NEW MEXICO
WATER RESOURCES
RESEARCH INSTITUTE

COMMUNITY CONVERSATIONS FOR THE NM 50-YEAR WATER PLAN: MANAGING WATER FOR FUTURE RESILIENCE

New Mexico Water Resources Research Institute

Miscellaneous Report No. 34

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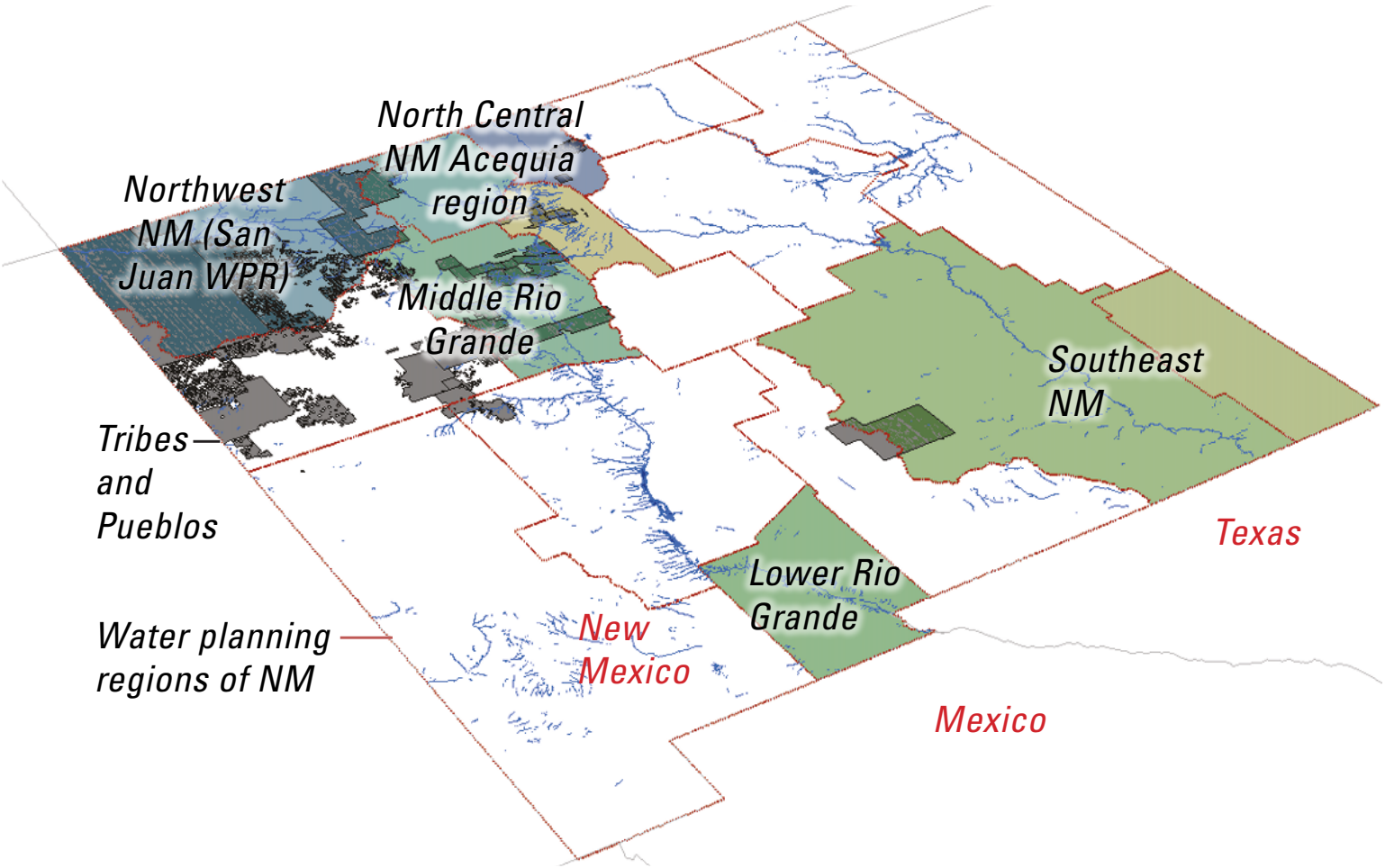

Figure 1. Community conversations on regional water dynamics and stakeholder visions for a resilient future occurred in these regions and communities.

Recommended citation: Maxwell, C.M., M. Sheely, L. Conrad, K. Perez, A. Hanson, S. Langarudi, A.G. Fernald. 2022. *Community Conversations for the NM 50-Year Water Plan: Managing Water for Future Resilience*. New Mexico Water Resources Research Institute. Miscellaneous Report No. 34

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1. EXECUTIVE SUMMARY

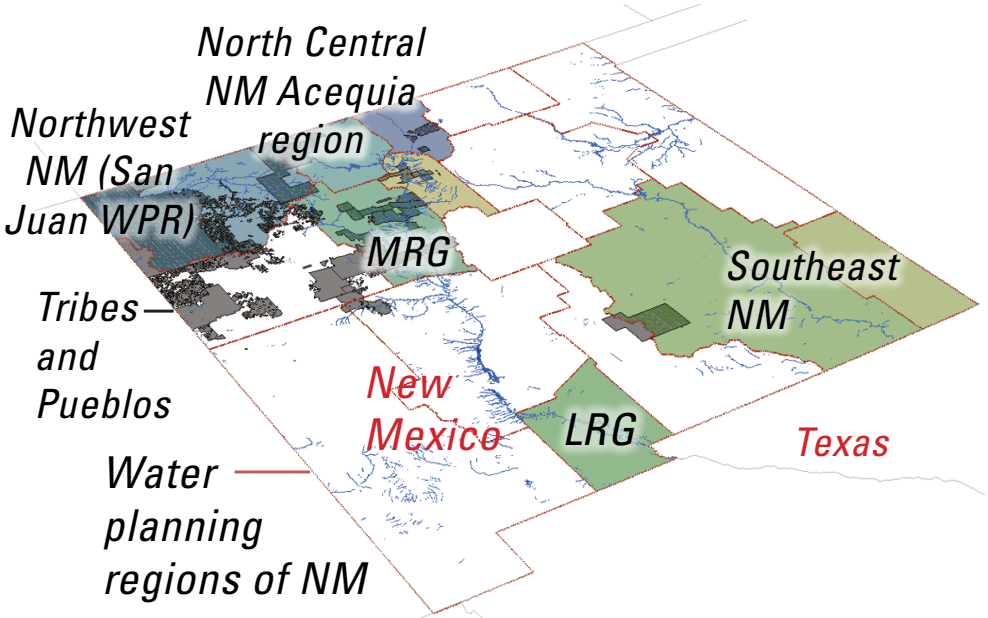


Figure 1 (as appears on p. 2). Community conversations on regional water dynamics and stakeholder visions for a resilient future occurred in these regions and communities.

This report contributes to the Interstate Stream Commission's beginning of development of a 50-year water plan by identifying critical elements of a long-term planning framework and beginning an endeavor to provide perspectives from different regions and communities around the state (***Figure 1***) of what is valued, issues faced and desired strategies to address those issues, and visions for the future. As said by Don Bustos at workshop:

> This is totally about community engagement. I think for it to be successful and to be embraced for future people and generations, it has to come from the people that are in those regions and it has to be homegrown so that people own it. And we really want to save our watersheds. So to me, it's about the community engagement piece, about the research and blending traditional culture and knowledge with all the appropriate activities that are occurring.

STAKEHOLDER PERSPECTIVES

Tribes and Pueblos

VISIONS

- Protecting the health of water resources for communities, cultural traditions, and wildlife
- Stewardship of resources for future generations
- Wet water and infrastructure to provide water for families and restore lush, irrigated fields

ISSUES

- Water quality compromised by wildfires, sediment, and mining
- Extreme water shortages, increasing temperature
- Water rights adjudications are time consuming
- Lack of funding to address aging infrastructure, unsure of infrastrucuture modernization choices

STRATEGIES

- Choose drought tolerant crops, dryland farming, rainwater catchment, and lessons from elders
- Integrated regional planning within each watershed that incorporates community collaboration and open conversations
- Include tribes in developing and communicating risk assessments

Southeast NM region

VISIONS

- Use alternative water resources to slow decline of groundwater resources
- Implement conservation programs that are more reactive to drier and wetter periods, rather than taking farmland out of production permanently

ISSUES

- Very little use of produced and brackish water resources among oil and gas producers
- Surface water shortages increase chance of priority call from downstream senior waters rights
- State lacks enforcement/compliance resources

Executive summary, cont.

STRATEGIES

- Fund local groundwater management districts to manage groundwater resources
- Withdraw water from production during scarcity and return during times of plenty
- Model the costs of produced water reuse versus disposal to illustrate the higher costs of disposal

Northwest NM region

VISIONS

- Use available surface water to continue farming, as well as serve the needs of other water users
- Increase adaptability to diminishing surface water

ISSUES

- Declining snowmelt runoff
- Erosion of bare soil negatively impacts soil health and surface water quality

STRATEGIES

- Restoration projects to slow and spread runoff across the landscape
- Modify infrastructure to capture stormwater
- Education/outreach that promotes water sharing

DSWB MODEL RESULTS

a) Southeast NM, Lea and Eddy Counties

- There is considerably less surface water evaporation from reservoirs located in the Rio Chama WPR than there is from reservoirs located in the Socorro-Sierra WPR. This is largely due to the cooler temperatures that are characteristic of the northern regions of the state.
- Until about 2016, the combined evaporative losses from Elephant Butte and Caballo reservoirs exceeded the total consumptive use for all NM OSE water use categories in Bernalillo County, the most populated county in NM.

b) Lea Counties (part of Southeast NM)

- In Lea County, groundwater storage has been steadily declining
- Most groundwater available in Lea County is fossil groundwater from aquifers that receive little to no recharge from the surface

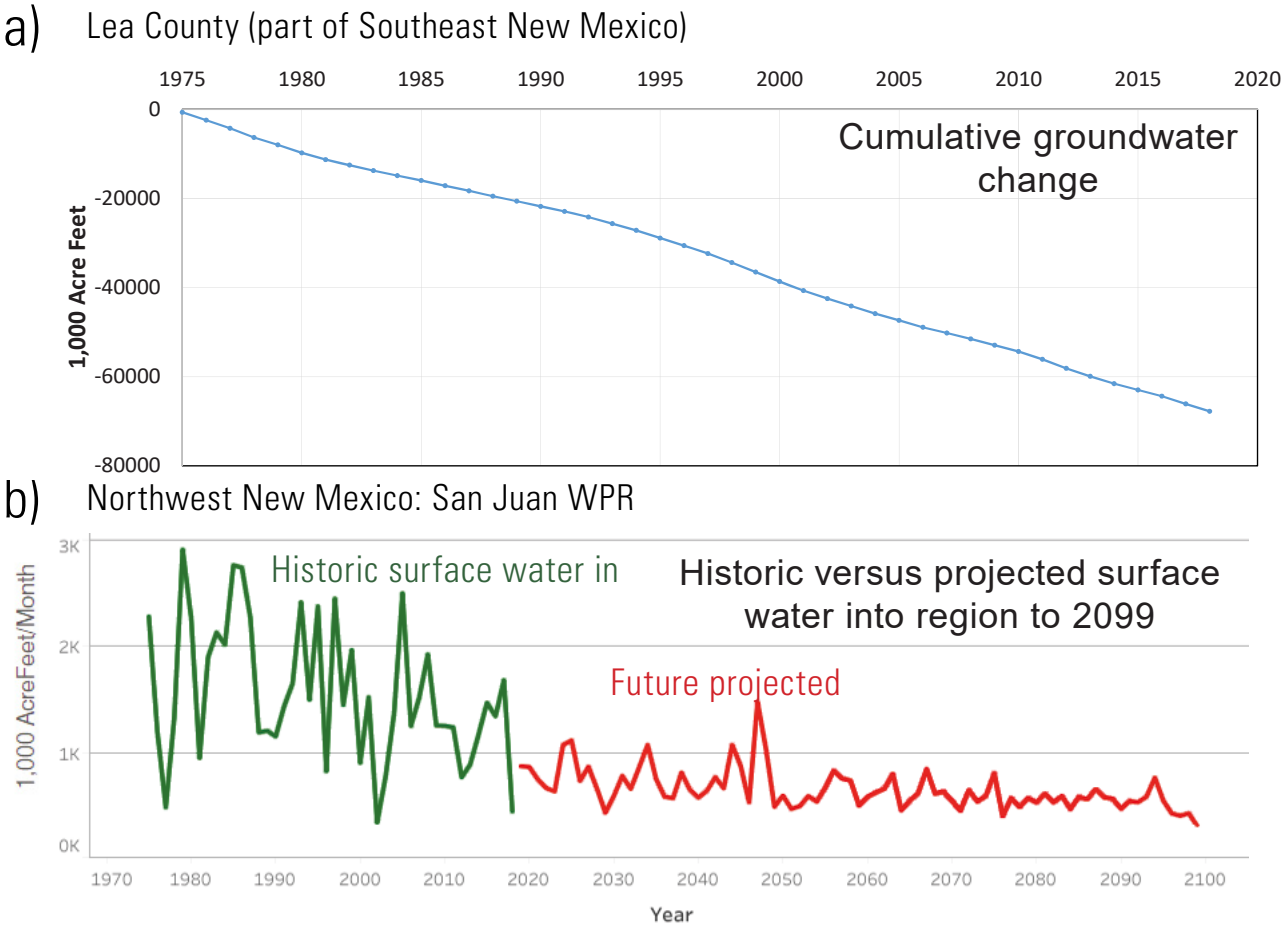


Figure 2. Regional Dynamic Statewide Water Budget (DSWB) model results for selected reservoirs, Southeast New Mexico and Northwest New Mexico

Executive summary, cont.

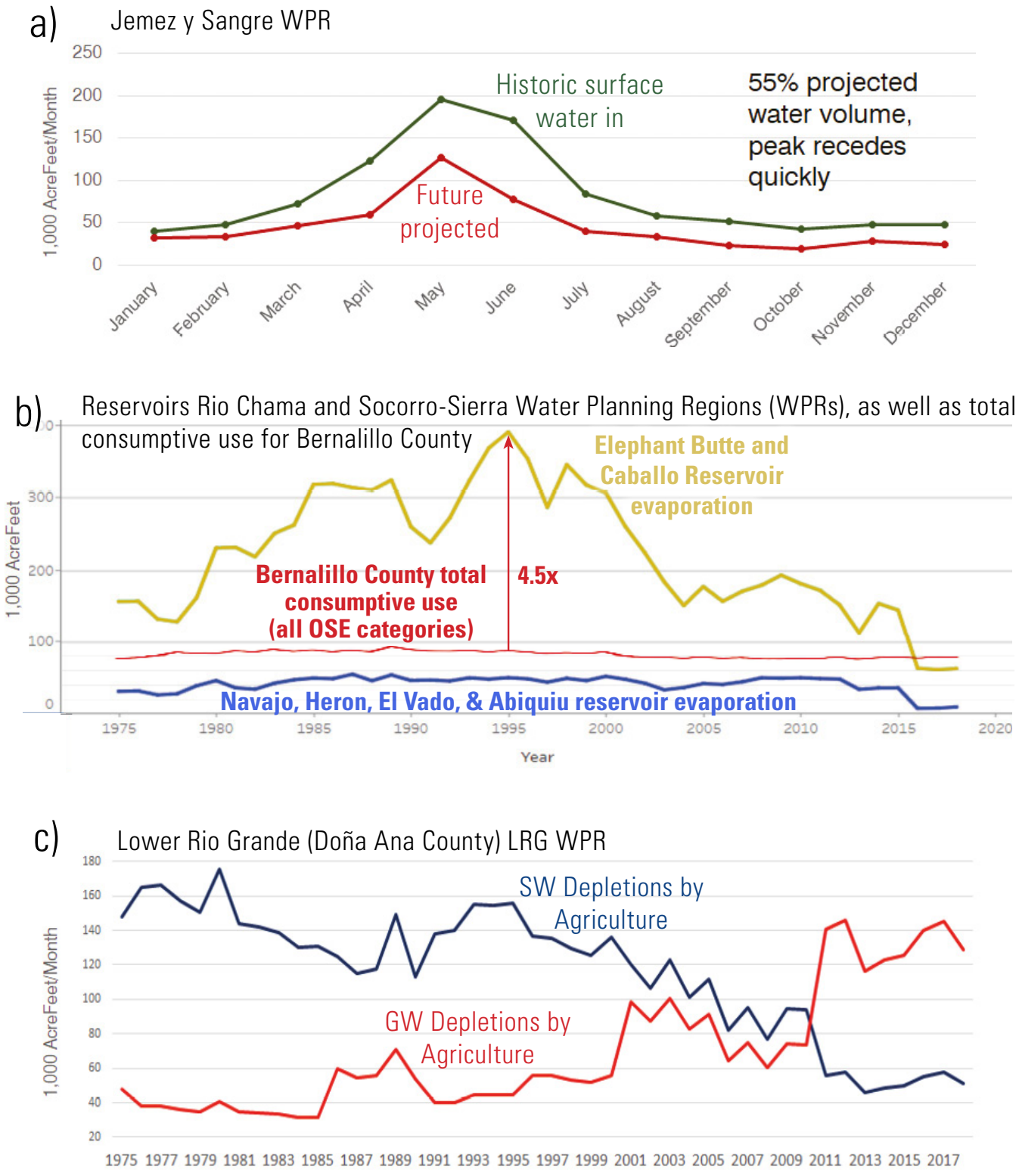


Figure 3. Regional Dynamic Statewide Water Budget (DSWB) model results for Rio Grande corridor basins.

Executive summary, cont.

DSWB MODEL RESULTS

***Figure 3* a) Jemez y Sangre WPR**

- Earlier and shorter peaks
- Overall less surface water quantity on average (findings also show significantly less in current period than previous wet years)
- With less surface water, there will be less groundwater recharge
- Stakeholders share that they are experiencing these changes

***Figure 3* b) Reservoirs Rio Chama and Socorro-Sierra Water Planning Regions (WPRs), as well as total consumptive use for Bernalillo County (part of Middle Rio Grande (MRG) WPR)**

- There is considerably less surface water evaporation from reservoirs located in the Rio Chama WPR than there is from reservoirs located in the Socorro-Sierra WPR. This is largely due to the cooler temperatures that are characteristic of the northern regions of the state.
- Until about 2016, the combined evaporative losses from Elephant Butte and Caballo reservoirs exceeded the total consumptive use for all NM OSE water use categories in Bernalillo County,

***Figure 3* c) Lower Rio Grande (LRG) WPR**

- As surface water (SW) availability declines, groundwater (GW) pumping increases to meet the demand
- Exemplifies dynamics of increasing reliance on GW globally
- Higher temperatures will increase evaporation and evapotranspiration (ET) rates, which will increase SW and GW demand

STAKEHOLDER PERSPECTIVES

North Central NM Acequia region

VISIONS

- Maintaining the tradition of water sharing, community involvement, and deep connection between history and future generations
- Building and maintaining economically viable agricultural communities with more young farmers

ISSUES

- Poor watershed health
- Extreme climatic variability, surface water shortages, lack of storage capacity, difficulty sharing water
- Loss of water rights
- Increased development is taking land and water away from agriculture

STRATEGIES

- Restoring watersheds for intact ecosystems
- Increase infiltration and natural water storage in the landscape
- Invest in the youth through more education and outreach

Middle Rio Grande region

VISIONS

- Working with the water budget we have towards a scaled down river with key functions to keep it alive
- Equitably sharing the resources of the community
- Thinking forward and across agencies, across communities, to make all of our plans happen

ISSUES

- Limited surface water in the future and declining acquifers
- Decreased farming will diminish river and environmental flows
- Implications of water use with new marijuana growing

STRATEGIES

- More implementation of aquifer storage/recovery and monsoonal flow capture programs
- More inclusion of the agricultural community in water discussions
- Ensuring water quality to also ensure water quantity

Lower Rio Grande region

VISIONS

- Economic and community resilience integrated with ecological resilience
- Build healthy watersheds to reduce sediment transport and retain flood flows with vegetation/aquifer recharge
- Address challenges of climate change by rethinking infrastructure
- Build networking and working groups to achieve regional goals

ISSUES

- Poor watershed health
- Downstream flooding and sediment transport
- Aquifer depletion

STRATEGIES

- Expand: aquifer recharge network, early warning and monitoring systems
- Watershed planning and restoration
- Develop watershed educational and technical support programs

2. INTRODUCTION

RESILIENCE CONVERSATIONS

With this project, NM WRRI sought to both 1) collaboratively develop understandings of regional water dynamics through preliminary visualizations from the DSWB and 2) distill clues for water resilience that could inform the NM ISC 50-Year Water Plan and serve as a launch pad to developing regional working groups, pilot projects, and regional offshoot modeling tools to evaluate the implementation of stakeholder-driven strategies.

Between October 2021 and March 2022, NM WRRI conducted a total of 12 focus groups, interviews, and workshops in order to collect local knowledge about visions for the future, goals, vulnerabilities, support needs, and interest in changing and expanding decision-making.

Each focus group, interview, and workshop included an introductory presentation given by an NM WRRI facilitator. This presentation shared preliminary visualizations from the DSWB that highlighted particularly salient regional water dynamics for that given region. In order to stimulate ideas for possible strategies and pilot projects, a broad selection of watershed restoration practices, alternative agricultural watering approaches, and crop ideas were also presented. Participants were made aware of possible funding opportunities for restoration pilot projects, and that there could be the opportunity to form regional working groups to pursue funding sources. At this point, the facilitator opened discussion through the use of three questions:

What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

What would you say are the biggest issues and challenges that your organization faces each year? What solutions do you think would address these issues, or are worth trying? What barriers are there to instituting these solutions?

Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, and long-term goals?

The responses from these questions have been synthesized into the following portions of this report in the corresponding categories of "Values and Visions for the Future," "Issues, and "Strategies." Within each category, NM WRRI have sub-categorized participant contributions into the areas of "Environmental," "Sociocultural," "Governance," and "Land Use-Economics."

Additionally, on October 28th, during the 66th Annual New Mexico Water Conference,

Introduction cont.

NM WRRI hosted a set of moderated breakout sessions asking participants to share their thoughts in pressing water concerns, challenges to addressing those concerns, and suggestions for solutions.

FUTURE STEPS

This synthesis report will serve to inform the NM ISC 50-Year Water Plan.
NM WRRI will also continue to work with regional participants to co-produce potential alternative management and policy scenarios and, in the LRG model, test the scenarios in model experiments to assess their effects and ability to achieve stakeholder visions for the future. NM WRRI will form regional working groups to pursue funding sources for additional offshoot modeling efforts and implement pilot projects based on alternative water management scenarios.

3. BACKGROUND

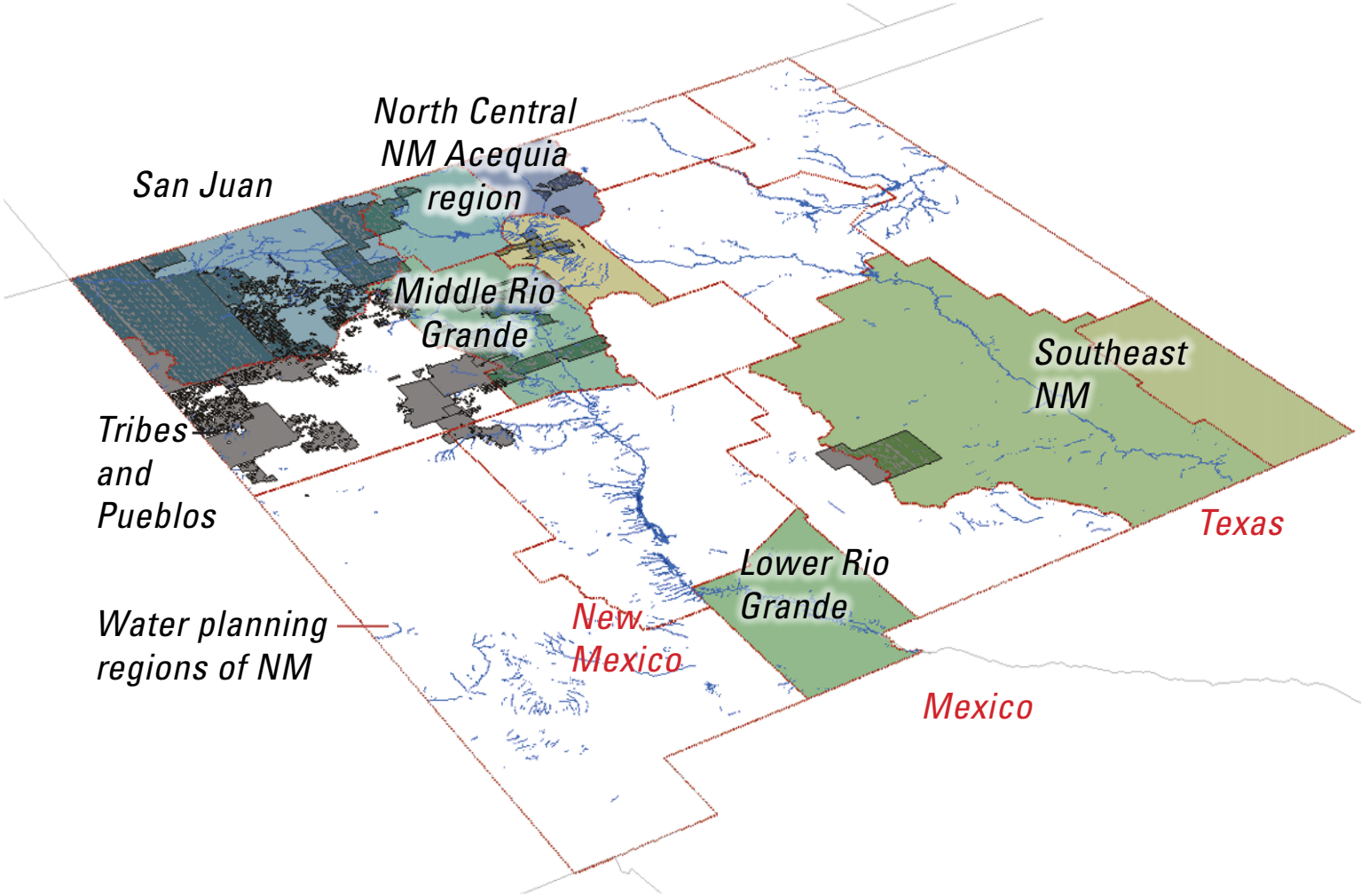


Figure 1 (as appears on p. 2). Community conversations on regional water dynamics and stakeholder visions for a resilient future occurred in these regions and communities.

3.1 NM WRRI's Water and Community Resilience Planning Approach

Looking far into the future, into the futures of the children and grandchildren of today, provides a perspective to assess what is valued, what might be possible, and the opportunity to compare the long-term effects of potential actions of today. This report contributes to the Interstate Stream Commission's beginning of development of a 50-year water plan by identifying critical elements of a long-term planning framework and beginning an endeavor to provide perspectives from different regions and communities around the state (***Figure 1***) of what is valued, issues faced and desired strategies to address those issues, and visions for the future.

Water issues for New Mexico are urgent, studies have shown that the American Southwest has been experiencing a mega-drought in the last two decades (Williams et al., 2022). Over the next decades and in the latter half of the 21st century, water stress and competition are projected to increase substantially (Dettinger et al., 2015), with more severe droughts (Cook et al., 2015), less snowpack and spring runoff (Fyfe et al., 2017), and increased flooding from higher intensity storm events (Loisel et al., 2017). The Leap Ahead Analysis from this effort synthesizes the predicted effects for New Mexico (NMBGMR, 2022).

The largest amount of knowledge important for water resilience for New Mexico's arid and semi-arid regions is held by stakeholders and community members, with far less knowledge in our documented data (***Figure 4***) (Forrester, 1980). Clues of the pathways to resilience come from rich and long water management traditions. The twenty-three Native American Tribes and Pueblos that are currently in New Mexico have ancestors that introduced agriculture an estimated 3,000 years ago (Wills, 1989). Evidence has been documented of water storage strategies that indicate important approaches for today, for example networks of ponds, terraces, and stone cisterns to capture flood flows found at Gran Quivira National Monument (Toulouse, 1945). Close to 700 acequias, a system of mutually managed irrigation channels, further developed the agricultural infrastructure over 400

Planning Approach, cont.

years ago, and continue today to protect traditional farming techniques (Arellano, 2014; NMAA, 2019). Acequia governance is structured based on water sharing, as opposed to the "first in time, first in right" prior appropriation structure common in the Southwest, which was established by the mining claim system (The Utton Transboundary Resources Center, 2015). These fundamentally different approaches to water governance and the rich and long history provides a depth of traditional practices and knowledge that can inform modern approaches that result in resilient systems.

The team planning process for this project to date and in our plans for next steps focuses upon collaboration to address stakeholder-defined actual problems, a central tenet of transdisciplinary methods (Mauser et al., 2013). The goal is to identify possible pathways to the stakeholders' visions of resilient futures. Resilience can be defined as the adaptive ability of a system to maintain functionality even when it is has been affected by a disturbance (Folke et al., 2010; Gallopín, 2006; Holling, 1973). Thus, the beginning point and *first component* shown in the diagram of the regional planning process for water and community resilience (***Figure 5***), is to identify stakeholders' visions for a resilient future based upon what they value about their region, the main issues that they face, and the strategies they would like to employ or test. To begin to provide these perspectives, this team conducted twelve events of focus groups, workshops, panels, and interviews with stakeholders from Tribes and Pueblos, five regions of New Mexico with a diversity of climatic and water conditions, and the NM WRRI statewide conference. These efforts also included collaboration with other programs that were supported by an NMSU College of Agricultural, Consumer, and Environmental Sciences (ACES) Competitive Operations Grant, the US DOI, Bureau of Reclamation Cooperative Watershed Management Program and Dona Ana Soil and Water Conservation District's Master Watershed Conservationist Program for the southern New Mexico region. Participants included stakeholders primarily engaged in land and water management such as farmers, acequia and irrigation system managers, and land managers.

The *second component* of the planning process recognizes that building a collaborative network that joins local, traditional, and scientific knowledge across a region is a prerequisite for developing mutual understandings of the regional dynamics, the *third component* (again, ***Figure 5***). Understanding regional dynamics requires a systems approach, a holistic framework from which to examine interrelated system components (Mobus and Kalton, 2015).

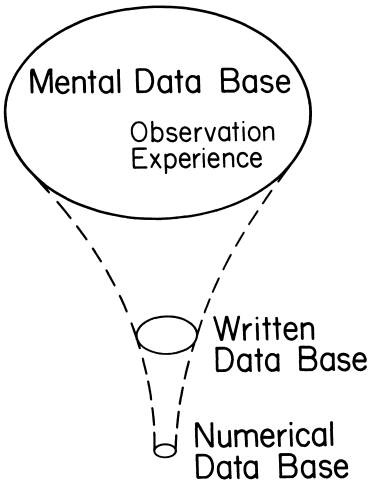


Figure 4. Stakeholder's mental data base holds far more information than either written or numerical data bases (from Forrester, 1980)

Planning Approach, cont.

The boundary of the region also has to match the scale of the problem and the anticipated management under study. For example, if groundwater level decline is an issue, the approach needs to encompass the region atop the aquifer, as well as account for the drivers of its conditions, such as the upstream dynamics (Poff et al., 2003). Not taking a systems approach to understand the regional dynamics in water management has frequently led to unintended consequences. Agriculture being often the largest water user has led governments globally to support increases in irrigation efficiency to "save" water to provide availability to other sectors, yet these strategies by definition increase the percentage of applied water consumed by crops. When decision-makers have not estimated the effects on the overall water budgets on basin-scales or taken into account the resulting water use of irrigators, substantial evidence shows the regional benefits are rarely delivered (Grafton et al., 2018; Pérez-Blanco et al., 2021).

To begin discussions to develop mutual understandings of the dynamics of water and its management and use on regional scales, we opened our community conversations with a short presentation on how water budgets can help stakeholders better understand regional dynamics, and examples of strategies to manage the water budget. Water budgets are the accounting of water movement and storage change into and out of a defined region according to the underlying hydrologic processes (***Figure 6***), and provide a foundation and sound science for effective water-resource and environmental planning and management (Healy et al., 2007; Poff et al., 2003; Winz et al., 2009). Models that include water budgets are also important to facilitate the testing of predictive scenarios ('what if') and identifying the optimum combination of strategies intended to address stakeholder challenges ('what is best'), which are critical to understand the relative efficacy and trade-offs of current and differing approaches (Singh, 2014).

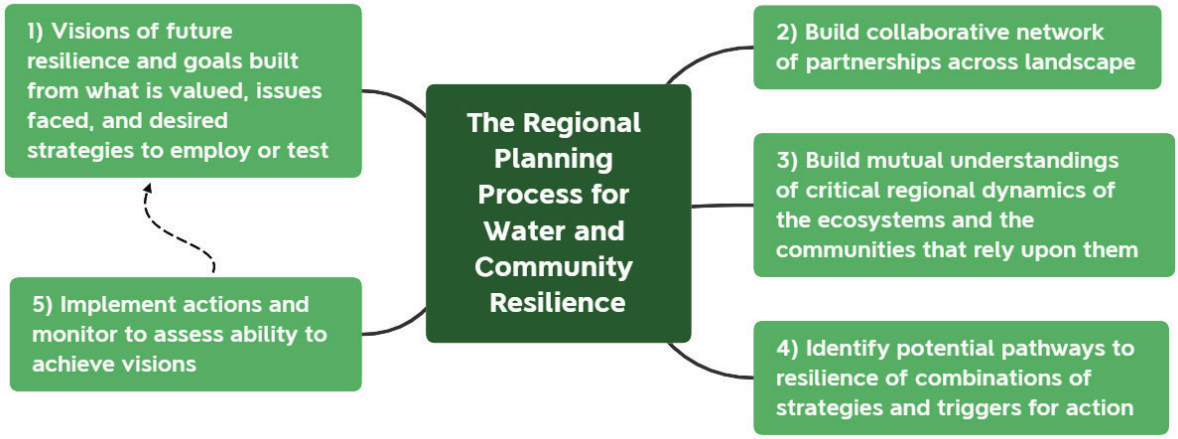


Figure 5. The regional planning process for water and community resilience that this team developed and guides our approach.

Planning Approach, cont.

Understanding the regional water budget dynamics of different management approaches requires local knowledge to define the cause-effect relationships and identify legitimate implementation strategies, and can rely on local knowledge when there is a lack of data to replace the traditional validation process with plausible outcome and vision building discussions (Ritzema et al., 2010). This highlights the need for integrating the social system, particularly water management and economic factors,

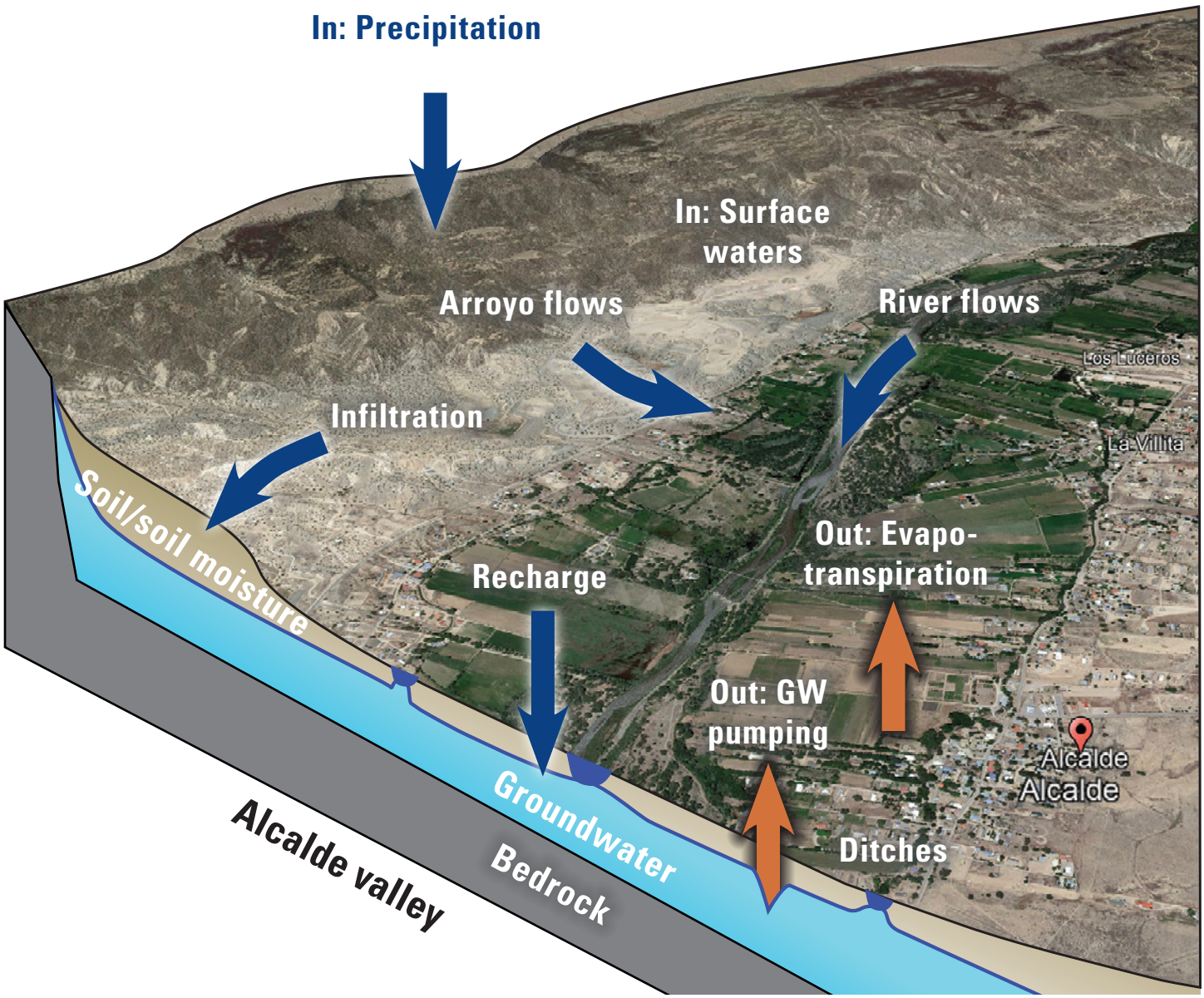


Figure 6. A water budget assessment to understand the regional dynamics, which accounts for water movement and storage change into and out of a defined region.

Planning Approach, cont.

with the water budget approach (Langarudi et al., 2019). Additionally, more research can be needed to build the evidence for effective strategies. In particular, water managers require more recharge estimates, expansion of field scale hydrology research to valley or regional scales (Gutiérrez-Jurado et al., 2017), and more testing or exploration of the feasibility and performance of all water saving technologies (Pérez-Blanco et al., 2021).

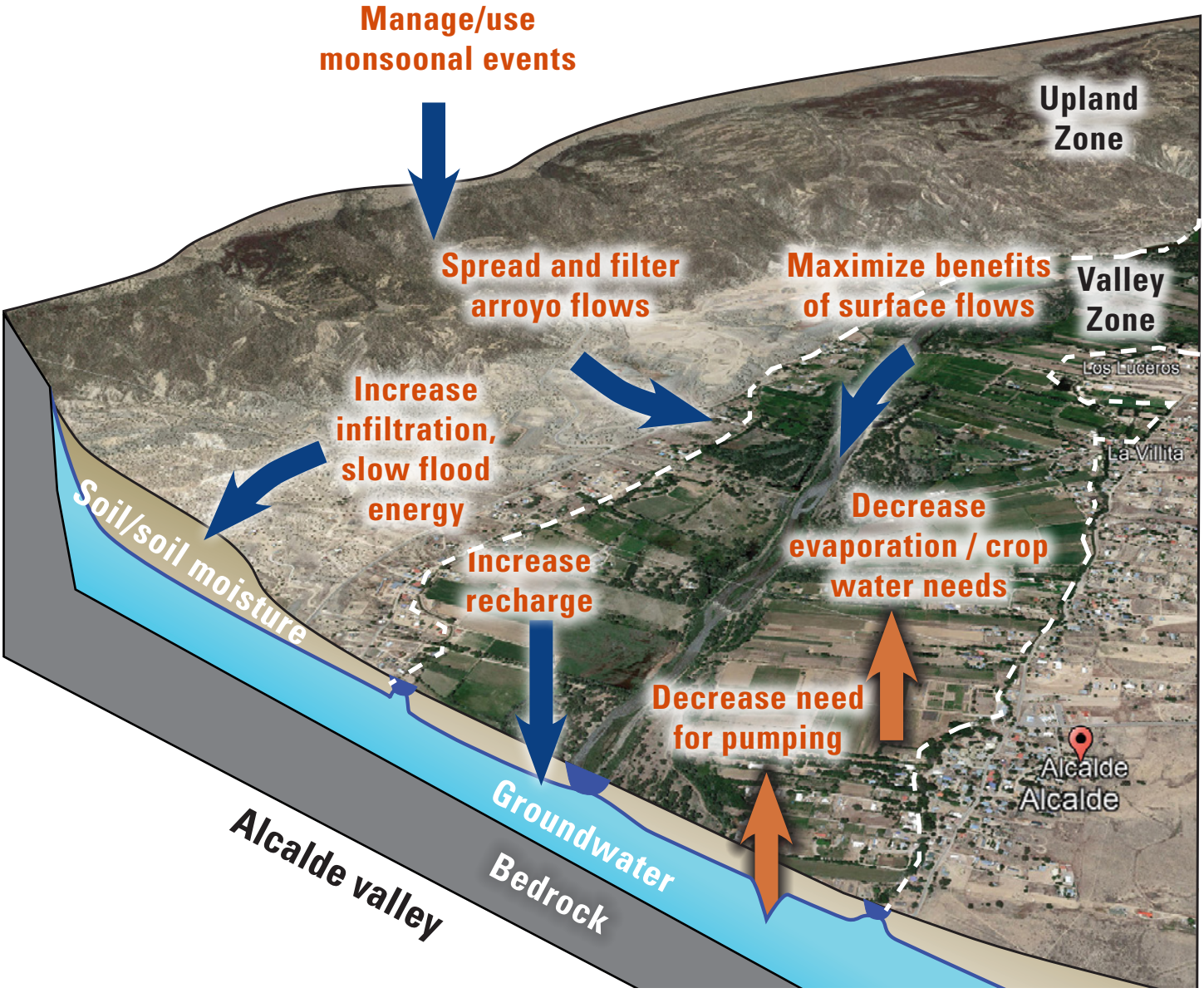


Figure 7. Predictive scenarios are critical to estimate effects of strategies to address projected climate challenges.

Planning Approach, cont.

To address significant regional water dynamics of the region under discussion, our team presented data typically inaccessible to individual water managers: regional historical and future projections. This data was estimated by the NM WRRI's Dynamic Statewide Water Budget (DSWB), which was developed by a statewide team to characterize historical behavior and predict future trends of New Mexico's water resources (Peterson et al., 2019). The DSWB utilizes extensive data inputs and runs on a monthly basis from 1975 to 2099, and is further described following in section 2.2. To support the idea of the cumulative effects of management on regions, we described that strategies can combined to target the functions of the hydrologic system to, in essence, "manage the water budget" (***Figure 7***). Managers can target maximizing the benefits from water supplies, both surface flows into a region and flood flows within the region's watershed. And on the flows out of a region, managers can target minimizing the depletions by decreasing evaporation and crop water needs and need for pumping. For example, significant water dynamics typically found in many regions of New Mexico are shown in ***Figure 8***. For much of the state, snowpack is the main surface water supply source. In the Northern New Mexico Rio Grande region,

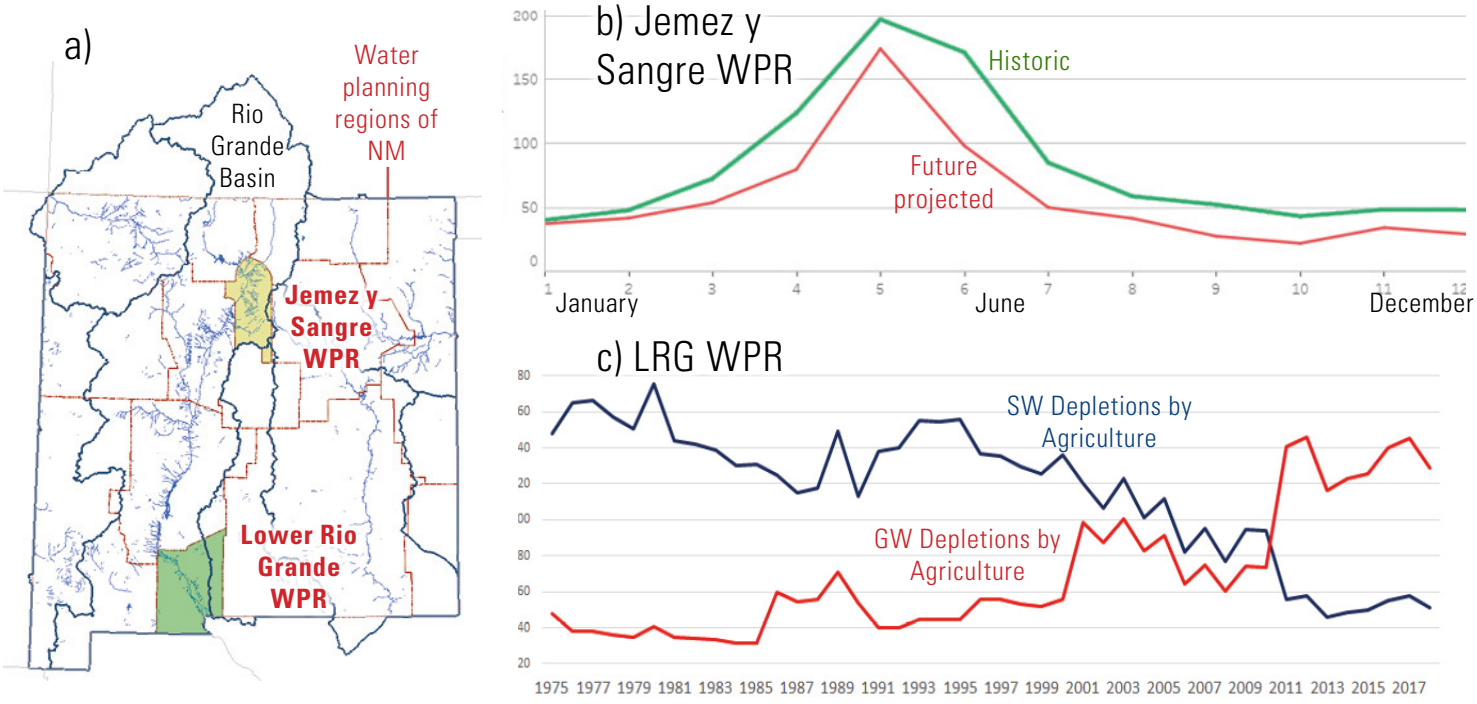


Figure 8. Dominant regional water dynamics common in NM as characterized by the DSWB. *a)* At the northern and southern ends of New Mexico, the Water Planning Regions (WPRs) of Jemez y Sangre and the Lower Rio Grande (LRG) are experiencing water dynamics as shown in b), and c). *b)* A major surface water dynamic for the WPR in the northern New Mexican Rio Grande basin as depicted by historic (1975-2017) vs. projected (2018-2099) average quantities of surface water into the region over a year show earlier and shorter peaks and significantly overall less surface water quantity on average

Planning Approach, cont.

snowpack is also the predominant storage system and warmer temperatures have resulted in earlier melts and spring runoff that has frequently come too early for farmers to be able to use it for their current crops, with projections for this dynamic to significantly increase as shown in ***Figure 8b***. Comparison of historic (1975-2017) versus projected (2018-2099) surface water average quantities over a year show earlier and shorter peaks and significantly overall less surface water quantity on average. Stakeholders share that they have already been experiencing these changes. The Southern New Mexico Rio Grande region is the most arid with surface water supplied from reservoirs that store surface flows predominantly from snowpack runoff, which has been highly variable in the last couple of decades. A direct response is the increase of reliance and pumping of groundwater (Langarudi et al., 2021) (***Figure 8c***), where the water table in many wells is declining (USGS, 2021).

The potential pathways to resilience, the *fourth component* of ***Figure 5*** and the strategies to manage the water budget in practice are generally required to be conceived and executed on the watershed scale. As the Southwest becomes increasingly arid (Prein et al. 2016), floods resulting from the high-intensity monsoonal storm events scour soils and vegetation, but also present opportunities if managers can harness the large quantities of water (Holmgren et al., 2006). Strategies to address the root of upland problems in the more arid regions towards the south and harness and filter flows as they get closer to the valleys are shown in ***Figure 9*** and ***Figure 10***. Loss of vegetation cover in these grazed rangelands due to livestock overgrazing and climate stressors began a history of severe erosion and gullying in the late 1800s, where the increase in bare ground allowed the floods to gain in energy, which then scoured top soils and vegetation (Abrahams et al., 1995; Antevs, 1952; Bryan, 1925). The current climate challenges fuel these same dynamics, resulting in the scouring floods that contribute excessive sediment into the rivers and ditches of the irrigation systems. The sediment from upland erosion is also a crisis for the entire existing surface water delivery system, both in quantity and quality. The sediment filling the channels reduces irrigation flow conveyance efficiencies - less volume remaining in the channels results in less water delivered (Depeweg and Méndez, 2002). The sediment also builds up in the major arroyo channels leading into the valley and increases the risk for catastrophic failures. As the arroyos fill, they have less capacity for flood waters, which increases flood energy that scours the levees that are protecting the farm fields. As flood waters have backed up and breached levees, major floods have occurred such as in Hatch, New Mexico in 2006. Engineered solutions, such as small reservoirs to function as sediment traps, have proven to exacerbate the problem by filling quickly (Sundborg and Rapp, 1986), and the required dredging maintenance to restore capacity (Sundborg and Rapp, 1986) typically begins new headcuts and increases upland erosion (John Gwynne, pers. comm., 2018). Downstream irrigation and flood managers see a critical need to collaborate with upstream range managers to address the root of the problem, the restoration and conservation management of the upland watersheds to prevent upland erosion before the sediment reaches the irrigated valley. A former irrigation district board president for the LRG region has said that "watershed restoration has become our

Planning Approach, cont.

farmers' most important priority," (Robert Faubion, pers. comm., 2017). Past research shows that management that spreads flood flows onto floodplains in river valleys, known as reconnecting floodplains, supports the key functions of increasing infiltration and reducing scouring flood energy, which in turn support the establishment of vegetated zones that buffer against disturbances (Opperman et al., 2010). Upland floodplains perform similar functions, however are distinct ecosystems from both the perennial river valleys, and the upland areas out of the flow (Acuña et al., 2017). The dryland ecological and management dynamics of the upper watersheds need to be further understood in order to predict and achieve the conditions and extent of revegetation that can mitigate high flow energy and filter flows to achieve the stakeholder's sustainability goals. Critically, previous work has found that vegetation can achieve buffering functions if the vegetation coverage and patch density are above minimum thresholds, and bare ground flowlenths below (Kéfi et al., 2007; Mayor et al., 2019; Puigdefábregas, 2005; Scheffer et al., 2009).

In the valleys themselves, example water demand reduction strategies are shown in ***Figure 10*** and ***Figure 11***. Water stress is one of the largest and most serious challenges to agricultural resilience for arid and semi-arid regions (Maleksaeidi and Karami, 2013) and will require the typically difficult task of agricultural water demand reduction to maintain or increase overall system resilience (Hess et al., 2016; MacDonald, 2010). Combined with water scarcities, over the next decades and in the latter half of the 21st century high-value crop viability and yields are projected to be affected by increased temperatures and climate extremes (Garfin et al., 2017). Significant declines in crop yields in the United States due to climate change have already been seen (Schlenker and Roberts, 2009). Higher temperatures in recent years have exceeded the upper threshold of an important identity crop for New Mexico—green chile from Hatch—interrupting the growth cycle and resulting in lower yields (Nierenberg, 2019). New Mexico is also a critical location to study agricultural resilience for small-scale farmers, where significant challenges have arisen from the last two decades of mega-drought (Williams et al., 2022) and the majority of farmers are small-scale. 98% of farmers are categorized by the USDA as small farmers and 78%, as very small farmers (USDA NASS, 2019). The reduction of surface water supplies in the state has already resulted in 26% less land being irrigated in 2017 than in 1997 (USDA NASS, 2019). Keeping water in agricultural valleys is critical for resilience of the landscape's natural resource base. Reductions in surface water irrigation decrease recharge to groundwater just when reliance on groundwater is increasing, impacting communities and riparian ecological integrity. Additionally, fallowed land can result in unintended consequences such as soil degradation, increased noxious weeds, and reduced farmer livelihoods (Summitt, 2011). The State's farmers also face significant socio-economic challenges, including widespread declining rural populations with economies lagging behind urban areas (Patrick and Blayney, 2022), an aging farmer population with over 40% over the age of 65, and the 78% of very small farms close to or not breaking even, generating less than $10,000 of net revenue annually (USDA NASS, 2019). Farmers in the State are concerned about the viability of the agricultural communities

Planning Approach, cont.

and are calling for innovative research and policies that support resilience.

Collaborators in workshops and working groups in the Northern New Mexico Rio Grande region emphasized that it is fundamental to target water resilience concurrently with agricultural resilience, that multiple strategies will be needed, and that estimates of the efficacy and the extent of the strategies needed are key. A central goal identified is the preservation of agricultural communities and a preliminary concept of critical strategies identified involved scenarios of optimizing the agricultural systems to the surface water supply, as shown in ***Figure 12***. Shown are the relationships and feedbacks between the strategies suggesting pathways towards resilience to be researched and tested in models that are proposed as the next steps in this planning effort. Important to the Acequia communities is food security, and the ability for each household to maintain their home gardens of healthy food. As less surface water is available, less recharge to groundwater will occur, and domestic wells become in danger of drying up. As well, the entire Acequia system constitutes the riparian system of the valleys, and groundwater levels dropping stresses the riparian galleries of trees and other vegetation which provide multifunctional benefits, such as creating a micro-climate that shades flows, inhibiting evaporation and supporting biodiversity. At one of the workshops, Don Bustos, of Santa Fe Farms and Greenhouses, summarizes key components of this potential approach.

> I heard that our growing season is going to change tremendously. And by 2050, which is only like 27 years from now we're going to be growing in the same conditions maybe as Phoenix, Arizona. How do we start to adapt our plants? What kind of food are we going to be growing in those conditions? What are the seasons going to look like? Our season's going to be more from maybe January to March, April, May, and then in the hot time, a couple of months, we don't grow anymore. We have to prepare for those types of changes, addressing the climate change needs. For the crop growing seasons, it is important to know how much water the specific crop is going to be used. So we get the right adequate amount of water to those crops. So, there's a lot of things that I think could be really important around our crop research and understanding what climate change is going to do to our growing and how we're going to be able to make enough money to pay the bills. What's the economic impact going to be in the future related to climate change in crop production? What are some of the high-value crops, I know there's a lot of success around lavender, but there's going to be a lot of other crops. Could we explore and develop a lot of herbs, or make remedies, or traditional kind of *remedios*. And then technology, we have to be able to incorporate technology.
>
> To be able to grow food with the least amount of water, but also be able to use that efficiently so that we can continue to recharge the aquifers, create these natural habitats for the pollinators and all the living creatures. So it's not only about the technology, which is there, but how do we blend that with needs for traditional and cultural appropriate types of growing methods? So we're trying to blend traditional knowledge with modern research and science

Planning Approach, cont.

Figure 9. Upland zone - example from southern NM

Planning Approach, cont.

Figure 10. Upland/Valley Interface zone - example from southern NM

Planning Approach, cont.

Figure 11. Upland zone - example from southern NM

Planning Approach, cont.

Figure 12. Upland/Valley Interface zone - example from southern NM

Planning Approach, cont.

and create a language and programs that benefit the whole community. The other piece I wanted to mention before I end is that this is totally about community engagement. I think for it to be successful and to be embraced for future people and generations, it has to come from the people that are in those regions and it has to be homegrown so that people own it. And we really want to save our watersheds. So to me, it's about the community engagement piece, about the research and blending traditional culture and knowledge with all the appropriate activities that are occurring.

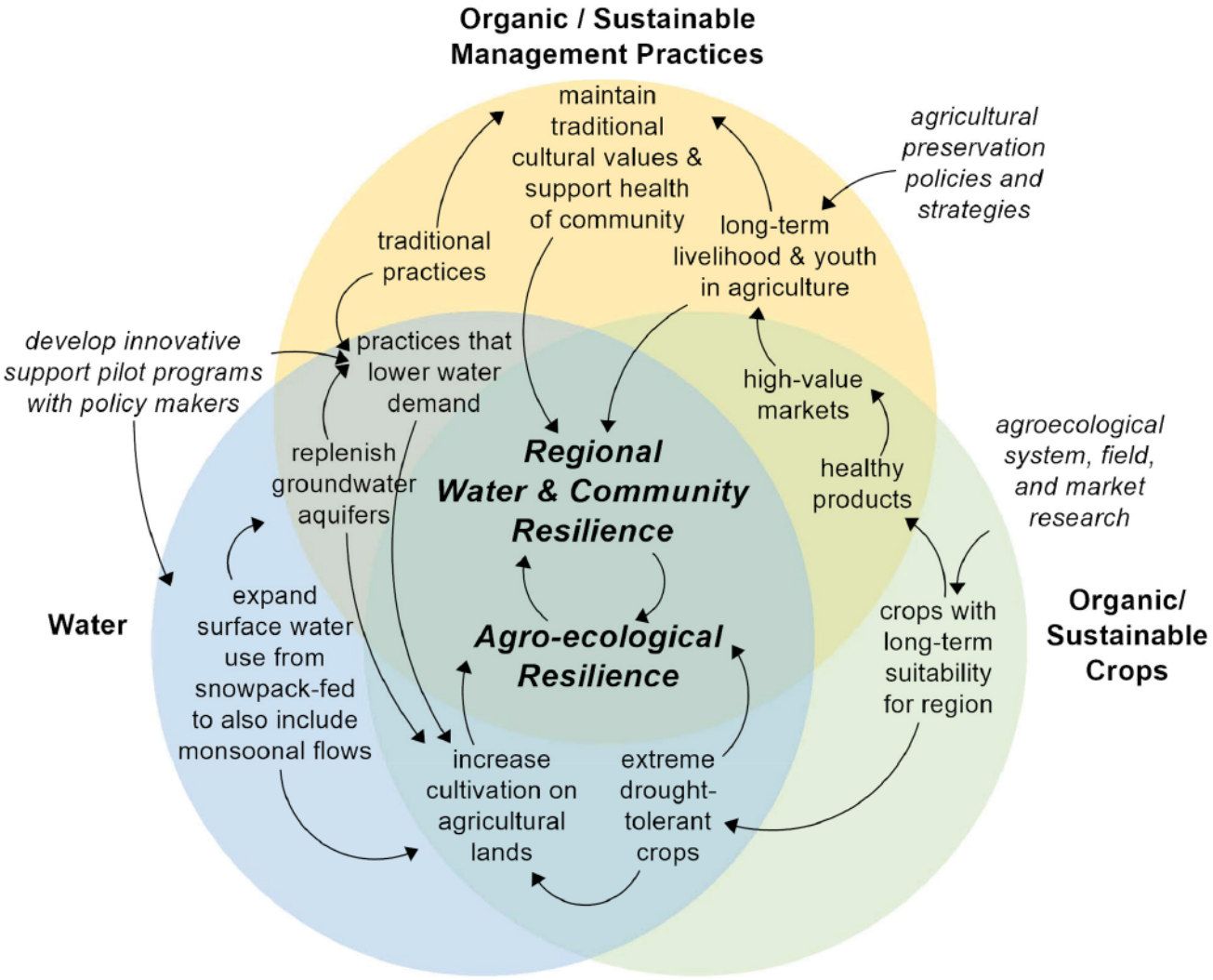


Figure 13. The stakeholder-proposed strategies in the sectors of water, crops, and management practices hypothesized to be needed for system resilience in some communities.
The diagram includes both the internal system strategies, as well as the external strategies required to support the system.

Planning Approach, cont.

NM WRRI's proposes that the next steps are to collaboratively develop working groups in regions throughout New Mexico to estimate the effects of strategies in integrated water and community resilience models, as described in section 2.3, and develop priority projects and monitor the effects to improve the models and help reduce uncertainties (component five of Figure 4). We propose to measure the ability of combinations of strategies to achieve the stakeholder's visions for a resilient future, back to the first component of Figure 4.

3.2 NM WRRI's Dynamic Statewide Water Budget Model (DSWB)

As climate change arises, water availability becomes an important concern in New Mexico. According to the NMBGMR, (2022), the primary observed and projected impacts of climate change in the state of New Mexico include warmer temperatures, decreased water supply (partly driven by thinner snowpacks and earlier spring melting), lower soil moisture levels, increased frequency and intensity of wildfires, and increased competition and demand for scarce resources. In this context, to help ensure a future sustainable water management, a complete understanding of the hydrologic cycle is required.

The water balance models are tools used by water users and managers to quantify the hydrological cycle. According to Healy, 2007, a water budget is an accounting of the rates of water movement and the change in water storage in all or parts of the atmosphere, land surface, and subsurface. A comprehensive water budget considers in its conceptual model the mutual connections and feedbacks between all these components. The New Mexico Dynamic Statewide Water Budget (NMDSWB) has been developed to provide reliable information of the spatial-temporal dynamics of the water budget for the State of New Mexico. The water balance is conceptualized through 16 fluxes of water moving between four stocks (***Figure 14***). The stocks quantify the water stored in four key components of the water cycle (Peterson et al, 2019):

- Land surface: this includes moisture stored in non-saturated soils or geologic formations, vegetation, or any other surface source that cannot be diverted for human use.
- Surface water: represents the total amount of water in rivers and other natural waterways at any time.
- Human storage and distribution stock: represents water at any given time residing in man-made storage impoundments or distribution systems such as public water supplies, irrigation canals, and reservoirs.
- Groundwater: this includes all water below the water table.

3.2 DSWB, cont.

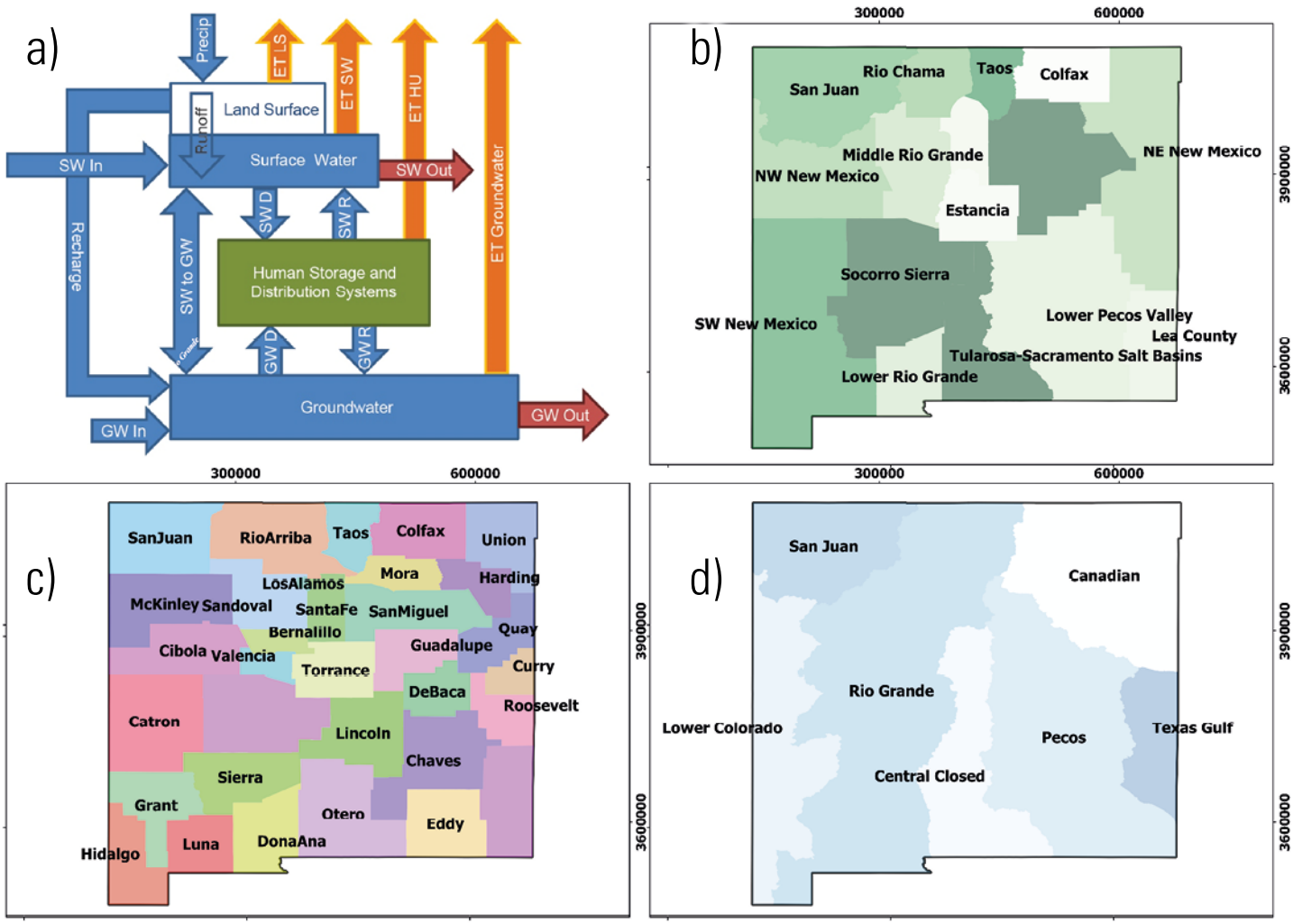


Figure 14. a) diagram of the conceptualization of the NM DSWB, b) WPR spatial scale, c) Counties spatial scale, d): River Basins spatial scale.

3.2 DSWB, cont.

The fluxes quantify how much water moves in or out between these stocks: precipitation, surface water in and out, surface water and groundwater diversions and returns, evapotranspiration (ET) from surface water, ET from groundwater, runoff, surface water-groundwater interactions, land surface ET, recharge, and groundwater flow.

The NM DSWB features four levels of mass balance accounting units: county, water planning region (WPR), river basin, and statewide (***Figure 14 b, c, and d***). These four scales define the spatial boundaries over which stocks and fluxes are aggregated. The mass balance accounting occurs monthly, meaning that no flux or change in storage information is available for periods of less than one month. The historical period of the mass balance analysis extends from 1975 to 2018, while the future scenario period of the model runs from 2019 through 2099.

In the future portion of the model, the drivers are the following: climate change impacts on supply and demand, population growth, municipal, and domestic per-capita use rates of water and agricultural acreage by crop type. Future temperature, precipitation, and streamflow estimates in the NMDSWB are derived from one of four separate General Circulation Model runs that span three different greenhouse gas (GHG) emissions climate change scenarios: low emissions (NCAR), moderate emissions (UKMO), high emissions (GFDL), high emissions (MPIM). Population growth can be altered from the baseline predicted population changes to determine the effects population growth has on municipal and domestic water use. The per-capita water use (i.e., depletion) rates can also be adjusted, an increased per-capita use rate will have a corresponding increase in per-capita withdrawals. Future agricultural acreage can be increased or decreased, thereby affecting irrigated agriculture depletion projections. These four future scenario options allow users to create unique future scenarios that can be compared to the historical water budget, showing how historical trends of water supply and use might change in the future.

As an example of future scenario period capabilities, three basic scenarios were run for the cumulative change in groundwater storage change in the whole state of New Mexico: a low-impact scenario (A), a baseline scenario (B), and a high impact scenario (C). Scenario A consists of a low GHG emissions climate option (NCAR), a low population growth rate, a decreased municipal and domestic per-capita use rate, and a decrease in agricultural land acreage. Scenario B was modeled with a moderate emissions climate option (UKMO), the standard population growth rate estimate, and the historically derived projections for municipal and domestic per-capita water use rates, and agricultural land acreage. Scenario C consists of a high emissions climate option (GFDL), a high population growth rate, an increased municipal and domestic per-capita use rate, and an increase in agricultural land acreage. These projections represent three potential future scenarios; however, the scenario options allow for many more scenarios to be modeled and compared.

In ***Figure 15,*** historical results and future scenarios are presented. For scenario A, the cumulative change is less than for scenario B, and this in turn is less than for the most critical scenario C. This example shows that changes in climatic conditions, population growth rate, per-capita use rates, and agricultural land area will alter future water budgets, as can be seen by looking at projected cumulative change in groundwater storage.

3.2 DSWB, cont.

Link to the DSWB online tool:

https://nmwrri.nmsu.edu/new-mexico-dynamic-statewide-water-budget-beta-version-3-0/

Link to the latest technical report (Peterson et al, 2019):

https://nmwrri.nmsu.edu/tr-380/

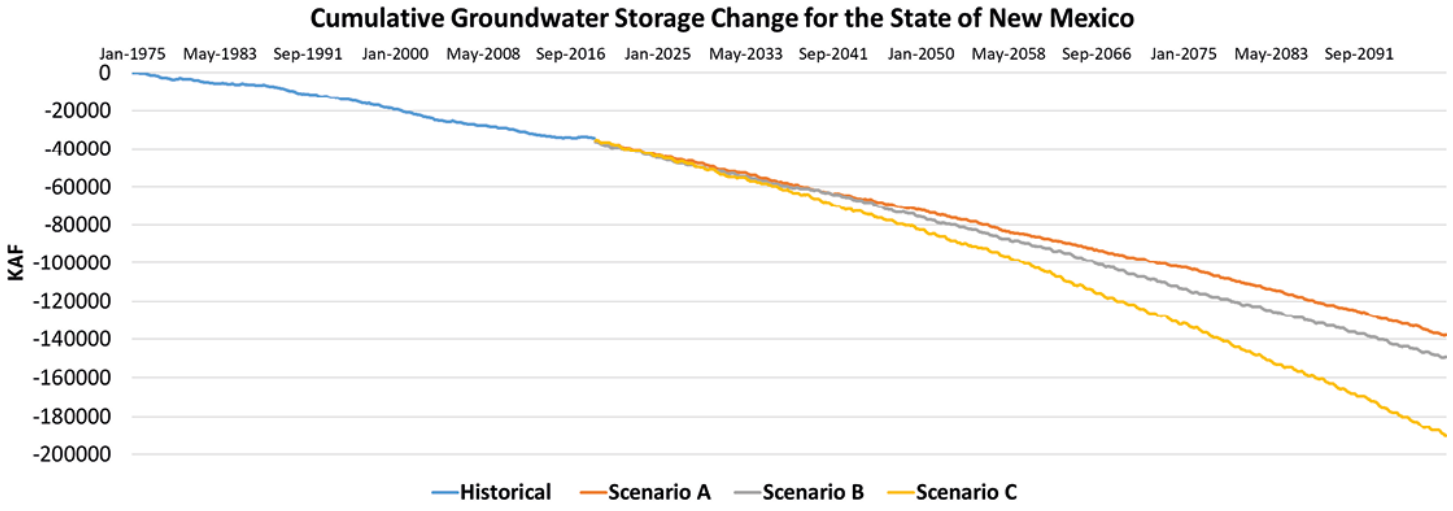


Figure 15. Cumulative groundwater storage change for the State of New Mexico: historical and future scenarios.

3.3 DSWB Water and Community (WC) Models

NM WRRI's DSWB model provides the synthesis of an extensive amount of the hydrologic data available on the statewide level, which provides a foundation and an opportunity for inputs into regional models integrated with other critical factors, such as socio-economic, that are customized to specific community questions and additional available data specific to the region (Langarudi et al., 2021). Our team has begun that process with a DSWB Water and Community (WC) model for the Lower Rio Grande (LRG) region (Langarudi et al., 2019; Langarudi et al., 2021; Maxwell et al., 2019). NM WRRI proposes to continue the water and community planning process supported by the development of the DSWB WC models in regions throughout the state.

The purpose of the DSWB WC models are to first collaborate with stakeholders to describe the interplay of dynamics that has led each region to their current state and then to identify socially acceptable paths to improved agricultural and water resilience. The DSWB WC model will act as the means to capture and reflect the understanding of the researchers, stakeholders that include water and land managers and water users, and policy-makers in the study regions. Our iterative engagement of stakeholders in developing the model, suggesting possible alternative scenarios for evaluation, and finally identifying which alternatives represent socially-acceptable pathways to sustainability follows the principles of participatory modeling (Jones et al., 2009; Palmer et al., 2013; van Eeten et al., 2002) For the purposes of these endeavors, a "sustainable pathway" is defined as a governance or resource management alternative that ensures availability and sustainable management of water for all, including water for humans and ecosystems (United Nations, 2016) and is acceptable or preferable to stakeholders. Stakeholders will be able to use the model's results to determine the tradeoffs of these different strategies on water availability and long-term livelihood of their communities and decide which work best for them. The model simulation will generate time series (trends) of outputs for all the

3.3 DSWB WC Models, cont.

indices, predicting dynamics to the end of the century.

While separate regarding feedback structure, the LRG DSWB WC model uses the NMDSWB model's outputs to drive the few variables outside of the system (exogenous) and define and calibrate the system relationships and behavior within the system (endogenous) (***Figure 16***). The model consists of seven modules: water, water use, agriculture production, non-agriculture production, population, labor, and wage. Stocks of groundwater and surface water interact with each other and with the rest of the model to generate the dynamic behavior of the social-hydrologic system. In particular, population and economic growth (both in agriculture and non-agriculture sector) not only determine water use, thus affecting the hydrology system, but also react to the dynamics of the water. In other words, strong feedback connections exist within and between the hydrology and socioeconomic modules of the model to govern its dynamic behavior. The model achieves minimal reliance on exogenous drivers, making it a novel tool for policy and scenario analysis. There are only 5 exogenous variables (surface water inflow, precipitation, irrigation precipitation, temperature, and workforce participation rate) in the model that drive 9 equations out of a total 97 (reliance factor=9.3%). The model is calibrated for southern New Mexico's Doña Ana County, also known as the Lower Rio Grande (LRG) water planning region of the NM Office of the State Engineer (OSE),

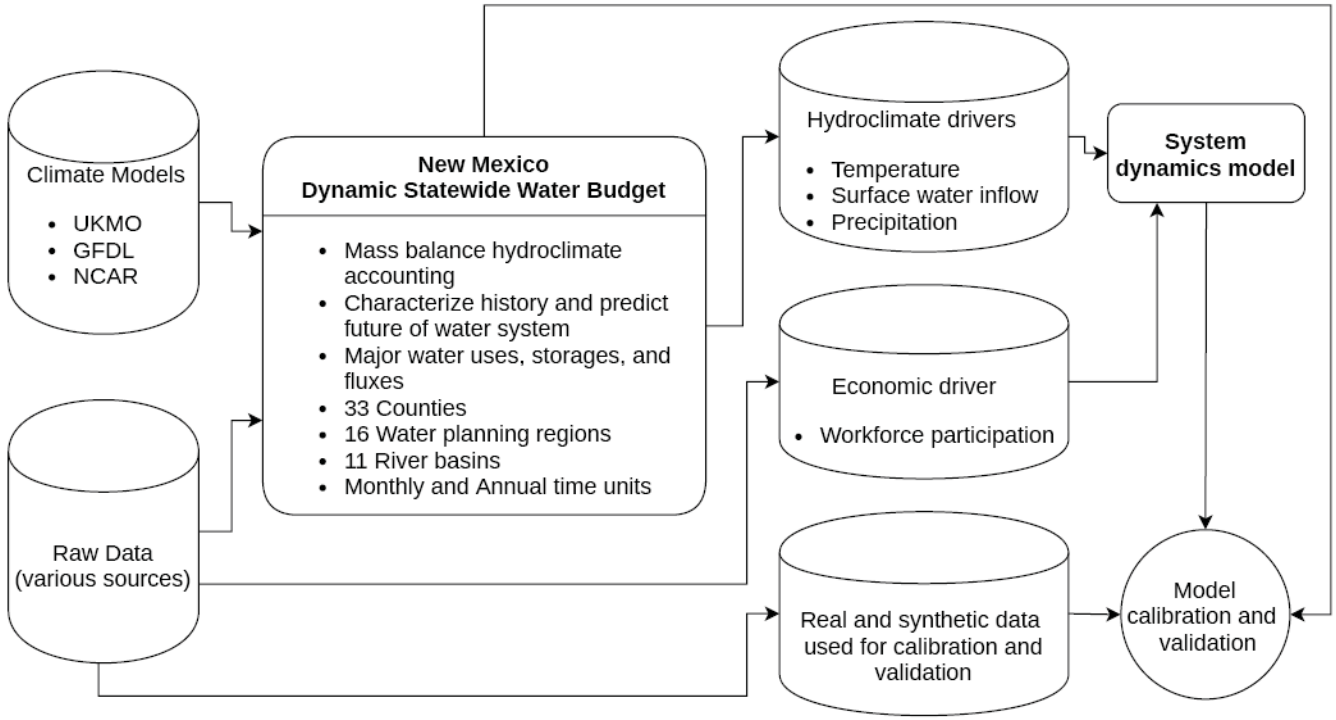


Figure 16. Schematic connection between the New Mexico Dynamics Statewide Water Budget (DSWB) (Peterson et al,, 2019) and the LRG DSWB integrated regional model (Langarudi et. al,, 2021).

3.3 DSWB WC Models, cont.

and also includes the Mesilla valley, and much of the Hatch valley. Simulation time ranges from 1969 to 2099. The model has been subject to the usual system dynamics confidence building tests. The test results suggest that the model cannot be rejected as an abstract characterization of the real system, at least for this particular region. The model can arguably serve as a generic structure for future social-hydrology modeling efforts as its fundamental structure consists of universal physical and behavioral rules.

The boundary of a model should be defined based on the goals that it is supposed to achieve. For any variable to be added to the model, we should ask whether or not it contributes to the model's goals. The primary goal of the model is to predict the dynamic behavior of key water use under different circumstances. Therefore, water use categories must be included as endogenous variables, i.e., they must be calculated within the model boundary. Significant drivers of water use include population, production, agriculture, navigation, and power generation (Simonović, 2012, p. 19), p. 19). Thus, these components should be inside the boundary as endogenous variables as well. The reason is that given enough reaction time, all these components respond to changes in a natural system. Note that navigation and power generation are excluded from the current model due to the absence of such sectors in our case study region. These important socioeconomic variables should normally be included in an endogenous social-hydrology analysis. Additionally, there are some exogenous variables within the model boundary, meaning that their dynamics do not depend on the state of other model variables. They stand alone and are predefined as independent scenarios. Hydroclimate exogenous variables that cannot be predicted endogenously by this finer scale, regional model are surface water inflow, temperature, precipitation, and irrigation precipitation. The only socioeconomic variable that remains exogenous is workforce participation for simplicity.

The Hatch and Mesilla Valley region, as is common for many agriculture-based communities in dryland regions, has been struggling to keep a balance between actual and sustainable use and thus is facing chronic water scarcity (Assouline et al., 2015; Chartzoulakis and Bertaki, 2015; Deng et al., 2006; Xue et al., 2017). The historical estimate and one potential future scenario of a measure of water scarcity for this region, generated by the LRG DSWB WC model, is shown in ***Figure 17***. The presented measure, which shows an example of the persisting nature of water scarcity, is a normalized 10 year moving average of the discrepancy between actual use and sustainable supply that would ensure that total outflow from the system stays equal to or lower than the total inflow, meaning that neither surface water deliveries to downstream users nor groundwater balance would be compromised.

We use a system dynamics (SD) approach to estimate the comparative effects of differing combinations of strategies on the ability to achieve both water and community resilience. Our modeling approach is stakeholder-driven in both project definition and focus (Winz et al., 2009), and a participatory assessment of resilience (Herrera and Kopainsky, 2020). We chose system dynamics as our main modeling approach because it facilitates understanding the feedback

3.3 DSWB WC Models, cont.

relationships of the factors that drive the behavior of a complex system, quantifying their magnitudes in simulations to assess potential alternative future scenarios (Fernald et al., 2012; Forrester, 1971; Forrester, 2007; Langarudi et al., 2019). It facilitates analysis that integrates factors from various disciplines, in this case we are integrating key hydrologic, social, agricultural, and ecological factors. Unlike traditional hydrologic models, it is capable of incorporating social and hydrologic feedbacks (Mirchi et al., 2012; Winz et al., 2009). Some hydrologists have recognized that social system feedbacks are essential for assessment of hydrologic systems (Fernald et al., 2012; Langarudi et al., 2019; Page et al., 2019; Tidwell et al., 2004), and hydrologists and other scientists in socio-environmental disciplines of socio-hydrology and hydro-sociology have taken up system dynamics approaches to understand the socio-natural system interactions, as "linear causal thinking cannot address complex challenges adequately" (Mirchi et al., 2012). Langarudi et al. (2019) show how the exclusion of social feedbacks from hydrology models could lead to the wrong policy outcomes, countering initial intentions of the decision-makers.

We use system science to identify the vulnerabilities of the regional water and community systems and which approaches can reduce the vulnerabilities (Brzezina et al., 2016). SD models allow us to determine if a system is resilient by assessing the behavior patterns of the critical system drivers and indicators over time.

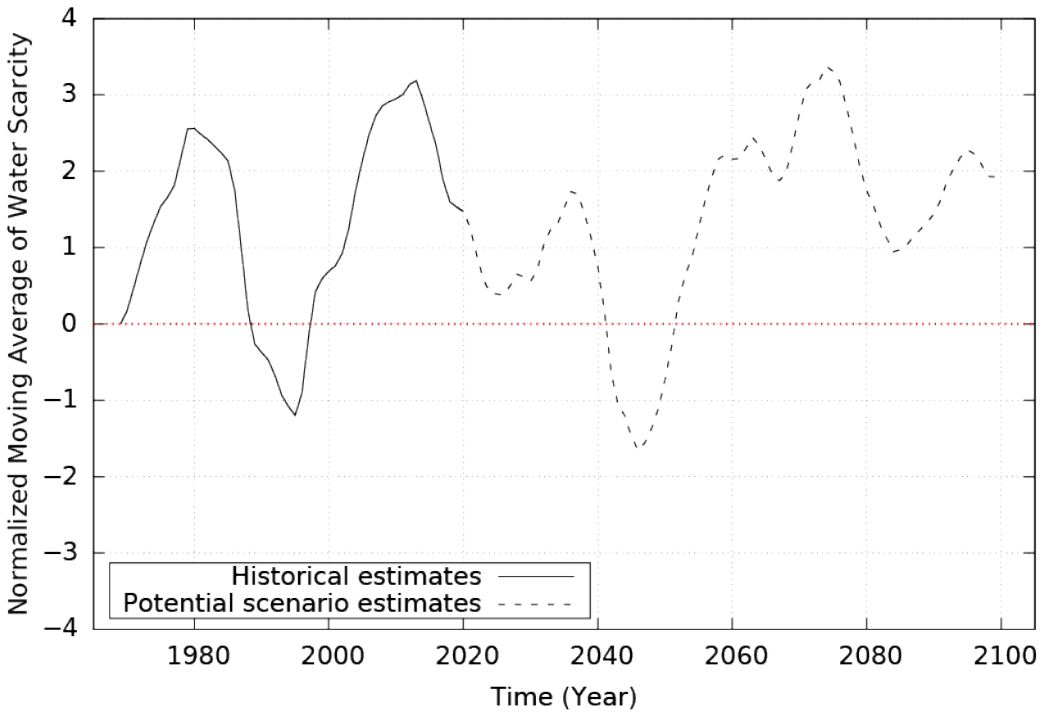


Figure 17. Potential magnitude of a preliminary estimate of water scarcity in the Hatch and Mesilla Valleys (Langarudi et al., 2021)

3.3 DSWB WC Models , cont.

Our objective is to determine which strategies can avoid exponential growth of negative indicators such as water scarcity or soil health depletion (***Figure 18a***, this figure adapted from (Kirkwood, 1998)), where the rate of growth or loss continues to increase to system collapse. A behavior that can indicate resilience is oscillation (***Figure 18d***), the quantity of the indicator fluctuates around some level, and an objective would be that the system is above targets for much of the time. Other system indicator behaviors can indicate resilience. Goal-seeking behavior (***Figure 18b***) is the most straight-forward, where an indicator starts either above or below a goal level and over time moves toward the goal, such as groundwater levels start in a depleted state and move towards being replenished. S-shaped growth (***Figure 18c***) indicates initial exponential growth or decline but is then followed by goal-seeking behavior which results in the leveling of the indicator.

The goal is to create better models by incorporating a more robust and accurate representation of decision-making processes by testing alternative formulations of information and utility perception (Langarudi and Bar-On, 2018). NM WRRI's DSWB Int Reg models represent innovative approaches that are critical for building social and institutional capacity. The analysis of socioeconomic feedbacks integrated into water research is crucial for achieving resilience in New Mexico communities.

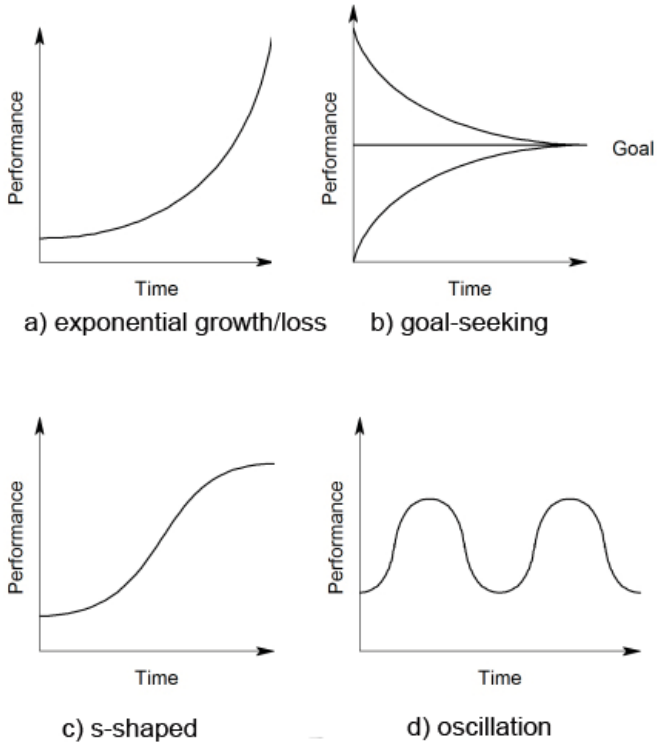
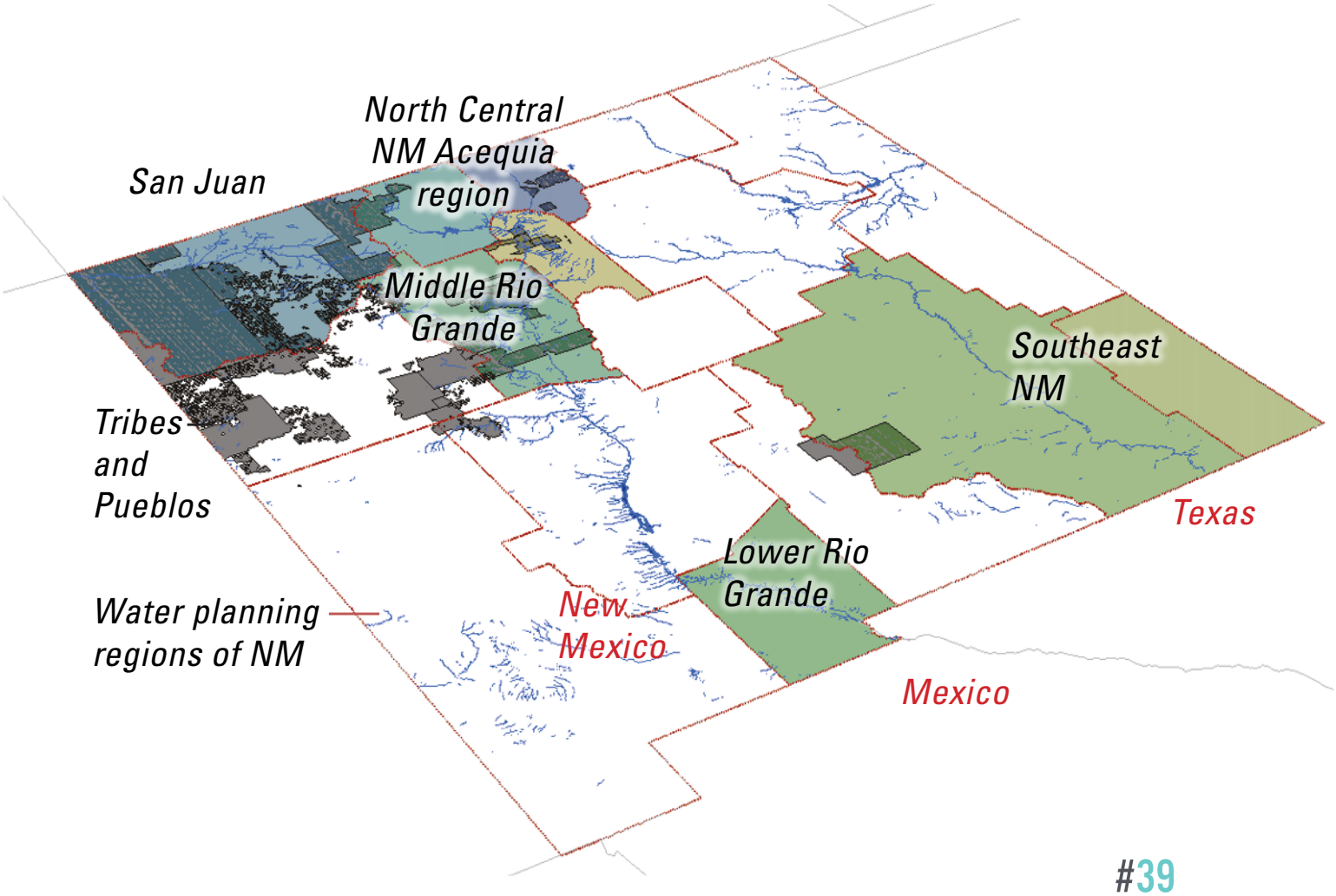


Figure 18. Characteristic patterns of system behavior

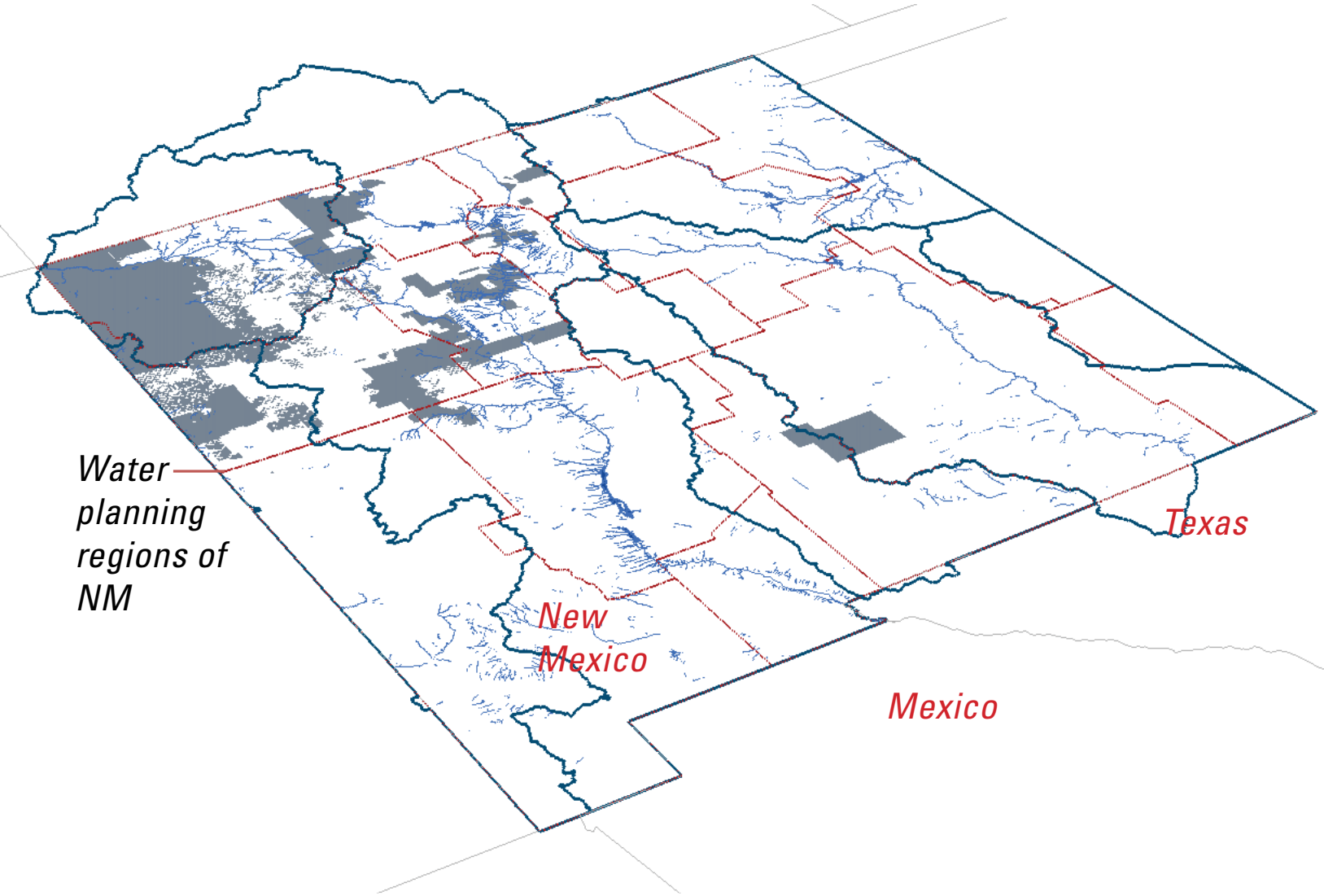
4. REGIONS AND COMMUNITIES

Regional Water Dynamics and Stakeholder Visions for a Resilient Future



4.1 Tribes and Pueblos

SUMMARY



Tribes and Pueblos Stakeholder Visions for a Resilient Future, SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- Protecting water and keeping contamination out of it.
- I'd love to see the Rio San Jose look like the Rio Chama, with spring flows coming through it.
- Santa Clara Creek to be able to sustain a cold-water fishery as well as the cultural traditions of Santa Clara Pueblo after being heavily impacted by fires in 2000 and 2011.

Sociocultural

- What is really valued is keeping water for this generation and generations to come.
- As our communities have been here for many centuries, if not thousands of years, one of our values is the stewardship of resources for future generations.
- We can't live without water. Therefore, there's a need for us to be able to have a permanent homeland by being able to have water for our Navajo communities.
- Isleta Pueblo will continue to plant and use whatever water is available to survive.

Governance

- Having wet water and not just paper water at the end of the water rights ajudication process,

Land Use - Economics

- Having an improved irrigation system, which can deliver water efficiently, to help farmers in the future.
- Ensure that the Rio Grande is able to remain the water source that forms the basis of Pueblo agricultural traditions.
- Just having wet water flowing through the Rio San Jose that is able to be diverted into fields.
- It would be great to see huge fields in the Laguna and Acoma areas, like those seen in pictures from the past
- It's always been the goal of mine in every area of Native country that we provide the infrastructure and the water that's needed to get to the families for their consumption.

ISSUES

Environmental

- Water quality impacts of forest fires and sediment transport
- The shortage of waters is quite evident nowadays and the drought that we're in.
- One obstacle we face is the jackpile uranium mine, which affects another one of our waterways, the Rio Paguate. Once it reaches that region it picks up the leftover contaminants, and then is brought downstream and left to deposit for quite a ways.
- Over the past couple of years without having the snow pack, there hasn't been runoff due to climate change and drought
- There are challenges associated with water quality and production challenges related to the geology beneath the surface.

Tribes and Pueblos,

SUMMARY, cont.

- At Santa Ana our feast day is in July, and it is so hot now. It's been hot for the last seven or eight years now. Last year, while we were dancing, people were falling just from the higher temperatures.

Sociocultural

- Our farming is very limited at this point because we're downstream with very little water anyway.
- There are many from the younger generation that are eager to continue farming traditions, but the water is just not there.
- Grappling with efficiencies and modernization of infrastructure versus traditional agricultural activities and ceremonies
- Water resources in the Pueblos have a real cultural component. Through our stories, there are ramifications that could happen if we don't have traditional crop-growing.
- Our community at Cochiti has been really impacted by the Bureau of Reclamation and by the Army Corps of Engineers when they built the dam, and other activities. We used to have a variety of fruit trees in our bosque area and in our farm fields that were just leveled.
- From Laguna's perspective, we're struggling with being at the bottom of a system, and for there to be continued flow in the river, which is also culturally very important.
- There is a need for consideration of historical cultural sites that are becoming unveiled at this time that were once under water.
- Building capacity within the Tribes, Pueblos, and Nations.. We have our own experts in our midst and we need to capitalize on that capacity that we have.

Governance

- The water rights adjudications that are constantly ongoing with Pueblos and Tribes take years and years to get settled.
- Because of the water that's due to Texas, that puts us in a bind because we really don't have water to be giving in the first place.
- Even though we were part of the Aamodt Settlement and the Pojoaque Basin Regional Water System is being built, it's going to take a lot of money and a lot of time to see the aquifer replenish, if it can.
- We could have all the water rights, have the adjudication, but if you don't have the wet water, those water rights don't mean anything.
- Because Navajo Nation has not only trust land, but also Indian allotments, fee lands, and then checkboard on the eastern side of our nation, it is more complicated to establish right-of-ways for development
- Although agencies such as Indian Health Service have been helping us to develop sanitation deficiencies that we've had within our nation, there are certain aspects of their program that have been underfunded basically since its inception.
- I think what's important to note from the water rights standpoint is that indigenous people have been here

Tribes and Pueblos,

SUMMARY, cont.

since time immemorial. However, the water policies that exist today did not recognize that. In 1922, when the foundational document for the law of the Colorado River was started, tribes were not included in that.

- The operation of reservoirs in both of these basins, impact the ability of Navajo Nation to access water and electricty by not taking tribal perspectives into full consideration.
- A lot of times the communities have to make concessions in order to get a settlement. That, in my mind, is a barrier because then in order to get that settlement, we have to conceed X, Y, and Z.

Land Use - Economics

- Irrigation water delivery inefficiencies due to having dirt canals, rather than concrete.
- Trying to find money to improve our irrigation system for farmers to be well-served
- Funding is scarce. Small EPA grants can't do it all.
- There's a lot of interest in the concepts of drip irrigation and things like that because it minimizes the amount of water used, but there hasn't been a sufficient communication on the idea that, if you go to drip irrigation, yes, you may get more crops, but you're going to reduce the recharge, and balancing that to allow water to stay in the river.
- We've been seeing depletion of backup irrigation wells.
- Within the Tesuque basin, we're at the middle, at the base of the mountain. So between us and the Forest Service, there was a lot of development.
- There's just concern that comes down to money: how do you refurbish or build and drill a new well and try to find another source of water?
- Aging infrastructure and a lack of funding for operations, maintainence, and repair
- Water quality challenges in places such as To'Hajiilee that degrade well mechanisms.
- More people are going to be putting in applications for growing cannabis, so that's going to be an added stressor of water depletion for everybody.

STRATEGIES

Environmental

- There is some discussion about doing away with concrete ditches, because we've lost part of those activities that are necessary to grow traditional crops
- The leadership at Cochiti last year made a decision not to dredge and not to mow around the ditches because one of the things that was brought up by leadership was ditches end up being areas where birds and bees can be sustained. I personally have seen the difference in the health of the corn when we have that biodiversity around our corn fields.
- For NAPI, we've started growing some crops that don't use a lot of water. We've started with krenza. It doesn't use a lot of water and has a deep root.

Tribes and Pueblos,

SUMMARY, cont.

- Repairing or doing maintenance to earthen dam structures, to be able to capture flows from flood events
- River restoration to fix certain areas within the Rio Tesuque reach on the Pueblo to mitigate erosion and sedimentation.
- Utilize alternative avenues of gaining water such as rainwater catchment

Sociocultural

- Holding farmers' meetings to help users upstream and downstream irrigate more efficiently to make the system work.
- Rivers flow beyond fence lines, so we also have to understand that interrelationship and interdependency with all of us.
- One of the things that is important is to be cognizant of the spectrum of all of our tribal communities; where they are and, in respect to tribal sovereignty, the leadership guiding the decisions and what they say.
- When we have these meetings, we need to have someone following up on those tangible outcomes to these issues that are being discussed.
- Integrated regional planning within each watershed is going to continue to be critical as we succeed in a water settlement.
- We as Native or Indigenous people already have that knowledge. How do we take that knowledge and implement it on the land without having to spend money or have someone else show us how to do it?
- I think we also need to take back those strategies that our elders had and apply them now in this timeframe in order to address this climate change
- Communicate climate change as something happening here and now, especially in regard to its impacts on Indigenous communities.
- Planners and climate scientists need to be more inclusive of tribal climate data, while also being mindful of indigenous data sovereignty

Governance

- Just being vocal I think is very important at the federal and state levels. We have to do that; there is power in numbers. We talk about that a lot at some of our meetings we have with our Pueblo environmental group. I think that's a very good strategy. We're able to talk about it and then share that information with our tribal leadership. That way they can pull together and make a difference.
- Getting involved: Jemez Pueblo and Laguna Pueblo joined together to file against the US EPA, and some of the changes that they're trying to do with the new administration.
- Following the Colorado River basin example, there needs to be more open conversation amongst stakeholders in the Rio Grande.
- Create philanthropic partnerships that establish funding opportunities within the Rio Grande basin.
- Slow down or stop development in New Mexico because there is not enough water for everybody
- To be more inclusive of tribes in developping and communicating risk assessments.

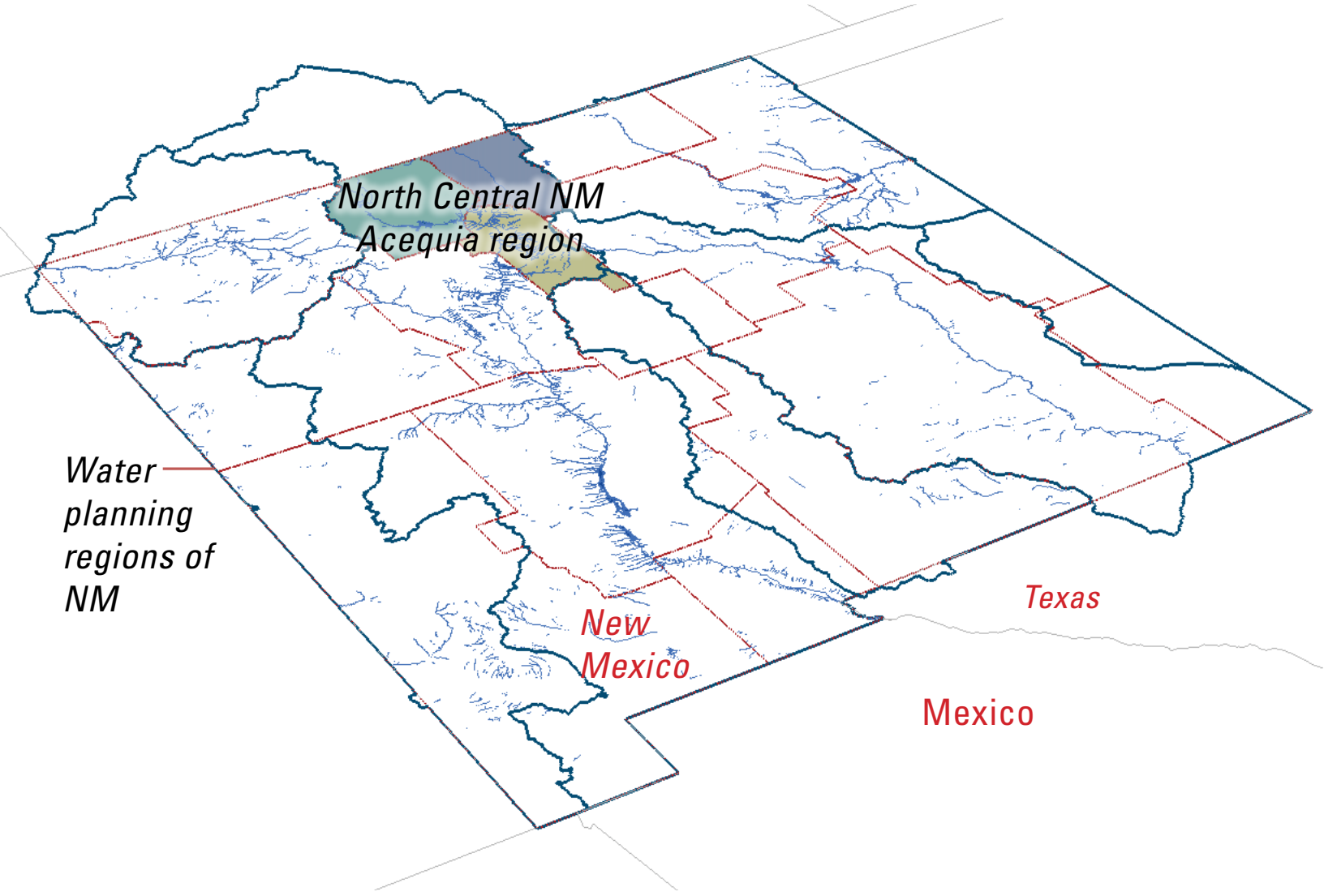
Tribes and Pueblos,
SUMMARY, cont.

Land Use - Economics

- Lining dirt irrigation ditches with concrete and/or using undergound piping to prevent water loss
- Putting into place infrastructure on not just a state, but also region-wide basis to protect the water that we do have.
- Implemeting a 24-hour irrigation schedule
- Implementing soil moisture probes and other tools to monitor watering needs
- Strengthen agricultural traditions within tribal communities by allocating plots for families to grow their needed crops, as well as large-scale operations at the tribal level to grow crops such as alfalfa
- Using traditional hardy seeds to do dryland farming along arroyos.

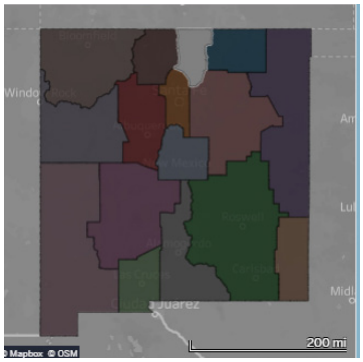
4.2 North Central NM Acequia

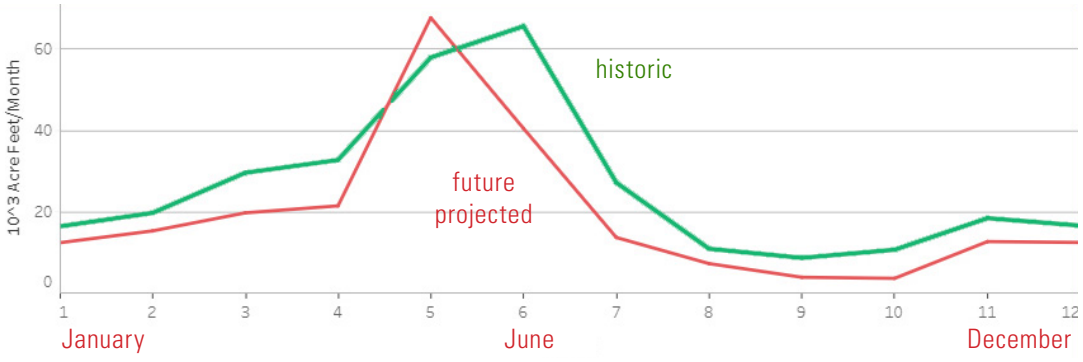
REGION SUMMARY



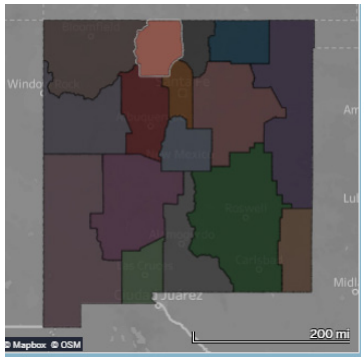
North Central NM Acequia Region
DSWB SHORT SUMMARY

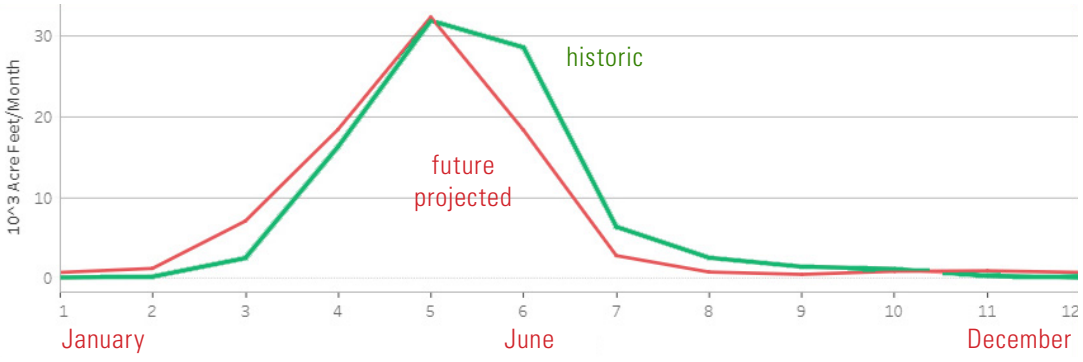
a) Taos Water Planning Region (WPR)



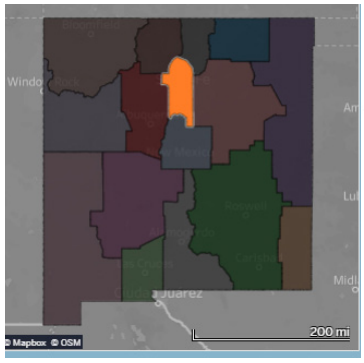


b) Rio Chama WPR





c) Jemez y Sangre WPR



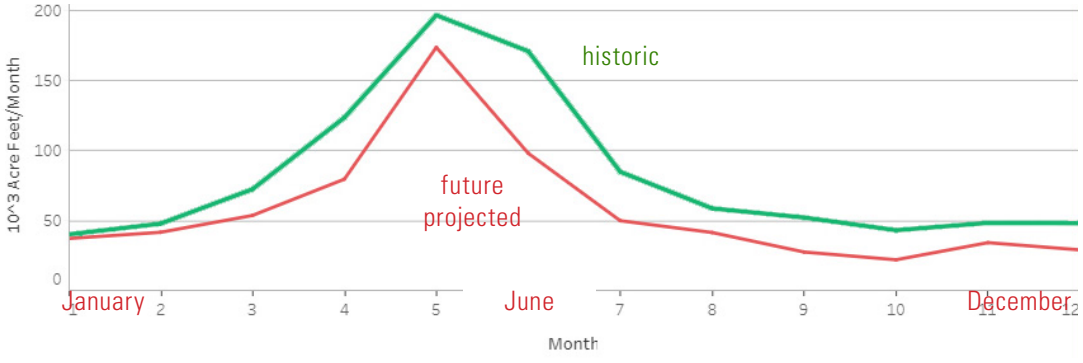


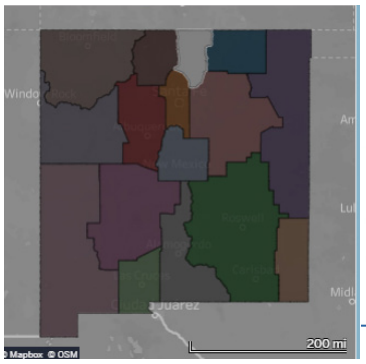
Figure 19. Historic average vs. future projections for seasonal surface water into the Taos, Rio Chama, and Jemez y Sangre WPRs.

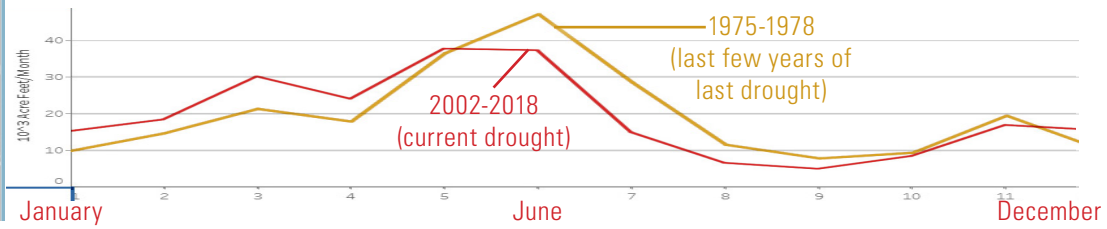
North Central NM Acequia Region
DSWB SHORT SUMMARY, cont.

- The data shown on ***Figure 19, Figure 20, and Figure 21*** all show surface water into the Taos, Rio Chama, and Jemez y Sangre WPRs.
- The data presented on ***Figure 19*** shows the historical surface water in averaged for each month from 1975-2018 and the projected surface water in for a moderate emissions climate model scenario averaged for each month for future scenario years 2019-2099.
  - The moderate emissions climate model scenario predicts that less surface water will be available in all three WPRs in the future.
  - The moderate emissions climate model scenario predicts a peak runoff in May in all three WPRs, which is a month sooner than has historically been the case in the Taos WPR. Significantly less surface water in for the month of June is also forecasted in all three WPRs.
  - Less surface water into these regions will reduce surface water allotments, decrease recharge, decrease water stored in reservoirs, decrease downstream surface water availability, and increase reliance on groundwater.
- The data presented on ***Figure 20*** compares surface water in during two different drought periods. Currently, the historical period in the DSWB model is from 1975-2018. Therefore, the 1975-1978 drought shown represents the last few years of that drought and the 2002-2018 drought period does not account for flows beyond 2018. Surface water in was averaged for each month during both drought periods, 1975-1978 and 2002-2018.
  - During the 1975-1978 drought, the surface water in peaked in all three regions occurred during the month of June. During the more recent drought period, runoff is shown to peak a month sooner. This is due to warmer springs in the more recent drought period, which causes snowpacks to melt sooner in the calendar year. This concept is further supported in these data, which show more surface water in during the late winter and spring months and less surface water in during the summer months during the more recent drought period.
- The data presented on ***Figure 21*** compares surface water in during the most recent drought period, 2002-2018, and surface water in during the most recent historical wet period from 1979-2002.
  - In general, this comparison illustrates that surface water was much more abundant from 1979-2002 than it was from 2002-2018,especially in the months of May and June.
- In the DSWB, historical surface water in estimates are data-based from USGS stream gage measurements. Future surface water in estimates are based on climate forecasts for flows that originate outside of the state (e.g., the Rio Grande at Lobatos, Colorado). From there, surface water in is equal to, or in some cases partially equal to the surface water out of the upstream mass balance accounting unit (MBAU) (e.g., water planning region).

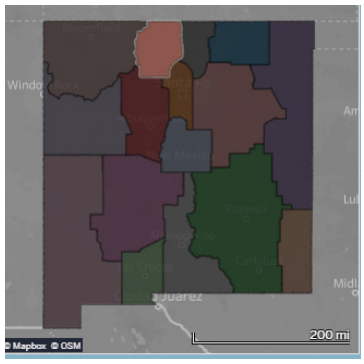
North Central NM Acequia Region
DSWB SHORT SUMMARY, cont.

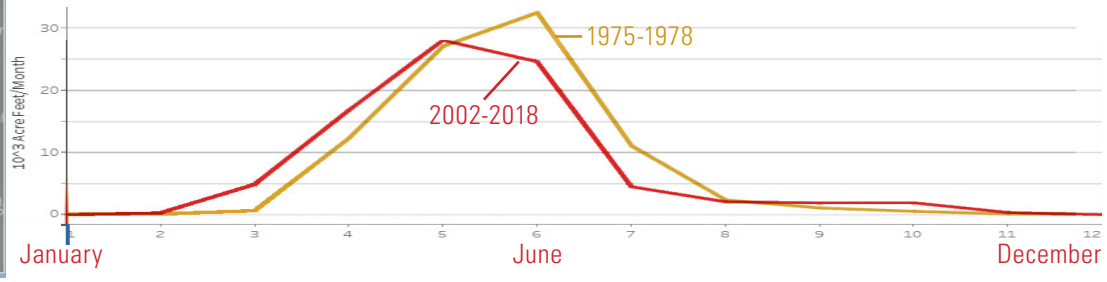
Taos Water Planning Region (WPR)



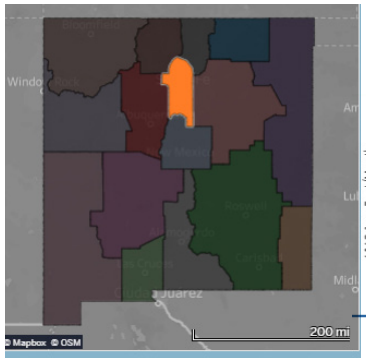


Rio Chama WPR





Jemez y Sangre WPR



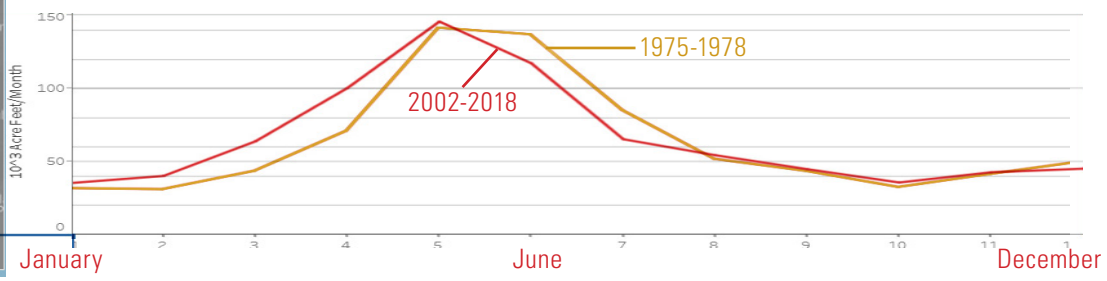
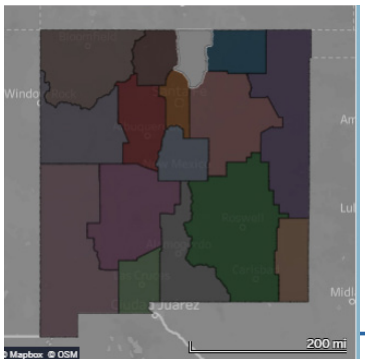
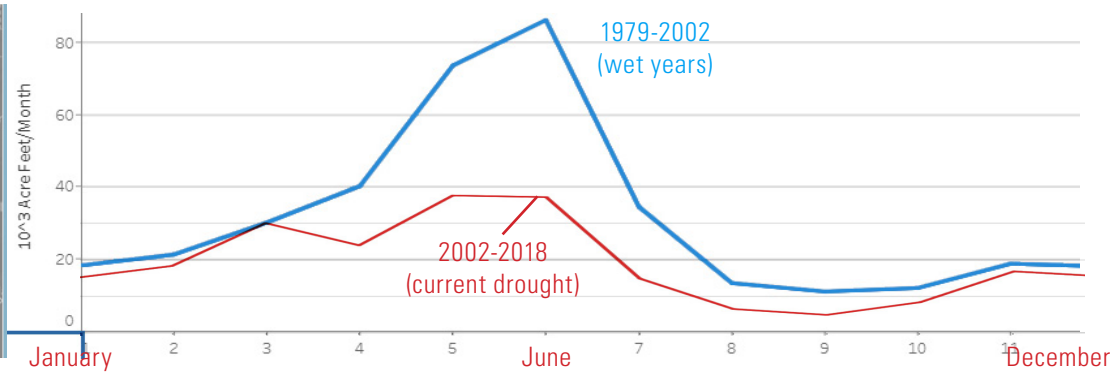


Figure 20. Changes since last drought in 70s for seasonal surface water into the Taos, Rio Chama, and Jemez y Sangre WPRs..

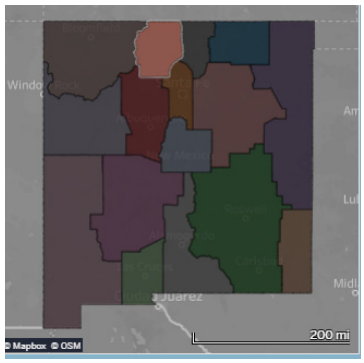
North Central NM Acequia Region
DSWB SHORT SUMMARY, cont.

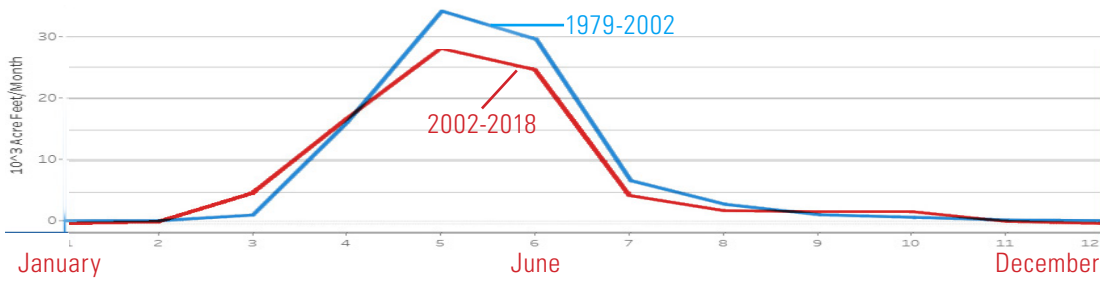
Taos Water Planning Region (WPR)



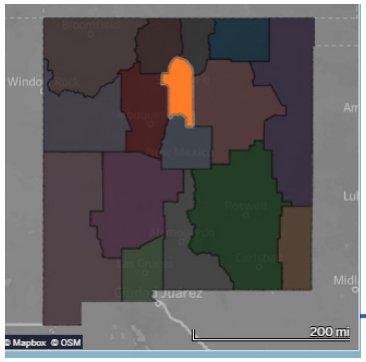


Rio Chama WPR





Jemez y Sangre WPR



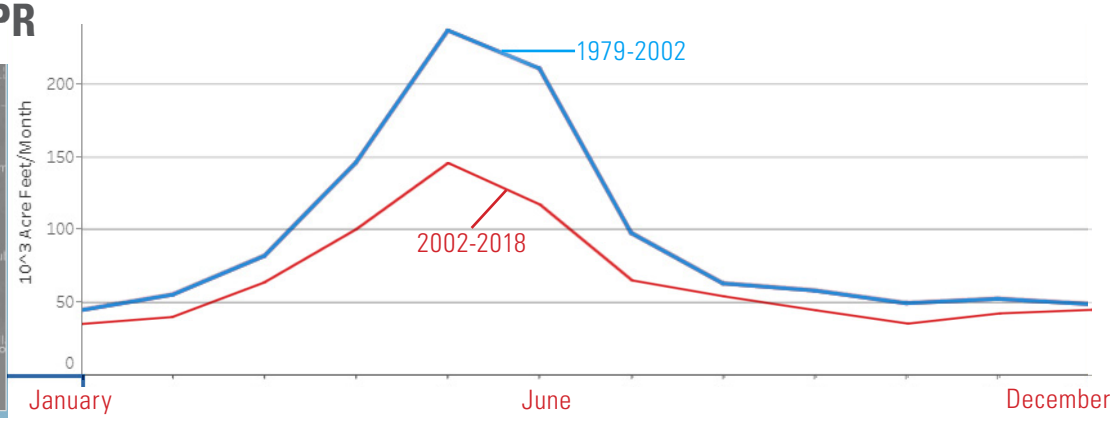


Figure 21. Changes since last wet years for seasonal surface water into the Taos, Rio Chama, and Jemez y Sangre WPRs..

North Central NM Acequia Stakeholder Visions for a Resilient Future, SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- We also recognize the value of acequias to the recharge of groundwater.
- The vision could be starting to build a regional climate and water resources monitoring network.
- At some point it would be great to take the holistic view and if modeling is involved on a watershed basis or regional scale to come up with numbers that we could show the public: this is what you're getting to assist us to do the kind of conservation ecosystem remediation,
- A large memory for me, and I look back at old pictures and old eight millimeter films, and it's just how lush and green our pastures and our hayfields were. So my partner and I are very interested in putting time and effort into our irrigation systems and bringing back that lushness and concentrating on soil health.
- All our acequias are spring-fed except the one on the Creek, and the Creek's actually a big spring coming off the mountain. They're all connected and the groundwater's pretty well-connected, too.
- ...looking at the value of acequias for recharge and groundwater return flow, hopefully the general public and the urban public can see the benefits of maintaining agriculture because there are downstream benefits.
- What I value is just the fertile land that's there and the water that used to be there.
- I think we can have a resiliency network. This network of pilot studies that can be holistic in themselves and capture the diversity of the landscape and not just the natural landscape, but the human landscape...we're going to be tracking resiliency with this network of stations just like you can track drought and groundwater.
- I want to help maintain it [resources, "gifts"] and keep the organic material on the land.

Sociocultural

- Connection to the land.
- Spiritual connection.
- The sense of freedom, of independence of being able to live off the land and really provide for our families.
- I'd like to add a reminder of the security along with freedom and independence acequias provide to us locally by facilitating the production of food during these changing times.
- 'Querencia' describes our place-based enthusiasm for this gravity-fed water supply and affirms how deeply indebted we are to our wise predecessors who brought this very appropriate technology from North Africa and Spain. It is quite a privlege to participate in the acequia system.
- I think it's really important to maintain

North Central NM Acequia,

SUMMARY, cont.

the connection between agricultural traditions and cultural resources.

- I think it's our connection to the land. It's what gives us a sense of place, a sense of belonging, a sense of backing.
- It helps us continue our traditions and also our friendships right in the community, for cohesiveness. Acequias really help people stay connected,
- It's the basis for our family and heritage.
- So for me, it's a sense of a deep connection to history and the future.
- So it's truly a part of my physical nourishment in addition to the spiritual nourishment.
- The sense of restoration that comes with living in this landscape. I think that's just an echo of the querencia and sense of place that others have mentioned.
- The sense of connection with community, and the ecological input.
- Real connection and sharing with our neighbors.
- So I think the most powerful asset that we have in the area I'm in, and most areas in New Mexico, is the relationships between the people. I think continuing to build on that solidarity in light of some of the challenges we're facing as a community is important.
- So part of who I am is really teaching how amazing each of our communities are and how they're so different, but how they all have their own story.
- I really envision that even though drought and climate change is a thing, that we are going to make it through as a people, because we already have for so long. It is powerful to have that hope and to have a really solid dream in our water system.
- But the reason why I really wanted to caretake this land was to provide a healing sanctuary for my community in developing more querencia, the remedios, the tradition of curanderismos, and helping my people heal from the generational trauma that has been here.
- Making sure that we're able to incorporate the foods, the healing, the shamanistic roots...I think that what we put into our bodies is a key to healing.
- My life and my life's experience are around the land and with water, and what I understand as being valued most in the region is people, land, water, your religion, your sense of identity, your culture, and your language. Those are things that are very much valued in the region.
- So, learning lessons on the land, sharing... and what our families have instilled on us by continuing the traditions of being a land-based people. That's really, I think the resiliency of Rio Arriba county,
- My main focus is not what I can do for myself today. What I try to focus on is what am I going to do for the next generation and the next generation beyond that?
- What's more important than anything is community, and by community I really mean people working together on a problem.
- Another huge thing that I am so grateful for and looking forward to, two weeks from Saturday is our acequia cleaning, our limpia.
- There's a big connection. There's a thread that connects us all together and weaves our fabric of our community.
- This is property that's been in my family since my great-grandfather. So it has a lot of traditional values to me.

North Central NM Acequia,

SUMMARY, cont.

- There's such a long tradition of agriculture in the area. What would be of interest to me and, of course, to many in the meeting tonight is that that tradition is able to continue in the future.
- The incredible traditions and history, the pueblos, the Navajo, the traditional acequias, all of those are such incredibly valuable things to learn from.
- So really just a heartfelt sense of gratitude to being together, sharing this time and for what is to come.
- I was very grateful to be in these conversations, to be part of this dialogue, and to have this opportunity to appreciate the lifetime of work that people have devoted to taking care of the land and water in their communities.
- That was a very common theme in our group was about community and the connections with our watersheds, aquifers, and in our farm lands.
- I feel like we're looking to the future clear-eyed and still bringing forth hope and optimism about what we can do in our communities.
- Everything, the people, the air, the earth, the water, the animals- so much. So I just value the region as a whole.
- I'm really grateful to be a caretaker and a provider on a hundred acres on the Rio Grande.
- Pretty much what was said before about everything about this region is valuable, but when I think about the cultural and traditional practices that have sustained our ability to live here throughout time and the adaptability that allows us to stay in this valley, I think is a huge asset.
- The knowledge of our region is very valuable.
- Our communal sense of surviving together.
- It's definitely the human and non-human interactions that I think makes us really unique.
- What I value about the region is the water and soil systems that are here because of centuries, no, millennia of active human participation.
- One of the things I value about it is that I'm able to walk in the footsteps of my father and my grandfather, my ancestors and the people that came before them anytime I walk along the acequias...I get to bring my grandkids, and they walk in my steps and they're creating steps of their own.
- The care of the land, the culture, the beauty of the area here are things that I value about the region.
- My vision for the future here, is that we continue to have a diverse and culturally sensitive region that my grandchildren can walk in confidence that the land has been taken care of appropriately.
- I just love being in nature and being surrounded by a community of water users and learning so much about cultures.
- Visions for the future? Again, for those of us in the position to have something to share,
- I really feel like the more each one of us makes an example, it inspires another. That's where I find more faith in the future is one by one in the community.
- I feel a lot of reassurance from my elders who also feel a lot of sense of pride that they know young people who care about the trees and our water.
- Here in my neighborhood is that a lot of the people that are growing here operate on a balance of favors...it's a

North Central NM Acequia,

SUMMARY, cont.

reciprocity, it's a do something without expecting something back. My vision of the future is for that to continue,

Governance

- It's important to protect the tradition of repartimiento, of water sharing.
- Traditions of water sharing and agriculture
- What I'm proud of is the way people were starting to speak up, and not just in paying attention to those things that are going on and going on into the future.
- We're one of the oldest ditches in New Mexico.
- A vision I see for the future is just more tribal interaction or consultation when it comes to water or agriculture, because we've been working these lands for years and years before any colonizers came onboard and took what was a lot of ours.
- My visions for New Mexico is that we get a state engineer in place quickly, that the state engineer's office gets staffed and funded properly without having to go through these ups and downs that has been happening.
- My vision for the future is that we have a solid 50 Year Water Plan that includes not just uses and who the users are, but protecting the sources.

Land Use - Economic

- It's a place that does provide a certain amount of livelihood for economic livelihood.
- It is important it is to sustain the acequias and all the infrastructures, because it's the lifeblood of especially this part of New Mexico, Northern New Mexico. I think that that's very important to farmers and ranchers in the area. So I think it's really important that the infrastructure be kept and sustained.
- I thought about a model that might be developed that let's say you increase the amount of farmers by X amount, by the year 2050, then the benefits of that to the aqua system, to the watering system, to the community health, to the environment, are all quantifiable benefits. You can say: here's the environmental economic impact occurring when you're displacing those traditional growers to do something else.
- Increase the amount of farmers by 2050 to have a viable and holistic watershed within the Rio Santa Cruz. And you could go to anywhere.
- Basically, I'm really interested in creating a food forest and supporting the Bosque.
- Our vision for the future, my vision, I think the vision of the collective here for the future, is that our people continue to remain strong on the land with the know-how on how to navigate policy, but also have the muscle and understand that if you want to have a successful farm and ranch, you have to put your money where your mouth is, and invest your own funding to make your own farm and ranch successful.
- What I value about this region is the rural nature of it. My vision for the future is to keep it rural.
- Looking into the future, hopefully restoring the farm lands and finding what's going to work for the land and work for us as farmers.
- I really thought that the acequia irrigated agriculture was, and is one of the defining features of not only north central New Mexico, but also some other acequia irrigated areas around the

North Central NM Acequia,

SUMMARY, cont.

state. So that's why we've dedicated so much effort to that over the last 20 or more years, to understanding how to support that.
- My vision is for more younger farmers.
- So I think I would love to see most of our land being used efficiently and enough water for people to actually make it work.
- Additional visions are probably we have a strong agricultural community.
- My vision is on a bigger scale for the future that the federal program has become more accessible to small operators that need them,

ISSUES

Environmental

- We experienced a really, really bad drought this spring, So we're dealing with extreme shortages and then also extreme variations.
- Since there's no water in the acequias, we're having complaints from people which mostly live along the acequia saying that their wells are drying.
- Our watersheds in that area are in very bad shape.
- An issue that really affects East Rio Arriba is invasive trees, Russian olives, Siberian elms, salt Cedars. They take up a lot of water, especially along the banks of the river.
- Intensified drought and flood cycles (damage and siltation from floods, little to no water at other times).
- Erosion.
- Higher temperatures, drier air, unpredictable cycles with pests, hail.
- Need to increase soil health.
- The health of our upland forests is imperative to consistent water flow.
- Forests need to be returned to balance and historic conditions through forest restoration.
- Sharing the water between the nine acequias is challenging, and we expect it is going to get worse with climate change, because the amount of water that comes down historically has been dropping for the last 10 years.
- We have noticed quite a big difference ...growing up it was acres of beauty and so much green for our cattle and horses, and now we don't have enough water to sustain that.
- It was a really difficult space working with the waters, just the inconsistency in the acequias and the flooding.
- Water quality testing.
- All this groundwater pumping is threatening our springs. I had to abandon my farm because we can't water anymore, because it's just dropped off. That's the fate of all the springs, and eventually it will be the fate of all the rivers if we keep this up.
- I was shocked to learn that soil health was not considered in the resiliency assessment. [for the 50 Year Water Plan].
- In order to create healthier soils, we do actually need some water, but then once we get started with that, we can effect a positive feedback loop.
- The main issues we have is getting enough water to get us through the whole season.
- Lack of water to share amongst all the acequias and all the parciantes of the acequias
- The principle driver here is drought. There's just not enough water, and

North Central NM Acequia,

SUMMARY, cont.

actually with climate change come things like extreme floods.

Sociocultural

- I think that pressure from the outside, from the new people and then the people that think they're not getting their fair share of water is its own category.
- How do we preserve our communities in light of these really severe water shortages?
- Water transfers are disruptive to communities
- I know that there is a cultural challenge because people are reluctant to eat new things and different things.

Governance

- We have more and more pressure from other entities that want water or that think their rights need to be prioritized during shortages.
- A lot of pressure is being created because of the shortages. We have difficulty sharing water.
- It's interesting because it turns out that the three acequias have different irrigation practices, so there's a mismatch.
- They're expecting to get their usual allocation and there is no water, no new water to allocate.
- Loss of water rights from acequias (MDs, adjudications, personal wells for ag and domestic use, cannabis and other commercial uses [especially by outside interests]).
- When a state engineer approves a transference of a water right, he should require the user to have a water conservation plan, and that doesn't seem to be part of the equation.
- Our parciantes have to learn to become more adaptable,
- I don't really want to use the word competing, but that's the easy word to get two competing strategies of a sound scientific approach versus policymakers getting in the way of what that means.
- I think that the lack of good information really hurts policymakers.
- Water laws are very difficult.
- No consideration of water efficiency on the users.
- But part of the problem with the acequias is they've only been running in the spring and the summer. So we have to develop other methods for water distribution to be able to address those climate crises and changes in the future.
- Would you say that the water laws as they exist right now, would you say that they kind of provide a disincentive to choose a more water efficient crop? Is that a barrier to going to selecting water efficient crops? Yes. It's a mega barrier because the whole game is for you to get a water right for a crop that uses the most water.
- But the problem is our law doesn't allow you to use less than what you're entitled to.
- I think that part of it is that if you don't use every drop you have or you have a right to, the concept is that the state engineer's going to come and take everything away, water law was set up to be very adversarial.
- The New Mexico adjudication process imposes a completely different water allocation process for an Acequia. Acequias allocate water by days. The state allocates water in terms of acre-feet.
- In 1907 New Mexico adopted a water code that privatized the right and gave

North Central NM Acequia,

SUMMARY, cont.

it to the owners of land in the acequias. This made it easy to separate the water from the land and to sell and transfer the right. You could not separate the water from the land in the traditional acequia system. The process destroys the traditional allocation of water for an acequia. A single water transfer from an acequia affects the other parciantes. Each parciantes is like a spoke in a wagon wheel. At some point the system falls apart when enough transfers occur.

- It seems to me that a lot of acequias are fighting the same battle separately.
- Basically the Rio Chama Acequia Association is under everybody's thumb. It's not something that we had a voice in,
- We're very focused right now on re-establishing the long-term system of repartimiento that has worked well for a long time, but these four or five difficult years since 2000 have really stressed everyone.
- I'm super nervous that if we keep going this direction, that capital interests are going to overwhelm natural resource needs.
- We need to be able to increase the amount of water, or at least hold the amount of water that's falling in the basin and divert it so it's more manageable, so we can meet those needs of a larger population and the needs of the pueblos, We know it's not the silver bullet, but with more management around the reservoir to continue to keep it either bigger or dredge it out a little bit to eradicate a lot of the invasive species. Those are all smaller pieces that can add up.
- Other challenges here is how do we use the water? You notice that two of the pilot projects that Connie talked about, were in La Mesilla. We have a dam that prevents flooding of the ditch, but how can we use the water behind the dam? You saw that pool of water back there. How can it be used?
- We talked about maintaining the traditions of the Acequia and one of the traditions is sharing water, and that is becoming more and more difficult these days it seems.
- But training people to understand what it means to have a water right is an issue, and the responsibility to your neighbors that comes with that.
- Educating people who buy property but are not from the area. It makes it very difficult for the local acequias because newcomers don't understand the whole way that acequias work, including governance and shared responsibility for the acequia, and easements along the acequia, and that's made it very challenging.
- I do know that whenever you do something to help fix a problem on your part of a stream or ditch, it tends to cause a problem for somebody downstream. You have to work all along the whole length.
- Maybe the other offering I'll have is about how long this takes and the patience needed [for conservation and restoration].
- Over the years a lot of water rights have been stripped from properties here in the Taos county.
- There's this fear of if you're not going to use it [water rights], you're going to lose it, and that's super problematic.
- What I know over here is the struggle of a lot of people wanting to lease them

North Central NM Acequia,

SUMMARY, cont.

[water rights] or to make money, passive income.
- ...the cause and effect and long-term effects have not been thought of...the cost of the burden of the use falls on the local communities.

Land Use - Economic

- We used to plant a lot of alfalfa, but most of the alfalfa fields are going into brome grass, which is a natural thing that happens that brome grass takes over, and so less hay is produced and brome grass doesn't have as deep roots as alfalfa does, and it's not as good for the soil.
- We need better irrigation management.
- Impact of cash economy (loss of population, hard for young people to stay, challenge to subsist off ag).
- Alternative water catchment strategies needed.
- The economic viability of production facilities has really been an uphill climb in the state.
- Political leaders are concerned about getting industry to the state, no matter what the water costs,
- I think large infrastructure is needed to improve water retention or water preservation. The idea of doing large regional infrastructure analysis, systems analysis and something more like a public awareness campaign.
- The issue is the need for pilot projects to build support and education to be right beside it (education, photo images, videos, news).
- I think the barriers for people doing different crops depends on who we're talking to. You know, in Chimayo, a lot of us are doing subsistence farming here and people grow what we want to eat.
- Nobody thinks about increasing food production in New Mexico, it's like we expect food to come from I don't know where, One problem is we don't have processing facilities in New Mexico.
- So as they [Taos Ski Valley] increase more summer activities for tourists [as ski season gets shorter], then of course, that's going to increase the demand for water.
- As development continues on up along the the ski valley and the canyon, the quality of the water, naturally, is affected.
- So the biggest threat now to us for our farming community is development. You know as people come in and go buy an acre or two acres, they're not really interested so much into irrigating. So we're losing a lot of the area from irrigation.
- You can't really sustain a family on five acres of land. So the small plot farming, I think, is going to have to change. So rather than growing alfalfa, I think we're going to have to start looking at more specialty crops.
- We're a collective of five women of color, and what we hope to be able to do eventually, is to buy land, and that's a difficult thing as a young farmer. It's also difficult to figure out how to buy land collectively.
- The Forest Services proposed a program/project to substantially increase the number of trails right in our immediate watershed.
- We [policy makers/politicians] are blocking land ownership.
- Santolina development.
- The Taos Ski Valley, two weeks ago, brought forward to the County of Taos Board of Commissioners a proposal for

North Central NM Acequia,

SUMMARY, cont.

$154.8 million recreation corridor with some tremendous impacts to that Rio Hondo.

- We've already had our Santolina up here and it's just filled in development, high-end houses forever, and tons of domestic wells and big subdivisions.
- So even if the rainfall had continued the way it was in the eighties, and partly into the nineties, I think we would have still had a water crisis, because unsustainable development patterns are rampant. Really bad water management decisions like assuming that paper water, moving water around through water transfers is the solution, and developers will have you believe that.
- We have a lot of people here with water rights, and most of the people here who actually use their water rights, I would say probably half of them are not growing food. Half of them are growing landscaping, and I don't know how well that's going to go over in the future, bluegrass lawns and things like that.
- We're so land-challenged here being blocked in by the pueblos, that we actually have people bulldoze arroyos and water has to go somewhere.
- We have infrastructure issues, we have, of course adjudication issues, we have development up the Creek issues.
- How to maintain an economically viable agriculture, that many people are involved, and that they have their heart in it.
- Great majority of food is imported into the state.
- The county extension agent program is so under-publicized and under-utilized.
- The lack of younger farmers and farming areas are decreasing.
- There's a lot of development happening here in the rural area that's not at all related to agriculture or ranching.
- That's my main concern is trying to find the resources where I can find this information, working with the Interstate Stream Commission, and finding the right people to direct me in the right direction [to acquire funding].
- What concerns me is all the development that's happened, we're right along the Santa Cruz River and there's parcels that are being sold off for homes and things.
- Land is expensive, farming is hard work.
- I'm concerned about people making a living off of land, even if it's not their primary source of income....So affordability is affordability of land, and affordability of maintaining or keeping family land as an example.
- We don't practice dry land farming anymore.
- There's a development up at Taos Ski Valley in the neighborhood of 250 homes that's going to be taking place. ...the only water that comes down the Rio Hondo is effluent coming out of the water treatment plant because of the amount of water that's being sucked up there.
- We have outpaced development based on water availability. That's only exacerbated by us being a tourist community destination.
- Land access and the cost of agricultural lands.
- Pollution of water and soil that is caused by new development or folks using chemicals or pesticides in neighboring lots.

North Central NM Acequia,

SUMMARY, cont.

- We also need support for workforce training and development for new and young farmers.
- ..if you are going to school to do this, you're burdened with student loan debt. So your ability to have a credit, to buy the equipment you need or run a successful business...is strapped in a very bizarre way.
- A good number of the parciantes on this acequia are back on their dues. So funding to keep the acequia operating functionally is really more and more limited.
- ...over the last decade or so, I can really see a whole new set of weed problems that are coming on to my existing ag land.
- Just a short synopsis, from my idea to approach them, to request money to the point where I was using the project to deliver water around my property, was a total of five years. Three of those years were maneuvering through the bureaucracy....When I went through this a number of years ago, there were five people in the Taos office. Now they're down to one.
- To take a couple of hours a day for however long it takes to maneuver through all this bureaucracy, is taking away your labor time on your property.... It's a deterrent, it keeps people from applying, it discourages people,
- There isn't an intermediate way for those leasing the land to access those funds [through government programs] without the full support of their agricultural, who they're renting from.
- the incentives for acreage. Most of us younger folks, it's my wildest dreams to have 10 acres, I have less than an acre.... So oftentimes these resources are intended for huge lots, huge acreage,
- So I think, believe, and support the idea of, how does equipment and operators become more available to people who don't have the funding? I'm not talking about through a government program, I'm talking about in our community.
- Our valley, and probably most valleys, are faced with long-term water scarcity. I would love to see all the land being used, but we'd probably need four times as much water, given the current amount of water in the current irrigation practices.
- We've all seen is our runoff is much sooner than we've ever seen. As an acequia community, that poses a lot of infrastructure challenges of how do you keep water on your land when it's June and the runoff is done?
- I think there's a key role for a very synthesized, maybe one place to have your needs met, because as of now you have to go here and there. The paperwork, it's like going to the DMV, which no one likes to do.
- Recreation is another pressure that comes in...The recreational use on our watershed is impacting the water quality of our watersheds, the water coming down into our acequias that we're distributing to the fields.

STRATEGIES

Environmental

- I think the starting place for us is to increase the fixed amount of water, however possible.
- We should be ready to capture massive

North Central NM Acequia,

SUMMARY, cont.

flood flow.

- Every thinning project should concurrently be stabilizing the soil.
- By creating decentralized, landscape-scale water retentive landscapes, we act as a keystone species, amplifying water infiltration, facilitating soil structure improvements, setting the stage for the storage of episodic downpours, and establishing carbon-sequestering vegetation where barren soils may have existed previously.
- Banking water in the shallow aquifer is a practice that can be readily applied to every site where earth works are underway.
- That is that intact ecosystems, whether it's up in the upper watershed with the drainage coming off the mountains or whether we're talking about wetlands in the low lands, but these systems being intact improve the water availability for people.
- These ecosystems have a need for this water in themselves for the many species that live there. And I think added to that point is, as we all know, high functioning wetlands also increase the water to the aquifers, which then ultimately helps human needs.
- We really need the system to be functioning at a high level for our existence to be sustainable really.
- Maintaining healthy soil biology is really important to maintaining the diversity of species growing above ground. So there's a lot of practices like composting and mulching and cover cropping, and no-till drilling as Mark spoke that help maintain what's happening below ground.
- There could be more monitoring of weather and precipitation and groundwater
- A better understanding of actually what is happening may be useful even on small scales.
- The reintroduction of fire is crucial where and when appropriate.
- What I have been able to do is very passive in regards to water restoration, I built some swales on my property, on the lower ends, to retain the water.
- Thinning projects in the bosques to help restore the watersheds and to get those invasive plants and trees.
- Trapping the water coming down in the runoff during the monsoons, I think that's going to be the key start
- I'm really impressed with what I've read about ancient China's way of handling water, both shortages and floods and trapping water. There's an ancient engineer who figured out how to create artificial marshlands so the water would spread out over this artificial marshland and then go into the groundwater table.
- Follow the principle of small scale water catchment systems that really slow it, spread it, sink it, the water. With that, we are rehydrating the soil and creating your own soil sponge that really can soak up all the water instead of having it just rush off and create problems in terms of erosion and siltation.
- It's a vision of multiple small scale projects. And I think that is really where we're headed at this sort of a dispersed instead of the sort of big technical technological solutions. It's more of a dispersed, human scale, wildlife scale, micro scale solutions.
- We need to be ready for extremes and my answer is increasing organic

North Central NM Acequia,

SUMMARY, cont.

material, both on the surface and in the soil, so soil health and to promote moisture retention and moisture...I'm advocating is agroforestry.

Sociocultural

- I feel like the strategies need to be really culturally relevant.
- A version of planning to me is really community engagement. But point being that we have models here and we need to build off those models that have worked.
- But I just keep wanting to say youth. We want them to have strategies that we've built that they can build upon.
- We have our community acequia historical traditional models, and then we have our modern iterations of them and youth organizations that are connecting kids and aspiring farmers.
- How many farmers we need to have, you know, how many people under 50 are engaged in implementing the models, designing the models, working the land?
- I think it's going to start a lot with trying to get the younger folks involved, not only in farming, but also in managing the acequias. We keep asking to see if we can get some other people to apprentice with the commissioners and mayordomos.
- Our association doesn't believe it's all about technology. We think that we can also use traditional knowledge to solve a lot of these problems.
- Neighborhood social media site for asking and discussing what to plant.
- Educate the people who are buying the land to get them acquainted with how things work around here in acequia country.
- Education, of course, helping us understand the land that we're on because the land that my grandfather grew on, isn't the same land that I'm growing on.
- We need to get the general public engaged so that we can move from just looking at strategies for local small farmers to survive to the point where they can thrive...but things people have thought about, is make it part of high school or middle school curricula so they learn about their traditions and about acequias.
- Education on alternative water management and storage methods (Drip, storage tanks).
- Educating the youth about food production, land use, means that somewhere after old farts like me are gone, there's somebody else that has some insight into what the food system is.
- Let's educate the kiddos.
- More youth programs.
- We need to change the standards. Educators have our hands tied by the educational standards.
- Historically, people would show up for each other and help one another, but we're reconnecting and rebuilding those relationships.

Governance

- People spoke of development and conflicts with water resources with development, but I think it also comes down to intentionally planned communities, so that are aware that water is a limited resource and there's a lot of currently occurring contradictions to that sensible planning. I think really looking at it from a community level,

North Central NM Acequia,

SUMMARY, cont.

how are we going to use a shortening water supply and how are we going to become more efficient in our use of the water?

- And then what we're going to need also is more improvements more awareness or education around water distribution so that people can start to think about growing crops in different times of the year.
- We developed a mechanism to share the water and monitor the sharing.
- It's in maintaining those good relationships that allowed us to get where we are now.
- All the acequias to get all their ducks in a row, get their legal documents, get their bylaws.
- I know that I'm personally going to be having a community party. This is where I'm hoping I'm going to gather information from everyone under my basin area and see what their problems are as well.
- I think that understanding the water budgets so that everybody can understand the trade-offs of different management descisions...I think these pilot projects will be great for showing some of these trade-offs and understanding the water budget for the trade-offs.
- It's very important to look up other alternatives in a combination approach.
- We're not looking at solving the problem all at once or that there's a silver bullet, but there's all these little pieces of the pie and we're going to start to pick up and put together.
- Extension agents. It'd be nice If we could have one that would be specific to the pueblo or more native specific because our land and water issues are different from everyone else.
- I feel like our tribal government is still very much living under an oppressive system of having one year terms, so we actually never get anything done. So if I could dismantle that entire government system, that would actually be beneficial to my organization and to my people.

Land Use - Economic

- Building standards that require less water use.
- One is the human campaign. And then the other one is the hard infrastructure campaign. So there are two different kinds of work being done, but they're both speaking to the same kind of preservation, completely different work.
- It would have been interesting if you could tell any new business moving in that you have to help restore or increase our water supply somehow.
- But Harold brought this up earlier about the fields declining in the Mora area. It's the same in Taos valley and the solution there has been the no-till drill and minimal disturbance disking, and then the no-till drill, and then planting a polyculture lot. So, perennial hayfields coupled with regenerative practices (perennial polyculture, no till drill, minimal disturbance).
- More protective covers for the crops, because in these kinds of really climate change activities where we're getting hailstorms or big thunderstorms, we need more protection for our crops to be more viable in these really turbulent weather changes.
- Develop our food system to be more of a local food system by a certain amount and date.

North Central NM Acequia,

SUMMARY, cont.

- Food sovereignty.
- A significant amount of land is fallow there's a potential to increase recharge on significant amounts of land.
- Fully funded and very community oriented Alcalde science center. We need more research scientists out there.
- There are some native plants that can be food crops also. A lot of that land where some of the diversions, ponding, restoration things can happen is public land.
- Start taking a little bit more coordinated and cooperative farming strategies in conjunction with specialty crops.
- So everybody really has to start growing quinoa and amaranth, things like that, and experimenting because we have to learn how to do all of these things quick. Every farmer should be a really good experimenter.
- Coalition of the National Infrastructure Bank. One of the things that I really appreciated about the National Infrastructure Bank, which is being pushed on a federal level, is there's part of that infrastructure money if we: A) create a state bank in New Mexico, and/or B) push for this Coalition for the National Infrastructure Bank, they would divert funds directly to helping our water, directly to helping our acequias.
- Identifying what are the crops we really ought to be growing here with our tremendous lack of moisture.
- Looking to what extent could New Mexico, if people were buying food locally, how much could that impact local farmers?
- Alternative crop choice pilot study at community farm in Los Ranchos.
- I would use them the county extension offices. That's going to show the legislators and others that it's still an important aspect of the university to have in the state.
- Coppicing.
- Being more self-sufficient in New Mexico and to have a more local food-shed would be really important, it's safer, it's more resilient.
- Drop water system by solar energy.
- We're being vocal on how to best disperse the recreation. Instead of concentrating in one area and one watershed, disperse it.
- I think a lot of ranching/farm conversations are under the assumption that land owners have a lot of land and that's just not true at this point for new and young farmers. Take note of that because if there was some sort of strategy, incentive, or policy that helps lessen one anchor operations get that support, we could conceivably see different ways the land is being used, how water is being used, and how that impacts our food system and those contributing to it.
- I can't tell you how many times the drip has saved me from going bankrupt because it's easy to use a tiny bit of water even if the acequia's only one inch deep and it's my turn, I can still water,
- So my answer to this right now, and my passion is polycultures, growing many species at the same time, in particular trees, and in particular fruit trees [for moisture retention during big rain events]...A polyculture of understory perennials, virtually all perennials, most of which are support species, but some of which are edibles.
- I had my mayordomo install for me an

North Central NM Acequia,

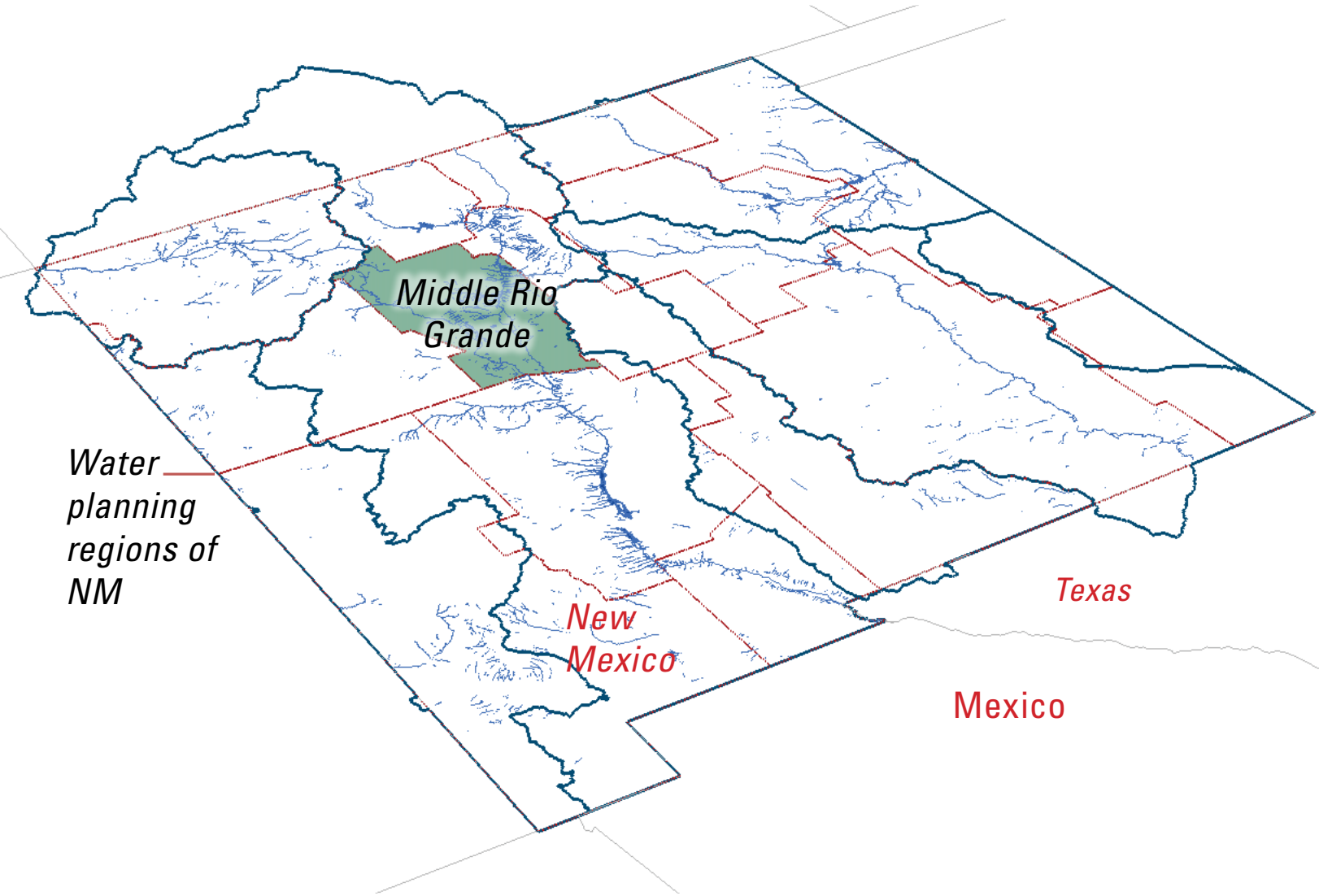
SUMMARY, cont.

inch-and-a-half pipe at the very bottom of the compuerta. So when there's only four to six inches of water in the ditch, people can't flood a field of multiple acres with grain or whatever, but that inch-and-a-half pipe can deliver 20 gallons a minute to any of my fruit trees. And I can be out there. All my fruit trees are terraced and bermed with a semicircular berm. So I can sit there and flood one tree basin at a time.

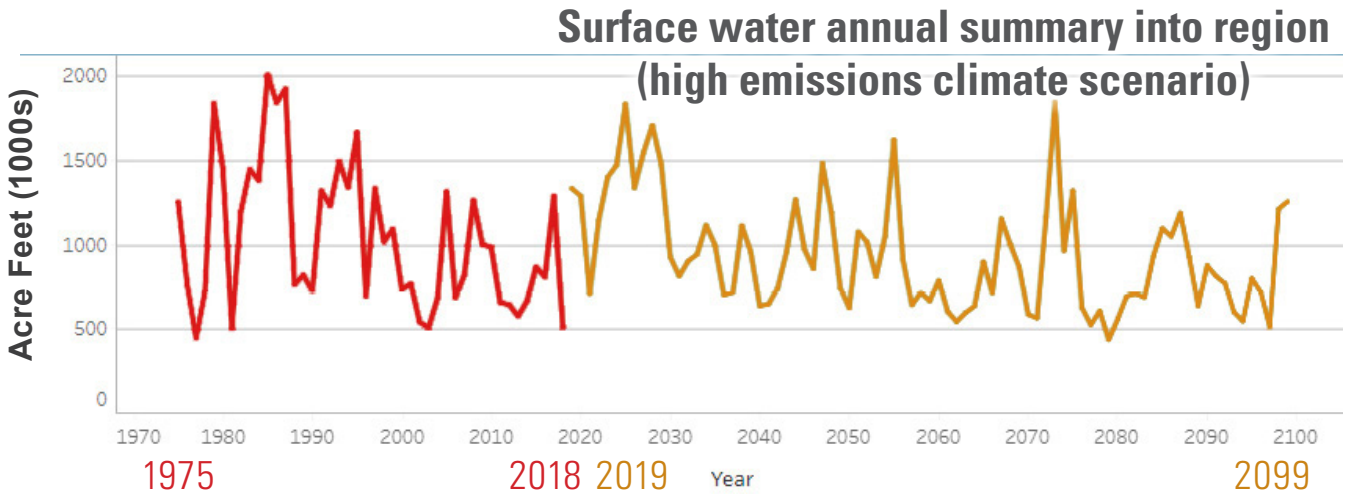
- I'm advocating planting stuff that grows fast, creating shade. The worse the water situation is, the greater percentage of trees need to be support species as opposed to yield species so that you can create that shade, especially afternoon shade relief and moisture retention.
- Armies of people have gone up and dug swales. A swale is simply a ditch followed by a berm that goes downhill and then every a hundred feet or so, they're digging swales. After 5 to 10 years, they have perennial streams that used to be ephemeral that are now perennial in their watershed.
- Unrestricted funding. I like when grantors give us funds for general operating support because we actually know the issues affecting our area, we know how to address it rather than them telling us what we need to do.
- Our ordinances and zoning need to be updated radically to reflect our ability to adapt with climate change.
- [Regarding the Red Willow Center's CSA program in response to COVID-19] It was nice to have that upfront income to be able to help our youth program because we used a lot of that to pay our kids, too, and just get any other materials or supplies we needed for the CSA, for the kids or the farm.
- Checklists: this is what you're going to need to access funding, or these are the people you're going to need on board to complete a project because it's so fragmented.

4.3 Middle Rio Grande (MRG)

REGION SUMMARY



MRG DSWB SHORT SUMMARY



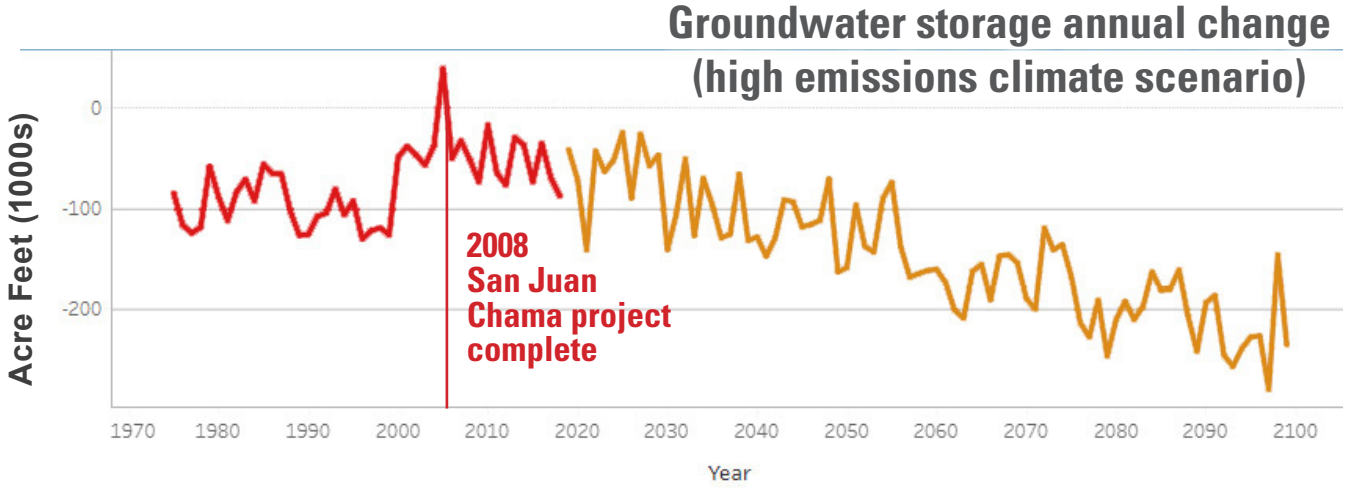


Figure 22. Historical annual surface water into the Middle Rio Grande Water Planning Region from 1975-2018

MRG DSWB SHORT SUMMARY, cont.

Surface and groundwater change trends

Historical annual surface water into the Middle Rio Grande Water Planning Region from 1975-2018 and projected annual surface water in from a high emissions climate model scenario from 2019-2099 is shown on ***Figure 22a***.

- During historical years 1975-2018, the surface water into the region generally shows a declining trend. This observation is in agreement with the Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources report (Dunbar et al., 2022) (i.e., Leap Ahead Analysis).
- Surface water into the region estimates from a high emissions climate model scenario shows significant variability with increased periods of low surface water supply into the region. This forecast is also in agreement with the Leap Ahead Analysis.
- Reduced surface water availability reduces storage in reservoirs, reduces aquifer recharge, and increases groundwater demand.
- In the DSWB, historical surface water in estimates are data-based from USGS stream gage measurements. Future surface water in estimates are based on climate forecasts for flows that originate outside of the state (e.g., the Rio Grande at Lobatos, Colorado). From there, surface water in is equal to, or in some cases partially equal to the surface water out of the upstream mass balance accounting unit (MBAU) (e.g., water planning region).

Historical annual groundwater storage change for the Middle Rio Grande Water Planning Region from 1975-2018 and projected annual groundwater storage change from a high emissions climate model scenario from 2019-2099 is shown on ***Figure 22b***.

- Groundwater storage change in the region is shown to have been declining during historical years 1975-2018. These results also indicate that the San Juan Chama Project decreased the decline, but that overall the groundwater storage was still being reduced.
- These results are in agreement with the Groundwater Level and Storage Changes in Basin-Fill Aquifers in the Rio Grande Basin, New Mexico Technical Completion Report (Rinehart et al., 2016), which reports overall declining groundwaterstorageforthe Albuquerque United States Geologic Survey (USGS) Hydrologic Unit Code Level 8 (HUC-8) basin from 1950-2015.
- Projected groundwater trends with a high emissions climate scenario indicate continued groundwater decline.
- Continued reduction in groundwater storage can negatively impact groundwater quality and will lower the water table. Lowering of the water table can cause wells to run dry; and in some instances, the shallow aquifer can become disconnected from the surface water system. Ground surface subsidence can also occur. DSWB groundwater storage change estimates incorporate groundwater storage change#15 values from Rinehart et al., (2016) where available. Currently, the DSWB does not estimate total groundwater storage and only estimates groundwater storage change.

Middle Rio Grande (MRG) Stakeholder Visions for a Resilient Future, SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- There's a lot of value in the Middle Rio Grande region and it's not all related to water, but it's all underwritten by water.
- Amazed at how much function is remaining in this river and how remarkable this ecosystem is.
- Irrigated farms are also very critical for migratory birds and other wildlife. Our flood irrigated farms provide some of the last wetlands left in the West, 62% of the wetlands in the Intermountain West states are flood irrigated pastures. And so those flood irrigated provide the wet meadows that these birds depend on.
- Working with the water budget we have towards a scaled down river with key functions to keep it alive.
- Maintain multiple values of river flows through Albuquerque that could be lost with loss of viable water supply.
- Simulating some of the original hydrology of our waterways to encourage more infiltration.
- This idea of a scaled-down river. It still has some of the functions of the historic Rio Grande, but is working within a much more limited water budget. keep this river alive with understanding the key parts of the hydrologymimicking historic processes on linear scales and in the watershed, infiltration and soil retention.
- Working with all the engineered infrastructure towards the advantage of the river ecology, where we're using the ditches and the return flows and taking advantage of that to efficiently keep the river alive.
- I would like to see a lot more implementation of the aquifer storage and recovery methods.
- What could be really cool, not just in the uplands, is main stem wetlands. These main stem wetlands are in deficit and are needed for winter wetlands for migratory birds.
- Water is a critical piece to keeping Laguna and Laguna's practices going.
- Reusing the water, recycling the water as much as possible, and then letting some of the natural water flow are my visions for the future.
- Water's at the center of everything, without water, we won't have anything.
- We have to protect that alluvial [aquifer] because it's paramount.
- Oftentimes identified as one of the favorite features of the middle Rio Grande Valley is the Bosque, and the access to green space.
- There's a lot of wildlife components that are more and more being represented and being understood as agriculture becomes more of a primary habitat for migratory and wintering waters.
- The agricultural communities that we supply play a really important role in maintaining those in-stream river flows.

MRG, SUMMARY, cont.

Sociocultural

- The agro-ecosystem, the intertwining of farm fields and the river, and the culture that is attached to the land.
- Pueblo sovereign nations that are here, and were here ancestrally, and just gives us a rich and a vibrant community.
- The land, the water and the culture that is attached to the land.
- Ultimately there's a real heart connection to the land by all the people we work with. Many of these lands have been in the families for generations, it's a significant part of our culture and a part of the families' land legacy.
- One of the values of water in the region is really the connectivity to community and sharing the resources. Ensuring that we all have equitable access to quality water, but also supporting the water resource for our habitat, our Bosque, our agricultural resources, our recreational benefits.
- Equitably sharing the resources of the community.
- What we have is what we have, and we have to protect it for future generations.
- What I feel like we value the most, or should, is culture and environment. Those two things combined are very much what makes New Mexico. ...water is inseparable from culture and environment.
- I envision us being a more rational, kind, and loving community of people.
- Just to be able to continue to live here in this community.
- There's a cultural significance to what we support. There's absolutely an ecosystem service in the way we manage our system, and the way we flood irrigate the valley [traditional flood irrigation].

Governance

- Working within the region, with our partners, and with communities to ensure that this water is available for now and into the future.
- Thinking forward in addition to thinking across agencies, across communities, to make all of our plans happen, and not work alone.
- A lot more collaboration between agencies and more authorization to store what little water we do receive higher in the mountains, in those smaller reservoirs where the evaporation rate is so much less than at Elephant Butte.
- We can use aquifer storage and recovery statewide, there are plenty of interested agencies who want to do it, we just need that path to completing it to be easier.
- My vision for the future is a more diverse approach across the state on how to work with what we have, rather than fighting the engineered systems we have, how can we work with them?
- I'd love to see us willing to try things and do things.
- Recognize that we have to do a bunch of a little pieces to make it work. We can't just do one thing. There's not gonna be this one solution that is going to make it all better.
- We wanted to be on top of that and show that we're not just sitting on the sidelines, we want to be on top of every water issue.
- That we really tamp down our lifestyles to comport with the problems that we have, and encourage the rest of the world to do that. New Mexico has a great opportunity to become a shining example for the rest of the world.

Land Use - Economic

- Our main values are farming, the Bosque, and within all, water.

MRG, SUMMARY, cont.

- Ensure that the natural spaces, whether it's farming or range or whatever, aren't lost.
- Overall objective is to ensure that Albuquerque can remain a sustainable urban area and that the people who live in Albuquerque can continue to enjoy the remarkable climate, recreational activities, entertainment, activities, and educational activities.
- Both the small and bigger farms down here in Valencia and Socorro County and have a huge economic value to our counties.
- What the district [MRGCD] values, is maintaining traditional flood irrigation that has all sorts of primary, secondary, and tertiary benefits.
- My vision for the future would be finding ways to generate that value, and increase that value to the point that we have a sustainable economy for agriculture here in the valley.
- I think if the district, and if our constituents are really going to thrive, not just survive, we have to change the way we value all of the outputs that come from agriculture. That would be my vision for the future. It's redefining the value for agriculture.

ISSUES

Environmental

- The declining aquifer.
- Pollution of the water sources, including urban runoff.
- Climate change, limited surface water in the future, the snowpack for instance is going to be less and less reliable as we go forward.
- Need for water quality in the water management discussions more which are also actually impacting water quantity, specifically the known groundwater contamination sites.
- We do, in all of this discussion, need to think about the uplands and how the water moves across the uplands and how we get better infiltration. They're overgrazed. This summer when we had all that rain in July, the issue was water quality for months. The water coming out of the Puerco and the Salado rios and into our ditches was nasty. It smelled like sewage and it clogged up our ditches, it killed crops.
- We're getting the high intensity storms that immediately run off and run past us. That's not useful.
- When we do have those big rain falls, how do we hold it? How can we better hold it so it doesn't just wash away and continue to erode, take away sediment
- Our uplands are in sorry shape.
- They do everything they can to keep us from removing them [invasive horses] from the area that the horses have destroyed our uplands, our former grasslands.
- New Mexico has the highest rate of erosion, times three in the whole nation
- So we have no snow pack, we have no water.
- Before that in 2018, we had a pretty severe drought up here and we had to turn off domestic water 16 hours a day and there was very little irrigation water.
- But my concern is this is a wonderful place to live, and I'm wondering how it can be sustainable in the future with climate change if we have no snowpack.
- What do we do about small communities like this that are dependent on spring flow?
- Mine contamination threatening aquifers.

MRG, SUMMARY, cont.

- The problem with some restoration was that with the dropping water level, people would say without any overbank flooding, you can't do any habitat restoration.
- Rio Grande bosque choked out with invasive species and is a fire hazard.
- One of the biggest issues we have in our region is going to be climate change and it's going to be creating a high variable hydrology for the area.
- Reduction in shallow groundwater recharge

Sociocultural

- Our farming and getting back to tradition is really being challenged along with all kinds of other things from the outside world, and now climate change.
- We have to start being more considerate of each other, and stop trying to make a whole bunch of money out of the water all the time. That's not what it's for.

Governance

- Human tendency to want one singular answer to water management that will fix the problem. And there's no such thing.
- Some dangers if we work in isolation
- There are these rules that we operate under that may not make sense for a changing climate. Does it make sense to have all this compact water stored in Elephant Butte?
- The other big elephant in the room is the compact,
- It's really important to look at these assumptions that become embedded in our policy, our water management, and our models. It's important to understand the true costs of environmental water needs. Often such needs could be satisfied through moving water through the system differently, and may have minimal water costs.
- Tension between connecting management decisions based off of the high level model and what the other, the more project-based models are saying.
- We're getting to that point in water resource management, where that tolerance for uncertainty and error is diminishing rapidly. And so shortening that gap and bringing those things closer together and having a longer look in the planning is going to be pretty critical.
- We're still in the process of having our water rights adjudicated. That's a huge barrier statewide to water resilience and having an understanding of how much water is available, because the tribes don't have numbers for how much water that they have to deal with.
- There needs to be better geologic mapping on these recharge areas...the better we identify them and the better we direct the runoff into those recharge areas
- We also need to know more about the hydrology of all of these things [complex surface water - groundwater interactions]...need more data.
- Lack of conjunctive groundwater and surface water management is probably another big issue...wells are not being asked to shortage share like any of the surface water rights are.
- State policy is a big problem when it comes to that. Having the political will to do a lot of these big changes in how we manage water in the state; that's not an easy conversation.
- That's definitely a barrier, access to facilities based on compact restrictions.

Land Use - Economic

- We don't have the capacity to capture the precipitation that we do get very efficiently.

MRG, SUMMARY, cont.

- Agriculture is a large user of water. But we don't want to lose the agriculture,
- Urban water conservation is much more challenging and it really isn't the answer that we will continue to [achieve] conservation.
- This is a place where that saying that the farming and the river are intertwined really means something because of the way that the system works and the hydrology of the river-farm system. If farming goes, the river will go, because there will be less return flows to the river. [all flows not consumed by agriculture and returning to water supplies, e.g. including those that are recharged or returned for in-stream flows].
- This also points towards something that's perilous about water conservation. Becoming more water conserving often means that there are less return flows going back to the river. And the river has evolved to need these flows.
- Essential to this river is keeping the farm farming system alive.
- I agree if we lose our farmland, particularly our flood irrigated farmland, the river is going to be hugely impacted.
- If we go to conservation on the farm, everybody going to drip, it's going to impact the river. We (irrigators) apply three acre feet per year to their field. Plants consume about two acre feet, the rest it goes back into the system.
- In water meetings, agriculture is always what's for lunch. Farmers are never included in the conversation, even though in this planning we're going to be hugely impacted and our communities are going to be hugely impacted.
- We aren't recognizing all the services are our farm lands provide and we really need to look at our values and what it's gonna look like in the future.
- Farmland is being bought up by developers, water rights transferred, and new subdivisions are emerging. They're putting in houses faster than we can ever protect the land.
- We need to talk about development and how are we going to curb it? Are we going to curb it and what is their role (developers, real estate) in supporting preservation of agriculture?
- Farmers are making adjustments and trying to figure out how they're going to do it, keep their land. It's difficult with the profit margins so small, but it is their way of life.
- How can I recruit [farmers] to protect their farms when there is little promise of water and no end to drought in sight. We are protecting the potential for farmland to exist.
- New marijuana growing and implications of water use. Some of these big growers are approaching some of my conservation easement farmers wanting to lease their water.
- Developments upstream of us have decreased the water availability.
- Our farmers are hurting for water. The farmers are frustrated because we're at the mercy of our upstream delivery,
- I think that all the farmers and some ranches here in this district are concerned about having a profitable farm, and that's their main concern.
- We've been under what I wouldn't call a scourge, but I spent a real heavy weight on overgrazing for 400 years nearly.
- This has become a population center, and there are way too many domestic wells which affect the springs.
- We [Albuquerque] probably save water on an individual level or household level pretty well. But I think that all the savings

MRG, SUMMARY, cont.

end up going back into providing water for new development.
- We are the biggest water-user city for hundreds of miles around. We save it penny wise and waste it pound-foolish by accepting every large-scale development proposal that comes down the pike.
- I'm not entirely convinced that the choices of crops. So we try and save water and then we spend it on extremely high-consumptive crops that are probably sent out of state.
- Up here, it's just more and more domestic wells. The state engineer has told us that if anybody has a piece of property, they have a perfect right to drill a well.
- If we pump the well, that affects the springs, but the well is deeper than the springs. So if the water runs out in the springs, if that's a possibility, but at the same time, with no snow pack a lot of the wells up here are going dry, too.
- We have a lot of small communities that are starting to see more and more encroachment, more and more development around the edges.
- Flexible storage, I would say is a top issue affecting the region.
- Funding's a big barrier for a lot of the conservation projects and initiatives that the district has.
- Our facilities are not meant for storm runoff. They are conveyance channels for irrigation water.

STRATEGIES

Environmental

- Pilot water leasing program that looks at on-farm efficiencies, delivery efficiencies. Water that is leased, then the quantified savings are intentionally returned to the river at the key locations. The Program at the same time is improving delivery efficiencies to farmers and limiting leases to a few years to avert a "buy and dry" scenario.
- Idea of ecosystem services payments is awesome - promote all the other services our farms provide to the wildlife and to the community and to the riparian areas. What do we value and how do we support that?
- Connection that conservation is tied to water in the river and species support.
- Importance of looking at other water resources [beyond conservation] and that's a discussion of implementation of reuse, that's talking about how to integrate green stormwater infrastructure, a lot of different things.
- Ensuring water quality to also ensure water quantity.
- We should get in these uplands and start trying to regenerate them.
- Regenerate the soil.
- You probably get as much return on effort by continuing the removal of the non-natives, the water sucking phreatophytes up and down the Rio Grande. I think you'd get a lot of water return for the investment to continue that program.

Sociocultural

- We can integrate and continue agriculture because that's an important part of our community and our culture, and also a necessity.
- Giving landowners the option to opt in or opt out is always going to result in better communication and outreach, better repeat, daters. Making it voluntary is probably a must in my opinion, to do anything in pilot fashion.

Governance

MRG, SUMMARY, cont.

- I would like to see more inclusion of agricultural communities in the conversations.
- Need to look more integrated in both resources and supply sources.
- I don't see how we can be successful if we aren't talking and working together.
- Need regional teams working on these complex issues, because there are no silver bullets.
- Expand our management of water past snowpack to include management of monsoonal flows when they come.
- More implementation of aquifer storage and recovery.
- More inclusion of the agricultural community in water discussions.
- Reservoir operations in general, can you use reservoirs for ecosystem services? Can you really make sure that spring snowbelt pulse moves through at the right time to benefit the native species.
- We really need to flip and think more agily how we think about water. I think we're still too rigidly thinking: Snowpack! maybe we won't have any snowpacks. how do we manage our systems and design our systems to capture that water when it comes through.
- The compact delivery issue with retaining and infiltrating stormwater doesn't actually apply to residential areas according to the State Engineer.
- Educate the public about stormwater being a resource that can be infiltrated on their land to irrigate or support their plants rather than using groundwater to do that,
- The biggest strategy to address that of course, is to finish the settlement, and we are pushing so hard right now to do that.
- Our strategy of course, was adjudication. We're trying to fight for our rights that we have with water.
- We're trying to get away from the congressionally-imposed restrictions on managing our lands properly.
- Teaching the young and the next generation about using the water wisely.
- Even if we love all the spiritual and cultural stuff, data is essential for all of us to be able to do anything.
- I'd also like to add that we have to better develop the concept of sharing [between cities/rural areas and upstream/downstream users].
- Changing our storage restrictions, becoming more flexible in how we can utilize the various dams and reservoirs upstream and downstream...is going to play a really important role in maintaining what we do.
- [Find] ways to increase the operational flexibility of the various reservoirs along the main stem and along the Chama, to increase our ability to store different types of water at different locations in the basin.
- Some of our ESA [Endangered Species Act] obligations, we're already addressing some of those through the use of our strategic outfalls and Environmental Water Leasing Program, where we are trying to match what we anticipate the need of those outfalls will be, based on river drying conditions and available snowpack.
- We would really like to regain the ability to store there [the MRGCD facility]. Because that's what allows us to maintain those late season deliveries, by capturing the peak of that annual spring runoff and saving that for later in the year.
- One of the strategies we're using to address that this year [managing deliveries]...is an emergency fallowing

MRG, SUMMARY, cont.

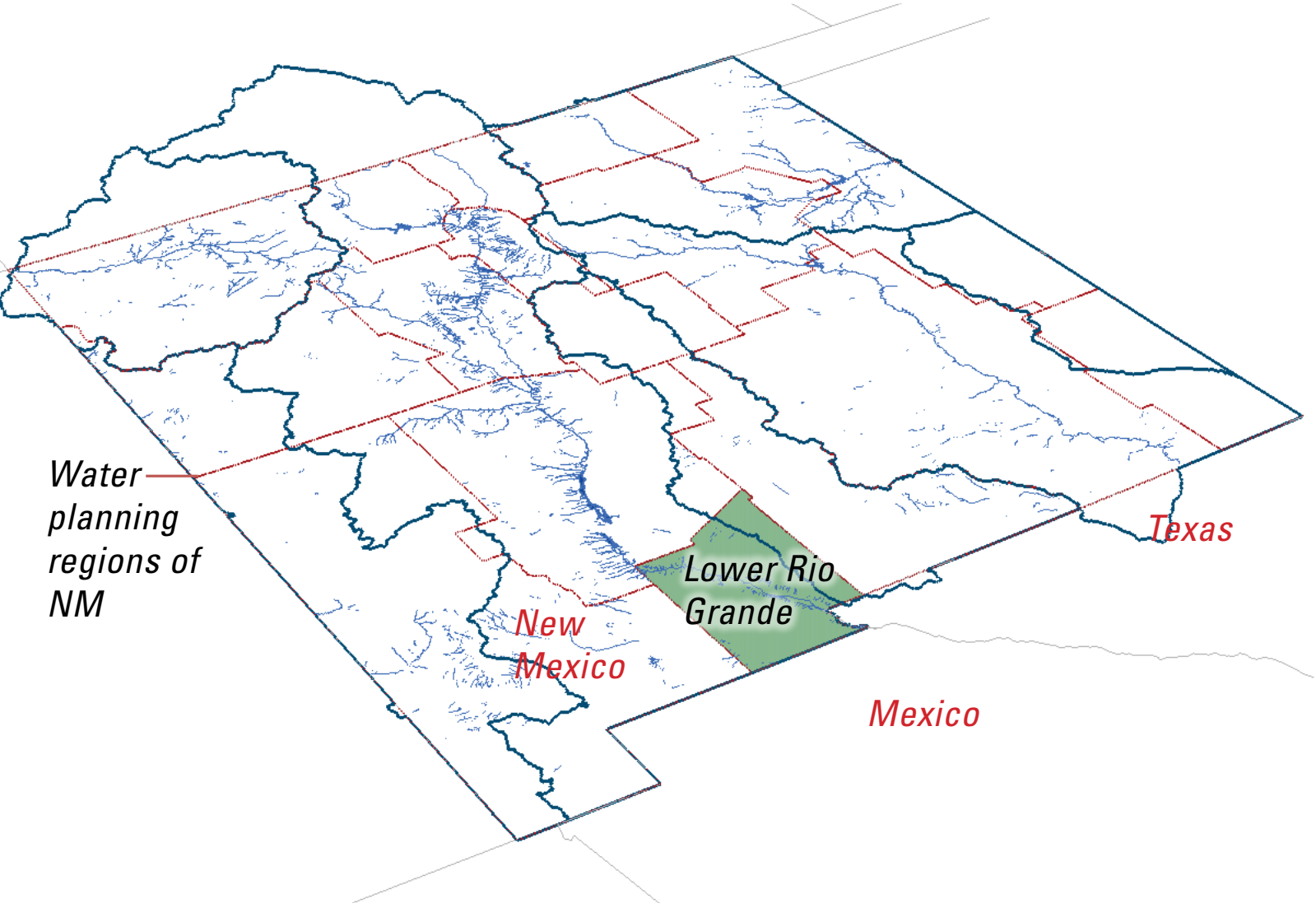
program that will be paired with the environmental water leasing program.

Land Use - Economic

- We have to take a realistic look at what people are being paid for those leases or ecosystem services, ecosystem services impacted, and how those leases are being managed to minimize unintended consequences.
- What we're trying to do is grow a constellation of stormwater infiltration basins throughout the upland urban area in Albuquerque.
- A different way to look at infiltration of rainwater is more of a distributed system of small infiltration basins.
- I really see reuse recycling of water, of wastewater, water efficiency as being the winning strategy.
- We are getting infrastructure money to replace some of the old pipes, which are the domestic water pipes.
- A good investment is laser leveling.
- We really have to be rational about evaluating the capacity. It's like a carrying capacity analysis [to guide growth and development].
- There has to be rational statewide analysis of the crop production, because I still have this nagging feeling that more crops are grown that are more water-consumptive than is needed for economics.
- We understand that unlined channels do have an important recharge benefit in some parts of the district. But, I think we definitely feel there's more upside to having these main arteries lined, so we can get water where it needs to go quickly and efficiently, and allow that spreading on the agricultural land to serve as the place for recharge, rather than through our facility.
- I think what it really comes down to,"What's the local or regional economy?" is the basis for a lot of the crops that we grow.
- I think if there's really an opportunity to encourage farmers to change their habits, to irrigate a crop that requires less water, would be to make sure that there are other sources of revenue that doesn't put them on the track of having to grow the most water consumptive high value crop, because they know they are being compensated for all of the other ecosystem services they provide.
- Protecting people's property is going to become a really important piece of adapting to climate change, where we have more and more flows intermittent, but high impact, high intensity flows, that could potentially come in.

4.4 Lower Rio Grande (LRG)

REGION SUMMARY



LRG DSWB SHORT SUMMARY

- ***Figure 23*** shows annual surface water and groundwater depletions by agriculture in the Lower Rio Grande Water Planning Region.
  - As surface water availability declines, groundwater pumping increases to meet the demand, which exemplifies the dynamics of global reliance on groundwater.
  - Decreasing surface water is also evident in the northern regions of the state, and is evident in reduced storage in reservoirs.
  - Forecasted increasing temperatures in the future will increase evaporation and evapotranspiration (ET) rates, which will increase additional demand for surface water and groundwater.
  - Reduction in groundwater storage can negatively impact groundwater quality and will lower the water table. Lowering of the water table can cause wells to run dry; and in some instances, the shallow aquifer can become disconnected from the surface water system. Ground surface subsidence can also occur.
- In the DSWB irrigated agricultural acreage is sourced from Trends in Irrigated and Dryland Acreages in New Mexico, 1970–1994 (Lansford, 1997) and New Mexico Office of the State Engineer's (NM OSE) Water Use by Categories reports (e.g., Magnuson et al., 2019).
- Crop type data are sourced from Lansford (1997), United States Department of Agriculture (USDA) Quick Stats, and the USDA CropScape Cropland Data Layer.
- Crop types are categorized as either grains, alfalfa and pasture, fruits and vegetables, or orchards.
- Crop specific ET rates are calculated using the Original Blaney-Criddle consumptive irrigation requirement.
- NM OSE's Water Use by Categories reports are used to inform how much surface water versus how much groundwater is used to meet agricultural demand.

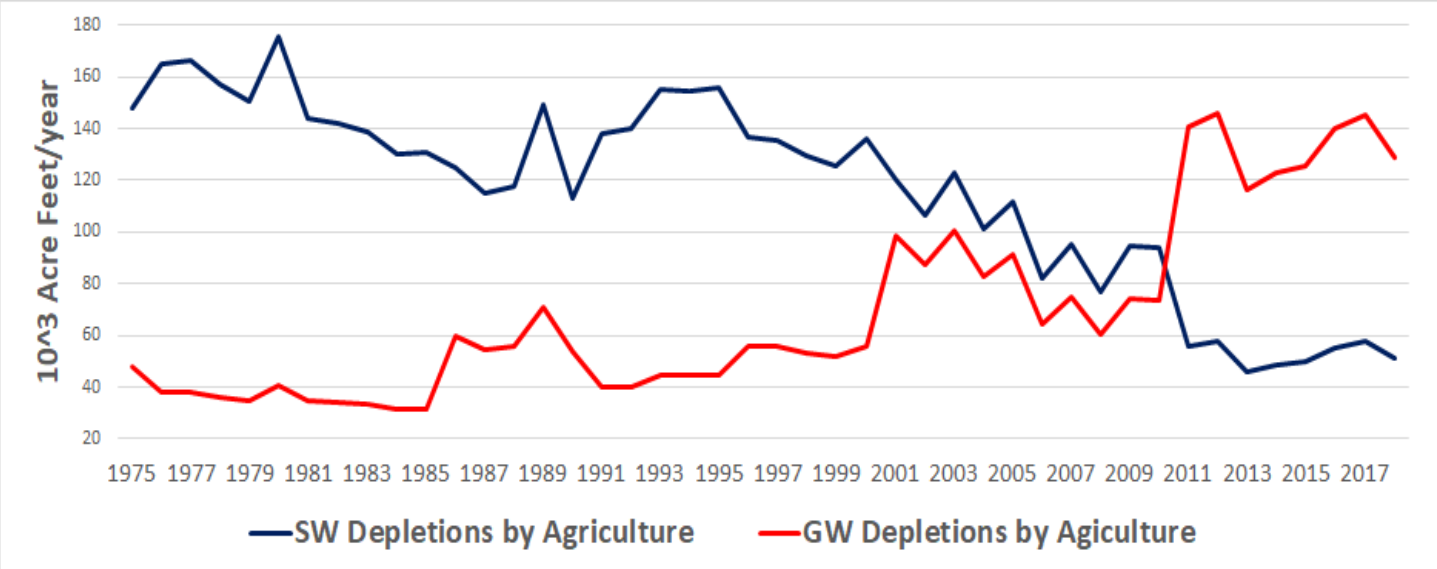


Figure 23. Historical trends of annual surface water and groundwater depletion by agriculture in the Lower Rio Grande Water Planning Region

Lower Rio Grande (LRG) Stakeholder Visions for a Resilient Future, SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- Significantly reduced sediment transport that leads to less sediment reaching the Rio Grande...on a larger timeframe, having to dredge less sediment, haul away less sediment from the river would be measurable.
- ...my vision is identifying the priority areas-the ones that we see we're having to clean out most often- like was mentioned, the Rincon...And so I think rather than starting with a volume, let's start with identifying the problem areas and how we can address them.
- Now the issue we're seeing [with pilot poject sediment basins] is that it's only dry enough during one month out of the year that we can go in there with heavy equipment to clean it out.
- The river reflects the health of the watershed. Everything ends up there. The timing and amount of flows, the diversity of plants and animals that the river supports...My metric for watershed health is the health of native fish in the river.
- My vision for the watershed is that the river is recognized as a stakeholder in watershed health and that we reimagine how to manage the river so that it not just functions to deliver agricultural water or get rid of flood water or runoff, but that it's restored to ecological health and it functions like it once did, albeit on a much smaller scale, with less water.
- To me, a healthy watershed is one that controls erosion but also prevents flooding and in the process of doing that provides open spaces that are good for growing vegetation, which of course in turn provides habitat for the animals lives we have.
- I believe that what falls on our lands should be retained for a period of time. I want it to stay and I work very hard to do that.
- I think every time we have drought we emerge as better managers.
- I'm looking at the question what does a healthy or restored watershed look like? To me it looks a little greener than it is now. That all comes back to my idea of having water be used by the plants or be added to the aquifer, one or the other.

Sociocultural

Governance

- Economic and community resilience, integrated with ecological resilience. Just that sense of the human community being integrated with with the land community....So just as a vision for how we do land management in the future. And the collaborative requirements that are necessary for real resilience.
- I think safety is always going to be a critical value.
- Build a network and a working group to achieve bigger [regional-scale] things.
- Further discussion on the value of these projects to the entire system, to the different entities.
- There are mechanisms that do allow different agencies to work together and leverage each other's right of way, so

LRG, SUMMARY, cont.

to speak. And then maybe, this is going back to that original question of thinking outside the box and collaborating together, we utilize existing mechanisms that allow us to collaborate. And maybe expand mechanisms like that.

- [Watersheds are] starting to be framed up in terms of not only the environment but the economic aspects, the uses that we value on the landscapes and the social aspects. We've got to take those into account in every decision we make.
- Past glory is not our future, we have to discover future opportunities.
- We have an oppotunity, climate change, the prospect of more intense storms plus aging infrastructure, it's an opportunity to rethink everything; how we deal with floods, and it's an opportunity to restore the river.
- I would like to see probably congressionally convened stakeholder process, or possibly under the direction of the Secretary of the Interior, to bring together everybody to think creatively about how do we do this, how do we fix all of these different problems in a way that provides some resiliency against climate change, protects people from flooding, meets the needs of irrigators, and restores the river and the environment generally.

Land Use - Economics

- Build a well-funded campaign [that is similar to how the Rio Grande Water Fund leverages funds].
- Reduce recurring maintenance activities by building a healthy watershed; ecologically and economically, because it's got to benefit everybody in the big picture for it to work.
- I'm a protector of open space. My existence depends on that premise.
- One of my greatest visions and opportunities that I see right now is this water infrastructure package that congress is trying to pass.

ISSUES

Environmental

- If you remove the sediment and the water keeps flowing downstream, it's simply going to pick up more sediment and move it again. So what you need to do is work on increasing the infiltration and reducing the runoff.
- We have sedimentation issues that impact costs of providing flood control. Sediment is reaching flood control structures.
- When we have these kinds of monsoon high moisture years...the invasive plants take over and kind of push out the native plants. I think that's an opportunity that we need to be paying attention to because they don't go away.
- Sediment now is a constant problem that has to be removed continually.
- When we go to remove the sediment from one of these structures, we create a big hole, because the watershed has adjusted to the sediment level in the pooling area. So when we remove it, we all of a sudden create a hole and then we headcut up and it creates more of a problem.
- Water is the biggest shortfall of southwestern ranches and it is the determinant factor in being able to rotate.

Sociocultural

- As a society we take this stuff for granted. We take watersheds for granted.

Governance

- I feel like every agency has programs and every agency has things they are trying to do, but we're all limited.
- Scale problems. There's a scale issue

LRG, SUMMARY, cont.

here about how we use, how we address the problem. It's easy to spend money on a single point, and those are tend to be more expensive, but you can, as an agency, you can just say, "Hey, let's throw money at this and fix the dam or whatever." But that's a single place. The problem with working in the upper watershed is that it's really a diffuse problem.

- Each of us have our constraints by our organizational rules and regulations, policies whatever they are.
- Everyone, we're constrained by state law and federal law, as well as local policies. And I think the key is to be able to work together, to find ways to get things done within the frameworks that we have already put in place, not necessarily to breaking any of the rules or to take someone outside of their levels of expertise, but to find ways within our own processes that we can get things done.
- When we look at the procurement regulations themselves, things get really tricky for public entities in terms of procurement. Can you spend public dollars on private property as an example? Not really.

Land Use - Economics

- Like the railroad bridge, specifically... They clean it up, deport it until you can drive a pickup truck underneath it. And then a couple of years later, you can't walk underneath it. That causes problems with our railroad. The railroad is willing to put effort into that to make sure that doesn't go all the way up and go over the tracks, as an example.
- But when we do see localized flooding, it is because either the drainage channels or retainage ponds are filled with sediment and do require much more frequent cleanup and maintenance.
- There are so many of these orphan structures out there that are really not ever meant to protect people. But because of hazard creep, there's many entities that don't have the dollars to go out and operate and maintain these facilities properly...And that puts the public at risk.
- A general lack of understanding and knowledge of agriculture and food production along with the importance of water.
- They [old dams from the 50-80s] don't meet any of the current design standards.
- One of our [DACFC] biggest challenges is once the water hits these dams, where does it go?
- That was a 100 year event and those dams were basically sized for a 50 year event. So, this is the issues that we come into is that we have all this aging infrastructure that literally cannot handle the events that we have to deal with.
- [when roads are graded flat and maintained that way]... what that does is that it creates arroyos in our roads but it also diverts off slope flows of water and starving those downstream site turf stands. It's a huge issue in my mind.

STRATEGIES

Environmental

- So I think this perspective of keeping the water, the sediment, and nutrients on the landscape...summarizes a lot of what would be healthy for the watersheds.
- Revegetation and other changes to the surface to increase infiltration, combined with spreading the water out.
- What we try to do within EBID is try to capture this water [stormwater], put it

LRG, SUMMARY, cont.

in our system, and then spread it out across the valley floor.
- When we're talking about restoring watershed health we should definitely look at the habitats along the river, particularly wetlands.
- Watersheds are going to play a key role in trying to make these old structures last and to also slow the sediment down so there's less sediment to remove. That also creates better recharge for us.
- That's one of our key things in the city due to climate change as we get hotter and longer hotter periods, we need to have more vegetation which helps keep us cooler.

Sociocultural

- A lot of people, when I talk to our legislators, don't understand we're in the Chihuahuan Desert, our watershed is completely different and I think there's an educational opportunity to try to do exactly what Connie shared with us today.
- Educate the general public on the importance of the watershed and the value of water for our future generations. I think the more we can get the general pubic involved in seeing what the issues are and how they can be solved, that will go a long ways toward getting Congress or the legislature, the local officials

Governance

- In order to address all the different issues, I think we have to identify them, prioritize them and plan it out. Then build upon that.
- So that might be a way to prioritize these multiple efforts to have multiple objectives. Thinking of the watershed scale.
- It makes sense to me to look, as you were just saying, where the problem areas are and look upstream from that... maybe prioritizing safety areas would be one way to try to narrow it down.
- Maybe review the programs we already have and other agencies have started. And what re-progress ahead in certain projects. And make that a project priority.
- If we knew everything that each other was doing, then we would also start to see where some of the things that we're doing can help each other....And that coordinated effort then becomes that much stronger.
- Just as an example, the Land Office is meeting monthly with the Last Cruces BLM, and we just spend an hour a month and share joint projects that we're doing together...And it's been incredibly helpful just help us both know what the other is up to and how can we collaborate, to get things done differently and better. So perhaps a face-to-face every once in a while conversation like this would be really helpful.
- But I think that sharing projects and showing how all of those efforts compound over time is what will really show evidence of what we're doing. Not just having conversations about them.
- So that implies engaging a longer term sort of community training effort.
- Scaling these problems in terms of what is it going to take at the watershed level?
- [Regarding DASWCD's Master Conservation Program] We're engaging volunteers to participate in some of these projects that are being described in the upper watershed, the green infrastructure kinds of projects that we're looking to engage volunteers to actually do some of that work. I think the bigger side of that is not just the onsite projects that they will accomplish, but I think the important element is also the educational and people in the community will be able to help advocate for the watershed itself.

LRG, SUMMARY, cont.

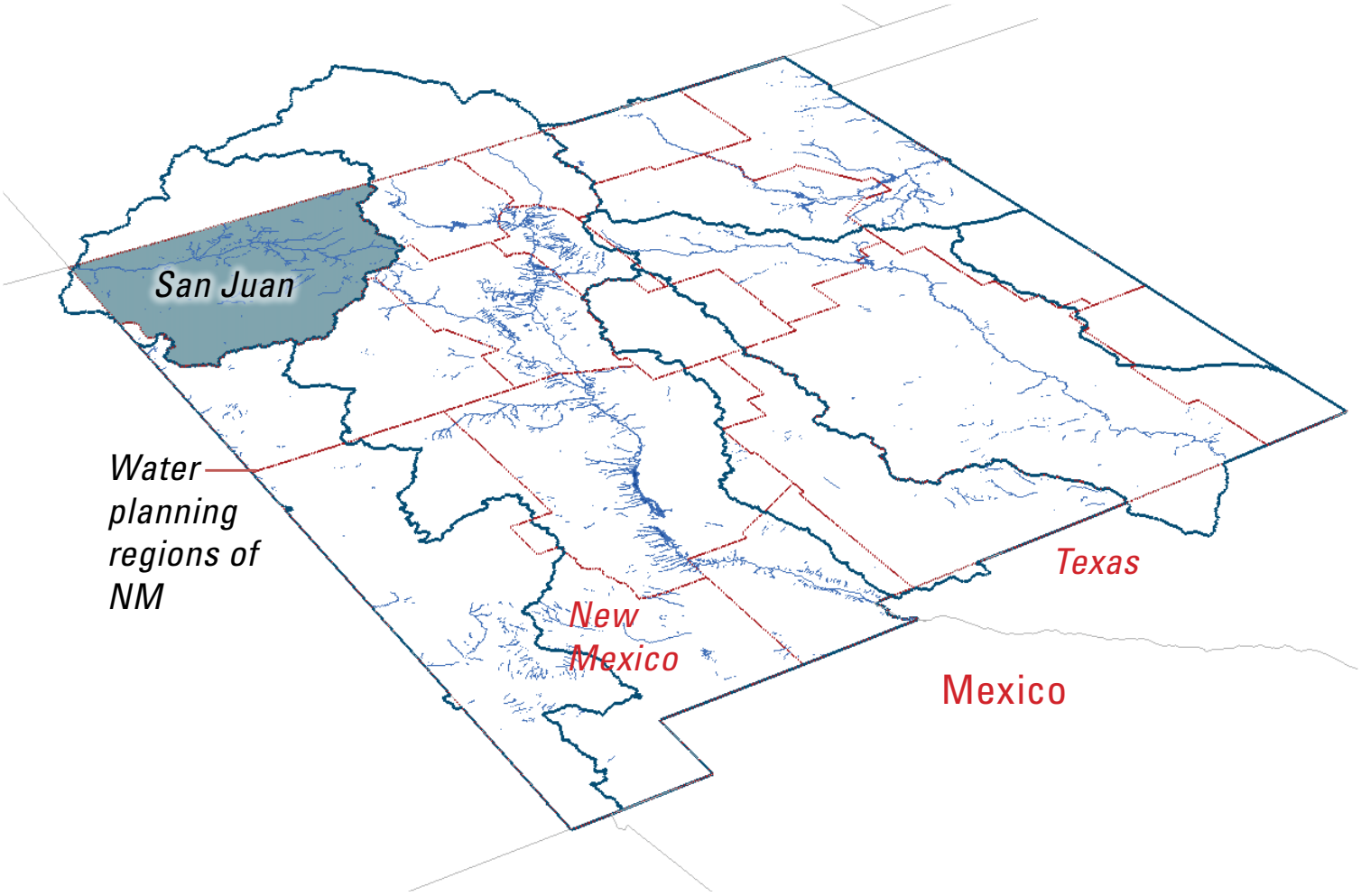
- Strategic timing, preparation is a key, understanding where this water [stormwater] is coming in, and then how to manage it, that's our goal is to actually prepare for these events and then deal with them.
- We could manage irrigation releases in a way that we could manage the channel of the river itself to allow more for overbank flooding. There's been some discussion of doing that but it really hasn't been implemented on very much.
- You have to have a great metering and monitoring program in place so that you can use both of those systems to coordinate together the connectivity that's between the river and the aquifer because they are one water source, it's connected [regarding how to better manage surface water and groundwater together].
- One of the things that I think the state could support us on is helping us develop a managed aquifer recharge program where when we do recharge water into the ground people that have rights to be able to recover it, that works for everybody as well as the healthy watershed.
- Over time, we [EBID] began to understand the importance of capturing stormwater [wild arroyo water]...So we made a determination, and it was approved, that we could capture as much water as we cold upstream, without affecting the downstream users water right.
- It takes dollars and it takes support. And so, number one you have to get public support for any of the projects that we do.
- We need to get our legislators involved, we need to get our youth involved in terms of managing this once us older guys are moving out into our own pastures. I think it becomes really important that we pass these ideas that we've been working on to younger folks who will then take the ball. Because these watershed projects are not short lived.
- Congress needs to be involved...I would like to see Congress reauthorize the Rio Grande project to be a multipurpose project.

Land Use - Economics

- ...the Placitas Arroyo and the Rincon Arroyo, huge watersheds. They don't have any flood control structures on them or sediment control in the watershed. But addressing the issues in the watershed would both address sediment, water issues, improve safety like Devina was saying, and also reduce costs.
- ...but I think I'm the only rancher in his district that has developed an algorithm that basically directs our rotation of cattle in a rest-rotation process. Extremely important in health and the long term sustainability of these lands.
- Red cattle are more heat tolerant... But more important than anything, we want a cow that can calve on her own...I want cattle that will convert at 5.7:1 or better. [lbs of dry matter:pound of grain in calves].
- So there's a bunch of federal agencies that if we could cost share with them or cooperate with them, then certainly I think there's an opportunity to improve our watersheds.

4.5 Northwest NM

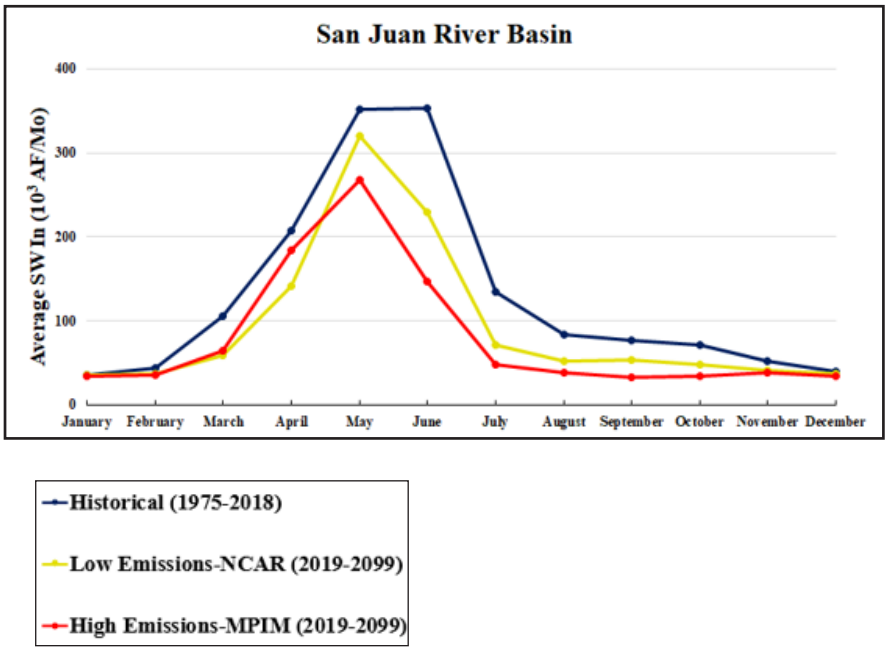
REGION SUMMARY

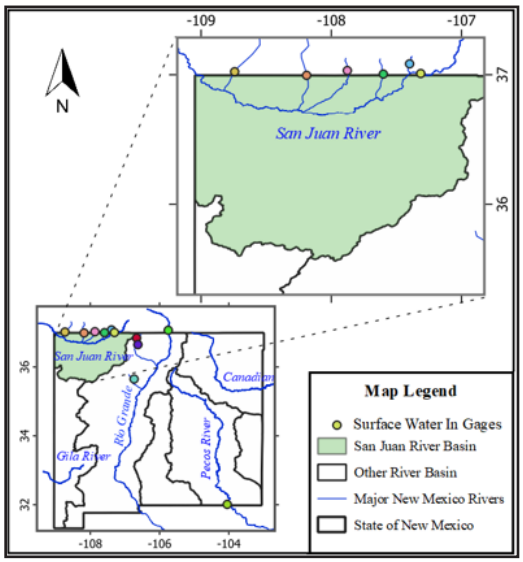


Northwest NM

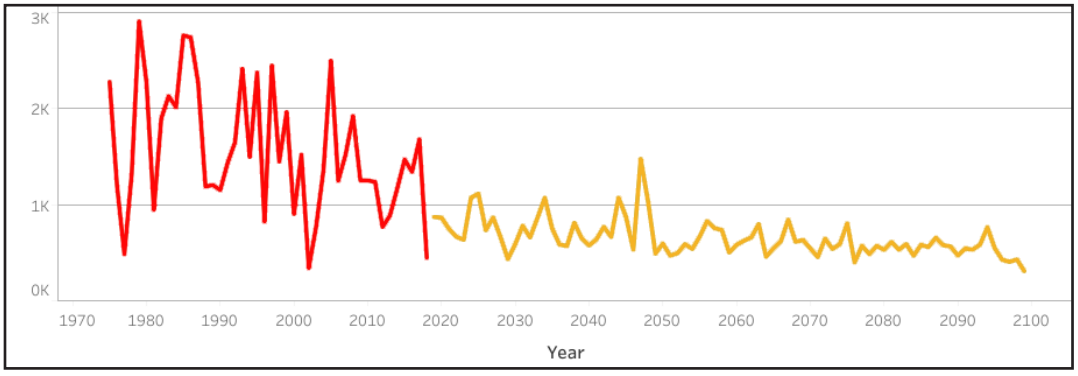
DSWB SHORT SUMMARY

a) Projected seasonal surface water inflows into the San Juan River Basin





b) Historic and projected annual surface water inflow to San Juan Water Planning Region, high emissions climate scenario



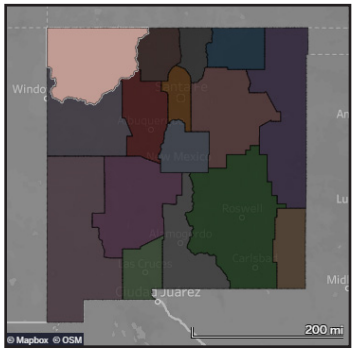


Figure 24. Significant dynamics in the San Juan River Basin and WPR

Northwest NM

DSWB SHORT SUMMARY, cont.

Figure 24a compares the average monthly surface water in from historical years 1975-2018 against the average monthly surface water in from a low and high emissions climate model scenario from the projected years 2019-2099.

- Both the low and high emissions climate model scenarios predict a shorter and sooner peak surface water in flow than was observed historically.
- Both climate models predict that less surface water will be available in the future in the San Juan River Basin.
- The high emissions climate model scenario predicts less surface water will be available than the low emissions climate model scenario.

Figure 24b shows historical surface water in averaged annually from 1975-2018 and projected surface water in averaged annually from a high emissions climate model scenario from 2019-2099.

- Historical annual surface water in generally shows a declining trend.
- Annual surface water in for a high emissions climate model scenario is projected to be significantly less than historical flows and shows a declining trend.
- Declining surface water into the San Juan River Basin presents challenges for the cities of Farmington, Aztec, and Bloomfield, which are surface water dominant domestic, commercial, municipal, and industrial water providers (Dunbar et al., 2022).

In the DSWB, historical surface water in estimates are data-based from USGS stream gage measurements. Future surface water in estimates are based on climate forecasts for flows that originate outside of the state. The gages used for both historical and future surface water in estimates are indicated on the upper map.

Northwest NM

SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- Protecting the quality of the water resources of the region for a variety of water uses and users.
- Water users will have to develop the ability to change and adapt to dimished surface water inflows.

Sociocultural

- Serving the water utility's users by providing an adequate supply of high quality water.
- Recognizingthat we all live and die by the fact that we share these water resources that are developed along the river there.
- The coalitions that we have put together have worked really well in working on water quality and water supply as well.
- Create more opportunity to conserve water and reduce pollutants that are going into that water supply by offering classes to homeowners on rainwater harvesting, wildlife habitat, invasive weeds, and soil health.

Governance

- Making deliveries from Navajo Reservoir to satisfy compact agreements concerning the CRSP, NIIP, and Endangered Species Act.

Land Use - Economics

- Being able to continue irrigating farmland into the future and maintain the value of agricultural land.
- Providing water resources that are suitable for all water users within the region.
- Working with the farmers and ranchers on really active stewardship and to find win-win solutions that help with agricultural production, help meet their goals, as well as doing what's best for our soil and water resources in the area.
- I don't think we're going to be as reliant on oil and gas and coal as we have been. Maybe we will be developing recreational uses of water, and shifting to more of a retirement area.

ISSUES

Environmental

- I'm a little concerned about our future irrigation water and the loss of it due to lack of snowfall
- Bare soil in cropland isnt ready to absorb rain events, so it just washes away the top soil and puts nutrients and bacteria in the rivers.
- If we don't have enough runoff, releases from Navajo Dam have to increase to satisy water users, exceeding our inflows.

Governance

- Concern about sending water down the river for other uses
- The current permitting environment makes easier to just build one giant stormwater retention basin, as opposed to twenty small structures up upstream in the watershed.
- There is no hard administration in the Colorado River basin right now.

Northwest NM

SUMMARY, cont.

Land Use - Economics

- Networks of oil and gas roads are cutting down channels, causing downcutting in arroyos. when it could be infiltrating into the soil.
- The infrastructure that we have is not going to be able to keep up with more precipitation coming as rainfall rather than snowpack runoff.

STRATEGIES

Environmental

- Research is needed to investigate how we can adapt to an environment where runoff is coming earlier in the year and increasingly as rainfall rather than snowmelt runoff.
- There will have to be some shift in how we deal with the infrastructure to capture these big, severe monsoon events would become more sporadic, but higher in intensity.
- Implement more water reuse to maximize the use of existing water resources.

Sociocultural

- Forming collaborations and partnerships with entities across the region to address surface water concerns.
- Implementing restoration projects slow and spread the flow of water across the landscape of oil and gas roads criscrossing the upper watersheds.
- Through education and outreach, make the practices that are used in agriculture on a larger scale available on the homeowner scale, so anybody could feel empowered to do that work and make improvements in their own backyard.
- Work together to recognize that we're looking a multi-demand situation a from both a use and availability standpoint
- Invest in education that promotes water sharing amongst users.

Governance

- Implementing planning documents and restoration projects to restore and protect water quality
- Making use of water from the San Juan River for municipal purposes
- Find ways to get blanket permitting to do a lot of upland arroyo slow-and-spread strategies in an upper watershed.
- Possibly reopening compact negotiations for the Colorado River to reflect this drier outlook.

Land Use - Economics

- Implementing soil health and recharge strategies to help the land, water, and agricultural producers
- Develop more and improved water storage and conveyance systems that reduce water loss, such as a pipeline from Lake Night Horse.
- Utilizing NMED's River Stewardship and Nonpoint Source Programs to conduct and revise watershed-based planning and restoration projects in the watershed.

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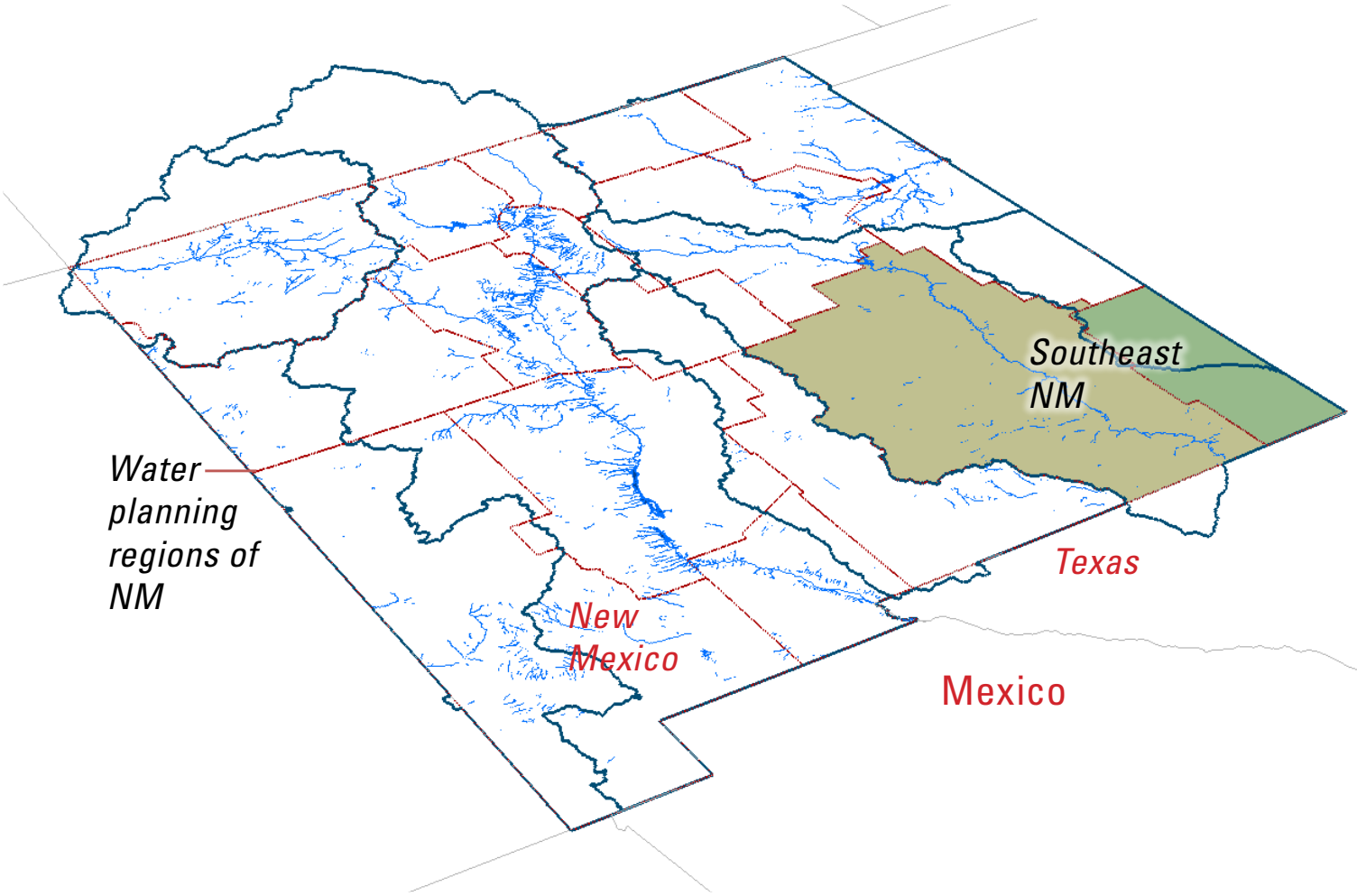
4.6 Southeast NM

REGION SUMMARY



Southeast NM DSWB SHORT SUMMARY

Groundwater storage comparison between Lea and Socorro Counties

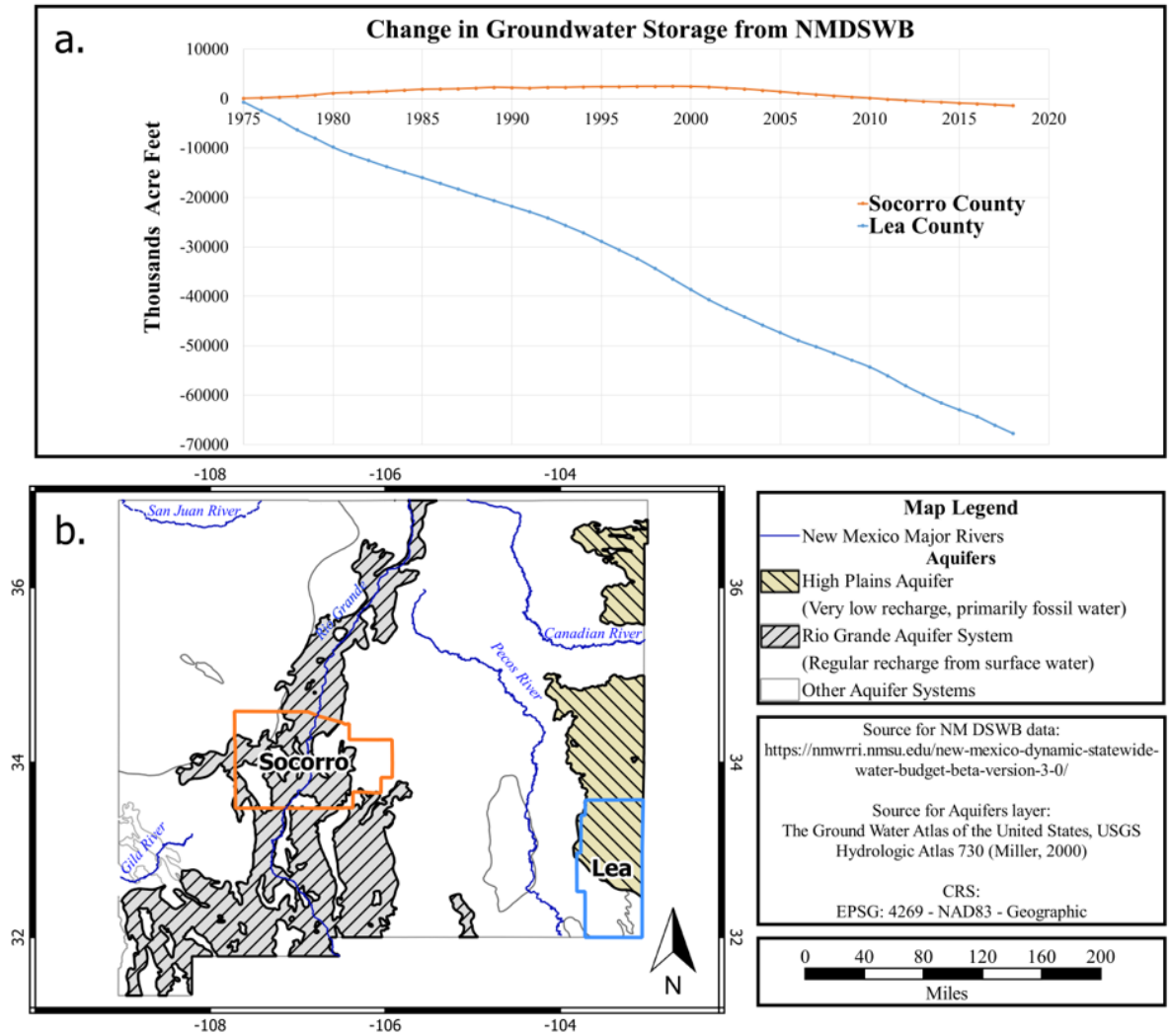


Figure 1. Comparison of groundwater storage in two different aquifer types: a. Annual change in groundwater storage for two different counties from the NM DSWB, b. Location of example NM aquifers with different recharge rates.

Figure 25. Cumulative groundwater storage change for Lea and Socorro counties.

Southeast NM DSWB SHORT SUMMARY, cont.

description

- ***Figure 25*** shows cumulative groundwater storage change for Socorro and Lea counties.
  - Groundwater storage in Socorro County has generally been stable from 1975-2018. The Rio Grande River runs through Socorro County, which results in recharge to the aquifer.
  - There has been a slight decline in groundwater storage in Socorro County that correlates with the onset of the most recent drought in 2002.
  - Groundwater in Lea County has been steadily declining from 1975-2018.
  - Since there is no major river system in Lea County, most of the groundwater available in the county is fossil groundwater that receives little to no recharge from the surface.
  - Reduction in groundwater storage can negatively impact groundwater quality and will lower the water table. Lowering of the water table can cause wells to run dry; and in some instances, the shallow aquifer can become disconnected from the surface water system. Ground surface subsidence can also occur.
- DSWB groundwater storage change estimates incorporate groundwater storage change values from Rinehart et al., (2016) where available. Currently, the DSWB does not estimate total groundwater storage and only estimates groundwater storage change. Groundwater inflow and outflow from one MBAU to another is currently assumed to be zero.

Southeast NM Stakeholder Visions for a Resilient Future

SUMMARY

VALUES and VISIONS FOR THE FUTURE

Environmental

- Maintaining habitats for regional wildlife
- In the Pecos Valley, we are blessed to have an Artesian aquifer with an incredible recharge ability.

Governance

- To develop a conservation program with the ability to be more reactive to drier and wetter periods.
- The PVACD board of directors are all from the Pecos Valley, and receives local input.

Land Use - Economics

- Begin to move away from oil and gas and potash as big employers and transition to other industries that can utilize these non-traditional waters, such as brackish and municipal wastewater
- Maximize the use non-traditional water resources, to minimize freshwater consumption, and therefore prolong the period of having fresh water available in those regions.
- Water is money to those who depend upon it for their livelihood.
- Encourage and promote additional water reuse where appropriate and safe in a way that protects public health and the environment.
- Getting produced water desalination to a price point that is competative with disposal.
- Through local groundwater management districts, soften the landing of diminishing groundwater in the region, while transitioning to a dryland farming system.
- Metering and water master are funded through a mill levy in the PVACD.
- Farmers don't want to see farmland taken out of production forever through the PVACD conservation plan.
- Small water systems don't have a lot of capacity, but could benefit from infrastructure and innovation to conserve water.

ISSUES

Environmental

- Southeast New Mexico sits at the edge of the Ogallala Aquifer, so fresh groundwater supplies will become more dire.
- There are times when there is little to no flow in the Delaware River, therefore impacting wildlife such as the Texas Hornbill
- Understanding the link between the Artesian aquifer and surface water, while coming up with responses to limited inflows.
- Surface water conveyance losses due to evaporation.
- The vast majority of the groundwater system remains unstudied, and therefore not understood.

Sociocultural

- Low barrier to entry and lack of standard operating procedures for water companies in the Permian Basin result in poor operational water management.

Southeast NM

SUMMARY, cont.

Governance

- The expectation that oil and gas producers are going to see additional limitations on the use of freshwater for operations.
- The right of capture law for groundwater in Texas is not going away anytime soon, making transboundary groundwater cooperation unlikely.
- Diminished surface inflows increase the chance of a priority call from senior waters rights holders downstream.
- A lack of resources at the Office of the State Engineer to settle disputes, process applications quickly, and enforce water use.

Land Use - Economics

- Small public water systems have been negatively impacted by cannabis production using drinking water.
- State agencies in general are under-resourced for enfororcement and compliance.
- The use of domestic wells for other-than-domestic crop growing.
- Groundwater is often the easiest and quickest option for oil and gas producers, but not the most economical.
- Traditional groundwater conservation is a one-way street that takes farmland out of production permanently

STRATEGIES

Environmental

- Using the characteristics of the Artesian aquifer to absorb flood events and recharge the aquifer.
- Find better ways to get the word out about restoration programs and get more people interested in those programs
- Utilize stormwater capture to replenish groundwater.

Governance

- Withdrawing water from production when the conditions dictate that's necessary, and then put that water back into production during times of plenty, providing a mechanism to react to changing conditions.
- Automate some of the state regulatory processes and make permitting more efficient
- Implementing local groundwater management distracts with a funding mechanism and whose boundaries correspond to the underlying aquifers
- Promote use of brackish and produced water by mandating that oil and gas producers not use fresh water for their operations.

Southeast NM

SUMMARY, cont.

Land Use - Economics

- Being able to make use of other alternative water resources, such as wastewater reuse, in order to slow the decline of groundwater.
- Find ways to promote more use of the state revolving fund to increase water reuse infrastructure in the region.
- Promote crop changes that work for the growers in the region and don't negatively impact their livelihood, but help with water conservation through more potential reuse.
- Working with the Produced Water Research Consortium or an organization like that, to model the cost of reuse.

4.7 Water Conference Breakouts

AGRICULTURE SUMMARY

What are your greatest concerns related to 10-25% less water supply by 2070?

- Need to share climate knowledge to the public in a way they can understand
- Change in growing seasons, monsoonal patterns, and adaptation of management strategies for farmers
- Land moving out of agricultural production and being sold because farming not eco-nomically viable. How will land be managed?
- Equity and disproportionate impacts to rural farming and ranching communities from climate change and climate change mitigation measures. How we support these traditional communities/ lifestyles through this? How do we determine what is equitable and who makes the final determination?
- Groundwater pumping and how it is going to affect the system
- Need for conjunctive water use management
- For how long is it going to be sustainable growing crops?
- How do we translate climate change data to management policy? Example: Ranchers are bearing brunt of climate change on USFS allotments – stubble height requirements haven't changed in decades, in spite of a changing cli-mate. Also, USFS is long overdue in updating forest plan revisions.
- Biggest concerns are feed prices and water quality related to changing climate.
- Changing composition of forests; shrinking meadows for cattle to graze

Based on these concerns, and challenges to addressing these concerns, what are your suggestions for how to achieve long-term resiliency?

- Lack of resources – funding, personnel
- We are missing some essential data
- Need for changes in existing regulations, new regulations, how to better streamline implementation
- Need for more consultation with traditional communities and acknowledgement of traditional knowledge on water sharing, etc.
- Recognize existing water sharing/ shortage sharing agreements
- Multi-year funding is needed for acequias projects
- More studies are needed
- How the system (groundwater – surface water) is going to be affected
- Between available data and actionable recommendations, there needs to be modeling effort to conduct program evaluation. Project will start next year to develop strategies to make crop farms on NM's high plains more drought-resilient.
- Changing crops and/or changing location of farm
- The cost of fallowing land is that it creates dust and invites weeds, which outweighs the benefit of aquifer recharge if available precipitation is low. Flood irrigation in some places amounts to 40% recharge. Policy must be made based on available data and/ or additional research needs to be identified/conducted.
- Groundwater needs to be better managed. Working on a study involving

Water Conference Breakout

AG SUMMARY Cont.

EBID and other irrigation district farmers, gathering all sorts of data including social.

- We do not have data on crops, distribution, consumptive use over time in the Mesilla Valley in addition to spatial ground water levels and pumping in the valley. etc.

What challenges do you anticipate will affect our ability to address those concerns in the future?

- Highlight successful farming and ranching practices that conserve water in each region so these practices can be replicated across the State.
- Increase funding for programs (state and federal) that assist with education and implementation of soil health practices, water conservation, etc. Funding for the cost-share match, if it has to be cash (role for NGOs here?).
- Acknowledge that agriculture is not the enemy and acknowledgement that the agricultural community is critical to climate change mitigation and leaders of climate change mitigation. Education and awareness of the agricultural community's contributions to climate change mitigation. Include the agricultural community in discussions - don't exclude them or dictate to them.
- Funding for a just, equitable transition to a variety of water conservation/ climate change mitigation practices in agricultural production.
- Contribute to aquifer recharge
- Groundwater monitoring
- Need for watershed agreements
- Get climate change data to federal land managers (BLM/USFS) so they can incorporate it into their management policies with their grazing permittees.
- Between available data and actionable recommendations, there needs to be modeling effort to conduct program evaluation.
- Soil health including microbiology and fungi can improve the water holding capacity of the soil and reduce irrigation water needs
- Importing water by rail may be option to look at. Unlike pipelines, the infrastructure is already in place.
- Studies have found that flood irrigation can have up to 40% recharge rate, which is worth considering when proposing irrigation system changes.

Water Conference Breakout

WATERSHED HEALTH SUMMARY

What are your greatest concerns related to 10-25% less water supply by 2070?

- Loss in river ecology and habitat (example: Rio Grande Riparian Connectivity Project is working to support habitat and habitat connectivity)
- Dropping aquifer levels and impacts to groundwater users along with baseflow to river systems
- Rangeland health. Management affects recharge/runoff
- Conditions resulting in increasing need to sell off cattle
- Need for education/resources for rangeland managers to support best practices for all constituents
- Continual drought, issues with increasing conflict and inability to share
- Concern for both ag and spiritual/traditional uses
- Spread of invasive species
- Increased bare grounds in uplands and valleys, along with erosion, leading to sediment transport.
- Possibility of permanent landscape aridification is concerning
- Vegetation density is a potential fire risk,
- The primary concern for downstream users that are groundwater dependent is getting efficient infiltration of upslope precipitation. Decrease in infiltration would have major impacts on groundwater users downstream.
- Concern over how ag community could remain resilient under different upstream watershed conditions
- Fallowing programs might negatively impact local economy.

What challenges do you anticipate will affect our ability to address those concerns in the future?

- Need to learn to cooperate across the state or within regions.
- Need for funding of solutions.
- Tribal water rights not being resolved.
- Increased enforcement needs, monitoring use/waste, and need for better data.
- For upland restoration/infiltration, people are uncomfortable with increased wildlife that might be attracted to these restoration sites
- For aquifer recharge programs, regulatory and best practices challenges
- The water rights/rates structure does not incentivize water conservation in agriculture
- Getting people to do this work in general, takes a lot of people to address the problems.
- The impact of wildfires and challenges of rebuilding/recovering natural infra-structure/infiltration capacities in post-fire conditions
- High water users such as juniper and various weeds tend to take over in post-fire or drier conditions, which poses a challenge for good watershed management
- Addressing watershed/landscape issues is very expensive
- Lack of legislative interest/prioritization of water issues, despite their importance.
- One barrier is the readiness of groups to use money when it does become available.

Water Conference Breakout

WATERSHED HEALTH SUMMARY, Cont.

Based on these concerns, and challenges to addressing these concerns, what are your suggestions for how to achieve long-term resiliency?

- Aquifer Mapping for greater understanding of our aquifers
- Water Data Access and Modeling
- Education and tools to help people know where their water comes from.
- Regulatory/policy changes to encourage conservation and reuse.
- Infrastructure and management plans for better capture and release of snowmelt, storm waters
- Work together to prioritize funding needs and be prepared to receive funding when available
- Taking stock of resources and coordination of resources, foster more collaboration
- Working specifically with school-age children as a pathway for getting information into and engaging the community.
- Increased aquifer recharge practices statewide. Start with wetland-type/surface spreading projects which do not have reuse assigned and move to a comprehensive and flexible aquifer recharge program for the state.
- Create a suitability map for the state showing areas that are suitable to start and better inform aquifer recharge projects
- ROI analyses to help prioritize investments
- Streamlining the environmental compliance projects would facilitate resilience projects
- In outreach, we should be sure to think critically about presentation/framing to be more appealing to landowners. Rural landowners are more likely to respond positively to a check dam/wetlands project framed as supporting infiltration to local groundwater than if the same project is framed as creating wetlands.
- More certainty in model predictions and additional research on how to deal with flashiness in models.
- Create ecosystem service payment programs to incentivize farmers to reduce water demand while keeping vegetative cover on their fields
- Create a comprehensive wildlife corridor map

Water Conference Breakout

PUBLIC WATER SYSTEMS SUMMARY

What are your greatest concerns related to 10-25% less water supply by 2070?

- Reconciliation of allocated/promised water vs. actual water resources available
- Intersection of water quality and water quantity (source water protection)
- Aging and lack of infrastructure
- Need for improved monitoring and forecasting of hydrology and water accounting
- Ambiguity in regulatory requirements on aquifer storage and recovery, indirect potable recharge, and direct potable recharge
- Metro areas may be ok but what about rest of state
- Importance of source water protections

What challenges do you anticipate will affect our ability to address those concerns in the future?

- Resources: funding, staff, modernized tools, etc.
- Agency silos (e.g., NMDOH interest in drinking water quality but not seated at the table)
- Lack of up-to-date information and data; address inputs being used by historical data models
- Continuity of expertise
- Linking of land use and water planning
- Technical capacity to attract funds
- Uncertainty on length of viability for alternative water sources

Based on these concerns, and challenges to addressing these concerns, what are your suggestions for how to achieve long-term resiliency?

- The State of New Mexico needs to comprehensively evaluate the costs for projects that have been proposed or mandated (e.g., Water Data Act, Produced Water Act), what the status is of funds (e.g., Water Trust Fund), and the need/demand.
- Local involvement to help put pressure on state legislature to discover needs and why funding certain projects is important
- Regionalization has a role here and has been successful in certain parts of NM, but some communities view it as a threat; we need to find a way overcome that view.
- Promote/advance agreements to allow better shortage sharing in each basin between agricultural users and public water systems.
- Improve funding for source water protection and collaboration among different departments.
- Promote conservation
- Increase reuse of water through improved understanding of water quality concerns and provide funding to implement projects.

Water Conference Breakout

COMMERCIAL AND ENERGY SUMMARY

What are your greatest concerns related to 10-25% less water supply by 2070?

- Large secure volumes for developing their leases. NM may be moving in a direction where there isn't a secure water supply (sometimes this is a lack of diligence on water right) regulatory certainty
- What does liability look like for produced water reuse long-term? Producers don't know what liability looks like on the producers end if produced water beneficial reuse happens
- Security of the water supply producers have invested in. Water supply concerns cause producers and investors to pull out or lose investment. (Due diligence)
- New Mexico has not been in the forefront of reuse
- Illegal dumping
- Disparities between Texas and New Mexico with groundwater regulations
- Pumping water from Texas into NM
- Drought in Northwest New Mexico, since they rely on surface water
- Water quality issues like the Gold King Mine Spill

What challenges do you anticipate will affect our ability to address those concerns in the future?

- The US is the worst at managing water
- Different groundwater laws between states.
- No interest in large-scale projects. Other countries look at total resource projects
- Land ownership
- some ranchers feel like they are left out from being able to sell their water.

Based on these concerns, and challenges to addressing these concerns, what are your suggestions for how to achieve long-term resiliency?

- List water supply risk (supply and quality)
- Provide a more stable operating environment for operators
- Find more options for water storage
- Water use offset markets to correlate with energy programs
- Tax deduction at the state level for water offset for water infrastructure project
- Carbon uptake by rangeland restoration using treated wastewater
- Geologic carbon sequestration
- Enforcement on water supply
- If produced water becomes a reality (legitimate source for beneficial use), the State of New Mexico could help match make corporate water offsets with conservancy efforts.
- The State can develop a water or carbon corporate offset market or water/carbon credits
- State support ranchers with water regulation and mineral rights where ranchers can sell water like Texas ranchers
- Help invest in treatment technologies that exist that are competitive with disposal
- Regulatory structure the producers can count on for security of water supply

Water Conference Breakout

OUTDOOR RECREATION SUMMARY

What are your greatest concerns related to 10-25% less water supply by 2070?

- Education, outreach: means bringing people to the river, connecting to that resource, hard to quantify. Popularity of wild and scenic on the chama
- Significantly reduced snowmelt, reservoir conditions will change, different experiences, EBID, recreation for skiing industry
- Increased user conflicts with navigable water issues on the table. Conflict between agricultural and recreational users.

What challenges do you anticipate will affect our ability to address those concerns in the future?

- Political divides,
- Not understanding why there might not be water in the river at certain times of the year.
- Urban-rural divide

Based on these concerns, and challenges to addressing these concerns, what are your suggestions for how to achieve long-term resiliency?

- Show and describe human perspective of river use, and evolutions of other uses coming online; Move beyond framing of competing uses
- grant sources to promote water recreation, similar to Colorado Water Plan grant: funding from statewide and regional level
- Work done in Colorado, user groups brought together users to the table in a collaborative way. A roundtable process passed by the legislature. This included a voluntary group, made up of ag, wetlands, riparian, small municipal, etc.

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6. APPENDIX OF FULL TRANSCRIPTS

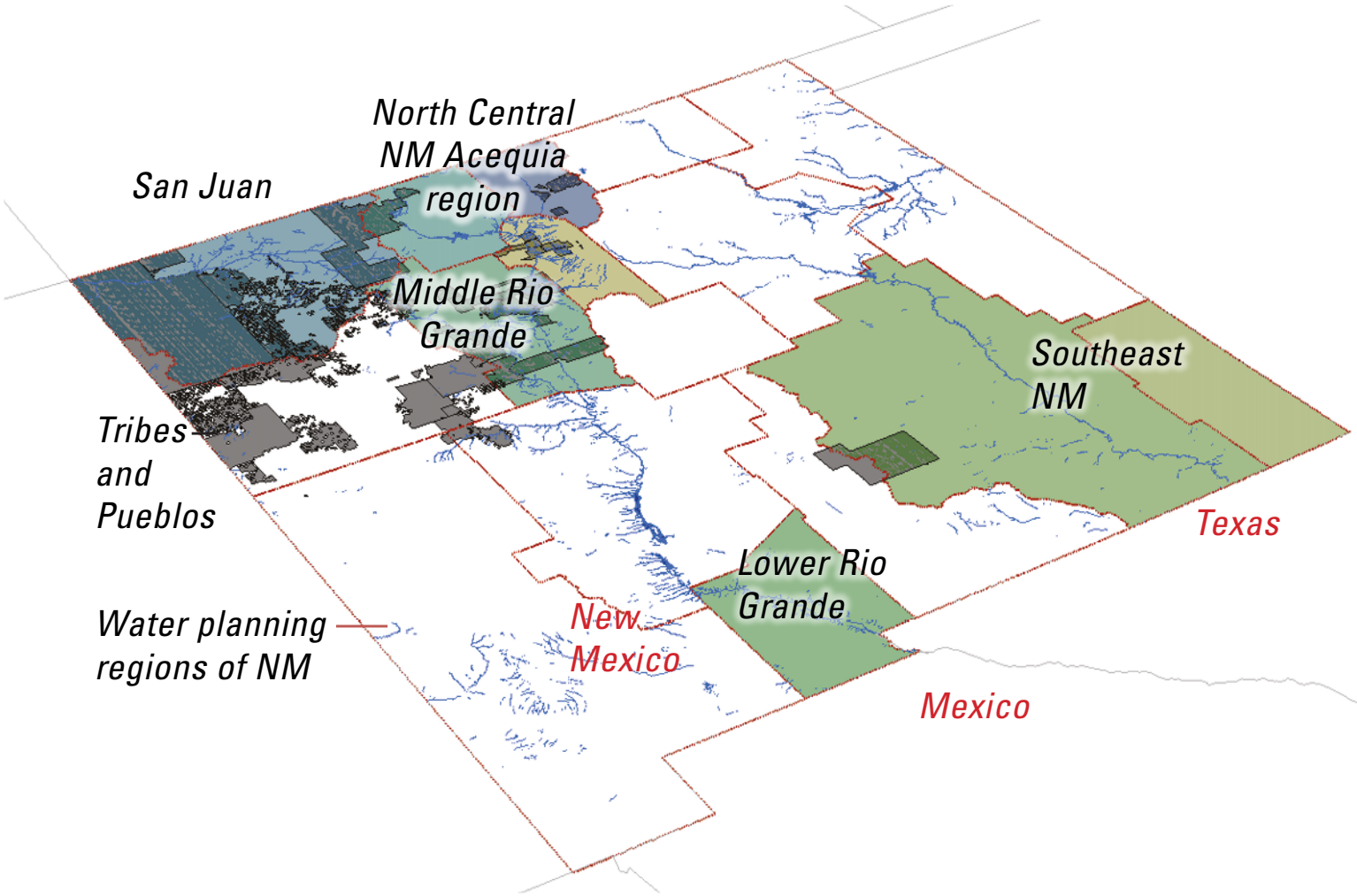
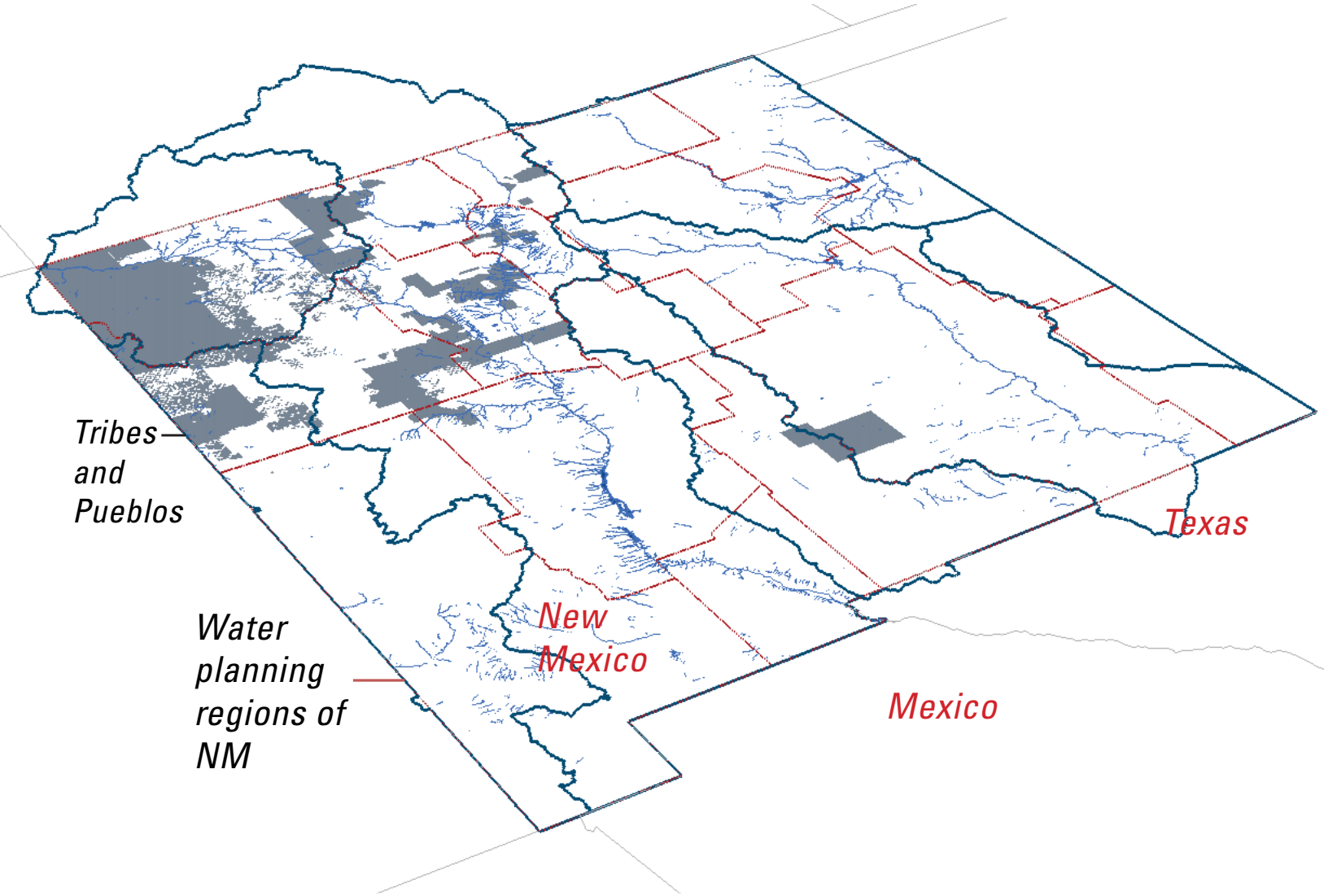


Figure 1 (as appears on p. 2). Community conversations on regional water dynamics and stakeholder visions for a resilient future occurred in these regions and communities.

6.1 Tribes and Pueblos

FULL TRANSCRIPTS



Tribes and Pueblos Stakeholder Visions for a Resilient Future

Focus group #1 Participants

Dino Chavarria,
Pueblo of Santa Clara
Office of
Environmental Affairs
Director

Jude Chavarria,
Pueblo of Santa Clara
Office of
Rights Protection
Director

Jeanette Joe,
Navajo Agricultural
Products Industry
Operations Supervisor

Greg Jojola,
Pueblo of Laguna
Environmental and
Natural Resources Dept.
Acting Director

Tammy Montoya,
Pueblo of Santa Ana
Department of Natural
Resources
Hydrologist

Phoebe Suina,
High Water Mark, LLC
Owner and Project Manager

Tribes and Pueblos Stakeholder Visions for a Resilient Future

Focus group #2 Participants

Joseph Abeyta,
Pueblo of Tesuque Environmental and Natural Resources Dept.
Water Quality Technician

Myron Armijo,
Office of the State Engineer
Tribal Liaison

Jude Chavarria,
Pueblo of Santa Clara Office of Rights Protection
Director

Jeanette Joe,
Navajo Agricultural Products Industry
Operations Supervisor

Greg Jojola,
Pueblo of Laguna Environmental and Natural Resources Dept.
Acting Director

Sage Mountainflower,
Pueblo of Tesuque Environmental and Natural Resources Dept.
Director

Adam Ringia,
Pueblo of Laguna Water Rights Office
Manager

Blane Sanchez,
Pueblo of Isleta
2nd Lieutentant Governor

Ryan Swazo-Hinds,
Pueblo of Tesuque Environmental and Natural Resources Dept.
Senior Environmental Technician

Crystal Tulley-Cordova,
Navajo Nation Department of Water Resources, Water Management Branch
Principal Hydrologist

Tribes and Pueblos FG#1 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Jeanette Joe, NAPI

Good afternoon. My name is Jeanette Joe, and I work with the Navajo Agricultural Products Industry. My main job is to deliver water to the agriculture, so I'm under the Navajo Indian Irrigation Project. I work under the Operations and Maintenance Department, and what we do is we deliver water from Navajo Dam all the way into the project.

The unique thing about this area is that we have a huge farm that uses the water. All the crops: alfalfa, potatoes, corn, and feed forage, very much helps our people. It goes back to them. Some of the products go out to different areas of the U.S. and also out of state, like Mexico. I do really enjoy working here, and my title is Operations Supervisor.

Dino Chavarria, PSCOEA

Hello. Good afternoon. My name is Dino Chavarria. I work for the Santa Clara Pueblo Office of Environmental Affairs, where we manage various federal grants to address environmental issues here within the Pueblo which part of it is water quality. **Something that is valued in the region is the water quality within the Pueblo, which would be the Santa Clara Creek,** a very small flow water body and not very wide, but **it's provided water to help the people in the Pueblo for thousands of years**. It is a water body that was unfortunately **heavily impacted by the 2000 and 2011 fires, which resulted in one hundred percent of fish mortality. We're trying to work to be able to attain the use of that water body, not just as habitat for a cold-water fishery, but also to be able to sustain the cultural traditions of the Pueblo.** That is done through work with various departments and programs working in collaboration with the Army Corps, and of course also we use EPA grants to do small projects within the watershed. Those would be non-point source pollution projects to try to improve the flows coming from the tributaries three deep sediment and lower the impact of the flows that result from the monsoons. And of course, the loss of the vegetation that previously had held the soil and trees in there. Of course **we have the thousands of hazardous trees still in the area that contribute to transport of the sediments into the water body.**

Of course, there are other issues that we work on. In fact we have to jump off this meeting at 3:30 because we have a planning meeting with Santa Cruz. Of course, a part of the [Rio] Santa Cruz is within the Pueblo. We're meeting to hear of their water improvement strategies that they're proposing for Santa Cruz. Part of it flows through the Pueblo lands, which **we have developed some similar types of 319 non-point source pollution prevention projects to try to strengthen that portion of the Rio Santa Cruz.**

Three miles of the Rio Grande flows through the public as well. So, water quality is an important issue from my perspective. We're working on these grants, so that's one thing we try to focus on. **But there are a lot of other issues that affect water. Of**

Tribes and Pueblos FG#1 Values, cont.

course, water quantity is one. Water rights is a huge issue, of course, throughout all of Indian Country. I'm sure those are long-term issues that need to be resolved as well before we can fully have final procedures in place that can make the water in New Mexico truly resilient, I think.

Tammy Montoya, PSADNR

Hi, good afternoon. This is Tammy Montoya. I work here at Santa Ana Pueblo Department of Natural Resources. What is valued about the region? Of course the main one is water. **One of the issues that the Pueblo is experiencing is the shortage of water.** Most of our irrigation lands come off the Rio Grande. I know last year and then the year before we were almost about to be on a rotating schedule because there was not enough water. This year is probably going to be worse because the irrigation season is going to start later.

Because of the water that's due to Texas, that puts us in a bind because we really don't have water to be giving in the first place. I know the snow is helping, and I hope that we get the snowpack we need. So it's basically the climate, the drought that we're experiencing.

With our irrigation systems, we're in the process of improving them because half of our irrigation system is not concrete; it's a dirt canal. If it was concrete, it could be delivered more efficiently and we wouldn't have the water loss. **Trying to find money and improving our irrigation system is one of the issues that we've been facing for all farmers to be well-served.**

The vision for the irrigation part is basically that our irrigation system can be all updated because the shortage in water is not changing. We can do on our part to have the improved system, which can deliver water efficiently, which will help us out in the future. Thank you.

Greg Jojola, PLENRD

Good afternoon, everybody. Thanks for having me today. My name is Greg Jojola. I am currently the acting Environmental Natural Resources Director for the Pueblo of Laguna. My regular job is the Environmental Manager. All of the Pueblos have share d the same kind of values for our areas, and probably the number one thing is always water: **trying to protect it and try to keep contamination out of it.** That's no different for Laguna. **The shortage of waters is quite evident nowadays and the drought that we're in.** We're in the Rio San Jose basin, mainly the population anyway. We're just east downstream from Acoma [Peublo] and downstream from the Grants Uranium Belt. So water is precious here. Trying to keep it clean is of utmost importance; keeping our alluvial as clean as possible. **That's what is really valued is keeping water for this generation and generations to come.**

Our farming is very limited at this point because we're downstream with very little water anyway, and then Acoma Pueblo is upstream of us. Whatever is left over from there trickles down to Laguna, so there's very little farming. We were once a large farming community with many acres of land to farm, with lots of irrigation ditches and things like that, but that is no longer the case anymore. **Our farming tradition unfortunately hasn't rebounded over the last hundred years or so. There are many from the younger generation that**

Tribes and Pueblos FG#1 Values, cont.

are eager to do that, but the water is just not there. That's the other thing we see as something that needs to be addressed.

Some actions and decisions need to be made on how to get there. We face all kinds of obstacles along the way. **One being our jackpile uranium mine, which affects another one of our waterways, the Rio Paguate**, which comes from Mount Taylor and spring-fed. It is quite pristine at the beginning, but as it flows downhill through the Paguate village, through the jackpile uranium mine, which is now closed of course, but **once it reaches that region it picks up the leftover contaminants, and then is brought downstream and left to deposit for quite a ways**.

Those are some of the challenges there. Like Dino said, we also have EPA grants, as well as Santa Ana. We all have small EPA grants to help us do little things. **Money is scarce as well. We're always looking for different ways to fund certain things.** EPA can't do it all. We see their dollars getting cut and us having to scratch and fight for dollars here and there, and really be creative. So that's Laguna's perspective. Each of us could probably talk for hours on what we've been up to and things that we do, but it's always good to have a sounding board with other professionals that care about water.

Connie Maxwell, NMWRRI

Thank you so much, Greg. Several of you brought up issues, but also let's start talking about strategies and sometimes it's very clear what needs to happen. The strategies that need to be implemented. But sometimes strategies need innovation.

Let's see. Jude Chavarria, let's go ahead and let you introduce yourself and talk about what's valued in your region before we move on.

Jude Chavarria, PSCORP

Good afternoon, everybody. My name is Jude Chavarria. I work at the Santa Clara Pueblo Tribal Administration and the Office of Rights Protection. I think one of the things that is most valuable to us is water. That's all I've heard my boss and the elders in the community talk about is water. **Water is more important than anything in the world.** I use one of my my boss's famous sayings: **someday water is going to be more valuable than gold.** That's his most famous saying that I always hear him say at every meeting.

Phoebe Suina, HWM

Good afternoon, everybody. Great to see everybody on the line. My name is Phoebe Suina and I'm from Pueblos of Cochiti and San Felipe. I have many hats, so I just want to leave it there for myself. With that said, looking at the slide here, what is valued about the region? I'm not sure what everybody else mentioned, but just coming from that perspective, **as our communities have been here for many centuries if not thousands of years, one is the stewardship of those resources for future generations.** As a mother, that's what I think about when I wake up every morning. So, I'm just here to learn and listen and do my best to participate.

Tribes and Pueblos FG#1 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Connie Maxwell, NMWRRI

Thank you, Phoebe. As I was saying, any other issues that affect your region, but also strategies that need to be employed to address those issues, to protect those values and also things that you think might be worth trying?

A lot of times we might know what generally needs to happen, but when we start to implement, lots of issues start to arise. So it requires little and big innovations along the way. And what are the big ideas that we need to really try to get to protecting those values and real resilience for the future?

I know one thing that I work on quite a bit down in Southern New Mexico, but I've been having conversations with folks in different from the Acequia Association. It's about trying to make best use of our monsoonal flows, temper energy from the floods and so forth, but also also see if we can recharge our aquifers in some instances. Some areas are getting a lot hotter in the summer, so sometimes winter agricultural production is going to be important. And so in that regard, groundwater, even if it's plentiful in certain regions is probably going to be more important in the future. Are any of you seeing need for experimentation, tests, strategies in those sorts of directions? Any policy innovations that you think need to be employed? I know water rights is obviously an a really important issue and there are a lot of adjudications that are going on at the moment. But any policies in particular you think need to be looked at?

Greg Jojola, PLENRD

This is Greg again. You hit on it. **The water rights adjudications that are constantly ongoing with Pueblos and Tribes take years and years to get settled.** But if it weren't for those, we wouldn't even have a shot. So those things are still in play, especially for Laguna, Acoma, and some other parties that are involved in that one. **Also, getting involved with even just WOTUS lately, Jemez Pueblo and Laguna Pueblo joined together to file against the US EPA, and some of the changes that they're trying to do with the new administration.** So even just tribes getting involved like that. We're lucky enough to have UNM law students do some pro bono work for us and assist us in that. **Just being vocal I think is very important at the federal and state levels. We have to do that; there is power in numbers. We talk about that a lot at some of our meetings we have with our Pueblo environmental group. I think that's a very good strategy. We're able to talk about it and then share that information with our tribal leadership. That way they can pull together and make a difference.** When they all make their rounds at the state and federal level to our representatives, lobbyists and whatnot, we have to be diligent. So we can't just sit back and watch things happen. I know it's easier said than done. We all want the same outcomes. **We might not be exactly the same, but water is on the top of our list and anything we do to support each other's issues I think goes a long way.**

Tribes and Pueblos FG#1 Issues / Strategies, cont.

Connie Maxwell, NMWRRI

Tammy, you had mentioned irrigation strategies were important. Do you think there's any more that you could share about that irrigation system update? I know you were talking about lining ditches and increasing efficiency and things like that. Any other kind of thoughts about irrigation strategies?

Tammy Montoya, PSADNR

Right now we have just been looking for grants to go along with the money we have received. We have a plan on what ditches are going to get repaired first. We're getting rid of all the natural ditches and they're all going to be concrete. Some of the system is going to be underground. Mainly the underground system is going to be near housing residences. So that plan is helping, to update the system.

Another strategy we've been using is having farmers meetings. This is when irrigation starts. We update them on helping them get into a system where all the users upstream and downstream know when they're pulling from the system for the system to work more efficiently, where we don't have two farmers trying to fight for the water. This has been helping out a lot. Each farmer knows when each farmer can irrigate their land. **We've implemented now the 24-hour schedule where they get to irrigate, which never happened in the past.** I know a lot of farmers put up for that so that they don't have to fight the system. So we have a lot of farmers irrigate during the night as well. **At these farmers' meetings they come with ideas and thoughts and then a lot of it is just working together and trying to make the system work because we're all using the same water.** That's one of the biggest strategies we've been using and it's been working so far. Getting the farmers to actually attend these meetings is something we finally conquered. They understand that these meetings are important to attend.

Connie Maxwell, NMWRRI

Terrific. That always shows the importance when people do start to show up and attend. I think that is that's a good sign. Dino, I know you've got to jump off in 15 minutes. Do you have strategies that you're employing that you think are good lessons learned for other places? And are there also things that you're interested in trying?

Dino Chavarria, PSCOEA

I think if we are going to see some drastic climate changes, then lining and making the ditches underground for the most part might be the best way to avoid evaporation. I know there's always been a counter argument about infiltration being lost because of that, but I guess with increasing temperatures, then maybe it evens out; that you're going to be keeping more than you might be gaining through infiltration.

It's very helpful actually, to hear that they're putting that type of infrastructure in place to make sure that their agricultural traditions continue and that they're able to continue growing the crops that are necessary for the Pueblo. **I think that is something that here in the region we'll have to be looking into at not just state, but the region-wide basis, implementing those type of activities to protect the water that we have.** There's a lot of use upon the Rio Grande. **The more**

Tribes and Pueblos FG#1 Issues / Strategies, cont.

we can do to make sure that it's able to remain as that source that forms the basis for the agricultural traditions of the Pueblos, then we need to look at that. It will be a big change for a lot of people. And of course, there's going to be a big cost to doing those types of activities, but it seems like it's going to be necessary if we are going to have hotter temperatures in the next few decades.

Tribes and Pueblos FG#1 Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Connie Maxwell, NMWRRI

Let's also now try to see if we can summarize some visions for the future and with this, a little bit of a synthesis. You can put a timeframe to it, if that helps. For example, "By 2030, we would like to see more surface water stability through storage or irrigation management." It can be longer; it could be your children's or grandchildren's generations as well. And certainly, if you have other thoughts about issues and strategies, please do bring those up as well.

Phoebe Suina, HWM

I just wanted to share again, just from an overall perspective, and I think Tammy touched upon this a little bit too, is **our water resources in the Pueblos have a real cultural component.** And each Pueblo is different. But for the two or three of the Pueblos that I've heard from tribal leadership about is a real sensitive connection to water in general.

We talk about our farming and our ditches. **Farming is one of those activities that is essential to our way of life.** Yes, some are cash crops, in terms of my alfalfa and other types of crops. **But we also have still that connection to growing traditional crops that we need every year.**

Through our stories, there are ramifications that could happen if we don't have traditional crop growing. I bring that up because we need the water to grow the traditional crops. In doing that though, it's not just the water itself. But if we step back a little further, there are all of those activities and ceremonies that happen throughout the year to grow crops. We don't have a button that we push and we say, okay, we're going to grow corn. And then voila, in three months or four months it's going to be a corn stock with corn.

There's this whole process that happens and it goes back to the ditches as well. **One of the things I've seen is some of those communities that went to ditches early on, and I can bring up Cochiti, there's some discussion about doing away with concrete ditches, because we've lost part of those activities that are necessary.**

If I talk about one corn stock, there are certain ceremonies and activities that need to happen. **With the dam we had that breakdown in that activity. And there have been some ramifications that we've seen from a community and traditional perspective that don't happen anymore** because we've lost ditch duty, ditch week, and all the activities that relate to that. One of the aspects of our planting is some of us ladies get thrown in the ditch. It's much easier to get thrown into a dirt ditch than into a concrete, in terms of safety! I'm just being a little facetious there, but in reality it's true.

Also, the maintenance of the ditches. We've had some conversations with farmers, and a little bit of tension to be perfectly honest. **Our community at Cochiti has been really impacted by the Bureau of Reclamation and by the Army Corps of Engineers when they built the dam, and other activities.** We used to have a variety of fruit trees in our bosque area, in our farm

Tribes and Pueblos FG#1 Visions for the Future, cont.

fields, that were just leveled. **I think one of the tensions that we have is, how do we grapple with efficiencies or modernization of infrastructure?** In some ways, we've seen at Cochiti giving up an essential part of what needs to happen to grow one stalk of corn. So there's a tension there. Each community is having different conversations about that, and it all relates back to water and water infrastructure. How we see water, how we steward water, and all of the interrelated activities within our community to make our community whole and make the whole process whole.

I just wanted to bring that perspective, and it's unique to each Pueblo. Some have adjudicated water rights, some don't. Some still do that ditch work every year. Some still grow those traditional crops, and some grow a cash crop**. I think one of the things that is important is to be cognizant of the spectrum of all of our tribal communities. Where they are and, in respect to tribal sovereignty, the leadership guiding the decisions and what they say.** The issues are down at the community level, but it also has potential regional impacts because of how each one of the communities utilize and manage water resources.

Rivers flow beyond fence lines, so we also have to understand that interrelationship and interdependency with all of us. It is one of those challenges for which there is not a cookie cutter approach.

Connie Maxwell, NMWRRI

I have a quick question. That was wonderful. Thank you. I actually live in central New Mexico off of the Rio Grande in Monticello, and one of our neighbors came from a small community, Poloma, south of here. One of the issues that they had was when they lined the ditches, the ditch was functioning as a riparian area, and the riparian gallery of trees was lost, which was a big loss to the community. Phoebe, have you seen those issues as well?

Phoebe Suina, HWM

Absolutely. Actually, **the leadership at Cochiti last year made a decision not to dredge and not to mow around the ditches because one of the things that was brought up by leadership was ditches end up being areas where birds and bees can be sustained.** Again, back to the example of the corn, we need the bees to help pollinate the corn. I'm from a farming family and I remember when I was two or three picking and going through the farm fields. It was a family activity that we all did. I personally have seen the difference in the health of the corn when we have that biodiversity around our corn fields. We have a field on the west side and then our family field is on the east side. So over 30, 40 years just seeing the difference between how we navigate that and the biodiversity around each field has been really interesting for me to see. **My great grandfather had a very sustainable farming system. He had Guinea Hens to mitigate the pests. We would think he was very innovative, but that's how they grew up.** That was the way that they made their fields sustainable. Just to let you know, there's been some discussion from that community of bringing practices back. **We can mow the tops, but we want to encourage certain plants.** We have pottery makers at Cochiti that still use wild spinach for the dyes along with other cultural plants within that area. It's

Tribes and Pueblos FG#1 Visions for the Future, cont.

an evolving conversation depending upon leadership and councils and traditional leadership as well.

Connie Maxwell, NMWRRI

Thank you, Phoebe. One thing you brought up is that we talk about innovations because we're not necessarily doing something now, but often innovations really are returning to traditional practices. So I was wondering if others are interested in some of the traditional practices being either revived or brought up again and any other visions for the future. Where would we like to be in the next short while and the next long while?

Jeanette Joe, NAPI

This is Jeanette. **For NAPI, we've started growing some crops that don't use a lot of water. We've started with krenza.** Right now we're in the process of planting that and using that as a test run. We will see how it will work out for NAPI. It doesn't use a lot of water and has a deep root. Since it's a huge farm, **we've implemented soil probes,** so they tell the farmers if they need to water or if they don't need to. We've been implementing that out in the field, so that helps a lot.

We've been watering at night, so we don't get a lot of evaporation and retain a lot of that moisture. We do have people out there keeping an eye on fields, and if they see water starting to run off, we'll turn off that field and let it dry out some.

We've been now working with BIA and they did implement a website that tells them how much water they need to apply and stuff like that. So that also helps us a lot when we're irrigating out there. What also helps is that we do control the pivots from the main office, keeping an eye on the levels of moisture and stuff like that. NAPI has been trying to not use too much water, but making sure the crops are getting the water that they need.

Connie Maxwell, NMWRRI

Fantastic. Any other crops that people are interested in trying, or even also what are some of the considerations when you're trying a new crop? What are some of the things that farmers need support for? You mentioned soil moisture probes. That's great.

Jeanette Joe, NAPI

NAPI are looking into other crops that don't use a lot of water. So those are still in progress. We're still trying to decide which one we're going to try and which ones will work for the farm. With the pivots, we do have technical support and they are constantly bringing in different items that we can use to help with the watering. And we do account for how much water we're actually pulling out.

Connie Maxwell, NMWRRI

These particular innovations and going back to tradition that each of you are speaking of, I think are incredibly important and really helpful. Are there any other final thoughts? I know everybody is really busy, particularly in relation to water. There's always a lot to do. So we really appreciate you sharing your perspectives, your visions for the future, and your issues. Thank you everybody. Have a good rest of your day.

Tribes and Pueblos FG#2 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Adam Ringia, PLWRO

Again, thanks, Connie. My name is Adam Ringia I'm currently I'm the Water Rights Office Manager for the Pueblo of Laguna. I was their Environmental and Natural Resources Director for a while as well, and certainly familiar with not just the water situation and the water settlement that we're working on, but also the farming issues and what have you that we deal with. Looking at the presentation that you just gave and listening to what I've heard leadership in the community saying over the years, one of the things that Laguna really struggles with is a **limited water supply.**

There's a lot of interest in the concepts of drip irrigation and things like that because it minimizes the amount of water used, but there hasn't been a sufficient communication on the idea that, if you go to drip irrigation, yes, you may get more crops, but you're going to reduce the recharge, and balancing that to allow water to stay in the river.

From Laguna's perspective, we're struggling with being at the bottom of a system, and for there to be continued flow in the river, which is also culturally very important. That sort of integrated regional planning within each watershed is going to be continue to be critical as we succeed in a water settlement. Even if we have water, perhaps that isn't necessarily suitable for the irrigation purposes that we want it for because it's too expensive.

Balancing all of those needs in a shrinking water climate is really our critical concern. **Laguna, like perhaps all of the other Pueblos, is a farming system. That is what the culture is based on. So being able to continue that is a critical need, and it's hard to do without water.**

So, visions for the future? **I'd love to see the Rio San Jose look like the Rio Chama, which is behind me in my picture, with spring flows coming through it.** I don't think it's going to happen anytime soon, but that would be a great vision for the future. Really, **just having wet water flowing down the river, and being able to divert it into the fields.** I've seen pictures of huge fields in the Laguna and Acoma areas, and it would be great to be able to see something like that again.

Ryan Swazo-Hinds, PTENRD

Some of the concerns from the Pueblo of Tesuque are that we depend on that snow pack, and with that snow pack comes Spring runoff. **Over the past couple of years without having the snow pack, there hasn't been runoff.** We've veered away from seeing that gradual peak, seeing the hydrograph, and then being able to see the monsoon events, due to climate change and drought. **Water is pretty important traditionally for cultural practices and for the agrarian lifestyle.** Having surface water in the stream is crucial. And when you don't have that water running through the river there's a disconnect. **Within the Tesuque basin, we're at the middle, at the base of the mountain. So between us and the Forest Service, there was a lot of development.**

Tribes and Pueblos FG#2 Values, cont.

Even though we were part of the Aamodt Settlement and the Pojoaque Basin Regional Water System is being built, **it's going to take a lot of money and a lot of time to see the aquifer replenish, if it can.** That being said, we can have all the water rights, have the adjudication, but **if you don't have the wet water, those water rights don't mean anything.**

We've been seeing depletion of backup irrigation wells. Last year, we were hoping to utilize one of the wells, particularly as a backup, and it proved that the water table has dropped. **There's just concern that comes down to money: how do you refurbish or build and drill a new well and try to find another source of water?**

Those are concerns because over the years we've had to change or adapt from traditional practices of earthen ditches and having water to at least put in the acequias and deliver that water. We've gone to concrete lining and we've done piping and taken conservation measures such as drip irrigation, sprinklers, what crops we grow, or just knowing that, hey, there's not going to be water this year. You might not be able to yield a good harvest. That being said, there's a lot that's going on. **We're impacted by being a tributary to the Rio Grande and not being directly on the Rio Grande.**

Some of the things that I think we need to start doing is repairing or doing maintenance to earthen dam structures, to be able to capture flows from flood events and things of that nature. Some of the work that we're starting to do is river restoration; **trying to fix certain areas within the Rio Tesuque reach on the Pueblo and mitigate for erosion and sedimentation.** Sediment loading is one of the top exceedances with water quality.
How do you mitigate some of these natural processes? We're looking towards people that have done this kind of work, but in the same sense we as Native or Indigenous people already have that knowledge. **How do we take that knowledge and implement it on the land without having to spend money or have someone else show us how to do it?**

For the future, we're all in it. We need to think about future generations and how people in the future are going to be able to survive. Water is the key to maintaining all life.

Jude Chavarria, PSCORP

Good afternoon, everybody. My name is Jude Chavarria. I am the Land and Water Rights Technician for the Pueblo of Santa Clara. I deal with the water rights settlements that we're currently in. What's valued about our the region we're in? **Water is very valuable not only for farming, but for everyday use.** There was a workshop that had us think about all of the daily ways we use water, and it really opened my eyes to see we need water for everyday use to wash yourself, to use the bathroom. It really made us think about the value of water; how much water really means to us, not just Native Americans, but to everybody in the world.

Some of the things that affect us are the ongoing water rights settlements. They've been going on for longer than I've been in my position as Land and Water Rights Technician. So I'm still catching up. Number one is trying to get these settled and see, like Ryan was saying, how we actually get

Tribes and Pueblos FG#2 Values, cont.

wet water, not just the paper water. **That's probably one of the biggest things all of us as tribes face, and it's very difficult, but a lot of help, compromising, and talking with all the parties involved is going to get us that wet water.**

Tribes and Pueblos FG#2 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Connie Maxwell, NMWRRI

Thank you Jude let's go to the next on the list. Crystal, I know you just joined us. What we're doing now is we talked a little bit about water dynamics and looking for the future in terms of strategies that might address. And so here we're introducing ourselves and starting with what is valued about the region, which and the community in which you live.

Crystal Tulley-Cordova, NNDWR

Okay. Thank you. I'm crystal Tulley-Cordova, and I'm a Principle Hydrologist with the Navajo Nation Department of Water Resources, Water Management Branch. We have various water uses throughout the state, and there are needs, challenges, and opportunities associated with those various uses. Spanning across 27,000 square miles in the four corners region, being in two different river basins—the Colorado river basin and the Rio Grande basin—as well as spanning across three states, **there are challenges associated with transboundary limitations for using our water.**

Because of our large area we do have challenges with developing the water for all needed uses, although we continue to try to address those issues through partnerships with federal partners, state partners, academic institutions, and non-governmental organizations. There are both short-term and long-term water related challenges that we have with the Nation. We try to address both of those water sustainability challenges and opportunities concurrently. **The pandemic has brought light to desperate need for water infrastructure,** I think not only within the Navajo Nation, the state, or Tribes, Nations and Pueblos, but also the United States, to be inclusive of other areas, including Alaska Native villages.

The water challenges are associated not only with capital development, but there are challenges associated with water quality and production challenges related to the geology beneath the surface, and depending on where the land might be and the different ways to be able to get permits to access that water. I say that because Navajo Nation has not only trust land. We have Indian allotments. We also have fee lands, so private lands, and then the eastern side of our nation, which is predominantly in New Mexico, is checkerboard. **In comparison, Arizona is a lot different. It's not as complicated to be able to establish right of ways for development.** In addition to those water challenges that I described, I think it's important to have an understanding as well about aging infrastructure that exists on our land. **Some of our water development areas or wells and different things are outlasting their suspected lifespan of 50 years.** Then there are others where we might put in a new system, and **To'Hajiilee is an example, where there are challenges with water quality that degrade the mechanical mechanisms of the well there.** So even though we may be able to continuously replaced things, there is a shortened lifespan

Tribes and Pueblos FG#2 Issues / Strategies, cont.

because of the quality associated with that water. **I think what is also a challenge, not only for our tribe but others, is the need for funding for operation, maintenance, and replacement (OMR).** The burden of capital development, as well as OMR is not just taken on by the Nation, but also by our federal partners because of the perpetual federal trust responsibility that they have to our nation. **Although agencies like Indian Health Service have been helping us to develop sanitation deficiencies that we've had within our nation, there are certain aspects of their program that have been underfunded basically since its inception.** I'm speaking specifically about Indian Health Service not receiving funding for operation and maintenance, although it is described under their operating procedures.

We can't live without water. Therefore, there's a need for us to be able to have a permanent homeland by being able to have water for our Navajo communities. We do have resolved and unresolved water rights. And that in itself provides challenges associated with how you access that water and being able to think about future development for that water.

One thing that I'd like to end on is the current situation that we're in now with the drought. I know a lot of focus sometimes in New Mexico is on the Rio Grande basin. In the northwest corner of the state there is the Colorado River basin, and what you've probably seen in the news is just how exacerbated the situation is with water, to where there were the interim guidelines developed for the worst-case scenario. But when in fact that wasn't sufficient, the drought contingency plans were developed. Now we're in a state of a third level where drought response operations planning for the upper basin of the Colorado River basin is occurring. And then in the lower basin there's something called the 500 Plus Plan where there is an incentive to encourage conservation and be able to use federal and state funding to supply funding for those efforts. **I think what's important to note from the water rights standpoint is that indigenous people have been here since time immemorial. However, the water policies that exist today did not recognize that. In 1922, when the foundational document for the law of the Colorado River was started, tribes were not included in that.** Therefore, we're in the situation that we are right now in which the operation of these larger river basins is primarily federal and binational with Mexico—the same can be said for the Rio Grande—but then also a state process. **When you think about the operation of reservoirs in both of these basins, there are challenges associated with not taking into full consideration the tribal perspective.** As an example of that, operations at Navajo Reservoir impact our ability to access our water. **At the same time, when you look further downstream to Lake Powell, that not only impacts our water availability, but it also impacts the ability of the Navajo Tribal Utility Authority to access hydro power.** Sometimes we just think about the water aspect and we don't necessarily think about the electrical impact. There are also concerns associated with as the water decreases within the San Juan River basin as well as the larger Colorado River main stem. **There is a need for consideration of cultural components as well. For example, some historical cultural sites are becoming unveiled at this time that were once under water.** Although it's not directly the wet water or

Tribes and Pueblos FG#2 Issues / Strategies, cont.

the paper water, these cultural components need to be considered as well.

Joseph Abeyta, PTENRD

I'm Joseph Abeyta. I'm the Water Quality Technician with the Pueblo of Tesuque. A lot of the issues and concerns I think were expressed by Ryan in vivid detail, but **another one that's come to mind recently is another stressor with water use with the cannabis industry that's going to be hitting the state.** I was wondering if that was part of the 50-Year Water Plan when it comes to industrial use and how the effects might impact tribes in the future.

Connie Maxwell, NMWRRI

That is a great question. I don't have an answer to that question. Does anybody else have an answer?

Myron Armijo, NMOSE

This is Myron, Connie. I don't think I've heard any discussion on the cannabis issue in the 50-Year Water Plan. I'll have to check and get back to everybody on that. That's a good question. You all may have seen in the news over the past several days that the Pueblo of Picuris and the Pueblo of Pojoaque have entered into intergovernmental agreements with the Office of the Governor. People are moving on that on that issue and I'm pretty sure we're going to have other Tribes, Pueblos, and Nations probably want to do the same thing as well.

Joseph Abeyta, PTENRD

I know it's in its first year, though **as time goes on, there's going to be more people putting in applications for growing cannabis and that comes with water use.** So that's going to be an added stressor of water depletion for everybody.

Sage Mountainflower, PTENRD

Hello, this is Sage Mountainflower. I'm the director for the Pueblo of Tesuque Environment and Natural Resources Department. Ryan did a really good job in describing what's important for the Pueblo of Tesuque and the issues that we are facing. **I think not having the availability of surface waters is one of our biggest concerns and not having that snow pack.** Overall those are the things that we're working on and trying to mitigate the best that we can.

Myron Armijo, NMOSE

I'm going to talk from a perspective of the entire tribal nations, Pueblos being my community. In my travels I've seen pretty much every Pueblo, Tribe, and Nation out there and the value that they provide, not only to their communities, but to everyone in the area. But I see that there are a lot of needs for Tribes, Pueblos, and Nations to get back into their agricultural tradition. Is it going to be cannabis? Isleta Pueblo is heavy into alfalfa, chile, and melons, as are other tribal nations.

I see the need for infrastructure, which is old in many areas. I'm pretty sure the Bureau of Indian Affairs installed piping infrastructure over the course of time, but we're here in 2022 and I see that some of the infrastructure is dilapidated. **Funding is going to be needed.** There is talk about lots of money coming to the State of New Mexico through the ARPA funds. Is this

Tribes and Pueblos FG#2 Issues / Strategies, cont.

going to be a one-time deal? I'm hoping that the monies will go a long way in providing renewed infrastructure to those communities that really need it.

I also see in my travels areas where we could be farming and making use of whatever water we do have. But that also takes money as well. You've got to have the equipment to redo the lands. **Maybe the community could have plots of for each maybe family so that they could maybe grow their melons, chile, corn, or whatever they need to do. Maybe also for the Tribe, so that they could be growing alfalfa on a large scale.** But that's also expensive as well and not everybody has those financial strengths to do that.

I see water quality issues and the inability to get water to people close to their homes in Navajo country. I think I told Crystal a long time ago, but one of my first travels out to Navajo Nation was when the Navajo Nation Water Settlement was still being negotiated. We went out to Gallup with a state congressional tour that Navajo Nation was hosting. We went out to the middle of Gallup and saw a watering place with the members of the Nation coming in with their water containers getting 35 gallons for a quarter. This was so surprising to me. Did I ever know that this was happening? I didn't**, but it's always been the goal of mine in every area of Native country that we provide the infrastructure and the water that's needed to get to the families for their consumption.** It's just amazing that this is out there in this day and age.

We have these conferences, and I think that **I've told this to Mark Sheely and Dr. Fernald at NM WRRI, that when we have these meetings we need to have someone following up on those tangible outcomes to these issues that are being discussed. That we follow up and get that done.** There are many strategies out there, however we need to make the concerted effort by everyone to make sure that we do follow up on those issues, whatever they may be. And then drivers and barriers for decisions being made. The barriers are basically funding a lot of times. The Office of the State Engineer has several ongoing negotiations in the Rio San Jose basin. We have Ohkay Owingeh and the Pueblo of Santa Clara, the Rio Jemez with Jemez and Zia Pueblo, Zuni Pueblo in the western side of the state, and of course Navajo Nation is involved in several of those as well.

And it's funding that's needed, but **a lot of times the communities have to make concessions in order to get a settlement. That, in my mind, is a barrier because then in order to get that settlement, we have to conceed X, Y, and Z.** There are also several settlements that are already done.

I think the same thought was shared by former governors Gil Swazo and Nelson Cordova, that once we got the partial final decree and the settlement was done, that was it; the work was done. **But there's more work to be done now**. And I think Ryan knows that well, as do those Pojoaque basin Pueblos. **They're working on the regional water system, as Ryan had mentioned. That's costly.** We just have to act on those decisions that are made and follow up.

As for visions for the future, I run a cattle operation with several of my family members. **The grazing area that we're in is just black**. We're having to supplement with hay, tubs of sweet licks, salt blocks.

Tribes and Pueblos FG#2 Issues / Strategies, cont.

That's very costly. **At Santa Ana our feast day is in July, and it is so hot now.** It's been hot for the last seven or eight years now. We used to see temperatures in the low nineties. Now, we have temperatures of 99,100, we even had 104 one day. While we were dancing, people were falling just from the higher temperatures.

So, in dealing with climate change we have to be open to whether there are new ideas out there that will help us. One of the folks touched on the resiliency of the Tribes, Pueblos and Nations. **We've been here since time immemorial and we know how to survive. I think we also need to take back those strategies that our elders had and apply them now in this timeframe in order to address this climate change**, if you will.

Connie Maxwell, NMWRRI

Myron, you touched upon the need to harness the traditional knowledge, particularly in terms of crops and practices and so forth. I was wondering if folks could describe some of the efforts that you know of in place that are doing that and some of the ways in which you're seeing traditional knowledge, and efforts that have been successful.

Myron Armijo, NMOSE

At Santa Ana, at the old village, the old Damayan, the elders used to plant their seeds along some of the arroyos. It was dryland farming, if you will, just like the Hopis do on Fee Land. **That's what used to be done way back in the day with the use of our traditional seeds that probably were very hardy.** I think it would take a lot to do what the elders did back in the day because our populations weren't so large as they are today. But I think that the strategies that were used by the elders would help us in the long run.

Connie Maxwell, NMWRRI

I think you're absolutely right. Maybe we could continue that and folks could talk about strategies that they know of, that our elders did employ or your elders employed that you believe should be brought back or perhaps adapted, like you say, Myron, for larger populations or different climate conditions.

Myron Armijo, NMOSE

At Santa Ana, with this virus we lost several of our elders. It was pretty heartbreaking to see that this happened to several of them. A lot of knowledge left all of a sudden.

Tribes and Pueblos FG#2 Visions for the Future

Connie Maxwell, NMWRRI

One of the things I like to do as we've gone through everything is come back to the question of the visions for the future. A lot of times, we have these tools. Myron, you're talking about issues that we need to address, and what is the mechanism for following up? How do we move forward? We've identified a lot of issues in different places, different working groups, different conferences and so forth. How do we actually move forward? One of the things that I feel strongly about is that a lot of times we really need to estimate the effects of the different strategies we want to employ, and that's not so easy to do. So I believe that if we can build a regional working groups, community working groups to where we can both collect different strategies and do you know, not just water modeling, but integrated modeling that looks at the effects on economic conditions and on agricultural resiliency in general. I think that's one good way to move forward and certainly something that we're going to be pursuing funding for at NM WRRI. So where do we want to go? The visions for the future. It doesn't have to be by year, but in the next 10 years, for our current generation, for our next generation, or for generations after that. You've spoken eloquently about what water and so forth. But what are some of those visions for the future and ways that we think we can actually get there?

Myron Armijo, NMOSE

One of the main things I think would be building capacity within the Tribes, Pueblos, and Nations. I'm so proud of people like Ryan, Crystal Tulley-Cordova, Second Lieutenant Governor Sanchez, Phoebe Suina, and others on the call. **We have our own experts in our midst and we need to capitalize on that capacity that we have**. We have at Santa Ana a young lady who is a hydrologist and the secretary for the Six Pueblos Water Coalition. We need to build that capacity within our own communities and ensure that our water is protected. I am really proud of all the young people that are stepping up to this issue. It's very complicated, so we need to build that capacity.

Connie Maxwell, NMWRRI

Thank you, Myron. Crystal, you had your hand up, but before I go to you I just want to say, Second Lieutenant Governor Sanchez, thank you for your comment. I'll read it if that's okay, because I know you have to take your leave for another meeting:
"Despite drought and the effort to conserve, Isleta will continue to use water in every possible way. **I couch that in terms of the past, and regardless of precipitation, we would plant and use whatever water was available to survive; hence that same approach.** We will continue to use water that is available to us unless, like our lands and resources that were taken away without choice, repeat. I have a last-minute meeting."

He apologizes for having to take his leave and thanks to everyone for your understanding. Thank you, Second Lieutenant Governor Sanchez. Crystal, please go.

Crystal Tulley-Cordova, NNDWR

I wanted to go back to your question that you had asked about traditional ways of knowing, and then couple that into strategies to address issues related to

Tribes and Pueblos FG#2 Visions for the Future, cont.

water. **What I know of our people is that we were observers of the land and of the environment.** That type of knowing, although not documented via data and online resources, but documented by oral history, is what we have had with our tribal members. With that being said, noticing those changes and adapting strategies to address water shortages was a great opportunity to be able to do that. A few examples of that was being able to melt the snow on the stove to be able to gain access to those water opportunities. **I remember planting as a young child with my grandfather and it was a cup of water to be able to grow corn beans and squash and watermelon. He didn't have to be a scientist to realize the groundwater wasn't available, and there wasn't surface water, but these ways of knowing were important.** Also work has been done as to be able to ask elders within Navajo communities, "what are some observations that you've seen?"

Ryan Swazo-Hinds, PTENRD

I think I could add to that. Going into the future, with the Pojoaque Basin Regional Water System being built, it's not a sustainable project. **It's going to cost lots of energy, lots of money, and if you don't have buy-in from non-native people it's eventually going to cost lots of money**. It's unpredictable what the resource of the Rio Grande will be since everybody has got their straw in the water, per se. And seeing the levels on reservoirs like Abiquiu and Heron, and even going down to Cochiti and Elephant Butte, it doesn't look very good for the future. **Engineers can design the water delivery system, but if you don't have water or electricity to deliver that, then it's useless.**

Connie Maxwell, NMWRRI

Yes, those are challenges. Thank you, Ryan and Crystal.

Crystal Tulley-Cordova, NNDWR

I think I can build onto that. Because today we are talking about planning, what could be helpful from indigenous perspectives as far as planning? Indigenous communities often plan for generations, like the yet-to-be-born. **We're talking about a 50-year water plan for New Mexico when, in fact, Navajo Nation wants to plan one hundred years and even more than one hundred years out to be able to have water**. But I think another approach that needs to be supported more is **interdisciplinary opportunities for planning.** I know there is this opportunity to have a few listening sessions, but is that really integrated into the plan? I know that Laurie Weahkee is doing a lot of things as well with talking with tribes, but it's one of those opportunities where it's just reaching out to the community and checking the box, saying "yeah, we talked to that community." But is that really integrated into the planning process for the state? I say that because there are rights holders of water within the state of New Mexico, tribes being among them. **I described in my beginning remarks the historical aspect, where tribes weren't included in water rights, and it was mainly a federal and state process, but it seems that as Indigenous communities continue to secure those water rights there's a challenge to be able to see how they can be integrated as a part of the process**. A process that for over a hundred years—we're celebrating one hundred years of the Colorado River Compact—hasn't included them. When you haven't included a body of people for that period of time, but you're trying to do that

Tribes and Pueblos FG#2 Visions for the Future, cont.

now, that provides challenges. So thinking about that is one. **Interdisciplinary, not only among the sciences, the legal, and the technical aspects, but also about Indigenous people, because there is a lot that can be said from them.**

Additionally, I think what's also important is that we talk about climate change. **Before, it seemed that we were talking about it like it was in the future. The people that I come from have known that it's here, it's now, and it's been here because of the variation of different environmental indicators that have shown as such.** Just as an example from some of the tea that we grow in the area, being able to see that tea height that indicates changes in precipitation that are known. The number of cuts that you can get from growing something and being able to realize there are changes there. I think this planning also needs to acknowledge the fact that there are more black swans than a head. The pandemic was one of them. Drought is there. **Even within the document, it's labeled "drought," and that terminology can indicate that a wetter future is in the future. Especially in the Southwestern US, a lot of scientists have encouraged us to talk about it as "aridification."** When you call it what it is, how do you plan for a place that can have significantly more water quality challenges and water production challenges in the future? I think it's important to be able to integrate that. I'm familiar with a lot of the models that the Bureau of Reclamation do. They do most probable, min probable, and max probable. Below min probable is what I'm interested in because then, when you begin to think about who is really impacted when there's less water available, I think that's the real question. We have all of these great communities that are throughout New Mexico, both tribal and non-tribal communities, but how do we succinctly work together to be able to compromise with one another? We are familiar as tribes, as we secure our water rights, with what negotiation looks like, but there are other stakeholders and rights holders and non-rights holders, because NGOs oftentimes advocate a lot for water as well. **There needs to be more open conversation. In the Colorado River basin we have these conversations with the principals of the state, people like Esteban López, as well as talking with NGOs, people in agriculture like the Imperial Irrigation District, and metropolitan users.** In the Rio Grande, I am not very familiar with any conversations that are occurring between different stakeholders.

What's been a part of the success in the Colorado River basin has been the funding opportunities that have been established by philanthropic partners. I think a lot could be learned from that example to implement in the Rio Grande, as an opportunity for people to have these hard conversations. If you don't have these hard conversations, what are you left to do? You're left to presume what the other person's position is. **What I like about the Colorado River basin, in contrast, is that I'm participating in those meetings, talking on behalf of Navajo water, to be able to describe what our position is. It seems like there's more empathy when you know what people are using the water for.** It's like a family relationship. We all have family. We have family members that we get along with. We have family members that we don't get along with. Either way they're still related to you, so you can figure

Tribes and Pueblos FG#2 Visions for the Future, cont.

out how to co-exist with one another. And I think that the same can be said for New Mexico and water that we need to be able to co-exist together because we can do more together.

Connie Maxwell, NMWRRI

Thank you crystal. I think that's absolutely great for people to have the space to have the conversations, to understand each other's perspectives, and quite often the answers are surprising. I think that's a really critical recommendation for going forward is to create those spaces and to do that longer term planning.

Any other thoughts or visions for the future, how we think we can get there. I know we've covered a lot of ground, but any other thoughts? Ryan, go ahead please.

Ryan Swazo-Hinds, PTENRD

As a biologist, one of the things that is taught in academia is carrying capacity. One thing I think that we need to recognize is that New Mexico and the Southwest has a carrying capacity, and each water basin or watershed has the ability to only hold so many people. I think we've exceeded that carrying capacity for New Mexico. **One thing I think that we definitely need to slow down or stop is development because if there's this intent to develop very square inch of New Mexico, then there is definitely not enough water for everybody.** That's my take on it, that we have to limit how many people can be here.

Connie Maxwell, NMWRRI

Thank you, Ryan. Any other parting thoughts?

Sage Mountainflower, PTENRD

Hello, this is Sage. Following some of the things that were mentioned. I know we did do the Aamodt Settlement here, but then now there are projects that need to be done to help mitigate for our stream, the Rio Tesuque, and there's not enough funding that is available either. **They come up with the environmental impact statement, but then there's no funding for the suggested projects.** That's an issue that we're facing: how do we do projects that are going to be beneficial to our community? So we settle, then we end up going into negotiations, then we settle some more, and we are still settling because we are not getting what was said. Then there is no water, so that's another problem that we're facing. **Quantifying water that's not there has been our biggest problem. There are other avenues to gaining water here, even to the point of considering rainwater catchment ideas.** When we start doing that, will we be regulated?

Connie Maxwell, NMWRRI

I think that's an important point because one of the things that's clear about carrying capacity is the ability for that carrying capacity to be depleted by climate. Certainly management historically has been an issue. It seems like one of the important objectives is to see how we can start to use management to try to build up some of that

Tribes and Pueblos FG#2 Visions for the Future, cont.

carrying capacity. Somebody mentioned taking every opportunity we have to slow water down, spread it out, do stormwater and rainwater harvesting. Obviously, there are going to be significant challenges ahead that those approaches won't be able to avert, but they might provide some buffering capacity. They might provide some opportunities that weren't there before.
Any other final thoughts?

Joseph Abeyta, PTENRD

Due to climate change and the impacts of water resources depleting, **would that affect the water quality parameter threshold to be more stringent, because there's not enough volume of water to dilute these pollutants that are in the streams and rivers?**

Connie Maxwell, NMWRRI

I think the answer to this is yes. But I also think that there are a lot of people on this call that are more qualified to answer that question.

Joseph Abeyta, PTENRD

I was just thinking out loud, so I wanted to bring it up.

Connie Maxwell, NMWRRI

I think that's absolutely true. One of the things, that's crazy about New Mexico is that you can't listen to the stream for excessive sediment. That is one of our biggest water quality issues. That issue has definitely been, from the reports I've heard from around the state, getting worse. I haven't seen extensive studies on that, but almost everybody I hear is saying these floods are carrying more and more sediment and becoming more and more significant.

Crystal Tulley-Cordova, NNDWR

There are a few more things I wanted to share. One, **I think it's important to have an understanding that if there are Tribes, Nations, and Pueblos seeing climate change impacts, to be able to be inclusive of that data.** Sometimes planners tend to assume that if data is not readily available on the internet, then it doesn't exist. **Along with that, to be mindful of indigenous data sovereignty. The second thing is also to be able to describe risk assessment and to be inclusive of tribes as well.** If there's not enough water for a reservoir, what does that mean? Does that mean no power or having to buy power from a different source at a higher rate? Does that mean trying to find other opportunities for waters? Because Indigenous communities are impacted more than other populations by climate change impacts.

Connie Maxwell, NMWRRI

Terrific points. Thank you so much. Those are really helpful from a planning perspective. [...]I really want to thank you all. Have a wonderful rest of your day.

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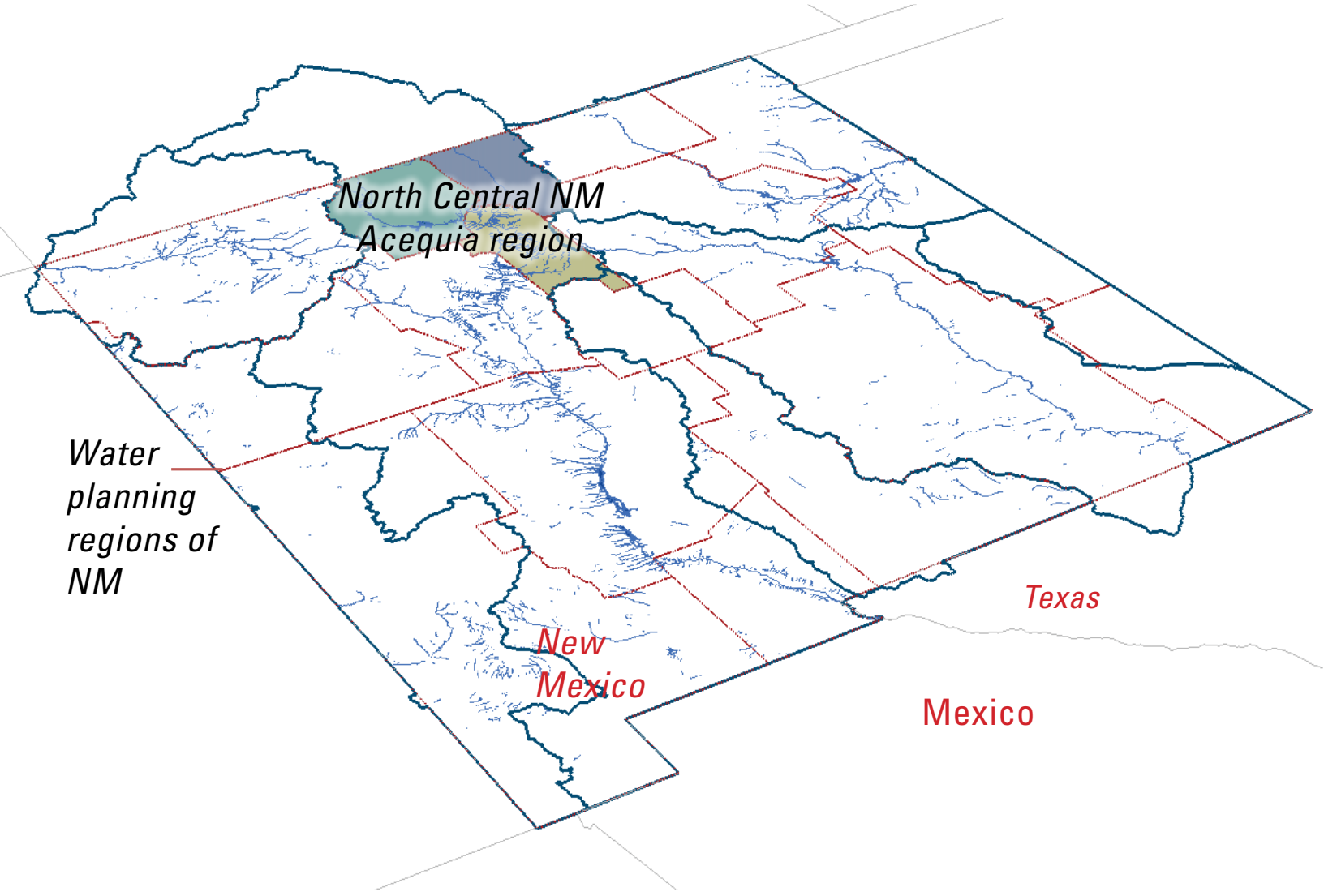
6.2 North Central NM Acequia
REGION FULL TRANSCRIPTS



North Central NM Acequia Stakeholder Visions for a Resilient Future

Focus group #1 Participants

Don Bustos,
Santa Cruz Farm & Green Roots Institute
Owner & Founder

Harold Trujillo,
New Mexico Acequia Assoc.
President

Mark Schuetz,
Taos Valley Acequia Assoc.
Board Member

Ben Wright,
Taos Land Trust
Land Projects Coordinator

Deandre Velasquez,
East Rio Arriba Soil and Water Conservation District
Programs Manager

Rob Heyduck,
Alcalde Science Center
Assoc. Research Scientist

Serafina Lombardi,
New Mexico Acequia Association
Program Director

Steve Guldan,
Alcalde Science Center
Superintendent

Darel Madrid,
Rio Chama Acequia Assoc.
President

Sylvia Rodriguez,
Taos Valley Acequia Assoc.
Board Member

North Central NM Acequia Stakeholder Visions for a Resilient Future

Focus group #2 Participants

Tiana Suazo,
Red Willow Center

Executive Director

Participant 1-04

Participant 1-01

Mike Musialowski,
Taos Valley

Producer & Educator

Participant 1-05

North Central NM Acequia Stakeholder Visions for a Resilient Future

Workshop Breakout Session (WBS) #1 Participants

Rob Heyduck,
Alcalde Science Center
Assoc. Research Scientist

Carlos Miera,
Des Montes Community Ditch Assoc.
Commissioner

Jay Lillywhite,
New Mexico State University
Professor & Co-Director

Luis Peña,
Acequia de las Canovas & Acequia de la Plaza
Treasurer

Donne Gonzales,
New Mexico Acequia Assoc.
Los Sembradores Farm Trainer & Youth Education Coordinator

Participant 1.1

Workshop Breakout Session (WBS) #2 Participants

Lucas Esquibel,
Esquibel Ranch
Rancher

Anamaria Armijo-Glenn,
Acequia Madre
Parciante

Javier Vigil,
JV Squared Consulting
Business Owner

Ana Moran,
Albuquerque
Farmer

Darel Madrid,
Rio Chama Acequia Assoc.
President

Participant 2.1

North Central NM Acequia Stakeholder Visions for a Resilient Future

Workshop Breakout Session (WBS) #3 Participants

Lynn Montgomery,
Coronado Soil and Water Conservation District
Chair

Carlos Arguello,
Acequia del Monte del Rio Chiquito
Commissioner

Robert Templeton,
Embudo Valley Regional Acequia Assoc.
President

Deandre Velasquez,
East Rio Arriba Soil and Water Conservation District
Program Manager

Nicole Olonovich,
Albuquerque
Community Member

Don Bustos,
Santa Cruz Farm & Green Roots Institute
Owner & Founder

Workshop Breakout Session (WBS) #4 Participants

Ted Schreier,
Albuquerque
Community Member

Steve Guldan,
Alcalde Science Center
Superintendent

Luciana Garcia,
Cow Creek Regional Acequia Assoc.
President

Participant 3.1

Participant 3.2

North Central NM Acequia Stakeholder Visions for a Resilient Future

Workshop Breakout Session (WBS) #5 Participants

Rick Martinez,
Acequia de Los Andosares
Treasurer

Sam Fernald,
New Mexico Water Resources Research Institute
Director & Professor

Emigdio Ballon,
Pueblo of Tesuque
Agricultural Director

Greg Corning,
Pojoaque Valley
Parciante

Isabelle Jenniches,
New Mexico Healthy Soil Working Group
Core Team Member

Suzanna Denison,
American Farmland Trust
Farms for a New Generation Program Training Manager

Participant 4.1

Workshop Closing Remarks

Serafina Lombardi,
New Mexico Acequia Assoc.
Program Director

Paula Garcia,
New Mexico Acequia Assoc.
Executive Director

Don Bustos,
Santa Cruz Farm & Green Roots Institute
Owner & Founder

N. Central NM Acequia FG#1 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Don Bustos, SCF.

So I think the most important thing is the **connection to the land**. To me, and I think to a lot of the folks in the valley that represent, it's a **sense of freedom, of independence** of being able to live off the land and really provide for our families and not be completely dependent on government or handouts or other kinds of agencies providing for us.

What I'm explaining is about being connected to our creator in a **spiritual connection** because when you raise an animal and you watch and nurture it, part of the cycle is that you are there, taking care of animals, and then they take care of you in many ways. So raising animals for food is a love relationship, it's being part of the holistic and spiritual system. We're honoring the creator by honoring everything that has been provided to us.

Mark Schuetz, TVAA.

I'd like to add a reminder of the **security** along with freedom and independence acequias provide to us locally by facilitating the production of food during these changing times. We also recognize the **value of acequias to the recharge of groundwater**. Considerable research at the Sustainable Agriculture Science Center at Alcalde confirms significant return flow to the rivers from water originating in acequias and agricultural fields. '**Querencia**' describes our place-based enthusiasm for this gravity-fed water supply and affirms how deeply indebted we are to our wise predecessors who brought this very appropriate technology from North Africa and Spain. It is quite a privlege to participate in the acequia system.

Ben Wright, TLT.

I think it's really important to maintain the **connection between agricultural traditions and cultural resources.** At least in the Taos area, I think probably through most of Northern New Mexico, that's really vital to the sustenance of both.

Harold Trujillo, NMAA.

Well, I think it's **our connection to the land. It's what gives us a sense of place, a sense of belonging, a sense of backing**. A place where you go back to rejuvenate your life and it's a place that does provide a certain amount of livelihood for **economic livelihood.** It helps us continue our **traditions** and also our **friendships** right in the community, for cohesiveness. **Acequias really help people stay connected,** especially in these times when we're zooming everywhere, but anyway, it does help us be connected to the community and to be connected with each other.

Darel Madrid, RCAA.

In the community I live in, the acequias are over 400 years old and we have 400 plus years of **repartimiento, of water sharing.** For me, it's important to protect that tradition, but in light of drought, it's important that we adapt to less water resources and make them more efficient in a number of ways for farming, for ranching. It's tied into the local economy, farm to table programs, so forth.

So there's that economic tie, but also what I'm very concerned about is outsiders coming in with no knowledge of the history and background, trying to buy their way

N. Central NM Acequia FG#1 Values, cont.

into things because they come with a lot of financial resources and I'm afraid that all of this will endanger that tradition of water sharing because for me, the green ribbons that we see along the river systems, that's the ecology of it, the animals, the trees, everything. As Don, pointed out our creator, this is the lifeblood of which we and everything around us survives. And it's important to protect that, at all costs and make it more efficient

Serafina Lombardi, NMAA.

Really appreciate what everyone's sharing. First, I thought of my son and for me as someone who comes from a very long line of subsistence farmers, without the water, without the land, what do I pass on? How do I raise my son? I mean, this is just the basis for our **family and heritage**, even though mine's Italian-American, it fits in with this place and I'm adopting it to Chimayo and this land. So for me, it's a **sense of a deep connection to history and the future**.

And that leads right into food, it's just directly what we eat. My snack today will be carrots from the garden and I've been eating green chili from Don's fields and red chili from mine. So i**t's truly a part of my physical nourishment in addition to the spiritual nourishment** that we've been discussing.

And then because my daily routine involves walking along the Rio Quemado, which is an intermittent stream that feeds a lot of the acequias around here, it's really clear to me how all the cotton woods and the landscape inspires me, the birds, the deer tracks that was following today, the bear tracks I was watching, this is all my ecosystem.

And the **sense of restoration** that comes with living in this landscape. That's the only way I really know how to live. So I think that's just an echo of the **querencia and sense of place** that others have mentioned.

And really just as Harold mentioned, the **sense of connection with community, and the ecological input.** I'm looking out at our well house, which is right along the lateral. Someone hand-dug well on this lateral because that's the way it will recharge. I see us returning to a time where we may depend more on our rivers and acequias for access for not just our irrigation water, but our domestic use.

Steve Guldan, ASC.

I see the region that we live in and **traditions of water sharing and agriculture** provide something to the state and beyond, as far as uniqueness. And again, with things like water sharing, how to get along with limited water supplies. The region's diversity adds to the overall picture of resource use in agriculture in the state and beyond. That in itself is valuable. And, of course, some of our research is trying to look at documenting the benefits of traditional agriculture and hopefully convince others in the state of why it's important to support agriculture in the area.

Rob Heyduck, ASC.

One thought at least is for me, working in agriculture professionally is one thing, but it's my heart's work as well. So my day job is one thing and when I go home, I just do more of that.

My home is upstream from where I work. They're connected and just as with this

N. Central NM Acequia FG#1 Values, cont.

group of folks joined together today, I feel that our hearts are all in it and I feel that way with my neighbors, both here in Alcalde and at home in Dixon, **real connection and sharing with our neighbors.**

Deandre Velasquez, ERASWCD.

I want to extend on what Serafina Lombardi said. It is important it is to sustain the acequias and all the infrastructures, because **it's the lifeblood of especially this part of New Mexico**, Northern New Mexico. I think that that's very important to farmers and ranchers in the area. So I think it's really important that the **infrastructure be kept and sustained**.

N. Central NM Acequia FG#1 Issues

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Harold Trujillo, NMAA.

I could address issues in our area, in the Mora area. We experienced a really, really bad **drought** this spring, there actually was no water in the three acequias that I participated in. So luckily we got rains, which help with growing pasture and then we're able to produce some hay, but I've never seen a year when the three acequias I'm a part of didn't have any water to irrigate with.

So we're dealing with **extreme shortages and then also extreme variations.** And since there's no water in the acequias, we're having complaints from people which mostly live along the acequia saying that their **wells are drying.**

The other thing is our **watersheds in that area are in very bad shape.** I have some mountain property in that area and I had a forestry group look into it and I have 1% airspace between trees which is really, really bad. The other issue I see is that we used to plant a lot of alfalfa, but most of the **alfalfa fields are going into brome grass**, which is a natural thing that happens that brome grass takes over, and so less hay is produced and brome grass doesn't have as deep roots as alfalfa does, and it's not as good for the soil. But it's this process of **paying less attention to our fields**. The irrigation practices. I think I see people not being careful in terms of opening the head gates, but they don't watch the water.

We **need better irrigation management**. I think we have gotten lazy in the way that we irrigate. I used to spend hours and hours in the field when I was growing up. But it's hard to find people that are willing to do that. They'll usually go in the morning, move the water, and then maybe in the middle of the day, later in the day, instead of being there shepherding the water. So you don't end up irrigating properly with the amount of time you have, that's happening more and more.

The way my dad taught me to irrigate was once you could penetrate your shovel a foot, then you move the water to a different location and you have to be there as many hours as you can to make sure you get equal coverage over the fields. But I see it becoming normal for people just to open the head gates and let the water go where it goes.

So as a result of that, we have maybe 10 feet of water penetration near the ditch, but maybe two inches at the end of the field. The one thing that is interesting, I did an underground drip irrigation because I thought that would help deal with the variations, right? So I have three acres of underground drip and I thought there should be in bad years, enough water to irrigate the three acres with underground drip. But guess what? There wasn't even enough water to fill up the tank for underground drip because it is too dry.

In addition, we have **more and more pressure from other entities that want water or that think their rights need to be prioritized during shortages,** like the Picuris Pueblo. For example, we have three mountain ditches that serve the Mora valley

N. Central NM Acequia FG#1 Issues, cont.

and in reality take water away from the Rio Grande watershed. So the Picuris Pueblos has complained especially during the low water supply years. So the Mora acequias need to respond to these demands and will need to adjust. And eventually who knows, we might have to have a sharing agreement.

A lot of **pressure is being created because of the shortages**. We have **difficulty sharing water**. We met to divide the water this spring among three acequias. And it's interesting cause it turns out that three **acequias have different irrigation practices,** so there's a mismatch. The one I belong to is a larger one and none of us irrigates the entire property, but the other two ditches, they make sure that they irrigate all their properties, no matter how many days it takes.

So, one solution was that we switched irrigation days based on the size of the ditches, we had four days for one ditch and then three days for another ditch and seven days for the Acequia de la Aguila for a total 14-day cycle. So we went back and forth. But that was complicated because the three different ditches have different objectives of how they supply water to their parciantes.

So there's those challenges. Now in the case of the Isla ditch, we have Murphy lake dam and Murphy lake dam is wet water, and we know exactly what's in a lake and what we can take out, but we are having trouble allocating the amount when it's not filled to capacity. We have in our bylaws that you get one day of irrigation for eight acres, but when there's not enough water in the lake, then we might only be able to give enough water to irrigate half of that when the lake is empty. So we were having to learn how does like Elephant Butte deal with allocation of water. So we're having to learn that, but in that case, we know exactly how much is in a lake. And so we can apportion it, but people are objecting. They're **expecting to get their usual allocation** and there is no water, no new water to allocate.

And it's especially difficult with the new people coming in. They bought abandoned land and then they want water rights and then they want a good amount of water. So that's even making it more difficult.

I think that **pressure from the outside, from the new people and then the people that think they're not getting their fair share of water** is its own category. Like the Picuris in this case, that's going to become a big, big issue for our valley because of the three transmountain acequias and then the new people that buy these lands, they just think that because an acequia runs through their field that they're entitled to take water and then they complain that they don't realize that they've been delinquent for 70-80 years, but yet they want water. So that puts **pressure on sharing the water and then sharing the limited water.**

Deandre Velasquez, ERASWCD.

An issue that really affects East Rio Arriba is **invasive trees,** Russian olives, Siberian elms, salt Cedars. They take up a lot of water, especially along the banks of the river. So that is definitely an issue that is brought up a lot from landowners who come in. They're always asking if there's programs for any invasive tree removals, also invasive plants. We have a program that we try to help people learn more about invasive species but they really do take up a lot of water and they deplete it.

N. Central NM Acequia FG#1 Issues, cont.

Serafina Lombardi, NMAA.

I put some of mine into the chat in an attempt to be succinct: **loss of water rights from acequias** (MDs, adjudications, personal wells for ag and domestic use, cannabis and other commercial uses [especially by outside interests]); **impact of cash economy** (loss of population, hard for young people to stay, challenge to subsist off ag); **intensified drought and flood cycles** (damage and siltation from floods, little to no water at other times); **erosion; higher temperatures, drier air, unpredictable cycles with pests, hail; need to increase soil health; alternative water catchment strategies needed.**

Mark Schuetz, TVAA.

The **health of our upland forests is imperative to consistent water flow**. The three functions of a a watershed (capture, storage, release) are best achieved in a forest with about 40% canopy cover according to research that Robert Parmenter as facilitated at Valles Caldera. Many of our forests have a closed canopy that prevent the snow from reaching the ground, often evaporating before it can participate in the terrestrial water cycle.

Fortunately, the recently passed Infrastructure bill has earmarked millions of dollars for forest thinning in New Mexico. The effort is designed to move forests closer to **historic conditions** where crown fires were rare, and surface fires managed a balanced landscape. NEPA clearance takes three years and millions of dollars to complete, but a lot of progress has been made in the Carson National Forest. I want to take a minute and really compliment the Carson for getting on the ball with that, but any **forest restoration** or super standard deduction like Harold was referring to, that we need on public land has to be a prioritized project and then get national environmental policy act clearance. Now a new 'Categorical Exclusion' has been created where necessary work can get cleared with less paperwork.

Forest restoration is a crucial way to ensure our watersheds do not burn and become "flashy" - a conditions where the lack of tree cover causes all the snow to melt and run off early in the season, leaving little for summer irrigation.

And just a quick story: In El Salto, my crew thinned a 20 acre block in 2016. The owner of the property just below the work testified that a spring on his place that had run early in the summer had quadrupled in size...apparently in response to opening the canopy and reducing the number of trees drawing on the limited water that was available. So that's just speaks to the significance of how very important it is that we get our **forest returned to balance** to address the diminishment of flows that were indicated earlier by Connie.

Steve Guldan, ASC.

Connie, can I make a comment and ask Mark a question? I don't know that much about forest restoration and management related to increased infiltration of water.

But are you finding at least in your neck of the woods, **people support when there is forest restoration?** Cause I'm wondering if part of the strategy in some areas is going to be public education. Several years ago, I happened to be up above Santa Fe and

N. Central NM Acequia FG#1 Issues, cont.

there was a concerted effort to prevent any type of controlled burning there, and I don't know where the data falls on all this, but they seem like every, every tree is a good tree and basically don't touch any tree was kind of the impression I got from this group based on what was posted up there on flyers that were posted around in the forest. Anyway. Could you speak to that? I think that's important. The public has to be on board with these efforts in one way or another.

Mark Schuetz, TVAA.

That's an excellent point, Steve, and a concern that should be on our list. We do still experience **some public resistance to forest thinning** but it is by far in the minority. This last week our crew was completing a project in a neighborhood in the foothills near Taos, and our client lined up two or three jobs on adjoining properties for other owners. A recent field trip in the Santa Fe Watershed showed hundreds of acres that had been thinned and subsequently burned with considerable success. **The reintroduction of fire is crucial where and when appropriate** because thinning is very expensive and fire is the natural process that best manages the forest to keep fuel loads at safe levels. On the Valle Vidal, six to seven thousand acres per year are treated with fire by dropping incendiary "ping pong balls" in the spring when there is still some snow on the ground with a sizable hand crew standing by, creating a 'mosaic' that is far less likely to burn catastrophically.

We have found an increasing acceptance of this work as more and more of it's been done. And then like after a haircut, it grows in and we have a really strong community wildfire protection plan working here with Jr Logan who was an environmental writer for the paper for years. And he's promoting this work with photographs and the data. Truth be told, some people will never embrace it, we've even heard comments, like I don't care if it does improve the condition, if it involves human participation, it's bad. But that's becoming more and more the minority as everybody's seeing what's happening in California and around the west. So the evidence is nudging the public in the right direction on that. So it's far less of an issue than it once was.

The issue is the need for pilot projects to build support and education to be right beside it (education, photo images, videos, news).

Harold Trujillo, NMAA.

I think that the **lack of good information really hurts policymakers** because where I work we looked at this biomass, generating facility that would **produce electricity and bio char** and people that run the Carson Electric Co-op or state policymakers are afraid to touch it because you're cutting trees to produce electricity. The good part was going to be that you've produced bio char which would help sandy soils retain water. But people are scared to touch those kinds of projects because of the pushback from environmentalists.

Mark Schuetz, TVAA.

Well, tagging on Harold's point, the **economic viability of production facilities has really been an uphill climb in the state**. I know in Europe they have whole wood utilization systems that heat hospitals and schools and produce a number of

N. Central NM Acequia FG#1 Issues, cont.

byproducts like Harold cited, but there's not a lot of successful projects in the states. There have been some big, expensive failures. So what seems to be going in Northern New Mexico is direct utilization because there's so much demand for firewood. So we have the "Forest Mayordomo Project" where local woodsmen are allocated an acre on the National Forest to clear unwanted trees, and they may take home all of the wood above 3" in diamteter. Quite a significant amount of forest restoration is taking place as logging contracts. I have worked on two fo these, and the results are quite successful and aesthetically pleasing.

Don Bustos, SCF.

I'd like to add a couple of things to this one. The idea of doing **large regional infrastructure analysis**, **systems analysis**, because I think a lot of times as acequias, we're individual acequias and we're looking out for smaller kind of a projects, but the way you started your conversation is that you want it to regional approaches.

And I think large infrastructure is needed to improve water retention or water preservation. Then that's where the focus might be able to start. And then that goes back to Steve's idea of something more like a **public awareness campaign**. How do you build a public awareness for these large regional kind of infrastructure systems that are going to be needed and then to design them and then to find, as Harold said, political will to actually fund these kinds of systems that are going to be needed for future preservation of our communities. So I think all the points were really well taken, but I think that a campaign, a public awareness campaign and then large infrastructure system developments that impact not only the shallow aquifers but the deep aquifers are going to be really important because more and more folks want to drill into that deep aquifer and suck the water from down there.

Harold Trujillo, NMAA.

Should we also include like major statewide concerns because we have a mentality that we want to encourage business to come to the state. And so that water problem issue is ignored. Facebook is a good example, where our **political leaders are concerned about getting industry to the state, no matter what the water costs**, I guess they're expecting to find the water later, which we know is true.

To me, that's a major thing, right? Because the first thing that businesses ask for is where's the water, right? If I need water for my business, and that's not an easy answer, we have also **very difficult laws**. We also have many entities that get involved in the allocation of water. You have the acequias, cities, middle Rio Grande irrigation district, Carlsbad, all of those irrigation districts.

The state engineer is working on a 50 year water plan. And so far the discussions I've heard is that the way the state engineer is thinking of dealing with it is with **water transfers**. That is very destructive to small communities because really what's behind those words is we're going to take it from the weaker water rights owner to the richer water rights owner. That's really what it means. It's very **disruptive to communities.**

If you transfer water rights out of an acequia community or any place, the water

N. Central NM Acequia FG#1 Issues, cont.

unfortunately is not where it is needed. And I've heard a previous state engineer saying, that's the biggest problem, right? We don't have water where it's needed and it's interesting. The assumption here is that where the water is now is not needed. Which is crazy. You will destroy the communities where it's currently located, if you want to relocate it to Santa Fe, Albuquerque, or Las Cruces. **There is not encouragement for consumers to use water more efficiently under current law in a water transfer.** I've been pushing for water efficiency. When a state engineer approves a transference of a water right, he should **require the user to have a water conservation plan**, and that doesn't seem to be part of the equation. They do have guidelines that they could implement for water conservation. In my office, we actually worked with the Colorado state engineer because they're developing those kinds of options. You can have efficient cooling towers and have recycling or reuse of water with the oil and gas people.

So none of that is being discussed at that level. It seems that the only solution they're going to go through is they're going to transfer water and that's how we are going to deal with it. So there's **no gap analysis**. I told the ISC guy, in this plan you need to find what's going to be the gap and how do we fill that gap, in the coming years.

There doesn't seem to be, there's still no answers to that. And that applies to us as acequias. How are we going to deal with those gaps in certain years? Our **parciantes have to learn to become more adaptable**, so it applies to us too.

Building standards that require less water use. We have standards like water-wise. My profession is energy efficiency and renewables. The way that we dealt with the energy shortages was to improve the efficiency of building standards, with additional, better insulation, better windows, all of that. And no one seems to be talking about addressing requiring water conservation building standards for buildings. And those standards exist. Santa Fe actually implements it, but on a statewide basis there's nothing that says commercial buildings should use less water or us efficient toilets, sinks, showers it's not mentioned and is not required that a building be water efficient. There are very strict requirements for energy efficiency. Building codes are updated every few years and they require certain amounts of insulation and good windows and all of that but there's nothing that requires water conservation for commercial buildings or residential buildings. It's voluntary in a sense, Santa Fe though does require you to use the Water-sense program that requires efficient fixtures and toilets.

So anyway, if you could include building standards that reduce water use, I think is another thing we ought to be pushing.

Connie Maxwell, NMWRRI.

Yeah. My background is architecture and I agree. It's an enormous part of the, of the environmental effect on the world. So I just, I just added into the chat, the list that we've come up with so far.

That's not to say we can't add. And even if we go on and start talking about strategies, if we want to add issues. I don't know if people have the ability to copy and paste that and say, okay extreme shortage and

N. Central NM Acequia FG#1 Issues, cont.

variation of water #1, that sort thing. But, I'd say it would be difficult to rank this list. So many of these issues are so critical and in some ways complex and hard to say that one is more important than the other. So maybe even if you don't want to go from one to like 20 or whatever it is, maybe if you want to.

Harold Trujillo, NMAA.

Could we perhaps **categorize them as local, like in the local community then regional and statewide** maybe that would be a good way to separate them out?

Connie Maxwell, NMWRRI.

You know, that's a really good idea because then it starts to see if there's competition between issues between local, regional, and state. I'm not sure practically how to do that, but I think that might be a good analysis. Are there issues that you think are regional issues but are not being felt locally, and like Don was saying, need a regional analysis and a regional approach.

Mark Schuetz, TVAA.

Connie? I have a little bit different, but comparable strategy for addressing ranking. This just came up with the watershed plans, working with Rosemary Romero too, and I think it's **already laid out for us in a logical fashion if we think about watershed function** because the watershed functions are capture, storage, release. And then our use is distribution, which gets down into efficiencies and all that. It seems to me that ranking doesn't mean you're not going to pay attention to things lower on the list if they're immediately pressing, but I think it sets the stage for what's most important which is capturing the most water that falls from the sky to start with and then proceeds to, is that water soaking into the ground. So it is local in the sense that it's based in part in the region and elevation, of course it's relevant to everywhere precipitation falls.

So that's what I would recommend as far as ranking. Are we making sure the water falls somewhere that it's going to infiltrate as most expediently as possible. Then of course, if it's a riverine system, the water's going to run and that there's not erosion compromising the quality of the waters, compromising the volume of water that could be pushed into the banks by good stream meander. All the healthy functions of the watershed, in my mind, is the crux of the problem.

Harold brought up what the state engineer's talking about doing is transferring water just to solve the problem, but he's working with a fixed amount. And I think the starting place for us is to **increase the fixed amount,** however possible. And that's especially essential now with the variability that we're looking at. **We should be ready to capture massive flood flow** because when it comes, look at what happens in the Southwest, we have drought and drought and drought, and then you see the streets running full to the brim in Albuquerque, and it's a flood issue.

So I, again, I would just advocate for my point that we should start ranking with the capture and then proceed on all the way through to distribution and efficiencies applications, vegetation growing over the top of where the water is used in field instead of having barren fields and so forth.

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Connie Maxwell, NMWRRI.

Yeah, I agree. I really appreciate your perspective, Mark. I mean, that's certainly coming from both the community and regional natural systems planner, that is very much an approach that I agree with, starting from the top of the system, trying to capture all the precipitation that we can, and then following the water path in terms of ensuring that at each point along the way you've got healthy function.

I also appreciate the ideas of saying, are there some issues that are hard to understand on a local level and, and could be as Don was saying, we need more analysis on the region in order to tie us together regionally, and then a campaign. So if we took those three kind of concepts where we boiled the list down, we took Mark's perspective and Don and Harold's perspectives in terms of kind of trying to tease out some of those dynamics, does that seem like a good strategy and we can follow up later with some of these as higher priorities than others. Our next section, the actual strategies to try to address these issues, what are some of the important ones to do? Any thoughts on that approach?

Harold Trujillo, NMAA.

I think it's good. I think that would be a more efficient way for us the participants to deal with, a ranking of some sort.

Don Bustos, SCF.

Yeah. I agree with Harold. I think there at least two that I identify immediately, maybe three. One is the **human campaign**. And then the other one is the **hard infrastructure campaign**. So there are two different kinds of work being done, but they're both speaking to the same kind of preservation, completely different work.

Harold Trujillo, NMAA.

I think Don mentioned a very good word preservation, right? **How do we preserve our communities in light of these really severe water shortages?**

Serafina Lombardi, NMAA.

I think I have a related comment on the priorities. I really resonate with Mark's approach and I didn't put the whole upper watershed care in my list because I just knew Mark would take care of that. It was his place to articulate it better than I would, but I think what comes up for me sitting where I do with my experience at NMAA is that, I don't really want to use the word competing, but that's the easy word to get two c**ompeting strategies of like a sound scientific approach versus policymakers getting in the way of what that means,** not in terms of implementing watershed restoration, but what if we do all this amazing watershed restoration and all of it is going to Facebook or all of it is going to international cannabis conglomerates.

So lifting up that, there's this hydrologic and ecological approach in reality that in some ways might feel more straightforward. And then there's the but how does the policy protect traditional users and water getting where it needs to be? So just lifting up,

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again, I don't want to call them competing, but different types of strategies that have different types of implications.

Mark Schuetz, TVAA.

I'm so with you, Serafina, that's so spot on and I almost **don't want to use the word prioritization with this list which should be considered as ordering,** just so there's some order to logically move through because it's a great point, you do watershed improvement and the water all goes to an industry and not in a balanced way with ag.

We want to make sure it's an interesting concept because you really have to take care of everything all at the same time. And so I'm guessing Connie's interest in prioritization is to assemble the whole picture in some sort of a logical format. And then I think that's all that the watershed top-down approach does is organize it in a concept conceptually, so you can consider it.

But I forest thin every year, but by golly, when it's time to go clean the acequias, we set the forest thinning aside and go clean the acequias and have them ready as soon as the water starts moving. So it's not like the forest thinning is first or a higher priority, you've got to deal with each of the issues that other folks that have spelled out so eloquently really simultaneously.

If you've got to stop a big inappropriate development or advocate for water efficient home design and that's the meeting to go to then whatever else has it, you know, we all do this. We all balance priorities.

Harold Trujillo, NMAA.

It would have been interesting if Facebook would have told you have to thin 10,000 acres so you can make up the water that you're going to use. They use about half the water that the Santo Lina development would need.

It's significant, the amount of water they use to cool all those computer servers. Anyway, they were told of course to use renewables, which is good and they're getting a lot of wind energy. **It would have been interesting if you could tell any new business moving in that you have to help restore or increase our water supply somehow**.

Mark Schuetz, TVAA.

Increase the delivery side of the water budget. Yeah. Yep. Perfect, great idea, Harold.

Steve Guldan, ASC.

I think that could help the businesses. That is a great point because they can put that out in their promo information, which I'm sure they're always looking for opportunities to sell themselves as ecological and beneficial in other words.

Harold Trujillo, NMAA.

Well, I've heard that one of the bigger funders for the Rio Grande restoration project actually does come from Intel, but they don't publicize it, but as I understand, they do support that effort.

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Mark Schuetz, TVAA.

Well, as the strategy starting at the top of the watershed, I think **every thinning project should concurrently be stabilizing the soil,** the landscape because logging practices have created gullies everywhere in the forest. And this is not really widely recognized, but I would like to restate how important it is that we restabilize the high country landscapes that are literally hemorrhaging water that should be soaking in and making its way through the whole shallow aquifer system.

In those areas where our crew (Watershed Dynamics) and Rocky Mountain Youth Corps works, it is often too remote for wood haulers to reach the small trees we cut. After we burn or lop and scatter the branches, we lay out the small logs horizontally on the landscape to create a series of miniature check dams that accumulate downslope migrating detritus in porous, cross-slope water infiltration beds. **By creating decentralized, landscape-scale water retentive landscapes, we act as a keystone species, amplifying water infiltration, facilitating soil structure improvements, setting the stage for the storage of episodic downpours, and establishing carbon-sequestering vegetation where barren soils may have existed previously.**

Banking water in the shallow aquifer is a practice that can be readily applied to every site where earth works are underway – in forestry as described above, in grasslands, farmland where acequia waters are "stalled on the landscape" to return to the rivers weeks later when the rivers would normally be running low…and in urban areas which Brad Lancaster has so eloquently described and demonstrated in his book "Water Harvesting for Drylands".

So just thinning and burning isn't enough in my view. And I just want to really emphasize that for folks to think about, because it isn't widely said, But there are tiny little remnants of some riparian species or a tiny little seep of a spring that's trying to run. But the aquifer recharge that creates the ojitos, the springs, and the acequias, as everyone knows, are supplied by infiltration which we would do well to facilitate wherever possible.

With regard to the water supply shortages we are experiencing in recent years, some adaptations are taking place. At a recent round table discussion with farmers participating in a cover crop initiative sponsored by Taos SWCD, several farmers were talking about dry land farming irrigated fields on those years when no water was expected. Crops that will endure with no irrigation like deep rooted alfalfa and dryland cool season bunch grasses have weathered drought years and then gone on to produce a good crop in subsequent years when acequia water returned.

I work in the ag land too. We are growing now alfalfa with cool season bunchgrasses and on one irrigation a year, we're getting two cuts. One year we had a real nice cut on a field with no irrigation because of previous decent irrigation in that same field - the banked water carried the day.

But Harold brought this up earlier about the fields declining in the Mora area. It's the same in Taos valley and the solution there has been the **no-till drill and minimal disturbance disking,** and then the no-till drill, and then planting a **polyculture** lot. Gabe Brown is promoting this polyculture

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work, which he's done a lot of work with them in the Dakotas and it spread all over the country, but really deep rooted perennial, cool season bunch grasses are way more hardy than brome and don't compete directly with alfalfa.

So the evidence isn't in because we don't have fields 20 years old yet with this, but so far the perennial rye and blue grammas grasses that mirror the native plant growing concurrently with alfalfa will give you a nice stand for grazing or hay and very minimal water demand. So, **perennial hayfields coupled with regenerative practices (perennial polyculture, no till drill, minimal disturbance).**

With the establishment of a hardy plant community, previously barren areas can access the available water stored in the shallow aquifer, the air is cooled, a micro-climate is established, and the local climate is moderated, "biological processes moderate climactic extremes".

The film "Kiss the Ground", available on Netflix, investigates the value of carbon sequestration on a global scale, which is of course, dependent on the water cycle.

Ben Wright, TLT.

I'd like to speak to a couple things. I think that this has been implied in a lot of things people have been saying, but I just want to make it explicit. That is that **intact ecosystems,** whether it's up in the upper watershed with the drainage coming off the mountains or whether we're talking about wetlands in the low lands, but **these systems being intact improve the water availability for people.**

But I think what is often missing in the conversation is that these **ecosystems have a need for this water** in themselves for the many species that live there. And I think added to that point is, as we all know, high functioning wetlands also increase the water to the aquifers, which then **ultimately helps human needs.**

I think there's a lot of emphasis in these discussions on the water availability for people and people projects and I think often the most, to me anyway, the most critical point is that **we really need the system to be functioning at a high level for our existence to be sustainable really**.

So I think that's really important and often overlooked. My second point is part of a solution. And I think we'd all come around to this, but Mark's talking about polyculture. I've been really involved in studying soil biology recently and just understanding the connection between diversity above ground and the diversity below ground.

And I believe that really thinking about **maintaining healthy soil biology** is really important to maintaining the diversity of species growing above ground. So there's a lot of practices like **composting and mulching and cover cropping, and no-till drilling** as Mark spoke that help maintain what's happening below ground.

I really feel strongly that these are very important tools in mitigating some of the effects of water shortages and higher temperatures and some of these things that we're starting to experience. I think the only other solution that I would add to the picture

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is strong foresightful community planning.

People spoke of development and conflicts with water resources with development, but I think it also comes down to **intentionally planned communities,** so that are aware that water is a limited resource and there's a lot of currently occurring contradictions to that sensible planning.

I think really looking at it from a community level, how are we going to use a shortening water supply and **how are we going to become more efficient in our use of the water?**

Serafina Lombardi, NMAA.

I think to add a little bit into what Ben was saying and another iteration of what I was saying before about kind of the policy versus other strategies is, this is very general, but I feel like the **strategies need to be really culturally relevant.**

A version of planning to me is really **community engagement.** When things come from above, they don't have the same meaning or relevance to communities. Again, are we building off of strategies that keep people on the land? Or are they ones that can provide more water and soil health, but are people practicing, their traditions, and growing food. What's the quality of life involved.

A way of summarizing that is as culturally relevant strategies. There's just a lot of pieces floating in my mind about this because my strategy would be like, f*** the whole capitalist paradigm and create a completely new system. So that's my top of the list strategy.

You didn't say it had to be like viable immediately, but I honestly do think the acequias are a model that's not capitalist. It's communal, it's sharing. It's not saying, oh I have the most so therefore I am Queen. I'm not saying I never fantasize about being queen, obviously, if that's why I said it.

But point being that **we have models here and we need to build off those models that have worked.** So it's kind of a meta strategy as opposed to a specific one, but there's so much I don't know how to articulate, but I just keep wanting to say **youth**. The word youth hasn't come up yet and I need to say it just because it's so important.

Again, who are we building this for? You're like, yeah, I love beavers. Are we building this for beavers. Yes. And we're building it cause I have a 10 year old on zoom school behind me and we're building it because we want him and all of his playmates to keep farming here in Chimayo and **we want them to have strategies that we've built that they can build upon.**

So I don't know, again, sitting in a lot of rooms where I'm not that young and I'm the youngest person in the room and where do we really get? And those kids, man, they're just full of ideas and vision that are surpassing even the wisdom and experience we bring. So I just had to say the word youth.

Don Bustos, SCF.

I'd like to build on that a little bit. I think that when the word models came up and I kept thinking about what was discussed around

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the different crops and how to preserve water in the fields and stuff. I thought about a model that might be developed that let's say you **increase the amount of farmers by X amount, by the year 2050,** then the benefits of that to the aqua system, to the watering system, to the community health, to the environment, are **all quantifiable benefits.**

And then like Harold's example, then you get another Facebook in, or we're one of these tech companies they're drawing from the community. They want water just for a profit, which is okay. But there has to be a model saying that if you have a Facebook company, you're going to lose this many young people, you're going to, you lose this many farmers.

Here's the environmental economic impact occurring when you're displacing those traditional growers to do something else. So that model, I think, would be a model that would be important for community awareness. So when a community decides to make decisions, they have something in their hand that they can move around and do it. To me, it's a visual and physical application that might be needed. I got a little excited about that, but there's pluses and minuses.

Harold Trujillo, NMAA.

Thank you, Don. New Mexico doesn't actually produce a lot of food, but we did a study a few years ago that showed a great benefit if we **increase food production in New Mexico** and nobody thinks about that, it's like we expect food to come from I don't know where, but nobody talks about that. Do we produce enough food in New Mexico? One problem is we **don't have processing facilities in New Mexico**. So anyway, that should be a priority. Producing food and it would help. And no one also talks about acequias being part of economic development. And yet it contributes to the economies of the rural areas in New Mexico. And then the youth, I agree, without getting the youth involved our communities will die quicker.

Connie Maxwell, NMWRRI.

So I think that vision is something like, **could we develop our food system to be more of a local food system by a certain amount and date. Is that kind of the idea in terms of a vision?**

Harold Trujillo, NMAA.

Yeah I think we have some backup information to that. It would be beneficial. So that would be helpful to the local communities.

Connie Maxwell, NMWRRI.

What about one of the questions we have, because one of the grants that we're interested in pursuing as something that's part of the organic program and working with the interstate stream commission to say, okay, you have this fallowing program, but if you did other programs that in fact did deal with the overall resilience, you know, social, cultural, agro-ecological resilience.

And we did programs like aquifer recharge programs, soil benefit programs and the thinning and so forth. What about crops? Your region in particular has such a wealth

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of traditional knowledge in terms of extreme water, efficient crops. But one of the things that we see is that agriculture follows the market, follows all sorts of other developments.

So we see down in Southern New Mexico in particular some of the crops are drought tolerant. Some of them are not. What are the future crops for New Mexico? And one of the questions is are there barriers to [01:37:00] making crop choice changes that you guys can identify? What would be needed to help people grow what we imagined to be the most sort of beneficial crops for New Mexico region by region?

Don Bustos, SCF.

I'm going to start by saying **fully funded and very community oriented Alcalde science center**. We need more research scientists out there. We need more cooperative extension agents out there. That's been, what's really been successful for myself and other growers is that we need that direct connection to doing those research that impact us directly in our regions. And that's for every region in New Mexico, not only the Northern region, but man, without these guys doing the science we're just, you know, I can go on about what I think would they have to do the research on, but I think that that's an important piece.

Harold Trujillo, NMAA.

One thing to point out is that the **department of agriculture just dropped the organic certification.** So I have to get my farm certified by a California organization and it's about 50% more expensive. So to me, they're going in the wrong direction there. They used to be partially state funded and that was dropped a few years ago because the state was going broke. It's unfortunate I think that they dropped that program. All they provide now is education. They don't certify anymore.

Serafina Lombardi, NMAA.

I think the barriers for people doing different crops depends on who we're talking to. You know, in Chimayo, a lot of us are doing subsistence farming here and **people grow what we want to eat**. And so foods that folks aren't familiar with, even like Paula Garcia, our executive director, likes to joke about how much she loves kale and chard.

She grows so much, but her community is not interested in all of her abundance of kale and chard, even though it's nutritious and some of us find it delicious, you know? So there's this, I think, question of who are we targeting to grow the different crops? And to me, it's both and. We want market gardeners and subsistence gardeners and people who just want to do land restoration.

I feel like I've seen shifts of what people are willing to grow and want to grow. And Don's a great example of like, oh, no one else is growing blackberries. Now he's growing blackberries showing it's economically viable and delicious. I think what's related to Don's point about Alcalde science center is, so let's say we choose some grains that we think are great for small scale, you know, local processing and some different things, but where are the locally adapted seeds? Where's that sense of maybe getting a story that connects it back to a crop we're familiar with and the technique. So I think, how we embed it in the existing narrative

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of the agriculture we already do with all like on this level of small holdings and, you know, what are people's motivations is the question. And then, how do we meet those motivations if certain things aren't going to continue to be as viable or beneficial.

Don Bustos, SCF.

So just to build on that a little bit, let me know if I go too far with this, is that I think Alcalde has done a lot of work on season extension, but helping, design - or I'm not sure how we want to frame this is - **more protective covers for the crops,** because in these kinds of really climate change activities where we're getting hailstorms or big thunderstorms, we need more protection for our crops to be more viable in these really turbulent weather changes.

And then what we're going to need also is more improvements **more awareness or education around water distribution so that people can start to think about growing crops in different times of the year.** But part of the problem with the acequias is they've only been running in the spring and the summer.

So we have to **develop other methods for water distribution to be able to address those climate crises and changes** in the future. Not everything's going to be the same. We're not going to be able to irrigate from May until September anymore. Things are going to be so crazy that we have to be ready for those kinds of changes. Or they already are, I mean, it's hard to depend on, the weatherman anymore.

Connie Maxwell, NMWRRI.

One thing that many of you brought up before was the idea of embedding water conservation into regulations. Would you say that the water laws as they exist right now, would you say that they kind of provide a disincentive to choose a more water efficient crop? Is that a barrier to going to selecting water efficient crops?

Harold Trujillo, NMAA.

Yes. It's a **mega barrier because the whole game is for you to get a water right for a crop that uses the most water.** So, this engineer has always fought this whole issue about efficient irrigation, because I think his point of view says, you don't save water.

However, we visited a project in Delicias, Mexico, which is Southwest of Chihuahua. And they paid the farmers to switch to drip irrigation and underground drip irrigation. And the farmers had to give up half their water rights for the drip systems to be paid for. And the US and Mexico jointly paid for this project. And they used underground irrigation system technology that was developed in Israel and they based it on the duty of water for growing corn. And it worked for them. I don't see why it couldn't work for us. **But the problem is our law doesn't allow you to use less than what you're entitled to**. Then you end up losing part of your water rights. So that's a big, big problem in our water law.

Don Bustos, SCF.

I want to check in with what Harold said there. I think that **part of it is that if you don't**

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use every drop you have or you have a right to, the concept is that the state engineer's going to come and take everything away. So, when people are planting, I encourage them to put orchards and orchard grass, that consumes all the water that they could use. And it'll be legally defendable in a court of law. I think also, as Harold said, part of the thing is that this whole **water law was set up to be very adversarial.**

So what you're trying to do here is you're trying to have like the community oriented vision. And none of the systems in place are there to do that. It's more to separate and be adversarial than community oriented. So that's one of the bigger challenges I've seen.

Harold Trujillo, NMAA.

The New Mexico adjudication process imposes a completely different water allocation process for an Acequia. Acequias allocate water by days. The state allocates water in terms of Acre-Feet. In my Acequia de La Isla we get one day of irrigation for each 10 acres of land. However, after adjudication we would probably receive 15 acre-feet for a 10 acre field. The amount allocated would be based on how much water it takes to grow a crop in the specific area and many other water delivery system factors. The water rights determined consider the historical water supply data. The data is outdated and does not reflect the fact that our water supplies are diminishing. Previously adjudicated areas are finding that they cannot deliver the amount specified in their official water rights allocation. Also, acequias share a river by parts. For example, The acequia de La Isla get 4 of 10 parts from the San Jose River and the Acequia de La San Jose gets 6 of the 10 parts from the river. We have to share the shortages. Usually we only get to irrigate about half of the land that could be irrigated under our acequia under current conditions. **The adjudicated water right ends up being a paper water right** because it does not reflect the actual supply. Historically, water rights were owned by the acequia community, not the individual. However, in 1907 New Mexico adopted a water code that privatized the right and gave it to the owners of land in the acequias. **This made it easy to separate the water from the land and to sell and transfer the right.** You could not separate the water from the land in the traditional acequia system. The process destroys the traditional allocation of water for an acequia. A single water transfer from an acequia affects the other parciantes. **Each parciantes is like a spoke in a wagon wheel. At some point the system falls apart when enough transfers occur.** Imagine if a water right was given directly to a homeowner in the City of Albuquerque and then that owner could sell their newly acquired water right to the City of Santa Fe or the highest bidder. This is what the 1907 Water Code did to acequia.

Connie Maxwell, NMWRRI.

Yeah. It seems like given that the ISC has taken on the idea of this ecosystem service payment concept, that they'll pay farmers down in Southern New Mexico, in the lower Rio Grande water planning region, to fallow their land, that it makes sense to suggest to the ISC, and there's other funding sources as well, that farmers be paid to do things that actually produce ecosystem services that recharge groundwater, that conserve water. People complain about drip for good

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reason, because if everybody converted to drip, there'd be no recharge. So how about if you're going to convert to drip and you're going to use less water, there also is a community aquifer recharge program to capture that arroyo water, that sort of thing.

Do you think a program that worked with the science centers such as Alcalde and said to the ISC and other programs - there's other funding sources, the ISC is not going to be able to afford to pay as much as is needed to address the program - but do you think a program where we would actually start to design some of these pilots studies and put them in place, do you think that's a good way to try to move forward?

And then, like Don said, the models that we create at the Water Institute and that other people have created can then estimate the benefits of those programs if they were adopted on regional scales.

Steve Guldan, ASC.

And among all the good things that have been mentioned, I think back to your slide on what happened in New York. At some point it would be great to **take the holistic view and if modeling is involved on a watershed basis or regional scale to come up with numbers that we could show the public: this is what you're getting to assist us to do the kind of conservation ecosystem remediation**, all the things we've been talking about, cause you gave dollar figures in New York.

And I think at some point this is just one of the approaches, not the only approach, but to come up with valid figures of what the public on screen is going to gain. And then there'll be more interested in supporting through policy or buying from local farmers or whatever it takes.

Harold Trujillo, NMAA.

I think the dollar is based on studies. I think we have some previous studies where it gives us dollar benefits from improving growing food Northern New Mexico. In addition, on the future crops, I don't think there's anything bad about pushing growers to produce potatoes and onions and carrots, Last year for the pandemic, I actually bought some potatoes and gave them out to different people because it's a famous crop that's gotten humanity through different hardships and several people took advantage of that and grew potatoes.

Connie Maxwell, NMWRRI.

So if we were to do these regional models, let's see if we can come up with the, the visions that we would try to achieve. So for example, the visions that have come up so far are to increase the amount of farmers by 2050 and measure the quantifiable benefits. Would that be maybe increase the amount of farmers to a certain point or just looking at kind of incremental increases?

What I mean by to a certain point, like that would help sustain acequias communities or something like that. **Is there like a target increase, like increase the amount of farmers to maintain communities or to maintain viable communities or something like that?** I think that was your vision Don.

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Don Bustos, SCF.

Yeah. I hadn't quite finished the thought on it, but **increase the amount of farmers by 2050 to have a viable and holistic watershed within the Rio Santa Cruz.** And you could go to anywhere, but I was just thinking about, you know, there's like 7,000 to 10,000, there's over 5,000 available irrigable acres of land here in the Santa Cruz.

So at some point we're going to have to exactly figure out how many of those acres have to go into agricultural production to really recharge the aquifer, to make it a healthy stream system and to keep it alive instead of just putting it in the middle pipe and shipping it up. I don't know right off the top of my head.

Connie Maxwell, NMWRRI.

That's great. And you said there's about 5,000 irrigable acres. And how many are being irrigated?

Serafina Lombardi, NMAA.

. I think it's always a delicate subject, but if you drive around our communities, you can see that there's plenty of land that is fallow. And I don't know that anyone's studied it in a way we don't want them to, because it's legal. There's a lot of legal complications and making a statement about that.

I think Don said all the right things. It's like, what is that balance of, how much can we irrigate? Do we need to irrigate? I added in for **food sovereignty** so that we can sustain ourselves. And that is a whole other question we haven't really talked to. We've talked about newcomers and outside interests, but the population balance and the **carrying capacity of this land** to live sustainably here we haven't brought up because it's awkward and hard. Or maybe that's not why, but that's one reason why. Short answer is, Connie, I don't even know what to guess exactly. I feel like a really easy guess would be to say like, almost half of irrigable land in a lot of the north on average is not being used depending on what community you're in. But I don't know that that's accurate. That's just a very internal, confidential guesstimate.

Connie Maxwell, NMWRRI.

Yeah. Let's just say let's make it so that it's not an issue, that is an important thing to do. Significant amount of land that could increase function or is fallow? Do you think that's safe? A significant amount of land is fallow **there's a potential to increase recharge on significant amounts of land.** Maybe that's the safest way to put that.

Serafina Lombardi, NMAA.

You hit it with the latter one, Connie, there's the **potential to increase is the real positive framing there**.

Connie Maxwell, NMWRRI.

This is a great vision. Any others? I know there was the culturally relevant strategies. There was fully funded science centers. Let's see if we could come up with a couple more visions where many of these strategies could apply.

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Harold Trujillo, NMAA.

Well, I think what one vision is, I wish we **could have a hundred farms that work as well as Don's farm.**

That would be a good objective because Don's farm runs reasonably economically well, so I think you would be a good model that hopefully it could be replicated.

Connie Maxwell, NMWRRI.

I'm sure, Don, lots of people have studied your farm, but would you be willing to serve as a model and identify some of the objectives that would help others be as productive and healthy and that sort of thing?

Don Bustos, SCF.

Oh, I definitely want to share what I learned from the Alcalde science center, Steve, Dell, Edmond, Dave, all those guys are instrumental in their success. So it's just building on what they've shared with me.

Ben Wright, TLT.

I'd like to add something. I think people have spoken to this a bit but I think there could be **more monitoring of weather and precipitation and groundwater** and what's happening underground. I know Lily is doing a lot of work in this regard, but we've just set up water monitoring wells in a transect here at the land trust and a weather monitoring station.

So we're actually tracking what's happening with the weather with what's happening on the surface and underground. And we're engaging in other projects with other landowners setting up the same type of measuring stations. **We're developing a system that's pretty easy to implement and to copy and implement and other sites.**

And I just think **better understanding of actually what is happening may be useful even on small scales.** People talk about regional scales and I know the work that Steve Guldan has done is a lot more in depth, but we're just doing land owner type research on what is actually occurring.

The vision could be starting to build a regional climate and water resources monitoring network.

Connie Maxwell, NMWRRI.

What about the culturally relevant strategies? Can we turn that one into a vision? We kind of started to go there with the idea of community structures that develop to strengthen existing community, you know, that sort of thing. What do you think Serafina?

Serafina Lombardi, NMAA.

I like that we're circling back to it. I acknowledged that I fade at the end of long zoom meetings, I don't know if other people are having that. I don't know what it is. Why do Zoom meetings feel hard? It wouldn't be the same in person. My brain. Really I don't have an immediate, like, oh, this is the way to kind of quantify it, but the direction you were taking it in earlier as far as some target or goal of how we continue to support, build on, further resource existing community

N. Central NM Acequia FG#1 Strategies / Visions, cont.

institutions. From a quick NMAA example, we have a farmer training program modeled after a farmer training program that Don started.

There are those kinds of, back to like, we have our community like acequia historical traditional models, and then we have our modern iterations of them and youth organizations that are connecting kids and aspiring farmers. And helping develop models like a lot of our young staff are part-time, they're want to be on the land and can't do NMAA full-time, but can't afford to live on the land without having an outside job.

Hence, I'm working a car, so now I'm full-time what happened?! Um, but that said again, I don't have the quick synopsis of like, well, this is it. But I do feel like, back to that point of like the target goal of **how many farmers we need to have, you know, how many people under 50 are engaged in implementing the models, designing the models, working the land?** You know under 50 is young in acequia world at this point.

I don't know. I don't want to blather endlessly as I lose my mental acuity. But I just, I don't know exactly what to say. I just feel like there's so many things we do need modeled and I appreciate that NMSU and all of you keep dipping your toes and asking us this question.

I just feel like it needs to keep being asked because it's not like the frame, I guess I'm used to thinking of it in. I feel like I'm forgetting to say things I think about all the time and I'm like, oh, what are those things I should be suggesting? So I just want to appreciate the conversation and the idea that it's an evolving conversation.

And I feel like the factors that are affecting this conversation are going to continue intensifying and changing. And I don't know where we make room for that. One of my thoughts was that we haven't even talked really about global climate change systems probably cause that's beyond exactly our scope, you know, we're trying to be in our region, but I can't help being like, yeah, we have to do all these things here. I feel very at the whim of the world right now. Where do those conversations meet? I don't know, but I had to say that because that's how my brain works.

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N. Central NM Acequia FG#2 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Tiana Suazo, RWC.

Good morning, everyone. I'm Tiana Suazo. I'm the executive director of Red Willow Center, I'm also an active tribal member in Taos Pueblo, but I'm also from Jemez Pueblo. Yeah, I think I know most people here. What do I value? My God, that's a big question. Cause I'm like **everything, the people, the air, the earth, the water, the animals- so much. So I just value the region as a whole.** So thank you.

Connie Maxwell, NMWRRI.

Thank you, Tiana. Participant 1-04. Oh, sorry. You're muted.

Participant 1-04

Okay. I'm on? Unfamiliar name to be recognized by, but I'll go with it. **I'm really grateful to be a caretaker and a provider on a hundred acres on the Rio Grande.** Our place has been primarily pasture for a lot of years, but we're changing the focus towards crop production.

What I can add, I feel like I'm pretty lucky to be in a place with such abundant water and I haven't had to be limited with conservation ideas, although they're always in the back of the head. All that said, 70 acres of irrigated farmland here and a lot of focus on old time food products.

I think it'll be said more, again through the process, but along with our water conservation, I think that looking at our diets are a big part of that. So that's what I can add for the moment, and I'm glad I can contribute anything.

Connie Maxwell, NMWRRI.

Thank you. Participant 1-01.

Participant 1-01

Good morning everybody, good to see everyone. I work for a small agricultural nonprofit, but I'm also a small scale grower in Hondo. **Pretty much what was said before about everything about this region is valuable, but when I think about the cultural and traditional practices that have sustained our ability to live here throughout time and the adaptability that allows us to stay in this valley, I think is a huge asset.**

We still have many families who are in good relationship and understanding with the land we care for. In a way that maybe if you're not from here or you don't spend a lot of time, there's just so much inherent wisdom and knowledge. So I think **the knowledge of our region is very valuable.** It's what I value about living here and being here. Also, just the intricate systems of being on a mountain range, next to a Gorge, where things are lush, and where we're able to grow food and have livestock, versus the places who shouldn't- are pushing things. But definitely our adaptability and **our communal sense of surviving together**, I think directly correlates to what we're able to see happen in our fields. I'm looking outside right now. Yeah. It's obviously we have, I have the Rio Hondo, so that's my water source and that's the snowpack from the Taos mountains.

So that's a very specific micro-climate for

N. Central NM Acequia FG#2 Values, cont.

us because all our other neighbors have a different water source. So I think everybody here or on this call, or who grows in this region has their direct water lines; and understanding how those flow, when it's high, when it's low, all the animals that contribute positively to our ability to live off the land. **It's definitely the human and non-human interactions that I think makes us really unique.** I'm excited to learn more about how water management systems, and it sounds so technical, but as you're saying things, I'm like, "All right, I've heard of this before," so thank you, Dr. Maxwell, for having us all.

Connie Maxwell, NMWRRI.

Thank you so much. Yeah. It's funny, sometimes I've recognized that as long as you're not speaking too quickly, (which sometimes I do) most people do know exactly what you're talking about, have some connection. Because everybody of course is very connected to water. And of course, many of you would know a lot more about how to manage water than most water professionals. Okay. Next, Mike.

Mike Musialowski, TV.

Good morning everybody. Thank you, Dr. Maxwell for facilitating and opening up the no-pun-intended, flood gates for conversation and ideas sorely needed. I am an amateur grower, mostly of fruit and perennials, and an educator K-12, math and science for about 20 years. I'm passionate about polycultures and water moisture retention through polycultures, growing many species in the same place at the same time.

What I value about the region is the water and soil systems that are here because of centuries, no, millennia of active human participation. Where I live in Talpa, which is a neighborhood in the Taos Valley, I have a foot to a foot and a half of top soil, and that's because the acequia is nearby. Those water systems were built a long time ago and constantly used. We have tiny little benches, not tiny, we're talking on the order of tens of feet that are very visibly terraced due to centuries or millennia of cultivation. It's that combination of wonderful soil, abundant sunshine tucked right against the mountains.

So the human participation in the system is what makes it work. I'm an immigrant to the United States and an immigrant to this region. I grew up on the East Coast. So to walk into this and have all these human and natural resources available, ooh, I'm starting to shy away from the word "resources." It's a gift, it's a gift. And **I want to help maintain it and keep the organic material on the land.** I'll stop it there.

Connie Maxwell, NMWRRI.

Oops. Sorry, I was muted. I think this is the final number. 1-05, And you are on mute. Yes. Perfect. Thanks.

Participant 1-05

Good morning. What I value about the land here is that I am able to live on 10 acres here also in the Talpa area. Mike, I hope to meet you sometime. I've got 10 acres here. **One of the things I value about it is that I'm able to walk in the footsteps of my father and my grandfather, my ancestors and the people that came before them anytime I walk along the acequias.** The other thing I value about the land is that **I get to bring**

N. Central NM Acequia FG#2 Values, cont.

my grandkids, and they walk in my steps and they're creating steps of their own. I've got some grandkids that live here. I've got some grandkids that live in the cities, and they are just blown away when they come and spend time. So I feel I'm planting the seed for future generations with them. **The care of the land, the culture, the beauty of the area here are things that I value about the region.**

I value that we are unique to probably two thirds of the state of New Mexico in that we have the mountains, we have snow packs, we're high desert, but we're right on that cusp of being-- we're in the Southern end of the Rockies. I value the diversity of the culture here. I value, and I am working to try to maintain that over time with all the stresses and stressors that we face here with our agricultural lands being used for residential developments. That's happening quite a bit.

When I talk about the steps of our ancestors, as Mike mentioned, we have a lot of area that's terraced here in the Talpa area. Off of our acequia it's around a little under 400 acres, and I've been investigating, trying to find out how these terraces were created back in the twenties, thirties, forties, with the WPA, CCC camps, all these different programs that were coming through.

I've talked to the oldest people that I can find in the neighborhood. It wasn't a federal project These lands were terraced by horses and scrapers behind the horses. That was happening since the turn of the century, since the turn of the 1900's. To see the amount of work that went in to do all of that, I just love it. Those seeds were being planted by the folks that were doing it in the most arduous, hard labor forms. That's part of what I love of the region here, and this isn't just unique to the Talpa area. There's a whole region here. Another thing that I love about the region, obviously it's been mentioned before, is the mountains and the snow packs that we get. I guess I'll go into concerns later on.

But just the beauty of the area, every single day. I've lived here most of my life. I, as many in the region do, they leave after high school to go off to college, military, et cetera, whatever. Fortunately, I was only gone about 10 years and I was able to come back and pick up where my father was and then after he's passed away, continue that. The resiliency of folks here, even through the pressures that are happening now, there's still, I think a real strong undercurrent of that really sustains the area here. You have to be able to have your eyes open and look underneath the surface to see how strong that is. A lot of people don't understand that. I'm glad that it's here, I'm glad that it's the way it is. The region provides another piece of the reasons I like the region. It provides so much history to the state of New Mexico. It's incredible, you start looking at some of this stuff and it just goes back a decade, centuries. Anyway I'll stop at this point. Thank you. Thank you very much Dr. Maxwell for putting this on.

Connie Maxwell, NMWRRI.

Thank you. Thank you so much. It really is such an inspiring thing. That's the one thing I see throughout is that connection to the land is so strong. Thank you so much.

So let's turn now to, like I said, let's mix the issues and challenges with solutions

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and what stands in our way to enact the solutions. They don't have to be solutions that are completely evidenced. They can be things that are worth trying and we want to gain the evidence. Because often, what I've found when I've done restoration projects is the restoration project usually looks really different by the time you're done than when you start. That is because the process of developing that project together with the community means that the diversity of the local knowledge really improves that project every step of the way.

So now whoever wants to contribute really the main issues, you can try to give it a category. You can just talk about it narratively, and some of the ideas, some of the things, have worked in the past. And some of the things that you think are worth trying, So issues that affect the region, strategies to address those issues, drivers and barriers for decisions and actions.

Participant 1-05

Okay. I'll speak up a little bit to this if you'll leave that up. Let's see. The issues that affect the region, in our region, in many ways we are considered a sponge to the rest of the downstream users because we have the snow pack. We have the mountains, we have the runoff we contribute a lot to the water resources downstream on the Rio Grande. However, like a sponge, you can only squeeze it so much before there's no more water left. **Over the years a lot of water rights have been stripped from properties here in the Taos county.** The biggest being the Top of the World Farms, which was a very large agricultural area up in the Costilla area.

That's all fallow, sagebrush land that is no longer in production. Now we're talking in a neighborhood of several thousand acres and there were several thousand acres of water rights that were sold and delivered, and are being delivered downstream. I don't know, the studies that are coming out nowadays with long-term affects, the aquifer recharge, the deeper aquifers, how long it takes for those things.

You don't see the immediate effects of stripping water rights off of land until, 20, 30, 40 years down the road. So, I think the strategies, this technology nowadays has taken us a long ways into being able to see some of that stuff. We've got the historical data to show.

Being a sponge to the rest of the state, all the waters in the Taos county have been adjudicated. So the only way you can get water out of here is if you sell it and do a water transfer. The acequias are vehemently opposed to getting that done or to having any water sold off of the acequias. Now having water transferred within the acequia is acceptable. Say someone's built a house and is no longer using the land, and somebody has a piece of property on that acequia that wants to bring it into production but they don't have water rights, that's an acceptable water transfer.

Our development is another issue that is right front in our face right now. **There's a development up at Taos Ski Valley in the neighborhood of 250 homes that's going to be taking place.** That area already is being impacted by the development that's taken place over the last couple of decades and it's accelerated significantly in the last 10 years. In the last five years, the development that's going on up there is very significant. This is going to be

N. Central NM Acequia FG#2 Values, cont.

impacting the downstream water users to the point where I would anticipate at some point in the not too distant future, **the only water that comes down the Rio Hondo is affluent coming out of the water treatment plant because of the amount of water that's being sucked up there.** Where the pressures are development.

Recreation is another pressure that comes in. We are being touted as a good recreation, outdoor destination, the effects of that impact our infrastructure and our local infrastructure here. **The recreational use on our watershed is impacting the water quality of our watersheds, the water coming down into our acequias that we're distributing to the fields.**

Drivers, and barriers for these decisions that are, that we're impacting; I think I've identified one of the ones that is with all good intentions, and in an abstract view, looks very good, but **the cause and effect and long-term effects have not been thought of,** and that is the tourism department push-ins and wanting to use a lot of our great outdoors for recreation as an economic boost to some of these local rural areas. On the abstract view that looks wonderful. However, **the cost of the burden of the use falls on the local communities**, when recreationals come and go, but they still have the wear and tear on the infrastructure. I don't think that's being looked at as a long-term effect. So that's one of the drivers, and I think that's one of the problems that's going on.

Working on down the list here, actions are, I'm a commissioner on our acequia here, and we are being vocal about some of the decisions that are being made by the forest service, by other entities to utilize the forest service for recreational use. **We're being vocal on how to best disperse the recreation. Instead of concentrating in one area and one watershed, disperse it.**

One of the big actions that needs to happen with all the acequias is becoming up to date on all their bylaws, on their audits, making sure that they're compliant with Interstate Stream Commission regulations to be able to apply for funding. As you mentioned early on, there's going to be a lot of funding that's going to be streamlined, coming on down. That's absolutely wonderful. However, there are a lot of acequias that aren't in compliance and will not be able to benefit from this.

I know New Mexico Acequia Association was working and providing a lot of guidance for acequias that want to do this. But at a local organic level, they need to have leaders that are willing to step forward and to take on those actions and those duties and responsibilities.

On **my vision for the future here, is that we continue to have a diverse and culturally sensitive region that my grandchildren can walk in confidence that the land has been taken care of appropriately.**

Connie Maxwell, NMWRRI.

Fantastic. Thank you so much. Next that want to, and we'll come back to the visions for the future. That's a particularly wonderful and succinct and comprehensive one. Thank you for that. We'll come back to that. If you want to add to that in the future. Anybody else that wants to lay out the issues that affect their region? Strategies you want to try, barriers to implementing those strategies?

N. Central NM Acequia FG#2 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Participant 1-01

I can go. I typed them all out because my brain was exploding and so I didn't want to lose all my train of thought, but then me and 1-05 had a lot of the same things in common. Yeah, so obviously the rapid development of agricultural lands. **We have outpaced development based on water availability. That's only exacerbated by us being a tourist community destination,** which was alluded to earlier. This is probably a little controversial, but new licenses that use water rights but it's not for livestock or for food crops. We saw that with the legalization of marijuana and all those new licenses put a strain on the rest of folks who are doing survival business off the land. There's nuance in that.

There's also currently entities soliciting water rights from water right users, using a lot of fear about if you're not using your water you're going to lose it, so you might as well sell it to us because now's the time to get them off your hand. Which is really problematic because they're not obviously sharing that you can water bank, in years of drought, you're not required to use your water. So there's additional information that isn't being shared. Instead, **there's this fear of if you're not going to use it, you're going to lose it, and that's super problematic.**

We haven't really invested in any other industries that manage water differently. So for the ski valley, for whitewater rafting, I think there's definite creative ways to entertain what different industries could better manage and use our water rather than making snow.

The additional push of leasing and selling water rights away from agricultural land use is really problematic, in my opinion. A lot of commissions are struggling. **What I know over here is the struggle of a lot of people wanting to lease them or to make money, passive income.** But what that whole process does on a singular acequia, and the unintended consequences of, if everyone were to do that, then we don't have a thriving acequia system.

That cultural component and the communal use of water, then, is changed if people are being encouraged to take water and selling it and going from surface to ground for let's say mutual domestic.

As a young and new grower and part of a chapter member of El Valle del Norte National Young Farmers Coalition, a lot of our concerns directly surround **land access and the cost of agricultural lands.** So unless you inherit a huge operation that has everything you need to either be a rancher or farmer, we know that one, farmers and ranchers don't make lots of money to begin with, but if you're new to the field or returning back to this lifestyle things like equipment and seed, obviously water infrastructure, all of that costs so much. So the succession planning of just community ag lands, not really having hands of the next generation to take care of it, because there's inequity in land acquisition. It's super expensive, it's unattainable.

N. Central NM Acequia FG#2 Issues / Strategies, cont.

So we really need clever policies that help new ranchers and farmers access land and be the next caregivers of that land. Given, if a family is unable to continue for whatever reason, which we see a lot, but for those who do have an interest be able to do that. That comes up pretty much every conversation we have. Obviously the **pollution of water and soil that is caused by new development or folks using chemicals or pesticides in neighboring lots**. I feel like most of my neighbors don't, but there's people that do.

We also need support for workforce training and development for new and young farmers. I feel I'm probably an outlier in terms of my age range. There's a huge gap in generations of folks who are currently land caregivers. And then there's a few decades worth of, I'm like, who's next?

So as our nonprofit looks for more growers, farmers, ranchers, it's really limited, mostly because it's not a very profitable way to start as a young person. I'm part-time, full-time elsewhere, and then I grow on the side. That's not my revenue source at all. I think the business and personal part of growing relates to the livable wages related to agricultural work. Because if you're a local grower farmer, you're not being subsidized in a way that big corporations are. We are lacking a knowledgeable working base at the moment, and I'm trying to catch up and learn, but I think there would be really good incentives to engage young people in land-based living as it is our future, and we're capable of doing it here.

I always have to bring this up, but new business farmers or ranchers are likely, **if you are going to school to do this, you're burdened with student loan debt. So your ability to have a credit, to buy the equipment you need or run a successful business... Student debt without it being canceled, everyone in my age range is strapped in a very bizarre way.** I don't have student loans, but I also have family lands. So I make it work, but that's not the case for most people. Because the cost of production is really high and what you need to thrive requires not more than fifty to a hundred thousand dollars of student loan debt.

I think those are just the tipping points of things when I talk with other young agriculturists. I would say that's probably the bubble of it.

Connie Maxwell, NMWRRI.

Fantastic. Thank you so much. Next on issues, strategies that you want to try, barriers to those strategies?

Participant 1-04

I could add just a little confirmation of what's been said 1-01, there. **Educating the youth about food production, land use, means that somewhere after old farts like me are gone, there's somebody else that has some insight into what the food system is**. Farm school kids come once a week, it's generally between five and seven kids, and they spend about four or five hours every week during the growing season. Actually the last time was this past Wednesday. So that just makes a possibility that the awareness of our food system continues to the next generations.

In our Acequia Association, Alfredo Montoya, who's really been active about initiating the idea of bringing young farmers on to unused and fallow land. I really appreciate

N. Central NM Acequia FG#2 Issues / Strategies, cont.

a lot of his intentions and how it goes, but it always gets locked up in the structure of the system. So rather than waiting for the organization or the system to create these programs, it's an encouragement through the New Mexico Acequia Association to really encourage people whose land is not being used to find people who want to use it, because there are.

On our piece this year, there were five other farm entities on small scales. But it's just a small example here in the Rio Grande Valley of so much land not being used. What happens as a consequence is a whole list of other problems that go on. But yeah, bringing the use-

Connie Maxwell, NMWRRI.

Sorry to interrupt. Could you list a few of those consequences? I think I know them, but I think it's really important to hear from you guys those consequences of the fallowed land, of land not being used.

Participant 1-04

A good number of the parciantes on this acequia are back on their dues. So funding to keep the acequia operating functionally is really more and more limited. I have a personal complaint about fields that aren't used, yet. The water runs across it just enough to wash a weed seed down the acequia and onto my field, over and over and over. It wasn't so long ago there was no buying the weed on our fields, but **over the last decade or so, I can really see a whole new set of weed problems that are coming on to my existing ag land.**

Through the Acequia Association, we haven't been able to have a general meeting for the last couple of years because of COVID. So finding ways to make the awareness and the importance of this valuable resource that we have, resource water element, that's an issue. I don't have any big suggestions on how to do it. But yeah, bringing kids onto land and making it available to young farmers or, not necessarily young, but those farmers who aren't fortunate enough to have inherited or had the means to place themselves on land.

This is just all in agreement with what was just said, education to people in as many ways as possible. I think COVID situations, again, made our awareness of food system a little more clear. Mother Nature, Pachamama, is showing us that there's some importance in the systems that we have really available to us right now.

Again, I always think of ways to educate ourselves of a different diet system that might be more efficient on the use of the land. The ancestors here can be a whole lot of information and examples of what that was. This isn't the country for growing strawberries. But all time, the three sisters and the forgotten brother, are really valuable parts of what this territory has provided in the past and can still in the future. That's just a little confirmation of what's already been said. Thank you.

Connie Maxwell, NMWRRI.

Thank you. Yes, number one, looks like you have your hand raised? Oh, it was a clap.

Participant 1-05

Okay. I can I interject a little bit about, okay. Let's talk about funding sources, issues and drivers and problems. I, myself personally

N. Central NM Acequia FG#2 Issues / Strategies, cont.

have participated in the NRCS EQIP program. **Just a short synopsis, from my idea to approach them, to request money to the point where I was using the project to deliver water around my property, was a total of five years. Three of those years were maneuvering through the bureaucracy.**

I'm just one small, I've got 10 acres here, seven of which are irrigated. I appreciated it. I did about $17-18,000 worth of work on the property and I had about about $6,000 out of pocket. I couldn't have done it without that, so I'm appreciative of that. The problem being is the bureaucracy and navigating through it. Now, if I am one producer, one 10 acre producer, that's trying to do this, how many others are out there trying to do this and maneuver through that bureaucracy together?

Now, in being layman in trying to deal with them, you gotta learn, everybody's trying to learn the same thing. If you're a big corporate producer, if you're a big rancher, you probably have a grant writer or somebody that's on top of all those deadlines, on top of all the applications, on top of all the new policies that come out, and you're getting millions of dollars to help you out. Wonderful. I'm talking about people that are in a situation similar to myself. What I have promoted or have suggested to several different entities, is that the resource we provided, whereas they could do that kind of work for a number of people. Anybody interested in doing this can approach this entity, and they have a person that takes their name and number, and starts helping them through the bureaucracy.

Now, New Mexico Acequia Association has taken that under their wing to some degree. The problem being is that they help you with the application, but then it falls into the laps of the USDA, NRCS, et cetera, FSA, and they are not staffed to do the work. In the Taos office we're down to one person. I currently have an application in that I've had in for about seven months or so. I have not had a call back, I have not had any follow-up on that at all. Just an example of what's going on.

They're inundated. One person cannot do, they can maybe push through 20-30 applications a year. What's happening here is Taos Water and Soil Conservation District has taken up a lot of the slack. They access a lot of the same funds that the EQIP program can access, they're pushing 60, 70 projects a year. So on the federal side, and I've made the suggestions that they need to bring staff up to levels. **When I went through this a number of years ago, there were five people in the Taos office. Now, like I said, they're down to one.**

If you look at the NRCS New Mexico homepage, you look at the different regions we're team #3 here in Taos. There's a couple of different offices. You can look around the state, and in total there's maybe 25 total staff to manage the NRCS Budget and assistance throughout the whole state of New Mexico. I'm going to do a little more research in there and look at other states and see what kind of staffing they have, because I want to be able to speak with a lot more knowledge when I speak about this as I raise the issue. The bureaucracy is, I understand the necessity for it, but for every individual to have to be going through that, it's problematic.

It's a deterrent, it keeps people from applying, it discourages people, it's an

N. Central NM Acequia FG#2 Issues / Strategies, cont.

underserved community that we have by this policy and actions from on the federal side. I think that there should be a big push to encourage entities such as NRCS through the USDA to properly staff the people. Now, if this massive bill passes through Congress at some point in time, there will be monies available to do this. I think the awareness and the problem needs to be brought up to the policymakers and the people that look at this and can help out the state from that perspective.

Farmers are out there, small farmers, we're out there trying to irrigate, we're out there trying to mend fences, we're out there taking care of the animals and stuff. **To take a couple of hours a day for however long it takes to maneuver through all this bureaucracy, is taking away your labor time on your property.**

It becomes problematic. Again, given the example of a big operation, they probably have somebody in the office sitting there, or they have somebody in contract, or they have folks that are strictly, that's their job in the operation is to make sure that they're accessing all these federal projects that are available. For a small operator trying to just have his property be sustainable, it doesn't work. It's a big problem, it doesn't work.

Connie Maxwell, NMWRRI.

Can I ask you, I know I've asked this question of others before why NMSU extension staff... I haven't been looking at the chat. Let me look at that, quickly. But, Rob is Agricultural Science Center, which is a completely different program, but extension staff are supposed to be helping in that regard as well. One of the things that I've been told is part of the reason why extension staff in New Mexico are so underserved is because it's based on population rather than land size. Has extension been able to help with any of the EQIP issues as well? It seems like a coalition between Acequia, Soil and Water Conservation District, and extension might not be a bad way to serve these.

Participant 1-05

I know here locally, the extension and Taos Water and Soil have a good working relationship. As far as the funding stream, I don't think that NMSU Extension Services is set up to do the funding, the access of the federal dollars and fund them to the users. In my experience, what they are very beneficial at doing is coming out and taking a look at your crop. They can look at any wheat problems you have, erosion problems, giving you suggestions and that sort of stuff. Taos Water and Soil will do the same thing but in terms of a revenue stream, I don't think they're set up to do that. I don't know.

Participant 1-01

Also, we haven't had an extension agent for two years.

Participant 1-05

That's correct.

Participant 1-01

Maybe going on three? I would just like to add to 1-05, he made two statements that I was like, "oh yeah, obviously." So all those concerned about an agricultural landowner are only multiplied when you're not an ag landowner, renting or leasing agricultural lands. So when you're needing to do work for NRCS, FSA, whatever it might be, you

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have to have a really strong relationship with who you're renting and tenanting from because they need your deed. They need real paperwork that oftentimes most families don't want to be like, "Yeah, sure, you can have this and take it to a government entity." **There isn't an intermediate way for those leasing the land to access those funds without the full support of their agricultural, who they're renting from.**

Secondly, t**he incentives for acreage. Most of us younger folks, it's my wildest dreams to have 10 acres, I have less than an acre**. For those of us growing on smaller lots, there's no tax incentive. There's nothing supporting that we see with larger agricultural land owners. **So oftentimes these resources are intended for huge lots, huge acreage,** but I'm going again with modesty, I have half an acre. Obviously, these big projects with Taos Soil and Water, they're going for big projects that do large mass understandably, right? Obviously, I want to see 30 acres soil regenerated, but also for my small half acre where I'm trying to do tree basins, have fruit, have multi crops, that's not necessarily a priority because it's deemed as a hobby. Also because I don't sell any of what I'm doing, because it's going to take me five to eight years for a fruit to come off of my newly planted trees.

So it's this in between time where those establishing new properties that were once fallow is a long trajectory and there isn't funding. Everything's been out of pocket and with the support of my neighbor in Talpa, Mike, who's been helping me, **I think a lot of ranching/farm conversations are under the assumption that land owners have a lot of land and that's just not true at this point for new and young farmers. Take note of that because if there was some sort of strategy, incentive, or policy that helps lessen one anchor operations get that support, we could conceivably see different ways the land is being used, how water is being used, and how that impacts our food system and those contributing to it.**

Connie Maxwell, NMWRRI.

Yeah, and throughout the world, there are still a lot more small farmers than large farmers and throughout the world, still the majority of food that people eat is produced by small farmers. In New Mexico, the trends are small farmers either are increasing or haven't been decreasing as much as around the state.

Obviously there's a long tradition here. This is a really wonderful state for small farmers. Those are really terrific points regarding, it sounds like apparently there's somebody at the American Farmland Trust in Santa Fe that is an expert in succession models. It sounds like one succession model point that would be really important would be, and I don't know how this would work legally, but certainly somebody that's an expert in this would know a lot more than me or somebody like yourself that's actually experiencing this, if the leaser could become an agent for the owner, that might help with some of those support programs. Now, of course, you'd still need the support to complete the application and complete the project. I think that point is extremely well taken, but that's sounds like another important element for lease and rental agreements, because I look at the patterns of fallowing around southern New Mexico. It's pretty striking. Like you all are saying, the amount of fallowed land in agriculture, in the state of New Mexico, is really quite

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significant. It's a significant issue.

All right. I don't think everybody has contributed in terms of issues, strategies, drivers. I haven't kept quite track. Tiana, I think we haven't heard from you on issues and strategies and drivers and barriers. Is that right?

Tiana Suazo, RWC.

No, not really. Sorry, I'm a little distracted this morning and don't have much to offer right now.

Connie Maxwell, NMWRRI.

No. That's okay. Can I ask, you can raise issues and strategies as well, but let's turn to visions for the future.

Mike Musialowski, TV.

Can I go with the previous category?

Connie Maxwell, NMWRRI.

Yes please. Sorry.

Mike Musialowski, TV.

Okay. Thank you for all for outlining so many of the connected, logistical, policy, cultural, geographical, issues together. I am more of a technical guy, I'm a biology geek, and what I'm going to talk about and offer are all long-term solutions. None of this is a quick fix, I wish there was, but there isn't. For me, **the principle driver here is drought. There's just not enough water, and actually with climate change come things like extreme floods.** So 2017, I believe Santa Fe got three inches of water in some locations in one hour. So I think to myself, okay, if someone has a field of pasture, what's the likelihood that if we get a three-inch storm, that pasture is going to stay there as opposed to just run right off the ground? **So my answer to this right now, and my passion is polycultures, growing many species at the same time, in particular trees, and in particular fruit trees.**

My gig is moisture retention. I think that I have superior moisture retention by having fruit trees that I particularly trained to go sideways as opposed to jump to the sky, to shade out their own footprint as quickly as possible. **A polyculture of understory perennials, virtually all perennials, most of which are support species, but some of which are edibles**, especially the alliums, the various onion species, chives, walking onions, leeks, et cetera, herbs that were talked about, we need to be prepared for.

This last summer was the wettest summer in Taos in about 10 years since I've been here, I've heard that it's been about 15, I don't know, followed by the worst drought in multiple generations. This year, we're about to get our butts kicked again if we don't get some snow up in the mountains. So w**e need to be ready for extremes and my answer is increasing organic material, both on the surface and in the soil, so soil health and to promote moisture retention and moisture**. In permaculture, we say, and thank you, Dr. Maxwell, for mentioning at least two of these terms I believe, we want to slow the water down, we want to spread it, and we want to soak it.

So what **I'm advocating is agroforestry**, and now there's really a lot of emerging evidence that agroforestry was used in North and South America for thousands of years. By the way, in that worst drought in degeneration two summers ago, I had

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a crazy apple harvest and a crazy peach harvest.

One thing that somebody mentioned about watering with a small amount of water, **I had my mayordomo install for me an inch-and-a-half pipe at the very bottom of the compuerta. So when there's only four to six inches of water in the ditch, people can't flood a field of multiple acres with grain or whatever, but that inch-and-a-half pipe can deliver 20 gallons a minute to any of my fruit trees. And I can be out there. All my fruit trees are terraced and bermed with a semicircular berm. So I can sit there and flood one tree basin at a time** and do other stuff while the water's running.

I'm going to start advocating. That inch-and-a-half pipe is fairly expensive, but you know inch pipe is not. One-inch pipe you can buy a 500 ft. roll for not expensive. It depends on your budget of course, but $150 for a roll of 500 feet of pipe, if you had multiple users, remember long-term solution, I'm not saying we can all do this in a second, but we could be delivering water in smaller quantities with much less water in the ditch that could actually be used.

I have over 70 species of plants growing in an eighth of an acre documented. I've experimented with 20 to 30 more species and continuing to geek out on plants, trees and shrubs. Particularly, **I'm advocating planting stuff that grows fast, creating shade. The worse the water situation is, the greater percentage of trees need to be support species as opposed to yield species so that you can create that shade, especially afternoon shade relief and moisture retention.**

Yes, this can be done on an even bigger scale. Somebody mentioned watershed restoration, a guy named Andrew Millison, not to be confused with Bill Mollison, Andrew Millison at Oregon State University has been going to India, doing research and doing a lot of videography. He has videos in India of valleys that are similar to Taos Valley in size, elevation, and in a natural precipitation. **Armies of people have gone up and dug swales. A swale is simply a ditch followed by a berm that goes downhill and then every a hundred feet or so, they're digging swales. After 5 to 10 years, they have perennial streams that used to be ephemeral that are now perennial in their watershed.** They have completely restored, it's mindblowing.

In a country like ours where our highlands are owned by the federal government, we would need to go through a lot of hoops to get both the community and the government to agree to do largescale swale digging. There are ways if we plant trees and we start changing the way we use our water. The research is clear. You can change rainfall patterns in a small area. You might say, "I'm a rancher, how does this help me?" I'm going to offer the idea of silvopasture. This is the same thing that ranchers do, well those who can afford to, and lease land from the federal government and send their cattle or other livestock up to the high country in the summer, and then bring them down in the winter.

If we plant trees, we can provide them shade, forage, pasture. Bare ground is anathema to me as a permaculturalist. So the goal is to increase ground cover, organic material, mulch, restore the soil, and reduce evaporation. I think growing livestock under a canopy of trees is a potential long term solution for those ranchers that still want to

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grow meat products.

Okay, I'm going to finish up here. Barriers, inertia. This isn't new. It's millennia, century old historical, but it's not what a lot of people are doing now. So there's just an inertia, it's a different way of doing things. Training capital for land, trees, equipment, seed, training, and ultimately to me, this is about linking traditional skills with innovation.

There's an obstacle to that. I'm 54, I Got a 30 year plan. At 84, I'm going to rest, I'll let you know how it goes. I would love to participate. Thanks everyone for all the different things that you're all doing.

Connie Maxwell, NMWRRI.

Fantastic, Mike. Thank you so much. Let's turn to the visions for the future. I know some of you have provided some already. The idea where do we want to be in 10, 20, or Mike's 30 years? Where do we want to be at that time, imagining both our area, but our region as well.

Participant 1-04

I could just go back to say, **let's educate the kiddos**. I'm probably among the oldest around here and I figured I've got about another 20 until somebody else is going to be doing the job. I grew up around a farm community and around farms, and it turned me on early, particularly the machinery and just the results. However, depending on, or waiting for government programs to do these things, we've all experienced that disappointment. On the small scale that we can do it individually is the way I satisfy my dreams and ideas. Of course funding and promotion, those are all ideas that some people have more skill for and more patience for. But each of us, one by one, create quite a chain of the events. So yes, educating the young ones.

Visions for the future? Again, for those of us in the position to have something to share, that's really what the vision goes on here. It might be backing up a little bit, but issues and challenges and solutions have also been in terms of managing land, big or small. Equipment. Sometimes, equipment can be a shovel and that can do a little bit, and then a little bit more equipment is a rototiller, a tractor, a baler, or a combine.

So I think, believe, and support the idea of, how does equipment and operators become more available to people who don't have the funding? It's not necessary to have all the equipment as an individual, but when the operator and equipment can be made available, and **I'm not talking about through a government program, I'm talking about because we like it in our community.** How can that be addressed or recognized a little bit more?

Yeah, so visions of the future. I don't have a lot of faith in the system in that way, waiting for the system to provide opportunities to see this happen. For those that have the patience, I'm really impressed. As individuals, one by one, we reach out, we bring the kids to the farm. Farming's not real profitable, profitable not in the bank account. But in reality, learning to feed ourselves, says on the one city block tear out your lawn or plant some groceries, small scale one by one.

I really feel like the more each one of us makes an example, it inspires another. That's where I find more faith in the future is one by one in the community, in the

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Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

hood. Yeah. That's it.

Connie Maxwell, NMWRRI.

Thank you so much. I know the power of the model is really quite remarkable. Even systemic changes don't happen until there's a real model out there that somebody can point to and say, this is what we need to do. Certainly, until you actually have a groundswell of movement on the ground, there isn't any systemic change.

Tiana, I know you said you're a little distracted today, but do you think you could maybe provide a vision for the future? I understand if there are other things tearing you away.

Tiana Suazo, RWC.

Oh, you're fine. **More youth programs.** Actually, is there any attempts of connecting with any of the pueblos?

Connie Maxwell, NMWRRI.

Yeah. It's probably organizational, but maybe it'll be both organizational and producer oriented. We are going to have one of these events specific to the tribes and pueblos.

Tiana Suazo, RWC.

Cool. I guess **a vision I see for the future is just more tribal interaction or consultation when it comes to water or agriculture, because we've been working these lands for years and years before any colonizers came onboard and took what was a lot of ours.**

Connie Maxwell, NMWRRI.

You have a particularly inspiring program there. Can I just ask you in terms of some of the strategies, what do you think would support the work that you're doing? What kind of help would help the area that you're working in?

Tiana Suazo, RWC.

Let's see, **unrestricted funding. I like when grantors give us funds for general operating support because we actually know the issues affecting our area, we know how to address it rather than them telling us what we need to do**. Yeah, my problems are very unique. I don't even know where to begin to explain. Anyway, going back to the visions for the future, just having unrestricted funds is really helpful. I think I heard someone mentioned about from NMSU, what are those people called? **Extension agents.**

It'd be nice If we could have one that would be specific to the pueblo or more native specific because our land and water issues are different from everyone else. I don't know, I just want to see more of my people growing, but that comes with support from our tribal community. Man, that's just who I have an issue with. **I feel like our tribal government is still very much living under an oppressive system of having one year terms, so we actually never get anything done. So if I could dismantle that entire government system, that would actually be beneficial to my**

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organization and to my people.

Connie Maxwell, NMWRRI.

That's really terrific. You touched on some of the issues that affect the region. One of the things you told me when we spoke earlier is how your particular farm, you have youth that are actually farming and doing the CSA. Do you want to describe a little bit about how you got that program started?

Tiana Suazo, RWC.

The CSA?

Connie Maxwell, NMWRRI.

The youth program and their involvement in the CSA.

Tiana Suazo, RWC.

So the CSA actually just came out of us responding to COVID. The virus hit and the pueblo actually closed all of its entrances and exits it had, and had just one monitored entrance and exit. So we cannot allow any of the public to come through. That seriously affected our market and the income we received from there. We had so many requests from non-tribal members asking for our Red Willow Center produce so we decided to create the CSA. Initially we had about 30 shares set aside, but more and more people signed up and then there was just changes internally in the organization. My farm manager had left. So I was like, let's just cap it at 23 people and see what we could do there, and it was really successful. **It was nice to have that upfront income to be able to help our youth program because we used a lot of that to pay our kids, too, and just get any other materials or supplies we needed for the CSA, for the kids or the farm.**

We had about five students who were doing more intensive farm work and they loved it, man. They worked harder than any adult that I had ever hired at all in the entirety of this organization. They enjoyed it so much. So they did a lot of the growing and washing, packing, and only a few times they'd come with us to the actual CSA distribution because it was from 4-6 and we already had them working their max hours at work. Yeah, that's just how it came about. We wanted to be able to serve people outside of Taos Pueblo and we needed money. That was one way for us to get a good chunk of money upfront and it was really beneficial and it did really well.

We know where our kids like to work at in the farm and what they love to do, so we're thinking this coming year we're going to expand our CSA membership to about 35 or 40 people and expand our youth program to maintain the five kids we did have, but also bring in hopefully another 10 to 15 students, depending on coronavirus, to be able to have these older group of students train these younger group of students to be able to help us work well together and grow as much food as we possibly can in the most sustainable way that we can.

Connie Maxwell, NMWRRI.

Thank you so much. Are there visions for the future?

Mike Musialowski, TV.

I'll jump in. Thank you everybody. Thanks, Tiana, great to hear your voice and challenges, hopes, and successes. I struggled with this question when you

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first asked, and I think I agree with the youth thing. I was at a New Mexico Organic Farmers Conference about five years ago and one of the award-winning farmers said that with his kids, he lets the raspberries do the talking. I've been eating my own fruit since August, fresh, and this particular apple has a few little worms that have bent in, and it's a little wrinkled because it's mid December, but man, the taste of real food, that's been grown on real land.

When children pull a carrot, or break off an ear of corn, or whatever, eat quelites, eat some lambsquarters, eat a leaf. It's a leaf, it's going to be salad! I'm like, "Oh wow, that actually is quite filling."

As an ex-educator, because I'm done teaching K-12, I quit this year, I wasn't saving the planet fast enough. **We need to change the standards. Educators have our hands tied by the educational standards.** If an alien were to land on the United States and were to look at our educational system, they would assume that every kid is going to college. That's the way the standards are written. I taught algebra two for years and it's lovely for 10% of the population that's going to be studying engineering, math, finance, economics. For the others, helping students jump through algebra two is a waste of time. As a matter of fact, it's turning them off to math.

We need to shift something in our society, in our system, to understand that you can't eat money, you can't eat cheap plastic stuff that you buy at the store. Yeah. We've got to change something in the whole system to turn kids on to get more practical skills that have to do with our food supply.

That includes what 1-0-something said about diet and cooking, let's turn kids on to cooking, and then they'll be into food, then they'll be into growing stuff on the land. When you eat a posole that's been grown locally with local pig, the flavor is mind-blowing.

Connie Maxwell, NMWRRI.

Thank you so much. 1-01, I'm not sure we grabbed your vision. Is that right? Did I get the right?

Participant 1-01

Yeah. I think we all can do our individual part of how we build relationships with those younger than us and older than us. I'm still a newbie, and I love that the definition of a new farmer is someone who has been doing it less than 10 years. I feel old, but I'm still a baby. This year will be my fourth year. But also I think, it's a system, right? Whether it's a state, county, or city level, we absolutely have to earmark agricultural lands as an asset and priority for the future. When we drive through Taos and further north, we have these amazing lots of ag land that in time will become probably second, third homes, condos. If there's a way from the state level down to obviously incentivize ag land use, slow down development, or make community designs that account for what the future will need, that's where we're at.

If I'm finding land access hard in 2021 where there's available water, which where I live currently there isn't, I get water once or twice a season, that's different in Hondo though, where I grow full time, what is it going to look like 10, 20 years from now? The preparedness for climate change and how leadership has an absolute obligation to lean into those researching,

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ways to manage water and soil, but also the traditional cultural practices that have stood throughout time to keep us alive; the hybrid and synthesizing of both. Because once we develop ag lands to permanent concrete structures, and the west side of our whole county is saying, does it make sense to develop in a valley at least to the rate that we're seeing? I know a lot of the tax issues are state level, even though county and cities I think do have a commitment to agricultural lands, farmers, and growers, because it is a value that we have, but there isn't much. It comes down to the economy and the money of it.

If there's more reason for young people to be engaged in ag because of tax credits or incentives and then it discourages a rampant development that has little consideration for; **our ordinances and zoning need to be updated radically to reflect our ability to adapt with climate change.** Like whoever mentioned earlier, and what **we've all seen is our runoff is much sooner than we've ever seen. As an acequia community, that poses a lot of infrastructure challenges of how do you keep water on your land when it's June and the runoffs done?** What are we doing with that? I know it sounds probably radical, I think about my nieces and nephews who, should they want to grow and have ag participation or lifestyle, what's going to be left for them?

Additional visions are probably we have a strong agricultural community. I feel a lot of us are still connected and feel like a sense of comradery and a deep pride of what we're able to do. So whether how leadership can be part of that solution of emphasizing, promoting, or sharing resource information because all the paperwork is so discouraging. I just think about folks that are my dad's age. That's just not something that's going to happen if there's so much paper work involved. Whether it's coalition work or collaboration between our ag nonprofit sector with a few state entities that really has a pulse on what current land owners are struggling with, oftentimes it's infrastructure, sometimes it's fallowed land adjacent.

I think there's a key role for a very synthesized, maybe one place to have your needs met, because as of now you have to go here and there. The paperwork, it's like going to the DMV, which no one likes to do. Checklists: this is what you're going to need to access funding, or these are the people you're going to need on board to complete a project because it's so fragmented.

Historically, people would show up for each other and help one another, but we're reconnecting and rebuilding those relationships. So I think there's a definite tool for that, which at our nonprofit with Alianza, that's what we're trying to do, but that unrestricted funding that Tiana mentioned goes a long way. Trusting people to spend the money, how they best see fit. It only makes sense instead of all of us trying to warp our mission and vision into a funder's preferences. I'm optimistic about the future most days. **I feel a lot of reassurance from my elders who also feel a lot of sense of pride that they know young people who care about the trees and our water.**

But that I still have so much information, I need more to be taught and to learn from those older than me and in turn, sharing that with those younger than me. I see Taos Valley as being a place that will probably be a space for climate refugees in all reality,

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given our water sources and our ag lands, that's probably within our future.

Connie Maxwell, NMWRRI.

That was fantastic. Thank you so much. In fact, that example I gave of ecosystem service payment program in New York, that's how they did it with the farmers there. The farmers requested unrestricted funding and it was a farm by farm solution and it was labor help.

There is a precedent. It's not a completely un-tried idea. So we just have a few minutes left if we want to end by our end time, but I want to make sure everybody has given their vision for the future. Any parting thoughts, any last points that have struck you as others have talked? Yes. Go ahead 1-05.

Participant 1-05

In visions for the future one of the things that I find, a lot of it is cultural a lot of it just community-based. **Here in my neighborhood is that a lot of the people that are growing here operate on a balance of favors.** There's a number of us that it doesn't matter whose hayfield is down, if those bales are baled, we all go pitch in and go and get them into the barn as soon as they're off the baler. It's a balance of favors that we help each other, **it's a reciprocity, it's a do something without expecting something back. My vision of the future is for that to continue,** that we continue teaching our young people about how to go about doing that and not expecting something directly in return. It'll come around.

The mention of engaging the youth is so important. There's so many positive things that have been about that. We held a farm camp here a few years ago before COVID, we had K-6 and these kids were just phenomenal. They learned how to cook, they helped prepare their meals at noontime, it had to include something that they picked from the farm.

My vision is on a bigger scale for the future that the federal program has become more accessible to small operators that need them, otherwise it would take them 10 years to fund a project where they could get it done in a couple of years. That's very helpful and it's appropriate.

My visions for New Mexico is that we get a state engineer in place quickly, that the state engineer's office gets staffed and funded properly without having to go through these ups and downs that has been happening. My vision for the future is that we have a solid 50 Year Water Plan that includes not just uses and who the users are, but protecting the sources. I mentioned earlier that here in north central New Mexico, we're like the sponge for the rest of the state. You can't squeeze that sponge but a certain amount. There's not going to be any more water. We need to protect that, we need to prepare. There's a lot of good ideas out there in terms of watershed restoration, protection, et cetera, that again, one person said it's one at a time, one at a time, one at a time, and that's how we teach our kids. That is a powerful.

I've got grandkids in Phoenix and in Rio Rancho that are creating their own gardens and maintaining their own gardens because of what they learned here. It's a little connection that they have when they come back here, they just have a blast. We have

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little grandkids that cry when they have to leave the farm and we're doing something right if that's the issue.

Anyway. Those big things are the federal programs being more accessible and state engineer's office get funded and staffed properly perpetually. Thank you.

Connie Maxwell, NMWRRI.

Thank you guys. We have come to the end of the time, but if there's anything else anybody wants to contribute?

Like I said, there's going to be more, there will be a tribes and pueblos group. So I'll be back in touch regarding that, but also a workshop in late February where we're going to be looking at different pilot programs. I think what we'll probably do is work with several of you and other folks to present ideas, but we'll also be asking for additional ideas.

It won't be a plan deliver, all done and ready and delivered to you. It will just be we'll make sure that we have done our homework and we've thought as much as we can, but we'll also be asking for ideas from scratch as well. Thank you all so much for your time and your perspective, but more than anything, all of the wonderful work you do to protect our land and our people, and I'll be back in touch.

Mike Musialowski, TV.

Dr. Maxwell, I'm assuming that you'll just keep in touch with us over various stages of the development of deconstruction of the transcripts. So I don't know what your whole process is, but, and then you mentioned that some of what you gleaned from these discussions could be helped to identify funding sources, and so you'll tease what might emerge from all that?

Connie Maxwell, NMWRRI.

Absolutely. We'll be back in touch. We'll probably produce an outline of our report in kind of mid-January, but we'll be working on capturing these perspectives really well. So it'll be here's transcripts, check to see, but also here's a report and here's some next steps. From a concrete point of view, there'll be that interaction and then there'll be that workshop that we'll focus on to outline some of the ideas for the pilot programs, but also to develop new ones and to develop those.

Mike Musialowski, TV.

When you say pilot program is pilot, what kind of programs instituted by?

Connie Maxwell, NMWRRI.

I think for example, one of the things that it doesn't seem like there's a lot of are the, I'm just looking for the slide itself, I don't know if I need to show it again, but a lot of the groundwater recharge type of strategies. One, of course, the problem is that if everybody goes to drip, you don't get that groundwater recharge.

There are some projects that are coming in Northern Rio Grande basin in New Mexico of some significant additional groundwater pumping. We'll start to rely on groundwater more, and groundwater will become an issue in the future, which then will affect surface water.

If your groundwater isn't full then as your surface water goes down your acequia, it'll

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suck into the ground a lot faster. There'll be a lot less surface water. So it ends up being a holistic problem which compounds.

So in that regard, I think we'll probably be trying to identify a couple of areas where there can be a community recharge project from arroyos, from arroyo runoff. I imagine there'll also be projects where we'll be trying to help filter that water so that at the end, when it returns, it can go into a ditch system without spreading the weed seed which is, of course an enormous issue.

Some pilot projects in terms of with fallowed land, can people start to get credit for fallowing their land, like the ISC's fallowing program in Southern New Mexico, while allowing really sustainable, low water use crops and practices. We're interested in trying to help farmers be able to convert to practices that give farmers more flexibility in terms of water use.

Are there super low water efficient crops that farmers are interested in pursuing but can't because there's more technical requirements, a lot of the sustainable and regenerative type of practices that you're talking about as well. It's at the beginning, certainly if anybody knows of an idea or a piece of land where to do a pilot project, I think that's a great start. Excellent.

Mike Musialowski, TV.

I'm doing free permaculture design consultations throughout this summer, pretty much one a week, while giving food forest tours at my food forest. I have a pretty long list of people who want to implement one thing or another. I can think of one site that actually, it's small, it's probably sixth of an acre or something, but somebody who would be open to having kids come and do projects like that.

Some sort of implementation of a mixed tree annual system. I'm, looking at alley cropping as well as a potential solution; so alleys of trees, alleys of annuals, alleys of trees, alleys of annuals.

Connie Maxwell, NMWRRI.

That's excellent. We'll, I'll definitely be in touch about this workshop. Let's come up with a project idea. I've also heard that there's a Native Seed Alliance, this was from a soil and water conservation district in the Middle Rio Grande, that is trying to collect as many traditional seeds and grow them out to do extension type of work and agricultural science center type of work.

I was thinking about getting in touch with them and of course, Rob, at the Alcalde A gricultural Science Center has lots of things that we're working on as well. So I think that's going to be an important part of it.

Mike Musialowski, TV.

Awesome. All right. Let's keep in touch and watch this thing evolve along with all the other things.

Connie Maxwell, NMWRRI.

Absolutely. Thank you guys so much. I really appreciate it.

N. Central NM Acequia WBS #1 Values / Visions

Question: What is your perspective on what you value about your region? Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Lily Conrad, NMWRRI.

Okay. Alrighty, maybe that's everybody. Since we don't have a whole lot of time, I think we are just going to jump right into it. My internet is kind of slow, so I apologize if I'm lagging at all. We're going to go ahead and start with some introductions. So if everyone could go around and say your name and your connection to the land or what region you're calling in from.

I just want to mention that it is definitely within your right, if you want to stay anonymous. And if you just want to state that in your introduction, we'll make sure that we don't include your name or any identifiers in our final analysis in our report to the ISC. So I just wanted to be sure to mention that. I'll go ahead and call you out so that it's easy to go around and hear from everybody. So Rob, would you like to go first?

Rob Heyduck, ASC.

Oh sure. My name's Rob. I work for NMSU at the Alcalde station where we irrigate off of the Rio Grande acequia Madre de Alcalde. I was living in Dixon irrigating there off of the bosque ditch, and now I'm in Velarde with no surface water access here. I work during the day on research. I grow plants for fun.

Lily Conrad, NMWRRI.

Awesome. Thanks Rob. Glad to have you here. Carlos, would you like to get next?

Carlos Miera, DMCDA.

Yes. My name's Carlos Miera and I'm a commissioner on the Des Montes Community Ditch Association. We are north of Taos and we get water off the Rio Hondo, and we have 9 acequias to get water off the Rio Hondo, serving over 2,500 acres in total. **So we kind of work on a major project sharing the water, and I think that's not our biggest thing that we've been able to develop over the last few years, we developed a mechanism to share the water and monitor the sharing.** And thanks to you, Lily, we've been able to do that quite effectively. Thank you.

Lily Conrad, NMWRRI.

Of course. Awesome. Thanks Carlos. Jay, would you like to go next?

Jay Lillywhite, NMSU.

Yeah. My name is Jay Lillywhite, I'm a professor at NMSU. I'm also the co-director of the Center of Excellence for Sustainable Food and Agricultural Systems.

Lily Conrad, NMWRRI.

Awesome. Thank you. Glad to have you. Participant 1.1?

Participant 1.1

I'm primarily here just to listen. I do have a small farm with my family from-- we irrigate off the lower Animas ditch. We converted that to drip irrigation back in 2011. So I also

N. Central NM Acequia WBS #1 Values / Visions, cont.

wear another hat in my spare time and I'm enjoying the topics that we're discussing.

Lily Conrad, NMWRRI.

Great. Thanks so much, Participant 1.1. Luis, would you like to go next? Luis, would you like to introduce yourself? You can go ahead.

Donne Gonzales, NMAA.

Hello. My name is Donne Gonzales.

Lily Conrad, NMWRRI.

Sorry, go ahead.

Donne Gonzales, NMAA.

My Internet's totally wiggin' on my end. But I'm Donne Gonzales and I am with the New Mexico Acequia Association. I'm very interested in just learning more. Right now I work with a farm training program, and I get to teach people how to farm and what that looks like using the acequias and drip lines. I water off of two acequias and I'm feeling really lucky, just that there were recent snow storms. I feel like we've been getting lots of moisture the past week. So, just feeling good and hoping that we get some more before it gets too warm. But thank you and I've got lots of love for you, Lily. I feel like I've learned a lot from your other presentation.

Lily Conrad, NMWRRI.

Thank you. Glad to have you. It's great to see you again. And Luis, would you like to introduce yourself?

Luis Peña, ADLC&P.

Yeah, sure. Good evening everybody. My name is Luis Peña and I'm a treasurer on the Acequia de las Canovas and Acequia de la Plaza in Servilleta Plaza, which is off the Rio Grande we're in that Petaca Corridor towards the north-central part of the state. I'm really glad to be a part of the group. Just trying to be innovative and figure out solutions around some of the challenges we have around climate change, economic disparity, the aging population, and isolation in the region we're in. I think we can solve a lot of our problems if we all put our heads together.

Lily Conrad, NMWRRI.

Awesome. Thank you so much. Glad that you made it. All right. So jumping into our first discussion point is learning more about what you value within your region and what your vision for the future is.

So what we mean by vision for the future is, where do you see water and agriculture or acequias in the next 20, 30 years? I will see if anyone wants to go first and if no one wants to go first, then I will call on a name. But if you feel like speaking, go ahead and start. Or if you have any follow-up questions to the prompt, I can also help clarify.

Carlos Miera, DMCDA.

I can start. Thank you. Within our community, in the Des Montes area we are, as I mentioned, we're north of Taos. We irrigate out the Rio Hondo, which comes down from the ski valley. **Sharing the water between the nine acequias is challenging, and we expect it is going to get worse with climate change, because the amount of water that comes down historically has been dropping for the last 10 years.**

N. Central NM Acequia WBS #1 Values / Visions, cont.

We have a monitor, a gauging station by the USGS. And over the last five years, we've been developing our own weirs and our gauging station so we can see that each year we are getting less and less.

To compound the problems, of course, the Taos Ski Valley is above us and, the ski valley, as they continue to expand and grow, they also recognize that the ski seasons are becoming shorter. Because they would normally open up the ski area until mid-December to get into full bloom because the lack of snow.

I was talking to the the owner or the manager of the of the ski valley just a couple of days ago. They have 60 inches of snow up there where normally it should be 90, or in a good year, up to 120. So the amount of snow up there has dropped drastically. **So they, too, understand that they're going to have to change their focus on how they do things and skiing as an enterprise.**

They are going to basically start looking at what they need to do more in the Summer. So as they increase more Summer activities for tourists, then of course, that's going to increase the demand for water.

So we've been meeting with them and hopefully, maybe try to work out a way that we can share the water, but it's not only the water quantity, it's the water quality. **As development continues on up along the the ski valley and the canyon, the quality of the water, naturally, is affected.** Aside to that, is as people come to our area to ski, they love the area. Especially where the last few years, with Covid, a lot of people have moved to the area.

So the biggest threat now to us for our farming community, is development. And I'll give you an example. I rented at least 14 acres that I grew alfalfa and used for pasture for my sheep and cattle. That was recently subdivided and sold, and now they're planting houses. I had to sell my sheep and trying to hang onto the cattle, but we're finding more, there's less and less farmland for growing hay as a result of development. **You know as people come in and go buy an acre or two acres, they're not really interested so much into irrigating. So we're losing a lot of the area from irrigation**. So as it continues, we will all see that the farming community in this area can continue to dwindle, as well as we're all getting older. And I resemble that remark.

Lily Conrad, NMWRRI.

Awesome. Thanks so much, Carlos. And if you could summarize all of those issues and current challenges into a vision for resilience for your community and in the future, do you have an idea of what that would look like?

Carlos Miera, DMCDA.

I think it's going to start a lot with trying to get the younger folks involved, not only in farming, but also in managing the acequias. And I think that's going to be key. We have a lot of history. There's a lot of aspects to managing the acequias that we do, and we need to start passing that on to the younger generation.

We keep asking to see **if we can get some other people to apprentice** with the commissioners and the mayordomos. In New Mexico, especially Northern New Mexico, it's always been played by the small

N. Central NM Acequia WBS #1 Values / Visions, cont.

plots of land that we have. **You can't really sustain a family on five acres of land. So the small plot farming, I think, is going to have to change.** So **rather than growing alfalfa, I think we're going to have to start looking at more specialty crops**. Whether it's cannabis or whatever they might find, but we're going to have to start changing and moving into more specialty crops that we can do on small amounts of land available.

Lily Conrad, NMWRRI.

Awesome. Thank you so much, Carlos, for those insights. Would someone else like to go next? Tell me about what you value about your region and visions for the future.

Luis Peña, ADLC&P.

So I think the most powerful asset that we have in the area I'm in, and most areas in New Mexico, is the relationships between the people. I think continuing to build on that solidarity in light of some of the challenges we're facing as a community is important; having space to bring people together and build on those relationships, working with nearby communities.

It seems to me that a lot of the acequias are fighting the same battle separately. So building more of a regional coalition or what have you, so that we don't feel alone as we address these challenges in our individual communities is probably the greatest asset and place we can focus.

Lily Conrad, NMWRRI.

Okay. Awesome. Thank you so much. Anyone else? Donne, do you have anything to share on this topic?

Donne Gonzales, NMAA.

I would absolutely love to. I enjoy listening to all the answers. I feel like it's a super silly dream, but I'm always like, "Acequias are going to live forever. And we are going to be super for so long" It's just so traditional and cultural.

So part of who I am is really teaching how amazing each of our communities are and how they're so different, but how they all have their own story and they're true. For instance, in my community, I have my acequia. It comes from the Jicarita Mountain, and our story is that it took 13 years, 13 families, to dig 13 miles down to get to my village. And I'm always sharing how beautiful that is with youth. **I really envision that even though drought and climate change is a thing, that we are going to make it through as a people, because we already have for so long.**

Just being more hopeful than not, because it's what we deserve as youth and sharing because it is powerful to have that hope and to have a really solid dream in our water system. Yeah, that's what I'll share.

Lily Conrad, NMWRRI.

Awesome. Thank you. And anyone else want to touch on this topic?

I just saw a message from Mark saying we have about 10 minutes left and I still have one more question for you guys, so we can also move on to the next topic as well. But if anyone wants to share, there's definitely time.

Okay, maybe I will ask the next question. And I think the beauty of these questions we have is it's all very intermingled. So it's very

N. Central NM Acequia WBS #1 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your region faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

easy to touch on all these different topics, really at any point. So if you think of values or visions at any point while answering this next question, please feel free to not block those thoughts and definitely include them. So the next topic that we would like to talk about, is to learn more about the issues that affect your region and some potential strategies to address those issues. Included in this line of discussion can also be ideas for pilot projects that you could see taking place in your community.

It doesn't have to be super well thought out, but maybe just kind of a brainstorming idea for a potential pilot study project. Maybe we can open it up to someone we haven't heard from.

If our meeting cuts out at any point and we're all sent back into the big group, I just want to mention that I know we haven't heard from everybody on all these topics. You will each get an opportunity to send us a written response at a later date, you'll be able to review your contributions in the form of a transcript and make additions or changes, so that you can definitely convey all the information that you're hoping to convey, but maybe didn't have time.

So maybe we can hear from one more person about issues, strategies, ideas for pilot studies. I'm not sure if Luis or Carlos would like to go, or Rob in our last couple minutes.

Rob Heyduck, ASC.

I'll say a little bit. I started out in forestry and then moved over to agriculture and I'm still interested in both of those. So when we talk about the different watershed, upper watershed, structure, diversions, ponds, things to slow the water down and hold it, I'm very interested in that from a kind of rebuilding natural habitats with native plants angle.

And I'm equally into experimenting with new crops on a personal level and at the station. So I think a lot about it, and we have regular discussions amongst ourselves in Alcalde about what new avenues we need to explore. A lot of my presence here is really to just listen. But those are two of my main interests. I think there's huge potential in both of those areas, and potentially overlap, too.

There are some native plants that can be food crops also. A lot of that land where some of the diversions, ponding, restoration things can happen is public land. So it remains to be seen who can harvest that, but I think there's tons of potential there, whether it's edible or not.

Lily Conrad, NMWRRI.

Okay. Awesome. Thank you. And we definitely look forward to more collaborations with the Alcalde Science Center.

Carlos, I'd like to come back to a point that you brought up really quickly before we all get kicked out. Do you think that there would be interest in a specialty crop pilot study in the Des Montes or Rio Hondo watershed area?

N. Central NM Acequia WBS #1 Issues / Strategies, cont.

Carlos Miera, DMCDA.

I didn't hear the first part of your question.

Lily Conrad, NMWRRI.

Oh, sorry. I was just asking if there would be any interest in doing a specialty crop pilot study in the Des Montes Rio Hondo area.

Carlos Miera, DMCDA.

I do believe that we're going to have to start taking a look at that. And also that you want to **start taking a little bit more coordinated and cooperative farming strategies.** But I see we're ready to move out. **I think there's some folks that would be looking at specialty crops as well as some of the coordinated farming work that we've been trying to do.**

Lily Conrad, NMWRRI.

I'm sorry, we ran out of time. Thank you so much, everyone.

N. Central NM Acequia WBS #2 Values / Visions

Question: What is your perspective on what you value about your region? Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Serafina Lombardi, NMAA.

Thank you for bearing with the recording. Anyone who wants to be anonymous, if you said you wanted to be anonymous in the gathering of the 50 Year Water Plan items, when you say your name to the group, you can just say, " I want to be anonymous." When everything's dictated, it will be marked as that.

Then you will have a chance to also review any notes from this breakout. So if you're like, "please don't say I said that, or you didn't capture that," then we will edit it if you choose to review the notes. So with that disclaimer, let me know if you have questions, but are timely. We're on a quick turnaround timeline to get this feedback for the ISC 50 Year Water Plan.

We really want to make sure that the state is hearing acequia voices, local voices, community voices. I don't want to take up our time explaining the 50 Year Water Plan too much. Jamie's been quite involved, so if you have questions, we're happy to give feedback. NMAA has really tried to give high-level input from our perspective, but they need to hear from you.

So I'm going to get out of the way and ask questions. So the first thing we really want to do is have everyone in the group introduce yourself and tell us what you value about the region you are from or live in. So in New Mexico, and what your vision is for the future. So who you are, and that could be what your acequia is and your ranch, really brief comments. And then really what is it you care about? What is working or what inspires you about your region, particularly in terms of agriculture and why. What is your vision and hopes for the future?

So that's question one up there and I'm going to go down the list of how you appear on my screen, if that's okay. If you need to pass and you want us to come back to you, no problem. But Lucas, I'm going to invite you to go first.

Lucas Esquibel, ER.

Sure. My name is Lucas Esquibel and my family has the Esquibel Ranch. We've been here since the mid 1800's on the Rio Nutrias watershed, which is near Cebolla, Tierra Amarilla, near Chama.

What I value and what I care about growing up, we have about one hundred acres of irrigated land off of our acequias, and our acequias aren't currently formalized. We are an acequia, but we don't have votes or anything yet, and we want to change that in the future to make sure all the neighbors get along.

A large memory for me, and I look back at old pictures and old eight millimeter films, and it's just how lush and green our pastures and our hayfields were. So my partner and I are very interested in putting time and effort into our irrigation systems and bringing back that lushness and concentrating on soil health. Yeah that's about the size of it, I think.

N. Central NM Acequia WBS #2 Values / Visions, cont.

Serafina Lombardi, NMAA.

Awesome. Thank you, Lucas. Appreciate that. Anamaria?

Anamaria Armijo-Glenn, AM.

Hello. Thank you all so much for welcoming me and for this whole space that you're providing for this discussion, I think it's really important. I actually grew up in Albuquerque in the north valley. So I grew up on the acequia. My parents farm and they raise sheep and stuff.

So now I live in Las Vegas. I'm on the Acequia Madre. I'm actually one of the first parciantes on the Acequia Madre, and I have been blessed with eight acres here in the heart of Las Vegas, which is mostly bosque. **But the reason why I really wanted to caretake this land was to provide a healing sanctuary for my community in developing more querencia, the remedios, the tradition of curanderismos, and helping my people heal from the generational trauma that has been here.**

There's only 2% of farmers in the United States who are people of color and I know there's a lot of trauma. Basically my goal is to have a learning center where we can cultivate and harvest remedios, learn how to heal ourselves to get healthier, just really rekindle that abuela knowledge, and working with the schools.

I feel like it's a really good opportunity to get our youth involved, (It's right next to west Las Vegas, I know Robertson isn't too far away), and to really create unity in the community with this central gathering place where we can collect the food and remedios. **Basically, I'm really interested in creating a food forest and supporting the Bosque.**

Asparagus was really wild and there's a lot of asparagus that used to grow here. Just the fruit trees that are there, rose hips, capulin, the cota, the yarrow, and dejara. All of those are remedios and more, to really thrive. Thank you again.

Serafina Lombardi, NMAA.

Thank you. Anamaria, I love the vision of returning to those native remedios, and also Lucas your vision of the green pastures that are great holders of really clear visions. Javier, I'm going to pass it to you.

Javier Vigil, JVSC.

Awesome. Hello, nice to meet everybody. I am from Chama, New Mexico originally. My family goes back, like Lucas's, back into the early 1600's. I have a very large connection as we have Villamonte Acres between Chama, New Mexico and Pagosa. We have a thousand-acre ranch that is given to us by family and part of an estate.

We have noticed quite a big difference in our soil as Lucas was saying, growing up it was acres of beauty and so much green for our cattle and horses, and now we don't have enough water to sustain that. I've noticed a huge difference in our water up at our ranch in Villamonte.

I'm also looking to heal our community as well. In relation to Anamaria, I have my own business it's JV Squared Consulting. I'm a grant writer and I'm going to be creating my own nonprofit called Northern New Mexico Recreation Foundation, healing the youth through recreation and outdoor activity. As Lucas knows, we have amazing

N. Central NM Acequia WBS #2 Values / Visions, cont.

fishing. Outdoor activity is key. Anamaria hits the nail right on the head in regards to our culture and **making sure that we're able to incorporate the foods, the healing, the shamanistic roots. I'm huge on that, I think it's really key that what we put into our bodies is a key to healing.**

My grandma just passed away this last year at 94. And before she died, her knowledge was still on point. It was incredible, and she dedicates it to what she put into her body at a young age, the gardening. So community gardens through our natural foods is really key. My uncle Ernest is the mayor of Chama, New Mexico. So we're looking to incorporate traditional foods again in the community gardens. Our ranch is keen to grow. I know the soil there is fertile, and so we're looking for support to, enhance our fields to support the community. We have tons of opportunity there.

I'm representing Villamonte Acres, I'm representing Chama, I'm representing my foundation, the people of the norte, and many of my friends who have died. A lot of our land is being destroyed, and we don't have a Native American connection as well. So I want to see my native families continue to grow and thrive. And it's really important. So I'm here to make positive change through unconditional love through the land, and any way that I can help from grants. I'm also a little league director here in Santa Fe. We're working on a $7 million project to renovate our fields for the kids. I'm working with Ray Birmingham from UNM.

I'm really excited to meet all of y'all and any kind of help that I can give, please let me know. Okay.

Serafina Lombardi, NMAA.

Wow. Y'all, we have a lot of heavies in the house and I know everyone else that's going to share is a heavy, too. Woo. I could just hang out with you guys all night. This is amazing. I don't want it to end, I know it's going to end before we're ready. That was a lot Javier. I'm still taking it all in, and I want to keep following up with all of you and figuring out how we connect and collaborate.

So I'll pass it to Ms. Ana, who, I saw in the chat was like, "Yeah, land for young farmers! I'm with you." That's awesome. So you have the floor, Ms. Ana.

Ana Moran, ALB.

Wow to follow up any of you. I am just blown away and smiling and hopeful for all of the projects from all of you. Anamaria, all of what you were saying, the remedios, querencia, just to space to heal for youth, for your community, I felt the deep love. All of the work from everyone, there's so much to learn from you. Javier, what you are doing is incredible. Please continue on this path. I hope that you can help to raise money and fund a lot of beautiful projects. So, thank you all.

I am Ana Moran I'm here in Albuquerque. I live in the north valley and I'm part of a collective of women farmers here in Albuquerque, and I was on city land before farming this last season. The city leases out land at the Rio Grande Community Farm, and that's where I was at. **It was a really difficult space working with the waters, just the inconsistency in the acequias and the flooding.** Being a farmer leasing that, you really confront and see what it looks like to depend on less water, and kind of having to change and adapt, and find ways to plant

N. Central NM Acequia WBS #2 Values / Visions, cont.

more resilient plants and save seeds.

So, it was a good lesson and we were blessed to connect with a farm in the south valley where we are helping to steward their lands. **We're a collective of five women of color, and what we hope to be able to do eventually, is to buy land, and that's a difficult thing as a young farmer.**

It's also difficult to figure out how to buy land collectively. Our systems are really built on this idea of ownership through one person, one family. That is something I want to learn in an intimate way. I decided to go back to school. So I'm in graduate school, studying planning and a dual master's in water resources.

I really appreciate hearing all of the Agua es vida, we all depend on this, in so many ways it shapes our lives. So I'm just grateful to share spaces like this with other farmers and ranchers and to see all the hopes, visions, and ways that we can try to save and regenerate our watersheds and our acequias, and bring water back to the desert. So I'm grateful to be here, thank you all.

Serafina Lombardi, NMAA.

Thank you so much, Ana. You're doing the work, you're living the dream collective farming. I love it. There's so much there, and thank you for that. I'm going to pass it onto Participant 2.1.

Participant 2.1

Good evening, everyone. Nice to see and meet you all. I am a lifelong farmer, rancher, community member from La Villita, New Mexico, just north of Alcalde. The Alcalde Science Center was the foundation for a lot of the ground recharge aquifer research of NMSU.

My late father, championed that work on our acequia. I'm an 18-year veteran and a commissioner on my acequia here in Alcalde. We grow a variety of crops and we raise livestock here, and I have another parcel of property in the mountains up above Hopewell Lake where we run our cattle in the summertime.

My professional career, I worked for Rio Arriba County in the planning department. So I know the Esquibel Ranch and the Villamonte Ranch from the beginning and through several different challenges that came across the county when it came to zoning and land use. It was everything from oil and gas and to protecting our acequias and our headwaters in the mutual domestics.

I actually worked for the Office of the State Engineer and led the beginning three-fourths of the Fifty Year Water Plan until this opportunity came about. In 20 minutes, I said yes to being the Rio Arriba County Manager. **My life and my life's experience are around the land and with water, and what I understand as being valued most in the region is people, land, water, your religion, your sense of identity, your culture, and your language. Those are things that are very much valued in the region.**

Our vision for the future, my vision, I think the vision of the collective here for the future, is that our people continue to remain strong on the land with the know-how on how to navigate policy, but also have the muscle and understand that

N. Central NM Acequia WBS #2 Values / Visions, cont.

if you want to have a successful farm and ranch, you have to put your money where your mouth is, and invest your own funding to make your own farm and ranch successful. You can work through other initiatives and efforts, but at the end of the day, it can be a lonely world when you're learning to grow crops or struggle with drought, pests, your neighbor, or some sort of conflict.

You have to put your head down, roll up your sleeves, know you're going to get dirt under your fingernail, and learn how to deal with two or three dilemmas at once. Because if you only deal with one or two, you're not going to end up with a successful crop. **So, learning lessons on the land, sharing, like we are within this environment, creating policy, but at the end of the day, rolling up our sleeves and getting to work and demonstrating our knowledge as traditional people on the land, and what our families have instilled on us by continuing the traditions of being a land-based people. That's really, I think the resiliency of Rio Arriba county,** the place of Rio Arriba county in the state of New Mexico, the headwaters of the Rio Grande and the Rio Chama, everything above 7,000 feet.

We are the reason why the state has been resilient in a very uncertain time of water shortage, water mining, lack of aquifer recharge, lack of infrastructure, investment, so on and so forth. But Rio Arriba county and the people, I think our vision will continue because of that traditional knowledge and we will continue to be the heart of New Mexico.

Serafina Lombardi, NMAA.

Thank you so much. Thanks for always being such a model of doing the work both in the world, in community, and on the land. Participant 2.1: Good to see you. Thank you all. Last, but not least I'll pass it to Darel Madrid, who is also on the NMAA Concilio, which is our board of directors. Darel, I open the floor to you to answer question one.

Darel Madrid, RCAA.

Okay. Good evening everybody. And before I start, I just want to acknowledge all the ladies in the room, Happy International Women's Day. I honestly believe that any room that has major decisions to be made, a woman should be present.

With that said, I'm the president of the Rio Chama Acequia Association. I am originally from Los Ojos, so I'm very familiar with ---. My grandfather, Pedro Antonio Madrid from ---, was a sheep herder, but in his later years he was a farmer. Of course in Los Ojos, they grow a lot of alfalfa and hay, and so forth. And the sheep industry is pretty big up there as well.

But my roots, they' re part of the original settlers in the 1800's when they were first settling that region. My grandfather spoke fluent Navajo and he told me all the stories of what they went through when he was a young kid, and what his parents and grandparents went through settling that region. One of the things that he instilled in me is the value of our land and our water. He instilled that in to me, and I carry that with me to this very day.

I graduated from Pojoaque High School, so I grew up in a very tri-cultural environment. I didn't hang out with any cliques when I was in school, I hung out with everybody. So I

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have a lot of close friends from the pueblos, the Hispanic community, and the Anglo community.

I've been working with Los Alamos public schools for the past 26 years. And one of the things that I admire the most from the little ones is the excitement when after The Pledge of Allegiance, we salute the flag of New Mexico. Where we are all these united cultures, and my point what I'm getting at, is I'm not a farmer, I'm not a rancher. I do have a small orchard.

I live here in El Guacho, which is a bedroom community of Espanola, in between Espanola and Hernandez, and the ditch where I am a parciante has a priority date of 1600. We are one of the three oldest ditches, second only to our native brothers and sisters, that's the Salazar ditch, the Hernandez ditch, and the Chamita ditch.

So there's a deep, rich history in this area right here. Now I'm not from this area. My wife is, and her family has a very deep history with the acequias here. Her dad and her grandfather had been mayordomos for the Salazar ditch and the Vigil ditch going back into the early 20th century. There's a deep history of acequias here in our families. Then of course, up in Park View, you have the various ditches that feed the various areas up there.

My main focus is not what I can do for myself today. What I try to focus on is what am I going to do for the next generation and the next generation beyond that?

Because in the Salazar ditch, we have 400-plus years of water sharing, repartimiento, and I am committed to extending that for another 400 years, if possible. I want to be able to see that my children, my grandchildren, and even, believe it or not, I have a great granddaughter; I want them to be able to enjoy what we've been enjoying for so many years.

I made it my life cause and it's what I love to do. I'm very fortunate to be surrounded by some very talented people. This area where I live is very unique in the fact that it's the most regulated section of river system in the entire state, and probably the entire nation.

Basically the Rio Chama Acequia Association is under everybody's thumb. It's not something that we had a voice in, since going back to the Rio Grande compact or the San Juan-Chama river project. The people here weren't part of that decision-making, yet, we're expected to abide by all the rules and regulations of it. So, it's almost a taxation without representation.

Myself and my vice president, Mr. Tim Seaman, have worked very hard these last five years to make our voices known, to be heard, and to get a seat at the table, and we have been very successful in that. We have a very good working relationship with the Acequias Nortenas that are above us, and the Middle Rio Grande Conservancy District below us.

It's in maintaining those good relationships that allowed us to get where we are now. We're on the cusp of achieving some really great achievements here. We have a lot of momentum going our way, but there's still so much more to do and we're not giving up.

I'm very honored to be in this room. Like you say, there's some heavies in here and I'm

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very honored to be part of this small little group. Thank you.

Serafina Lombardi, NMAA.

Thank you, Darel. We really appreciate all your leadership on the Rio Chama Acequia Association and beyond. We are going to be taken out of this breakout group very soon. We're not going to get to question two. It's been--

N. Central NM Acequia WBS #3 Values / Visions

Question: What is your perspective on what you value about your region? Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Paula Garcia, NMAA.

We've got a great group here. They're all going to be good, but I'll say this is an exceptional group. Good evening again, I just appreciate that you're here with us still. It's getting a little late, but since we're all together, we'll make the best of the time.

And this is my favorite part of the gathering is when we get to hear from you. We have some really simple questions for the breakout. But before we do, I think we have enough time for just a very quick introduction really quick that way we leave more time for a discussion.

I'm just gonna go in the order of my screen and start with Lynn Montgomery. Want to introduce yourself, Lynn?

Lynn Montgomery, CWSCD.

Yeah. Thank you. Good evening. I'm Lynn Montgomery and I'm with the Coronado Soil and Water Conservation District. I'm a parciante in Las Acequias de Placitas, and I'm also a parciante in another acequia in Placitas: La Rosa de Castilla.

Mainly I'm concentrating with historic conservation districts, doing watershed restoration projects and projects with farmers and ranchers. Also our watershed up here in Placitas is really important to the whole region, so we're faced with a wall of wilderness. So we're trying to organize somehow to start treating that because it's just awful. Anyway.

Paula Garcia, NMAA.

Thanks Lynn. I appreciate all the work that you're doing. Let's go next to Carlos Arguello.

Carlos Arguello, AMRC.

Thank you, Paula. Hello everyone. I'm Carlos Arguello from Talpa, New Mexico; a commissioner on the Acequia del Monte del Rio Chiquito. One big piece of news that we have is a substantial amount of money appropriated by the legislature to hopefully finish the restoration of our reservoir that feeds about 400 acres here off of Acequia del Monte del Rio Chiquito. There's one other ditch off of the Rio Chiquito, our sister ditch, Acequia Madre del Rio Chiquito, and the Talpa Water Users' Association, which owns and operates the reservoir.

Currently our acequia is being real active along with the sister acequia, and a number of community members are pushing back on some major insults that are taking place to our watershed. **The Forest Services proposed a program/project to substantially increase the number of trails right in our immediate watershed.** We are working diligently on a very active and robust letter- writing campaign to our elected officials and other interested parties that have gotten a lot of attention to push back and make some changes on that.

The forest service has agreed to do what they're calling a course correction. I farm about 10 acres here, and one of the best things that **I have been able to do that is very passive in regards to water restoration, is I**

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built some swales on my property, on the lower ends. Actually, a couple of different swales that catches the water and holds it on the property instead of running off into the salvage.

So I'm able to keep a little more water on the property for a little bit longer time, and it really helps.

Paula Garcia, NMAA.

Excellent. Congratulations on the funding. You certainly are in the middle of a lot of struggles right now. So thanks for keeping the fight going and let's go next to Robert Templeton.

Robert Templeton, EVRAA.

Thank you, Paula. Hi, Robert Templeton. I live in Dixon. I'm on the Acequia del Bosque. I am the president of the Embudo Valley Regional Acequia Association. One of our thrusts recently has been **water quality testing**. We've got a program that we're working with, Amigos Bravos, and also with the NMED. **We're very focused right now on re-establishing the long-term system of repartimiento that has worked well for a long time, but these four or five difficult years since 2000 have really stressed everyone.**
My generation that knew each other and had this worked out is mostly gone. So we've got this younger generation that's having to deal with this situation. But that's a major thrust right now.

Paula Garcia, NMAA.

A big undertaking. Thank you so much, Robert. Let's go to Deandre Velasquez.

Welcome.

Deandre Velasquez, ERASWCD.

Hi, my name is Deandre Velasquez. I work for the East Rio Arriba Soil and Water Conservation District in Hernandez, New Mexico. I'm the program manager at the district so I help facilitate the programmatics. Right now, one of our most important projects is we do some **thinning projects in the bosques to help restore the watersheds and to get those invasive plants and trees out of there.** That's one of our main projects going on right now at the district. And I'm just happy to be here, so thank you.

Paula Garcia, NMAA.

Good to meet you. Thanks for coming. Lets go next to Nicole, who was one of our presenters, and then we'll round things out with Don.

Nicole Olonovich, ALB.

Hi, my name's Nicole Olonovich. I don't think I'm a presenter. I'm actually running for House District 12 and acequias are a big concern, especially with the Santolina development. Santiago Maestas, Ana Moran, and a bunch of other environmental protectors told me that I should really get involved. Also, I apologize for my broadband, if I turn my video on, you won't be able to hear me. So I apologize for that.
But I do want to say that I think you guys for being here, I am on unseated Tiwa land and I look forward to learning.

Paula Garcia, NMAA.

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Thank you Nicole. I got you mixed up with someone else. I really appreciate that you're running. Thank you for that. Everyone heard from Don already, but Don, do you want to say anything else by way of introduction?

Don Bustos, SCF.

No, other than I'm honored to be part of this group and I want to learn more, so just glad to be here. Thanks.

Paula Garcia, NMAA.

Great. We have a pretty simple task tonight. We want to hear from you about issues in your region and just in your introductions, we got a little taste of some of the things you're working on. So I appreciate that.

So the first question is for you to tell us, what do you value about your community or your region and what do you envision for your future? Looking ahead to 20, 30 years in the future. It's a good question, it's thought provoking. Anyone want to go first? And we're recording by the way.

Robert Templeton, EVRAA.

I could start. I think for me, **what's more important than anything is community, and by community I really mean people working together on a problem.** I have what some people might think is a pessimistic view, I don't think it's a pessimistic view. I think it's a realistic view of what's coming. I think that we are going to be pushed in ways that we haven't been pushed in a long time, maybe never.

I don't think we can count on fossil fuel and the plastics that we all have gotten used to using. Maybe another 10 years, maybe another 20 years, maybe not.

The forest people around us are telling us that there's not likely to be conifers in New Mexico by the middle of this century. So I think we're facing struggles, and that community, that sense of working together as a watershed, it's essential. It's a critical piece.

And I also appreciate all of what Don was talking about and what the other presenter Emigdio was talking about. We have to think differently about what we're growing and how we're using the water.

Paula Garcia, NMAA.

Yeah, thank you. That's very insightful and I don't think it's pessimistic at all to be thinking about scenarios that are already being predicted with modeling. And if anything, I think it's a hopeful thing to look at the future clear-eyed. I appreciate your perspective on that.

Robert Templeton, EVRAA.

Realistically.

Paula Garcia, NMAA.

Realistic. Yeah. Thanks Robert. And who wants to go next, Nicole?

Nicole Olonovich, ALB.

I want to piggyback off of what Robert is saying. One of the main reasons, again, that I'm here today, and one of our presenters spoke about it, is politicians, right? **We are blocking land ownership.**

This for-profit Santolina build from Barclays can definitely destroy what we were looking

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at in the very first presentation of the ability to create that precipitation area. Because if we put urban sprawl out on that Mesa, this side of town is really going to be impacted. So I'm certainly concerned about water being life, and our politicians are literally not listening. I wouldn't run if I thought they would listen to me.

I fought for the bees this year. I fought for a green amendment. I fought for so many environmental things, and it seems every time we showed up, even in numbers, like the plastic bag repeal, we showed up in numbers and they still voted against our interests. **I'm super nervous that if we keep going this direction, that capital interests are going to overwhelm natural resource needs**. So that's my biggest concern.

Paula Garcia, NMAA.

Yeah. Thank you for working on the Santolina issue. We appreciate you being connected to the acequias in that area. Carlos, let's go with you next.

Carlos Arguello, AMRC.

Thank you and thank you for the last two speakers. One of the things that I'm really proud of in our community, is the way it's been stepping up lately in regards to responding from a grassroots level on some of the development and some of the proposals that are being pushed forward here in the valley.

All of these proposals tremendously increase the gentrification pressure that's going on in the Taos valley. One of the things, and one that I'm involved here locally, are the trails that are proposed to be built right here on the West-facing side between Taos Canyon and Rio Chiquito. It's a tremendous overdevelopment.

There's another issue that's clear and dear to me, and that is the Rio Hondo. I was raised in the valley of Valdez. **The Taos Ski Valley, two weeks ago, brought forward to the County of Taos Board of Commissioners a proposal for $154.8 million recreation corridor with some tremendous impacts to that Rio Hondo.**

What I'm proud of is the way people were starting to speak up, and not just in paying attention to those things that are going on and going on into the future. Taos has been a very accepting community for years and years to the detriment, now that people are seeing how this pressure has been building. One of the proponents of the trails up here, was comparing Taos to Moab. Now, if anybody follows some of that stuff, what's happened to Moab is just overrun. I understand there's need for economic development, and at the state level, there's a big push for economic development to rural areas to utilize the outdoor recreational opportunities.

But one of the things that things being overlooked is that some of these proposals don't take into account the rural pastoral aspect of these communities, and we're being overrun. The burden of use falls on the local users. To answer the question put forward: what am I proud of in the local community, is the work that's done on that level.

We recently had a Mayoral election where the old administration was pretty much given the boot. A landslide election of the new council and the mayor took place, which is quite significant because of the

N. Central NM Acequia WBS #3 Values / Visions, cont.

message that they were putting forward. It's quite the reverse of what's been going on for the last years. I'm hopeful that some of that will take traction on a larger scale and try to put some control to the development that's being pushed in the area here.

Another huge thing that I am so grateful for and looking forward to, two weeks from Saturday is our acequia cleaning, our limpia. The lower Parciantes, which we usually number in a 25 to 35 person group meets here at my house.

From here we take off headed upstream. The other group, usually about the same amount, meets at the upper end, at the presa and works down. We meet halfway and it's always a good connection for everyone. The acequia es la vida; at least one time minimum a year, you all get to visit with your neighbors as you're doing community work together.

So that's a big piece of what happens around here, along with all over the valleys, all over the acequias, throughout New Mexico. There's a big connection. There's a thread that connects us all together and weaves our fabric of our community.

If anyone is interested in what's going on up here, you can read what's called The Enchanted Circle Trails Association (ECTA). They've got a website which describes the processes of some of the projects that are going on. You'll be able to see the Talpa Ridge Conceptual Trail Plan that's being put forward for the expansion of existing trails that are about 20 miles expanding to over 70 miles, in a very small piece of forest service property right here, close to town. There's a lot of controversy going on with the proposal put forward by the Taos Ski Valley Incorporated. That project is not going to go away. It was simply brought forward to the county commission, and they pulled a request for a letter of endorsement because of the amount of response that they got in just a short amount of time.

There was a special meeting with a 72 hour notice and there was a large amount of people that spoke in opposition of that. So there's places where you can find out some of this information, it's ongoing. It's not going away. So that's what's happening up here in this part of the world. Thank you, Paula.

Paula Garcia, NMAA.

Yeah. Thank you for that really fantastic overview. It really gives us a pulse of what's happening and I'm glad to hear that people are standing up and trying to protect Taos. You're under tremendous pressure there.

Anyone else want to talk about what's special about your region or community, and what you would like to see or what you think will happen in the next 20, 30 years?

Lynn Montgomery, CWSCD.

Yes. I live in Placitas and that's on the north end of the Sandia mountain. We're right under the mountain in the village here, and **all our acequias are spring-fed except the one on the Creek, and the Creek's actually a big spring coming off the mountain. They're all connected and the groundwater's pretty well-connected, too.**

We've already had our Santolina up here and it's just filled in development, high-end houses forever, and tons of domestic wells and big subdivisions. Peggy Johnson,

N. Central NM Acequia WBS #3 Values / Visions, cont.

a renowned hydrologist, did a lot of studies up here in Placitas and she warned me that **all this groundwater pumping is threatening our Springs.**

And especially, I had to abandon my farm because we can't water anymore, because it's just dropped off. That's the fate of all the springs, and eventually it will be the fate of all the rivers if we keep going. I'm really trying to get people together to really do something about the watershed.

Because if we dry-up, or nearly dry-up, we're really going to have to get clever with growing things. Placitas has been emptied out many times in the past because it dried out, it's not the first time for us, and there's a lot of memory of all of that.

As things get worse, people come together better. There was a lot of feuds and fighting in the last couple of decades in the village that was really awful. Now all of a sudden, everybody's getting back together and limpianos is looking really good. There's a better spirit amongst the people.

We have an amazing history up here; we border three Pueblos, and I'm going to try to help restore all the relationships we used to have with them. And they have crews that thin forests and everything, and they're the best. The land grant is becoming very active and settling down. They went out and beat their chest a lot when they first got all these things from Congress and all that stuff, but they're settling into their role.

So we have a lot of resources, people-resources, and institutions here in this little village. I am hopeful, even though we probably will seriously dry up. This drought just keeps going, it's a mega drought and it's from climate change and it likely won't stop.

So everybody really has to start growing quinoa and amaranth, things like that, and experimenting because we have to learn how to do all of these things quick. We don't have time to laze around and not do anything, we have to experiment. So, **every farmer should be a really good experimenter.**

Paula Garcia, NMAA.

Well said, Lynn, I appreciate that very much. I personally believe that we would have had a water crisis even without climate change because of the extent of the groundwater pumping and the poor condition of our watersheds. S**o even if the rainfall had continued the way it was in the eighties, and partly into the nineties, I think we would have still had a water crisis, because unsustainable development patterns are rampant. Really bad water management decisions like assuming that paper water, moving water around through water transfers is the solution, and developers will have you believe that.**

I think if you live on the land, you know the truth. That ultimately these surface to ground transfers and groundwater pumping, they shrink the pie of the overall water resource.

We're really short on time, but I just want to give you one more opportunity to offer some closing remarks about what you think would be some key strategies, and potentially even pilot projects that you think can model ideas that you have that could make us more resilient in this dire future we're looking at.

N. Central NM Acequia WBS #3 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your region faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Carlos, did you raise your hand?

Carlos Arguello, AMRC.

Yes, I did. The most important thing that needs to happen for being effective on a forward-going basis, is for **all the acequias to get all their ducks in a row, get their legal documents, get their bylaws.** I know the New Mexico Acequia Association has a whole team that helps people do that.

I know here in Taos valley, some of our acequias here in the Ranchos and Talpa area need to do that. And I think that the more acequias get all their affairs in order, so to speak, the stronger of a voice we have. In addition to that, the more funding can come our way. Our acequia has been pretty proactive where we've been able to get quite a few things done over the last number of years. But of the three entities we're involved with right here, the Acequia del Monte is the only one that's ended up being the fiscal agent for the other two. If everyone gets their stuff in order, then we can be better allies and have a stronger voice into the future. That's my comment.

Paula Garcia, NMAA.

Yeah. I'd love that and that's within reach, that's within our power. Good suggestion. Thank you. Nicole, you have your hand up?

Nicole Olonovich, ALB.

So I went to a meeting last night, Indivisible Albuquerque, I don't know if you guys are aware of them, but we had a guest speaker come from the **Coalition of the National Infrastructure Bank. One of the things that I really appreciated about the National Infrastructure Bank, which is being pushed on a federal level, is there's part of that infrastructure money if we: A) create a state bank in New Mexico, and/or B) push for this Coalition for the National Infrastructure Bank, they would divert funds directly to helping our water, directly to helping our acequias**.

They have a 10-20 rule, which is communities that have been living in poverty, for up to 10% in poverty for more than 20% of a time, they get first dibs at that money. So I think that first pushing our legislators to pass that state bank and then pushing our federal legislators, there's people from all over New Mexico here for that National Infrastructure Bank. I think those are some big moves we can make.

Paula Garcia, NMAA.

Thank you. That's a good point. And that we're going to need resources in our communities and that this is a good possibility that we should be looking at.

Any other comments about strategies or pilot projects? Do you want to say anything else, Don, about your pilot projects and the Rio Santa Cruz, I think especially how it ties to your regional association? Because I think that's a big theme and we only have two minutes, but I'll give you the last two minutes to talk about the importance of the regional associations in doing this landscape-wide initiative.

N. Central NM Acequia WBS #3 Issues / Strategies, cont.

Don Bustos, SCF.

Thank you, Paula. And Lynn, I believe you're getting wiser with age. I just really respect that. So I just wanted to say that, and I know all of you said but I think it's good for all of us.

So, in Santa Cruz, we're going through an adjudication process with a couple of Pueblos and the numbers don't matter or anything. What does matter is that we have to come to some kind of a water sharing agreement, so that everybody drinks water or nobody drinks water. So it has to be a water sharing agreement. To fulfill those needs, **we need to be able to increase the amount of water, or at least hold the amount of water that's falling in the basin and divert it so it's more manageable, so we can meet those needs of a larger population and the needs of the pueblos,** also. It's not going to meet all the needs, but depending on how much it can add, it can really ease the tension between the acequias, the city, the forest, and everybody else involved with that limited share of water.

We know it's not the silver bullet, but we know watershed management; with more management around the reservoir to continue to keep it either bigger or to dig it out, dredge it out a little bit to eradicate a lot of the invasive species. Those are all smaller pieces that can start adding up to a whole pie.

So we're not trying to solve the problem all at once, but we're really trying to figure out what's the best management tools that are there, and we can improve on to meet the climate change and the need for sharing water. **Our association doesn't believe it's all about technology. We think that we can also use traditional knowledge to solve a lot of these problems.**

So we're not going to go the first tip is to put everything in pipes or be able to pump it out of the ground. We have to figure out other ways to be able to do that. That means a discussion around environment, social, but then all the legislative policies, also. There might be policies that have to be changed on the Senate of the state and maybe all the way up to the federal level that allows a-

N. Central NM Acequia WBS #4 Values / Visions

Question: What is your perspective on what you value about your region? Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Mark Sheely, NMWRRI.

Welcome everybody. You get the technical host as your facilitator for this breakout session. I just wanted to say thank you again for coming here. I'm just gonna give everybody a few moments at least just to get in and get settled. Feel free, if you'd like to turn on your camera or keep it turned off as well. We'll respect everybody's visibility preferences for this breakout session. And before we get started, I'm just going to broadcast a message to everyone, just to make sure that they record their.

Sorry, the joys of multitasking. Okay. Let me also share my screen here with a little bit of guidance for today's quick breakout discussion. Okay. Can you all see my shared screen?

Okay. Thank you so much. So just a quick overview, basically just have a few questions that will serve to drive the conversation this evening. So I'm just going to start out with a quick question. You can introduce yourself as specifically, or as generally as you want if you prefer not to give your whole name.

And I'll just be asking, in your case, what do you value about the region that you're connected to? Particularly in the context of this workshop, we've been talking about your connection to the water, to agriculture, to the landscape in general. And then as a kind of second part to that question what is your vision for the future of your region based on those values that you have?

And then in the next part, we'll just move on to talking about getting into the specifics, getting our hands dirty, talking about, what are the specific issues that affect your region? Some strategies that you might think can address those issues.

Then if you have some ideas for possible pilot study project sites that could help to give a critical understanding and help to hopefully achieve some of those visions for the future. So I will I'll go based on the participant list that I have here.

And so as I said, just introduce yourself. Share what you value in the region and your vision for the region's future. So I'll start out with Aragon, are you available?

If I do see that you're calling in, if you need to unmute, you can either use the mute/unmute button on your smartphone or you can press star six to unmute as well. Okay, I'll give you, Aragon , if you're there and available a few moments. But in that case let me move on to Ted.

Ted Schreier, ALB.

Good evening, Ted Schreier. I actually live in the suburban part of Albuquerque. So I am not a farmer directly, although I do some food growing around my household, though, even in that it's primarily in containers. I am participating as a community member, but also I am involved with a couple of projects, one of them being Food is Free Albuquerque, which distributes gleaned food, and also a just getting-started community farm in Los Ranchos. In question two here, my interest is in **identifying what are the crops we really ought to be growing here with our tremendous lack of moisture.**

N. Central NM Acequia WBS #4 Values / Visions, cont.

So I hope as time goes along; well and I know there's two sides to that, deciding what they are, getting them distributed out to the people that are going to grow them, the harvesting. And also, **I know that there is a cultural challenge with some of that because people are reluctant to eat new things and different things.** So I think there's a big hurdle there as well.

Mark Sheely, NMWRRI.

Very interesting. Thank you, Ted. Let's see. Next, I see Participant 3.1, if you're available you can unmute.

Participant 3.1

Hi, I'm a board member of the Rio Quemado, Rio Frijoles, Rio Medio, and Santa Cruz Stream Systems' Community Ditch Association. We're working with the adjudication and the pueblos.

I'm a past commissioner on the La Mesilla Community Ditch and I currently volunteer with the ditch to try to find funding for various projects. **What I value about this region is the rural nature of it.** So I live just a little bit south of Espanola. It's very rural. **My vision for the future is to keep it rural**, but here's some of the issues with regard to that. It's that **we have a lot of people here with water rights, and most of the people here who actually use their water rights, I would say probably half of them are not growing food. Half of them are growing landscaping, and I don't know how well that's going to go over in the future, bluegrass lawns and things like that.**

So I was listening with great interest to the person from Tesuque Pueblo, because I'm with Ted, let's figure out what can grow and what will grow. Then we can talk about getting people to embrace those foods. I can say, "quinoa" to my husband, and he'll say, "quin-what?" so it's going to be a challenge.

Other challenges here is how do we use the water? You notice that two of the pilot projects that Connie talked about, were in La Mesilla. We have a dam that prevents flooding of the ditch, but how can we use the water behind the dam? You saw that pool of water back there. How can it be used?

Then, **we're so land- challenged here being blocked in by the pueblos, that we actually have people bulldoze arroyos and water has to go somewhere.** Those are some of the issues that affect our region. So I'll just shut up and I'll let someone else talk. But, Ted I'm with you, quinoa.

Mark Sheely, NMWRRI.

Thank you so much, Participant 3.1, a lot to digest there in terms of issues or possible strategies overall, questions that need to be addressed for the future of your region. And so I see us, if we can, circling back and also looking for some commonalities between what's being discussed here. So far we've mentioned, what are the crops of the future and that being one aspect of achieving agricultural resiliency, as well as some possible, it sounds like some possible pilot project sites for consideration. So thank you so much, Participant 3.1. Next I see Luciana.

Luciana Garcia, CCRAA.

N. Central NM Acequia WBS #4 Values / Visions, cont.

My name is Luciana Garcia and I'm the president of the Cow Creek Regional Acequia Association. I also have a small farm that I'm inheriting from my father that I'm trying to restore, really. It's hard to grow on it right now. As far as question two goes, there's a lot of issues that are going on. **We have infrastructure issues, we have, of course adjudication issues, we have development up the Creek issues.** So we have a lot of things going on. F**or the future, hopefully restoring the farm lands and finding what's going to work for the land and work for us as farmers.**

Mark Sheely, NMWRRI.

Okay. Thank you so much. I wonder if you wanted to touch on, I feel like a lot of it can be implied. Were there any other things that you wanted to touch on in terms of what you value in the region?

Luciana Garcia, CCRAA.

For me, **this is property that's been in my family since my great-grandfather. So it has a lot of traditional values to me.** That's why I'm so involved with the Acequia Association. That matters to me to use that water and protect that water.

Mark Sheely, NMWRRI.

Yes. Yes, I know. It was great to hear Don Bustos talking about the desire to preserve and maintain these traditions that have been going on for hundreds, if not thousands of years. Then on the family level as well, you see the passing on from farmlands from ancestors to future generations. Thank you. Next, I see Participant 3.2.

Participant 3.2

Yeah. So I guess I'll be an upcoming master student with New Mexico State University with Sam Fernald. I actually don't live in New Mexico right now, I live in Nevada, in Western Nevada and I work with habitat restoration out here. I'm here to learn as much as I can, so I don't have a ton to share, but what we're seeing out here is a huge amount of drought which has really had all the wildlife around our area that we're trying to restore, leave, and we're trying to get that restored so they can come back. So I'm just here to learn, and I appreciate everyone's thoughts.

Mark Sheely, NMWRRI.

Thank you so much, Participant 3.2. Great to meet you, too. I'm sure I'll probably be hearing more from you as you're one of Dr. Sam Fernald's students. I work at the institute where he's director. Thank you for joining us today, even if it is just mostly to learn and listen in.

Participant 3.2

Absolutely.

Mark Sheely, NMWRRI.

Let's see. I see Steve.

Steve Guldan, ASC.

My name is Steve Guldan. I work for New Mexico State University here in Alcalde at the Science Center. Some of you may have been here and know about it. For question number one, **there's such a long tradition of agriculture in the area. What would be of interest to me and, of course, to many in the meeting tonight is that that tradition is able to continue in the future.**

N. Central NM Acequia WBS #4 Values / Visions, cont.

It also reminded me, I just finished a book by Juan Estevan Arellano. Some of you knew, or at least know about, Juan, who was a big advocate of acequias and traditional agriculture. S**o I recently finished his book and it was very interesting to see him lay out the different terms for different parts of the landscape and how they were used in the past. And, it would be great even to be able to pass just that on to the next generations, as much of that as possible, where he talked about landscape use -- all the way from the sierra down to the river**, it was very interesting.

For question number two, of course the big issues are **how to maintain a viable agriculture, that many people are involved, and that they have their heart in it** like I can see with Luciana. But it's very difficult economically, and in the end there has to be some economic viability unless somebody is independently wealthy. So that's one of the big challenges. Of course, Don Bustos works a lot on that on his end and is trying to share what he knows to make it a viable agriculture.

It's only going to get more challenging in the future as there'll be changes. But there're all kinds of aspects to that, that we could spend a whole other session on. Some of it's been touched on tonight with alternative crops. Like Ted mentioned, I think it reminded me of something. One of the hopes, and I know the New Mexico Acequia Association has worked on this in the past -- aspects of **looking to what extent could New Mexico, if people were buying food locally, how much could that impact local farmers?** I think tremendously, of course, because the **great majority of food is imported into the state.**

To me, one of the solutions is going to have to relate to getting everybody on board in the state, all people from the bigger cities and simply for them to understand the value of traditional agriculture in the state. So that they provide support through policy and through their purchasing. Buying local could have a tremendous impact and kind of along the lines of that, some of our interests here, or my interests anyway, at the Science Center have been documenting the value of traditional agriculture beyond just the food that's produced. That's led to collaborations with Sam Fernald on **looking at the value of acequias for recharge and groundwater return flow. And hopefully the general public and the urban public can see the benefits of maintaining agriculture because there are downstream benefits**, so I'll stop there.

Mark Sheely, NMWRRI.

Okay. Thank you so much, Steve. Pardon that, I just had to broadcast a little time warning to everyone in there. Okay thank you so much. I feel like a good place to turn now and in our time remaining, it's flying by so quickly already, and there's so much we can discuss. But I think that a lot of you have touched on what you value and some of the issues that you see, and I think beginning to describe as well, some of the strategies for those issues.

So I just wanted to open up the floor if there's any possible strategies that you would maybe like to see implemented, or as you saw from the presentations earlier, if you think that there are any sites for pilot studies or pilot projects that could address some of these issues. I'll hand things back over to you.

N. Central NM Acequia WBS #4 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your region faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

We can also maybe go through the order as well. Ted, was there anything that you wanted to tell.

Ted Schreier, ALB.

One of the things we have discussed in relation to the community farm in Los Ranchos, by the way, it's at the Agra Nature Center, which some people may already be familiar with, is a demonstration area.

So that's an area where we could absolutely do some, admittedly small scale, we could do some testing. **We could put something way out on the fringe and plant it and not throw any additional irrigation at it and see how it does.**

Mark Sheely, NMWRRI.

And this would be experimenting with things like possible alternative crop choices?

Ted Schreier, ALB.

Yes.

Mark Sheely, NMWRRI.

Ah, okay. Just wanted to make sure. Alright, thank you so much . Let's go down the line again. I believe, let's see, Participant 3.1?

Participant 3.1

One of the things that might be needed is we have a **neighborhood social media site** where people ask questions and alert us as to what's going on in the neighborhood like that. But some of the most recent questions that have come up are, "Hey, I'm new in the area, what should I plant? What fruit trees should I plant?" With things like that. I know there's the center out in Alcalde, as a matter of fact, I tried to get into the pruning program there and missed it by about two weeks. I was going to register too late. But how do we get some of these resources that are available so people know about them a little bit more?

Mark Sheely, NMWRRI.

Absolutely. In some of our previous discussions, I think some of the first acequia focus groups that we did, that was definitely, one thing was education, engagement, providing resources for people to learn about some of those things that you mentioned.

Participant 3.1

I do have one other thing about acequias. **We talked about maintaining the traditions of the Acequia and one of the traditions is sharing water, and that is becoming more and more difficult these days it seems.** Because people look at water, as they say, "oh, I have a water right which means I get to irrigate every time I want to irrigate," and that is not necessarily true.

That's some of our biggest difficulties with people. Hey, I'm a newcomer to the area, relatively new, 30 years. More than 30. Nevermind. **But training people to understand what it means to have a water right is an issue, and the responsibility**

N. Central NM Acequia WBS #4 Issues / Strategies, cont.

to your neighbors that comes with that. That's a big problem here. Am I making any sense?

Mark Sheely, NMWRRI.

Yes, I think so. Would any of our other participants want to weigh in on that?

Ted Schreier, ALB.

I think you're absolutely making sense. We see particularly now in the social environment, just so many people that are mine, don't touch, I'm going to abuse the snot out of this system and that system, and everything I can possibly make contact with. Participant 3.1, going back to the first thing you said about getting information out. We have a very large Facebook group down here in Albuquerque that is having a great deal of fun doing exactly that, but also **the county extension agent program is so under-publicized and under-utilized.**

Participant 3.1

Yes.

Steve Guldan, ASC.

Yeah, thanks. If I could mention, thanks for that Participant 3.1. Every county in the state has an extension office and that's how the model was developed over a hundred years ago. Not all states have that anymore. Of course, it gets swamped with all kinds of questions and they can't answer everything, but they'll find experts that can answer things if they can't directly.

And **I would use them. That's going to show the legislators and others that it's still an important aspect of the university to have in the state**. So I appreciate that tip.

Ted Schreier, ALB.

Yeah. The Bernalillo County office is just stellar. They're so good.

Steve Guldan, ASC.

If I could just mention quickly what Participant 3.1 was mentioning. I think it relates somewhat to what has come up in, I guess you could say, acequia country. I know some of the commissioners on our Acequia de Alcalde, even Alfredo, I think I saw his name. I don't know if he's in our group, but, others have brought up one of the **challenges they've had is to educate people who buy property but are not from the area. It makes it very difficult for the local acequias because newcomers don't understand the whole way that acequias work, including governance and shared responsibility for the acequia, and easements along the acequia, and that's made it very challenging.**

So some of the things, and I'm sure the New Mexico Acequia Association has dealt with this in different ways, I think in any situation where people are involved with that, they can try to educate whether it's real estate agents, I think have been mentioned, and others, so that they **educate the people who are buying the land to get them acquainted with how things work around here in acequia country.** That's the simplest way to put it.

Mark Sheely, NMWRRI.

Great. Thank you, Steve. Thank you, Participant 3.1. We're winding down on our time, so I want to make sure I just get a chance to hear from Luciana and Participant

N. Central NM Acequia WBS #4 Issues / Strategies, cont.

3.2 as well. Luciana were there any possible strategies or pilot sites for projects that you want to put forward?

Luciana Garcia, CCRAA.

Are we talking about on my personal property, are we talking about along with the whole acequia I'm the president for?

Mark Sheely, NMWRRI.

Either one, really. I guess we've been trying to encourage people to think as big or as small as they'd like, just in order to generate some ideas for, what are some possible strategies to explore in helping with resilience in these areas?

Luciana Garcia, CCRAA.

Education, of course, helping us understand the land that we're on because the land that my grandfather grew on, isn't the same land that I'm growing on. As far as other education goes, **I know that I'm personally going to be having a community party. This is where I'm hoping I'm going to gather information from everyone under my basin area and see what their problems are as well.**

Mark Sheely, NMWRRI.

Great. No, it definitely rings true to the grassroots, bottom-up kind of action that Don was talking about, these kinds of decisions and strategies and working together coming from the jente.

Luciana Garcia, CCRAA.

Definitely.

Mark Sheely, NMWRRI.

Thank you. Let's see, Participant 3.2, are you still there? Okay. I guess I just wanted to, if there was anything else you wanted to add, I know you're listening in, but in case you wanted to mention anything.

Participant 3.2

I don't necessarily have project ideas. One thing that was talked about today was **the lack of younger farmers and areas and that decreasing as we go along**. I've definitely noticed that where I am living now, I live in a very rural area. **There's a lot of development happening here in the rural area that's not at all related to agriculture or ranching.** I feel like that's becoming more common, so I just wanted to point out that issue and say, I've definitely noticed that where I am now.

Mark Sheely, NMWRRI.

Okay. Thank you. Thank you so much. So final moments here, is there any last words that you want to put forward for now, or any ideas? Just hold the floor open for any comments that anyone would like to make.

Steve Guldan, ASC.

Maybe if I can just add a couple more things related to what we've talked about already. **We need to get the general public engaged so that we can move from just looking at strategies for local small farmers to survive to the point where they can thrive.** That's a pretty big ask, **but things people have thought about, is make it part of high school or middle school curricula so they learn about their traditions and about acequias.**

N. Central NM Acequia WBS #5 Values / Visions

Question: What is your perspective on what you value about your region? Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Connie Maxwell, NMWRRI.

Just to let you know, these breakout sessions will not be shared. The recording is just to get your perspective accurately. So today we are here to collect your perspective for both the Interstate Stream Commission's 50 Year Water Plan, but also to develop this initiative.

So let's just go around, introduce yourself and go ahead and answer the first question. Tell us what is valued about your region and what is your vision for the future? There's two basic questions. We'll then move on to issues and strategies after that. But I'll go ahead and list off the different participants.

Go ahead and introduce yourself and tell us what is valued about your region. If you do want to remain anonymous, that will happen in the reporting. If you want to remain anonymous, you can just tell us what you feel comfortable about. And the first person is Lidia.

Rick Martinez, ALA.

Okay. I'm actually Rick, I'm using my wife 's zoom computer. So my name is Rick, Lydia is my wife. I'm actually the treasurer for our acequia here, Los Andosares. **What's valued, we're one of the oldest ditches in New Mexico**, and of course **the main issues we have is getting enough water to get us through the whole season**. I'm having trouble as far as getting a lot of information, older information, for our acequia in order to go out for funding, because I'm trying to figure out how we can conserve a lot of this water. In that, we're trying to line our ditch so we don't get a lot of evaporation from the water. **That's my main concern is trying to find the resources where I can find this information, working with the Interstate Stream Commission, and finding the right people to direct me in the right direction.**

Connie Maxwell, NMWRRI.

Great. Thank you so much. Sam?

Sam Fernald, NMWRRI.

Yes, I'm Sam Fernald from the New Mexico Water Resources Research Institute, I'm the director of the institute and also professor of watershed management at NMSU. I worked in Alcalde when I first came to NMSU, and **I really thought that the acequia irrigated agriculture was, and is one of the defining features of not only north central New Mexico, but also some other acequia irrigated areas around the state. So that's why we've dedicated so much effort to that over the last 20 or more years, to understanding how to support that.**

I think that understanding the water budgets so that everybody can understand; if we make a change here, if we start using more water for crops, that's going to make less for the mutual domestic. If we start lining our ditches, we'll get less recharge, but we'll have more water movement down the length of the ditch. Just having better information so that we can make the trade-offs, and **I think these pilot projects will be great for showing some of these trade-offs and understanding the water budget for the trade-offs.**

N. Central NM Acequia WBS #5 Values / Visions, cont.

Connie Maxwell, NMWRRI.

Thank you, Sam. Participant 4.1, let's see if we can hear you. Let's give it a shot. It doesn't sound like the microphone was working either. She let us know that her sound has--

Participant 4.1

What's valued about the region? What's my vision for the future? I've only been here over 20 years. W**hat concerns me is all the development that's happened, we're right along the Santa Cruz River and there's parcels that are being sold off for homes and things. What I value is just the fertile land that's there and the water that used to be there.**

My vision is for more younger farmers. That's partially why we have our school. Issues affecting the region? I think people have mentioned it, **land is expensive**. I think for us, it's been difficult to find someone. **Farming is hard work**, 24/7. Strategies to address the issues? I'm not sure.

I haven't heard the rest of the presentation exactly, but I think that's all I have to say for now.

Connie Maxwell, NMWRRI.

Okay. I just typed a thank you. Greg Corning.

Greg Corning, PV.

I'm a newcomer, I'm in Pojoaque Valley. My ideas I've had, I think one thing is that some people think of the Siberian Alps as a curse, but I think it's a possible resource. They coppice very well. **Coppicing** is an ancient art, as you probably know, using woodlots can last hundreds of years, sometimes for different purposes. So I think that's something people should look at.

Yeah, that's about it. Like I said, I'm a newcomer, a parciante on a ditch and I don't have a lot of background. I **do know that whenever you do something to help fix a problem on your part of a stream or ditch, it tends to cause a problem for somebody downstream. You have to work all along the whole length**, but you probably knew that.

Connie Maxwell, NMWRRI.

Thank you, Greg. That is definitely true- the upstream-downstream connections. Isabelle.

Isabelle Jenniches, NMHSWG.

Hi everyone, I'm Isabelle Jenniches. I'm part of the New Mexico Healthy Soil Working Group, which is a grassroots advocacy group here in New Mexico, obviously concerned with soil health. I have to say this evening has really been a breath of fresh air, it's been amazing to see the ideas.

I'm just so relieved that you are interacting with the 50 Year Water Plan, because I have been part of the conversations, webinars, that were offered also for the resiliency assessment, and **I was shocked to learn that soil health was not considered in the resiliency assessment.** Literally not, it was forgotten or I don't know. It was incredible. And you had it on your first slide, right? So that was awesome.

I think they will change it. So I'm wondering how this amazing project will actually

N. Central NM Acequia WBS #5 Values / Visions, cont.

appear in a 50 Year Water Plan and how you are interacting with them so that we can educate the sort-of pillar scientists that are creating this resiliency assessment. That will really be important for the 50 Year Water Plan for 50 years, to create a plan and to advise the governor on how to address our water situation. So it is really important that your innovative ideas get to them. Just another example, perennials were seen as bad, and clearly the whole holistic idea that you laid out did not appear in this resiliency plan, and I'm afraid it will not be in a 50 Year Water Plan if we're not all making a ruckus, so that is one thing I wanted to say.

Back to your questions, the values of the regions, really what everybody has said is just so incredible. As you can hear, I'm not born here. To me it's been just such a privilege to be here and to witness **the incredible traditions and history, the pueblos, the Navajo, the traditional acequias, all of those are such incredibly valuable things to learn from.**

So that is, for me, value here. And the issues that have been named, of course, **in order to create healthier soils, we do actually need some water, but then once we get started with that, we can effect a positive feedback loop** and you've pointed out some strategies to do that, slow it, spread it, sink it. Restoring the small water cycle, you get local rains going. There's a lot we can do with soil health and water, and they're so intricately linked. So I'm very happy to see a grounded understanding of that today.

Connie Maxwell, NMWRRI.

Thank you so much, Isabelle. Suzanna.

Suzanna Denison, AFT.

Hi again, everyone. I really appreciate hearing everyone and we'll keep mine very brief. Primarily, what is valuable about this region and vision for the future? You just heard me talk about it, but I'**m concerned about people making a living off of land, even if it's not their primary source of income.**

So affordability is affordability of land, and affordability of maintaining or keeping family land as an example. In the conservation world I work in, about half the time is focused on making land accessible and affordable through different conservation strategies that support all kinds of different habitat, including human habitat. So I think that's the real struggle with viability or sustainability thinking about agriculture.

Maybe the other offering I'll have is about how long this takes and the patience needed. I'm realizing now I'm moving into year 15 with my own family's farm of succession planning, which has meant a lot of different things including restructuring the business so my parents' assets aren't tied up in the land. Also working with different area conservation organizations to support ultimately a conservation easement, but just knowing that this has many chapters and I know has many chapters going forward. This is not a one and done type of deal, but just really takes time and takes patience and all kinds of communication skills that are really challenging with near and dear family members. I feel the urgency that I think a lot of people do with the climate, but also knowing that we're in it forever. So let's take our time and be really thoughtful and know that it will take a long time. Thank you.

N. Central NM Acequia WBS #5 Issues / Strategies

Question: What would you say are the biggest issues and challenges that your region faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Connie Maxwell, NMWRRI.

Thank you Suzanna. Emigdio, can you unmute? It's star six, once again, on your phone.

Why don't we open it up to tell us about the issues that are affecting your region and strategies to address those issues. The strategies don't have to be things that you're completely convinced will work. That can be things that you think are just worth trying. In that regard, those strategies that are really critical, you feel that we need to gain a better understanding of so that we can try to achieve visions for the future.
So I'll just open it up to anyone.

Rick Martinez, ALA.

In Don Bustos's comments, he mentioned **trapping the water coming down in the runoff during the monsoons, I think that's going to be the key start** in how we can figure that out.

Greg Corning, PV.

Related to that **I'm really impressed with what I've read about ancient China's way of handling water, both shortages and floods and trapping water. There's an ancient engineer who figured out how to create artificial marshlands so the water would spread out over this artificial marshland and then go into the groundwater table.**

So I don't know if people are doing that in this time or not, but that might be a good approach.

Connie Maxwell, NMWRRI.

Yeah. Thank you. It is amazing how because of the challenges that we face, a lot of the traditional technologies are going to need to be resurfaced and adapted. Those stories from around the world are really critical. I agree.

Any other visions for the future? Where do we want to be in 10, 20, 30 years? It can be something that's measurable, it can be something that is just a vision for the future.

Rick Martinez, ALA.

Just the **education** of it. Drip irrigation is one thing that I really want to bring to our farm and figure out how we can use our acequia water, trap it in either a storage tank, either above ground or underneath, preferably above ground because of where I live, and use that as drip irrigation so we're not using so much water.

Isabelle Jenniches, NMHSWG.

Really **being more self-sufficient in New Mexico**, the statistics are really crazy. We import 95% of our food, and then we export 97% of everything we grow. And so **to have a more local food-shed would be really important, it's safer, it's more resilient.** I really enjoyed Emigdio' s presentation of all the different crops that we have currently growing and that we could perhaps grow here and that we would probably be wise to look ahead in terms of climate change,

N. Central NM Acequia WBS #5 Issues / Strategies, cont.

what is it going to be like here?

And then look around eco regions around the world. This is the sort of permaculture principle of checking out what rose elsewhere, what might actually like it here and then try that is a really easy idea of diversity. And the pilot project ideas were just so inspiring just to see the green and the fields of flowers, the pollinator plans.

So I think those are really wonderful strategies. And this sort of principle there is the sort of small scale water catchment systems that really slow it, spread it, sink it, the water. And with that, we are rehydrating the soil and creating your own soil sponge that really can soak up all the water instead of having it just rush off and create problems in terms of erosion and siltation and all that.
So it's a beautiful vision and I think it's very achievable. People are doing it. **It's a vision of multiple small scale projects.** And I think that is really where we're headed at **this sort of a dispersed instead of the sort of big technical technological solutions. It's more of a dispersed, human scale, wildlife scale, micro scale solutions.**

Connie Maxwell, NMWRRI.

Go ahead, Sam.

Sam Fernald, NMWRRI.

I think my vision follows onto what we've been talking about. **I think we can have a resiliency network.** We spend a lot of time measuring rain and river flow, even acequia flows more and more. But if we have this **network of pilot studies that can be holistic in themselves and capture the diversity of the landscape and not just the natural landscape, but the human landscape**, that becomes something we can communicate in the 50 year water plan and say we'll be tracking just like you're tracking drought and groundwater, **we're going to be tracking resiliency with this network of stations**. We could take Greg's 1.6 acres, he advertised and turn it into a resiliency network station and do the holistic soil-water-plant-human study at that and many sites.

I don't know if that's going to be able to get into the 50 year water plan in that wording, but I think we're going to have some great data to show for it down the road if we keep that vision in mind.

Connie Maxwell, NMWRRI.

Thank you, Sam. It looks like Emigdio is unmuted. Do you want to tell us what your vision for the future is?

Emigdio Ballon, PT.

It's very interesting why we talk, there's so many ideas; they're doing this and China is doing this over here, they're doing this over there in many places. Again, I will mention how people in this continent in North America, when we look at the Hopi people, dry land, **we don't practice anymore dry lands practice.** We forgot completely because sometimes we don't pay attention to the very important factors of why people practice-- not for one year, for thousands of years. The same thing, happened in South America.

But anyway, I was looking at all the type of aspects they use, for example, some people in Peru, they use plastic bottles. We are not talking about the commercial farmers, very big farms, but actually, if you want to use

N. Central NM Acequia WBS #5 Issues / Strategies, cont.

water in that way, they can be useful for your family, for your community. People coming together and beginning to make the step of the practices of technology. Okay. It's not high technology.

It's using all this I would say the plastic bottles, one liter of the capacity and more than a small one. Then they carry on the bus to the other one and fill up the water one and covered the other one and using one type of, they probably use some type of cloth. This cloth is put in the bottom of one of the bottles they covered. They call the system **drop water system by solar energy**, and the people are beginning to grow some food in base of this type of technology.

The other way, we can say so many other ways, I didn't have ideas because I didn't have a chance to practice looking and seeing how it works in these type of things, because already drip irrigation is a very good system anyway, so we have to look it up. Also any system you are going to use in irrigation is going to have some type of problems in the long photo. If you are not even very well, your soil is going to bring you very easy salinization and compaction of the soil. That's very important to making all these practices together. We cannot make you only one thing and thinking about one type of solution. **It's very important to look up other alternatives in this way of combination.** I would say modern technology or the science technology, and the actual technology both combined can probably be a very good alternative for the future generations or the fruit of life. Because it's very important to look at these types of things, because we forgot some types of these things, and we're looking for new things. When we have observed these little things already here but, we forgot these things, what our ancestors used in these areas.

I am not from the US. I am from South America, Bolivia is my home. It took my people, for example, using different type of the systems for wildlife conservation, because wildlife is going to be one of the crucial things in the near future. In 2001, we had a water war in my country because the transnational companies, they wanted to privatize the water all over this planet. Paraguay is another example. We have already the step of the control and beginning to control the water. Not only the water you are drinking, the water from irrigation, the water from the river, all these types of things. We have to begin to be prepared to making different types of authentic situations, and beginning to thinking how we can stop this type of abuse and the mal-use of the water, because few people are the poor people. We're fighting for this right.

We are still seeing the step of this equation with the water rights in this country, with the indigenous, nature, all these types of things. The same thing happening in Central and South America. Okay. When we talk about the techniques, we have to begin to see all these techniques, they can be a good technique for our family, for our community, and for our country.

That would be my opinion about the step of the conversation and what we have right now.

Connie Maxwell, NMWRRI.

Thank you, Emigdio. That's true, there are wars all around the world over water. We are very fortunate in the United States in

N. Central NM Acequia WBS #5 Issues / Strategies, cont.

many ways. Other visions for the future, other strategies folks would like to try? We only have a minute or two left.

I have to say I'm very grateful for all of these ideas and contributions and I do feel like this is a place where a lot of the aspects of my work are starting to come together and to be able to look at things as a system is not only a joy, but it's a necessity. I very much agree with all of the ideas that folks have been bringing, and I like the idea, Sam, of this idea of network of resiliency measures. One of the things I'm also inspired by is that if we have these regional working groups we can really start to get into the character, the unique dynamics of our regions and those regions can share stories with each other.

It'll be a very powerful community-based organization for us to be able to look at our local and our regional dynamics, but then also share our stories with other regions. That's my vision for the future, for what comes out of the 50 year water plan.

I don't know if we'll quite be there. The ISC has talked about it being a living document, and we're in active conversation with them about trying to kickstart just such an effort. I know we're like 30 seconds away. I don't know if anybody wants to add anything. You might get cut off.

Isabelle Jenniches, NMHSWG.
Just thank you. And that is such an encouraging vision. And thank you for doing this work.

Connie Maxwell, NMWRRI.
Thank you.

N. Central NM Acequia Workshop Closing Remarks

Serafina Lombardi, NMAA.

Thanks, Mark. And this could be a good time if people have things they were trying to say in the chat, and Connie, I don't know if there's a followup procedure. Now we didn't get to question two, but we all responded to question one. So I don't know if you want to share the best mechanism for people who wanted to provide further input on question two, or just further input in general- what the best mechanism for that is?

Connie Maxwell, NMWRRI.

Absolutely. The next steps from this are that we are going to go through a process of transcribing these. Everybody that wants to stay anonymous, when we distribute the transcriptions of the discussions we will definitely keep you anonymous, but we'll also give you the ability to review and add. You don't have to keep what's there, you can add, you can change, you can improve. And yes, we will absolutely welcome, particularly if you didn't get a chance to answer any questions or make contributions, please do add to that. We will try to get it done fairly quickly. It does take time. So it'll be a couple of weeks, but we'll try to turn around quickly so that folks can have it fresh in their minds.

We're over time and we really appreciate everybody's time. Like Mark said, I know some folks were right in the middle of an idea, Don, I don't know if you want to finish your thought. I wouldn't be surprised if it's an inspirational closing for us.

Don Bustos, SCF.

I don't know about inspirational closing, but we were talking about how to solve a problem.

We're not looking at solving the problem all at once or that there's a silver bullet, but there's all these little pieces of the pie and we're going to start to pick up and put together. If we can start to put that pie together and then it makes it a larger holistic approach, and we're looking at everything. So there's no silver bullet, but we work piece by piece and put it all together.

Connie Maxwell, NMWRRI.

Fantastic. The other thing that was a description of our next steps with the ISC. As Don's talking about, we're starting to pull all of these ideas together. There are several funding efforts that are in front of us.

The quickest one, we just got the deadline today for the organic grant. So in terms of field trials and crops we'll definitely be appealing to all of you that might be interested in looking at, what are the future crops for New Mexico? And can we do field trials? That grant is due April 16th or 17th, something like that. So in five weeks.

But other funding efforts are there to look at; things like aquifer recharge and watershed restoration and how all those things fit together. So we'll be trying to pull together working groups to pull proposals together. We will be back in touch. And with that, I would just like to ask Paula and Serafina if you have closing comments and regards to folks, please do. Go ahead. Thank you so much for the chance to work together on this.

N. Central NM Acequia Workshop Closing Remarks

Serafina Lombardi, NMAA.

I'll just say thank you to everyone for being here for taking the time. Everyone in the breakout group, and I'm sure reflects and reverts back to all the other breakout groups, that you're all putting your heart into this work already. It's really inspiring and leaves me very uplifted and excited for all of our conversations, collaborations, hard work, visiting each other's homegrown pilot projects and collaborations to come.

So really just a **heartfelt sense of gratitude to being together, sharing this time and for what is to come.** I'll pass it to you, Paula.

Paula Garcia, NMAA.

Yeah. Thank you, Serafina. I feel the same way. **I was very grateful to be in these conversations, to be part of this dialogue, and to have this opportunity to appreciate the lifetime of work that people have devoted to taking care of the land and water in their communities. That was a very common theme in our group was about community and the connections with our watersheds, aquifers, and in our farm lands.**

There's some very visionary ideas and they're grounded in a very somber reality about the projections for how dry our future is going to be. That was reassuring to me because **I feel like we're looking to the future clear-eyed and still bringing forth hope and optimism about what we can do in our communities.** The way communities are mobilizing and working together around the state, I found very inspiring.

Much more to say, but it's late. And I look forward very much to seeing the transcriptions and notes from this, and sharing with everyone and being able to work on next steps.

There's some wonderful ideas here and we can encourage each other and work on this all together. I came away feeling, "Que viva las Acequias!" That's how I feel.

Serafina Lombardi, NMAA.

Que Vivan!

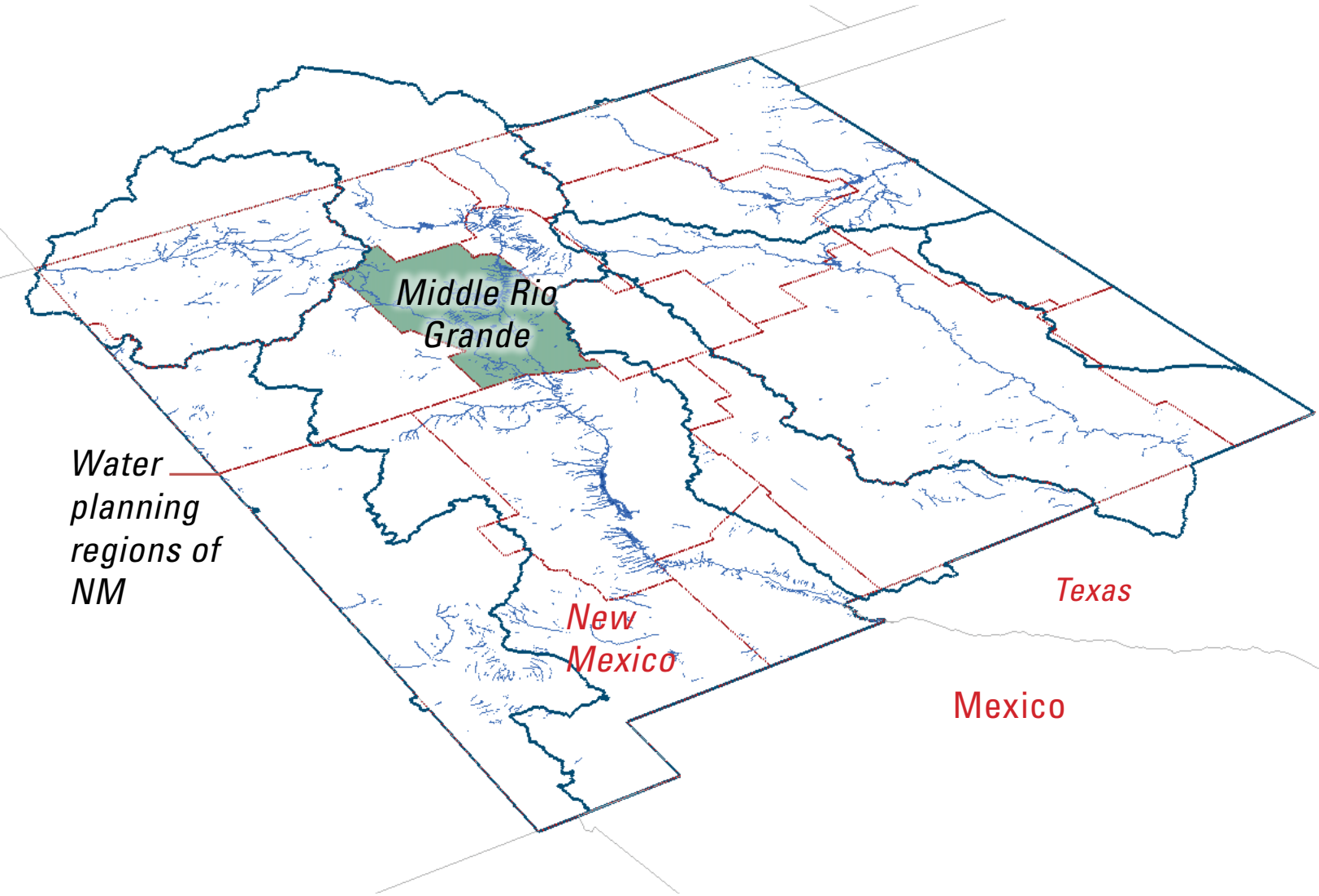
Connie Maxwell, NMWRRI.

Thank you everybody, have a wonderful night.

Paula Garcia, NMAA.

Good night, buenas noches.

6.3 Middle Rio Grande (MRG)
REGION FULL TRANSCRIPTS



Middle Rio Grande (MRG) Stakeholder Visions for a Resilient Future

Focus group #1 Participants

Steve Glass,
Ciudad Soil and Water Conservation District
Board Chair

Paul Tashjian,
Audubon Southwest
Director of Freshwater Conservation

Cecilia Rosacker,
Rio Grande Agricultural Land Trust
Director

Tammy Montoya,
Pueblo of Santa Ana, Dept. of Natural Resources
Hydrologist

Diane Agnew,
Albuquerque Bernalillo Co. Water Utility Authority
Water Rights Program & Environmental Manager

Focus group #2 Participants

Adam Ringia,
Pueblo of Laguna
Water Rights Office Manager

Greg Jojola,
Pueblo of Laguna
Environmental Program Manager

Lynn Montgomery,
Coronado Soil and Water Conservation District
Chair

Carolyn Kennedy,
Placitas mutual domestic water system
Commissioner

Matt Schmader,
Albuquerque open space program (former)
Former superintendent for 25 years

Interview

Casey Ish, Middle Rio Grande Conservancy District
Water Resources Specialist

#223

MRG FG#1 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Steve Glass, CSWCD

There's a lot of value in the Middle Rio Grande region and it's not all related to water, but **it's all underwritten by water.** This is a value that is the economic engine for this state and it's where all of the economics happened in the state. Even though we have larger cities, we have the oil patch, we have all the agriculture, but in reality, **a lot of the value that's generated in New Mexico at least flows through if not originates in Albuquerque. And none of that can happen, Albuquerque can't continue to function, without a reliable water supply.** That's true of any municipal area and true of any rural area, as a matter of fact, because water is life, as they say. So from the perspective of the conservation district up here, **our resource concerns really focus around maintaining resources, maintaining the ecosystem services nearby Albuquerque, not losing that** because it's so profitable for people to convert farm land, or even vacant land, into retail spaces or even neighborhoods.

And so from our perspective, as a conservation district, **we really work to ensure that the natural spaces, whether it's farming or range or whatever, aren't lost.** And part of making sure that's true is that we need to work with agriculturalists to educate them about ways in which they can maintain their access to their irrigation water so that they will continue to farm and not want to sell their land off for a one-time big payment from a developer.

Sustainable region - the overall objective is to ensure that that Albuquerque can remain a sustainable urban area and that the people who live in Albuquerque can continue to enjoy the **remarkable climate, recreational activities, entertainment, activities, and educational activities.**

Paul Tashjian, Audubon SW

Having worked a lot in the Middle Rio Grande, a lot in Valencia county, it's sort of professional, but also personal. I just I love the Valley. I love the river here and **the agro-ecosystem, the intertwining of farm fields and the river**. I love that there are **Pueblo sovereign nations that are here, and were here ancestrally, and just gives us a rich and a vibrant community**. And the river itself—that's what I spend a lot of my time on. As well as the farmland and the refuges outside the farm land. I continue to be **amazed at how much function is remaining in this river and how remarkable this ecosystem is**.

Cecilia Rosacker, RGALT

MRG FG#1 Values, cont.

Diane Agnew, ABCWUA

For both the Water Authority, and for myself, I think **one of the values of water in the region is really the connectivity to community. Ensuring that we all have equitable access to quality water, but also supporting the water resource for our habitat, our Bosque, our agricultural resources, our recreational benefits, and just really sharing the resources of the community. Working within the region, with our partners, and with communities to ensure that this water is available for now and into the future.**

And that we're **thinking forward in addition to thinking across agencies, across communities, to make all of our plans happen, and not work alone.**

MRG FG#1
Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Steve Glass, CSWCD

So we also are concerned, of course, about, as you showed, **the declining aquifer**, even with the new San Juan Chama drinking water system in place. So, we have that as another one of our resource concerns, as well as **pollution of the water sources, including urban runoff.** So those are challenges that we work on every single day and **the overall objective, of course, is to ensure that Albuquerque can remain a sustainable urban area and that the people who live in Albuquerque can continue to enjoy the remarkable climate, recreational activities, entertainment, activities, and educational activities.**

A major issue for the future is climate change. We're going to be facing a situation **where water availability will decline**, as we've already begun to see from your graph. We're seeing declines in the availability. **The snowpack for instance is going to be less and less reliable as we go forward.** And without the Colorado snowpack obviously, **we don't have the capacity to capture the precipitation that we do get very efficiently.** The water utility authority has done remarkable work in conservation. But at some point, I think we're going to reach the limit of that conservation capacity, and I'm not sure that we're going to be able to locate new sources. I'm sure Diane can address this much better than I can, but you know, we've seen the, the graph that shows around 2050, that we're going to we're going to deplete the available water supplies even with conservation. And I think that's a major challenge for for the Middle Rio Grande valley here.

And **agriculture is a large user of water. But we don't want to lose the agriculture**, like Paul talked about, the lovely interplay of agriculture and in the Bosque, we don't want to lose in an attempt to provide sufficient water for the municipal sector. So, I wish I could offer a solution. But the challenges are that we have this declining water availability issue and we don't have real effective ways to address it, other than finding more efficient ways to use water for agriculture, I suppose, and still maintain our agricultural element here in the middle of valley.

Diane Agnew, ABCWUA

I think that your [Steve Glass'] point about conservation is well-made and we were actually just talking with the US Fish and Wildlife Service, an agency who has not previously participated in conservation discussions, but now is. They have a new directive to find a way for them to engage in conservation in the Middle Rio Grande, because they've made that **connection that conservation is tied to water in the river and species support.** And one of the things we discussed with them is that, **in the nineties, it was really easy to make big gains in the conservation** because it took fairly minor tweaks to our customer behavior and infrastructure, shower heads, toilets, whatever, to make big changes. **And now we're in that tail end of the curve where it is much more challenging and [those tweaks] really aren't sufficient to continue to achieve conservation**. Outdoor efficiency, for example. [We are] continuing to find ways to

MRG FG#1
Issues / Strategies, cont.

work with our big five is what they're calling them, our biggest five users of water, our major water users. But that cannot be the sole focus of water management. And so when you go to those big five and you help them with something as simple as replacing their sprinkler heads, you can see a 20% reduction in their water use. So that's just really underlining the **importance of looking at other water resources [in addition to conservation]** and that's **a discussion of implementation of reuse, that's talking about how to integrate green stormwater infrastructure, a lot of different things.**

And I think for me, from my position, and especially in my position as it's grown in the last year or two is really seeing that I feel like **there's this human tendency to want one singular answer to water management that will fix the problem. And there's no such thing. And so we need to break out of that thinking and we need to look more integrated in both resources and supply sources for the Water Authority, but also as a community and in the middle Rio Grande basin so that we can integrate and continue agriculture because that's an important part of our community and our culture, and also a necessity.**

And I don't see how we can be successful if we aren't talking and working together, to be really honest. And that we in fact can find **some dangers if we work in isolation** because one important point that was made in a working group about stormwater, almost two years ago, but when you start capturing stormwater and changing flows into the river, you start changing downstream communities' water not just in quantity, but in quality. **We have limited surface water in the future. We have a lot of people who need water and we should all be working together** understanding that there are nuances and different needs, but I don't see how we can do this without each other, to be totally honest.

The only thing I would add to this discussion, which is particularly on my mind because of my role as Environmental Manager, **I really would love to hear water quality in the water management discussions more**, and not so much natural water, like natural water quality. But I mean, when you have a major contamination source that's nearby or in a water source. **I'm thinking specifically about the known groundwater contamination sites** in Albuquerque and the orphan sites in Albuquerque, and they're not addressed in a meaningful way. And they're allowed to linger for decades. **That is actually impacting water quantity -** that is changing how water resources can be managed. And so I think **historically we've kept those categories of things separate, But I don't think we can continue to keep them in separate buckets as we move forward because limited resources also means that those impacted sources are going to be more and more important.** So linking these more and more would be helpful because there'd be more leverage and more weight in pushing these things to move forward.

MRG FG#1
Issues / Strategies, cont.

Connie Maxwell, NM WRRI

I think that that's a terrific point. That's something I certainly have found in my work as well, and that I've found in the literature, people like Elinor Ostrom, who worked a lot on groundwater and discovered that it's not inevitable that we create the tragedy of the commons and use all of our groundwater. But it takes both collaboration with each other in the same scale and then across scales.

Paul Tashjian, Audubon SW

So I just want to riff of a little bit off of what Diane was saying that with the state water plan there's all these sessions that I take part in. I just think that none of these problems are easy and all require long term planning and problem solving. **We really need ongoing regional teams working on this stuff. These are complex issues and there aren't cookie cutter solutions**.

But in terms of the Middle Rio Grande and how I understand it, **this is a place where that saying that the farming and the river are intertwined really means something because of the way that the system works and the hydrology of the river-farm system.**

And so I really believe **if farming goes, the river will go. Just because there'll be less return flows to the river.** [all flows not consumed by agriculture and returning to water supplies, e.g. including those that are recharged or returned for in-stream flows] But **this also points towards something that's perilous about water conservation. Becoming more water conserving often means that there are less return flows going back to the river. And the river has evolved to need these flows.**

I wish Casey Ish was here today from the Conservancy District because he can really speak about this program, and we've (Audubon) has been support for a **pilot water leasing program**. **This program looks at on-farm efficiencies, delivery efficiencies**, and then also has a leasee component to it. The leasee component is very intentionally recognizing the connection between irrigation efficiencies and diminished river flows. The Program also is very intentional about recognizing potential negative effects of leasing on farmers, and wanting to have it just be seasonal or year leasing. And then that is funded through this federal funding with Bureau of Reclamation. **Water that is leased has quantified savings that are intentionally returned to the river at the key locations; the Program at the same time is improving delivery efficiencies to farmers and limiting leases to a few years to avert a "buy and dry" scenario.**

Essential to this river is keeping the farm farming system alive. This has been a very exciting program to be working with—I recommend talking to the District and getting their perspective.

Connie Maxwell, NM WRRI

We will follow up with Casey Ish. And I know Cecilia, you have mentioned that you have interacted with the MRGCD. Was it on that program?

Cecilia Rosacker, RGALT

Yes, we partner with the MRGCD and actually, because I also farm, they came to me to talk about the leasing program. My understanding is that out of 60,000 irrigated acres in the district, 1000 acres were leased into that program.

MRG FG#1
Issues / Strategies, cont.

If I could step back and say a few things, **I'd like to thank Paul for really talking about the interaction between the river and the farm land. And I agree if we lose our farmland, particularly our flood irrigated farmland, the river is going to be hugely impacted**. I've been going to the NM Water Dialogue meetings and participate in these kinds of meetings for over 20 years. **Agriculture is always what's for lunch, being offered as the solution for water capacity in other communities and also portrayed as the villain for "using too much water".** And yet when I go to these working groups, there's never a farmer there except for me. **Farmers are never included in the conversation and their perspective and input is left out of the conversation.** I think we need to start considering that because in this planning farmers we're going to be hugely impacted and our communities, wildlife, open space, and culture are going to be hugely impacted.

And one of the things that I don't hear often enough is like what Paul was saying is let's talk about the other values that farmland provides, and particularly flood irrigated farmland. As Paul mentioned, **if we go to conservation on the farm, everybody going to drip, it's going to impact the river. We (irrigators) apply three acre feet per year to their field. Plants consume about two acre feet, the rest goes back into the system.** Water Consumption by of plants isn't going to change no matter how you apply it, but **water running through the fields and through the system is critical for maintaining the river.** And so **I would like to see more inclusion of agricultural communities in the conversations** and I campaign to **promote all the other services our farms provide because the public always is out there saying, oh, the farms use all the water. But the farms provide a lot of services to the wildlife and to the community and to the riparian areas.** And we need to take that into consideration and really think about our value system. **What do we as a community, as New Mexicans value and how do we support that?**

RGALT works on conservation with farmers, I'm talking with them all the time. Right now, just to let some of you who don't know, it costs $60,000 in transaction costs to convey a conservation easement. We can access CE acquisition funding through some federal agency programs but landowners cannot afford to pay the CE transaction costs. Farmers are willing to do it – protect their land. Some of them in rare instances they can afford the costs are willing to spend that $60,000 to give away half the value of their land (the CE value) because **they love their land. And they see what their land provides to the community.** But meanwhile next door - we have existing easements - where next door to that protected CE property, **the farmland is being bought up by developers, water rights transferred, and new subdivisions are emerging. They're putting in houses faster than we can ever protect the land.** And I think **we need to talk about development and how are we going to curb it? Are we going to curb it and what is their role (developers, real estate) in supporting preservation of agriculture?** Should developers have to pay a tax for development or their communities pay taxes to protect farm land, like they are doing in Bernalillo county through their conservation mill levy? Should conservation groups work to get a real estate transfer tax with funds generated to be allocated for land and water conservation?

MRG FG#1
Issues / Strategies, cont.

Socorro county is already an impoverished community, and the public paying taxes to protect agriculture and water is [a difficult prospect], you can't squeeze water from a stone. In summary, **I feel that the agricultural community is left out of the conversation and we aren't recognizing all the services our farm lands provide, and we really need to look at our values and what communities and state are going to look like in the future.**

Connie Maxwell, NM WRRI

Thank you, Cecilia and Paul I completely agree without agriculture. we lose our recharge and all of the myriad values that infiltration affects in terms of riparian area, water quality, the filtering, the wetlands, the wildlife. I agree. And I have found I've experienced the same things Cecilia that you describe that agriculture is often left out of the picture and villainized for the large use of water, and the recharge aspect isn't understood well enough.

And that's one of the reasons why I actually pursued this idea of looking at things in terms of water. And I think one of the powers and the values of a water balance model to show those incredibly important functional effects.

Issues, strategies?

Cecilia Rosacker, RGALT

So if I could add, **I think the idea of ecosystem services payments is awesome.**

I think the water leasing program could be great, but I'm going to say from my perspective as a farmer, **the amount that's being offered - No way would I lease my water. When my crop dies after that year of fallowing, the amount being offered is not even enough funding for me to reseed the following year or even keeping the weeds mowed and keep the invasives from taking over.** I think those programs can work, but I think **we have to take a realistic look at what people are being paid for those leases, ecosystem services impacted, and how those leases are being managed to minimize unintended consequences.**

Connie Maxwell, NM WRRI

And what is your perspective on barriers to agriculture reducing it's water quantity consumption while at the same time, staying resilient and still achieving those recharge functions. Do you see people considering other crops? Do you see other types of support that would be critically needed to help farmers move in that direction? Do you see barriers in terms of water rights, for example?

Cecilia Rosacker, RGALT

Farmers are resilient. They're going to figure out something - a way to keep farming, make it work. One thing that I see a lot of farmers doing is planting fast growing annual hay crops like sudan because you can get a decent hay crop out of sudan. The other day, one of the farmers said, this is going to be a valley of sudan. All that being said, alfalfa is one of the most drought tolerant hay crops you can grow. It can tolerate drought; it can go a long time without water because its tap roots are so deep. In fact, the best way to kill it is to overwater it. **So farmers are making adjustments and trying to figure out how**

MRG FG#1
Issues / Strategies, cont.

they're going to do it, keep their land. It's difficult with the profit margins so small, but it is their way of life. This last year, all of us lost out on our irrigation water. Even if you didn't sign up for the leasing program, you had to forgo two months of watering due to MRGCD's curtailment of the irrigation season. That's a huge impact on the community. That was two hay cuttings we missed out on, instead of five cuttings, we only got three. **Farmers feel panicked, their livelihoods and way of life are threatened.** When I've gone out to talk to landowners about conservation easements, they ask why would I do this? **Why would I protect my farmland, there wasn't even water in the ditch this year. How can I recruit them to protect their farms when there is little promise of water and no end to drought in sight. We are protecting the potential for farmland to exist.** Yet farmers are working on it, people are making adjustments and trying to figure out how to make it. They're keeping the faith, hoping and praying to make a crop one more year.

Connie Maxwell, NM WRRI

What kind of support do you think people farmers need to make those adjustments or have more options? I know that's not an easy question to answer.

Cecilia Rosacker, RGALT

No. And that's why you need a group of farmers in the room because you would get a lot of answers. Especially farmers whose farm income is their primary income.

Connie Maxwell, NM WRRI

More issues, more solutions that maybe aren't completely worked out, but are worth trying. I know we've talked about a lot. Maybe we've hit the main ones.

Paul Tashjian, Audubon SW

What you pointed to in your slide **about reservoir and evaporation, there are these rules that we operate under that may not make sense for a changing climate. Does it make sense to have all this compact water stored in Elephant Butte?** What is it and what does that mean? That stuff is being looked at in the Basin study now, I think, that hopefully will come out in this Rio Grande Basin study that's just getting off the ground.

Then **reservoir operations in general, can you use reservoirs for ecosystem services? Can you really make sure that spring snowbelt pulse moves through at the right time to benefit the native species.**

Diane Agnew, ABCWUA

To that point, Paul, one thing I've been thinking quite a bit about after seeing a lot of the climate models that were presented with the 50-Year Water Plan is that **we really need to flip how we think about water. I think we're still too rigidly thinking: Snowpack!** Like that series of steps - there's going to be water in the spring when the snow melts, and then there's going to be monsoons that will pick up any slack that we didn't get from snow melt. And I feel like what those climate models are telling all of us is to **think more agilely about how we look at water,** because there are several charts that they presented that shows **maybe we won't have any snowpacks**. We don't have that spring runoff, but we will see an increase in precipitation that will happen later in the year. And so **how do we manage our systems and design our systems to capture that water when it comes through. And what kind of agility can we build into our**

MRG FG#1
Issues / Strategies, cont.

systems? Because if anything, we know that we don't follow this formula that has been true for the last 50 years. It's going to change on us and what we see in 2020 maybe won't be what we see in 2021, as an example. So **how can we be thinking about working with the water when it comes so that we're prepared to use it or manage it efficiently.** And I really think some of that's just breaking this formulaic approach we've had for water management because we were able to. 50 years ago you could count on it, it was a clockwork, but I don't think we can count on it anymore.

Connie Maxwell, NM WRRI

That's a subject that I've devoted quite a lot of my thinking towards, is how to manage the flow as it goes across the landscape. So looking at watershed-scale solutions and thinking of things on those watershed scales. I know that there started to be some idea that perhaps concreting all of our arroyos as they go through Albuquerque might miss some opportunities for ecosystem services. What do you guys think about the idea? I know there are water rights barriers to infiltrating, doing aquifer recharge and infiltrating water because of compact requirements, but theoretically, if you got it into the ground faster, there'd be less evaporation, you'd have more water. What do you guys think about maybe even pilot projects, how to work out some of those type of solutions and managing that precipitation when it does come?

Cecilia Rosacker, RGALT

I think that's an interesting point and I think **we do, in all of this discussion, need to think about the uplands and how the water moves across the uplands and how we can get better infiltration.** They're overgrazed. I can tell you, **this summer when we had all that rain in July, the issue was water quality for months.** The water coming out of the Puerco and the Salado rios and into our ditches was nasty. It smelled like sewage and **it clogged up our ditches, it killed crops.** The water quality killed crops. The trash that came in through our ditches, the sludgelike mud, sticks, even pinecones – it was unbelievable. And we had a screen filtering trash out of our irrigation turnout. I'd have to lay on my stomach in the middle of the night with my arm in our irrigation pipe valve to dig out three feet of mud and sticks in order to keep the water flowing. Addressing upland restoration in all of this is essential, for better infiltration and improving water quality.

Connie Maxwell, NM WRRI

We definitely have that problem Southern New Mexico in much the same way.

Steve Glass, CSWCD

I was actually going to share the similar approach as Cecilia just alluded to and, **the compact delivery issue with retaining and infiltrating stormwater doesn't actually apply to residential areas according to the State Engineer.** And so we actually had piloted a project - what **we're trying to do is grow a constellation of stormwater infiltration basins throughout the upland urban area in Albuquerque.**

And to me, that is at least in an urban area, and maybe even in semi-urban areas, if we can **educate the public about stormwater being a resource that can be infiltrated on their land to irrigate or support their plants rather than using groundwater to do that**,

MRG FG#1 Visions for the Future

it would be probably a small contribution, but it would be a beginning.

To begin that capturing rainwater rather than letting it run to the river and evaporate there. And so that was an idea that we here at Ciudad Soil and Water came up with and obviously, like all programs it's had some limited success, but we do have a model that seemed to gain some ground. So I'll just offer that up as **a different way to look at infiltration of rainwater is more of a distributed system of small infiltration basins.** Rather than trying to capture it after it's left the concrete channel because that's next to impossible, as we know.

Connie Maxwell, NM WRRI

In the work that I've been doing, we have been trying to tie watershed restoration to the overall water balance of a region. We have found in Southern New Mexico Elephant Butte Irrigation District is actually the biggest supporter of watershed restoration in the uplands, in the rangelands themselves. So we're combining that with the green infrastructure type of programs that you're talking about, Steve, and it's funny because a lot of times you'll get people in the same room and they don't realize they're talking about the same thing. Green infrastructure and putting one rock dams in uplands are the same sort of principle. The climate change effect on the uplands, as far as we can predict is projected to just get worse. Less soil moisture in the uplands, less vegetation, less infiltration, more intense storms. And that picture Cecilia that you painted of what happened this last July - that dynamic - seems to be set to just get worse. And the one slide I skipped over in the presentation was California actually instituted a law saying that watersheds are critical part of our infrastructure and therefore infrastructure funds can be applicable to upland water restoration. And fortunately, in this infrastructure bill that passed, $8 billion is set for Western water and Reclamation is in charge of that, and they do have some funds that are going straight to upland watershed restoration, recognizing that exact factor.

We can continue to discuss any issues and strategies as they come up, but let's turn now to this idea of visions for the future. There's one particular way that I'm thinking about this and that is that water model that I presented to you guys. What we do is we model these individual strategies. They are tools in our tool box that we can employ. But at the end of the day, what we're really trying to do is model these scenarios for the future. We take what we value about the region, and project goals - let's say, short term goal being by 2030, a midterm goal by 2050, obviously long-term goal for future generations by the end of the century. If you guys can put into words your visions for the future, that can really guide, what we test and what we measure, and we can see, we can then take those charts, those graphs and say what's it going to take to get to that vision? How many of these strategies that we just described are we going to have to employ to get there?

So vision for the future, if you can think of it, you don't have to confine yourself to short, mid or long, whatever occurs to you. When you think about the future, if you can just give it a little bit of quantification - one vision for the future can be as an example to turn around our diminishing groundwater levels.

MRG FG#1 Visions for the Future, cont.

Steve Glass, CSWCD

I'll key off of a Paul's comment regarding the rules and regulations around reservoir use, and **I would like to see in the future that there's a lot more collaboration between agencies and more authorization to store what little water we do receive higher in the mountains, in those smaller reservoirs where the evaporation rate is so much less than at Elephant Butte.** And so to me, that would be a fantastic goal.

That, and maybe as you pointed out, **simulating some of the original hydrology of our waterways to encourage more infiltration.** We've straightened so many rivers and dammed them, and just eliminated the original meanders that allowed infiltration to occur.

To me in the future, that would be a way that we could definitely manage what water resources we would be seeing in a much more rational way.

Paul Tashjian, Audubon SW

I always talk about the "Rito Grande." Rito - being a little river - Grande, **this idea of a scaled-down great river. The Rio Grande still has some of the functions of the historic Rio Grande, but is working within a much more limited water budget.** The Rio in many places is naturally adjusting to less water while retaining some key ecologic functions. If we have more intention into managing with these changes, we could actually **keep this river alive through climate change by understanding the key parts of the hydrology and by mimicking historic processes.**

Connie Maxwell, NM WRRI

And let's just list them off quickly, just so we get them from your experience: infiltration, soil moisture retention, recharge, support groundwater levels that support riparian areas, what other functions?

Paul Tashjian, Audubon SW

The other thing I would say is that **there are ways we can work with all the engineered infrastructure towards the advantage of the river ecology**. Almost, I dare say, embracing that engineered infrastructure. This is what we're doing in the Middle Rio Grande–**we're using the ditches and the return flows and taking advantage of that to efficiently keep the river alive**. Another part of this idea is using the reservoirs to our advantage. Reservoir management can help use limited water more effectively for environmental flow needs.

Steve Glass, CSWCD

I'll throw another one out there. **I would like to see a lot more implementation of the aquifer storage and recovery methods** that the Water Utility, and I guess Rio Rancho, are pursuing on relatively limited scales. I think there's a lot more that could be done there **so that we capture water when the usage rates are down and we can even out the curve**. I'd like to see that expanded myself.

Diane Agnew, ABCWUA

Me too. I feel like it's an under-utilized option for New Mexico. And I was trying to figure out how to succinctly answer what my vision is for the future, but I really feel like this gets to it - like a diversity in how we're approaching water management. **We can use aquifer**

MRG FG#1 Visions for the Future, cont.

storage and recovery statewide, there are plenty of interested agencies who want to do it, we just need that path to completing it to be easier. Right now it's really resource-intensive, time and money. And Water Authority and Rio Rancho, we're really the only utility who have been able to do it because we have the staff and money. So **can we make that path straighter and easier.** And even thinking with agriculture, there's some really neat **models out in California on how to work with farms on managed aquifer recharge.**

My vision for the future is a more diverse approach across the state on how to work with what we have. I think that's an important point that Paul just made is that **rather than fighting the engineered systems we have, how can we work with them?** And then I don't know, **I'd love to see us willing to try things and do things.** I feel like there's this struggle of really being afraid to do the wrong thing. And really what we need to do is just try to do some things that we know work, and not wait until everything's lined up to do the really big thing that's going to be perfect, but be prepared to do the little things we know will work, infrastructure, infiltration of stormwater, ASR. There's a lot of things we know work. And so how can we start putting all of those pieces together and **recognize that we have to do a bunch of a little pieces to make it work. We can't just do one thing. There's not going to be this one solution that is going to make it all better.**

Paul Tashjian, Audubon SW

The idea of trains bringing in water from out of state came up in some of those meetings, and I had to cringe. This was a solution that was entertained for 10 minutes plus.

What we are talking about when we talk about these recharge problems is also the importance of our winter wetlands. I worked a lot with the federal wildlife refuges, such as Bosque del Apache. **What could be really cool, not just in the uplands, is main stem wetlands. These main stem wetlands are in deficit and are needed for winter wetlands for migratory birds.** There's that picture you have Connie from California, I think it might be from Sacramento or something like that.

Connie Maxwell, NM WRRI

I'll just flash it on for a second because I think it really does tell the story of what agriculture is. And so this is Kern county and it is part of a water bank. And it is doing managed aquifer recharge and reuse, and look all that aquifer recharge there. Yeah I agree. I think it's an extremely important tool in our toolbox. And then, as Cecilia was talking about with the uplands, imagine a big upland elevation here, it's those green rivers going up into the watersheds as well. And every place that water flows, having it be a seasonal wetland, so to speak. So combining those strategies to start to work together, because then those seasonal wetlands will protect these actual wetlands down below, because as Cecilia described so well, if you get a whole bunch of sediment and trash coming down, you get *E. coli* from animal feces and all sorts of things coming into this system, as well as just the flood energy, you definitely damage those systems as well.

I feel like we've captured a lot, but any other visions for the future? Any way that we might want to quantify it. You could apply an arbitrary year, for example, if one modeled different strategies with reservoirs and tried to estimate when

MRG FG#1 Visions for the Future, cont.

would you start having a bigger effect for the state, say by 2030, by 2050. So maybe years don't really matter, but any other any other quantification? So let's say, obviously the goal with storing more water upstream in higher elevations is to decrease evaporation. I understand, however, that there can be issues with storing more water, for example, for Cochiti, effects on their farmland below, does anyone know of any further development on this strategy in recent years?

Paul Tashjian, Audubon SW

The other big elephant in the room is the compact, which we keep on talking about. It's going to be essential that we don't dip into compact deficit over 200,000 acre feet to Texas. **I don't know if is there any opportunity ever for reopening the compacts**, and looking at some of these things, I think we have to take in account to change some other places for storage. This is a delicate, delicate issue, and a critical issue.

Connie Maxwell, NM WRRI

One of the things that has always struck me is that for maintaining water quantity for compact deliveries, a lot of the strategies that would in fact increase water over time, the tools that we use, the hydrologic tools that we use, for example the water modeling tools, would initially not show what we know to be true. That if we're increasing infiltration, we're increasing groundwater we're then supporting surface water. If we're decreasing surface water infiltration into a groundwater source underneath a river, the further down the groundwater level, the more we will loose of the surface water. Why is it that our tools are not supporting these solutions more. That wasn't very well said. I think you all probably know somewhat what I'm talking about. For example, I've had the conversation with folks at Reclamation, we need to slow water down, infiltrate it in the uplands, that story it's we can't do that because then we're diminishing our surface water. Over time, we'd actually be supporting more surface water in the future. That's probably more of a reflection and a life goal. It's certainly been one of my life goals is to have these tools start to show that these solutions won't impact our compact. And in fact, we'll protect, it will protect our surface water deliveries.

Steve Glass, CSWCD

Are you saying that the water balance models need to be upgraded to take a longer view? If the models don't support the proposals then either the proposals are not really valid or the models are flawed, All models are flawed I know but. So is that what you're saying is that, that we need to need better alignment between obvious solutions and the output of the models.

Connie Maxwell, NM WRRI

That's my opinion, but it's a question. What do you guys think? Solutions that you all have known for years would in fact protect water quantity, would protect water quality. Somehow in the world of policy, they're not taken up and we're always told we can't do that because of the compact, because it'll affect surface water. So my opinion is that the models aren't taking into account these effects enough. And I can see that in some of the models, but the other point that you're making Steve is that often models don't

MRG FG#1 Visions for the Future, cont.

look far enough ahead as well. It's both a time issue as well as the tools themselves are two coarse.

Paul Tashjian, Audubon SW

So this is really interesting, but a lot of my career, I worked with these sort of assumptions and **I find that often they're not even policy per se, they're more like management assumptions**. The assumptions are often very much rigged against the environment and very much for the sort of idea of concrete, efficient movement of water. Concrete as in concrete channels. I don't want to overstate it, because there are efficiency trade-offs, but I've found that **it's really important to look at these assumptions that become embedded in our policy. They become embedded in our water management, and our models. It's important to understand the true costs of environmental water needs. Often such needs could be satisfied through moving water through the system differently, and may have minimal water costs.**

Connie Maxwell, NM WRRI

And some of them are wrong over time because it's true immediately that with a concrete channel, you're going to eliminate those infiltration losses. But then when it gets the river, you've got a groundwater system that has dropped.

Diane Agnew, ABCWUA

Yeah, there's definitely a short term perspective, you're exactly right Connie, where it's just looking at the year at hand and making decisions without accounting for the longer term, more holistic. I think that's an incredibly important point. And I know I personally, in my career it just seemed like there are the models and the assumptions that exist at a bigger regional scale. And then there are the individual models that are looking at these options for recharge and infiltration that say something completely different. And they just co-exist. It's like this **tension between connecting management decisions based off of the high level model and what the other, the more project-based models are saying.** That division seems like it's going to become more and more critical in water planning. I feel there's a lot of things in water management where there's some tolerance in the system to let it fly, but **we're getting to that point in water resource management, where that tolerance for uncertainty and error is diminishing rapidly. And so shortening that gap and bringing those things closer together and having a longer look in the planning is going to be pretty critical.**

Connie Maxwell, NM WRRI

Fantastic, thanks for particularly for putting up with my somewhat abstract thought - it's been something that I have noticed over the long term. So I think we're getting to a good point, but some final thoughts, some last minute thoughts, last minute visions.

Cecilia Rosacker, RGALT

I just wanted to throw out one more thing that is the conversation happening in the valley – the impacts of water due to the cannabis growing industry. This is something missing and that needs to be considered in water planning, it is another water transfer/user/developer. **The legalization of marijuana and moving water rights to areas where they normally would not be applying**

MRG FG#1 Visions for the Future, cont.

water and how those transfers are going to impact water applications in the valley.

And also the impact on our rural communities and our culture. I know the Acequias have a strong opinion on that and the impacts that's going to have on our communities and the future of agriculture. I don't know what's happening in Colorado with all that, I know the NM State Engineer's office is flooded with people declaring their water rights and **some of these big growers are approaching some of my conservation easement farmers wanting to lease their water** or see what kind of water rights they have. It's here, it's coming. And I think it's going to change things.

I know the Acequias have a strong opinion on that and the impacts that's going to have on our communities and the future of agriculture. I don't know what's happening in Colorado with all that, I know the State Engineer's office is flooded with people declaring their water rights and **some of these big growers are approaching some of my conservation easement farmers wanting to lease their water** or see what kind of water rights they have. It's here, it's coming. And I think it's going to change things.

MRG FG#2 Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Adam Ringia, Pueblo of Laguna

My name is Adam Ringia. I am the Water Rights Office Manager for the Pueblo of Laguna. I was the Environmental and Natural Resources Director for about 10 years out here. So I have a fairly broad scope. I was thinking that this was actually part of the Tribal Water Working Group for the 50 Year Plan, because I had that on my calendar, but I didn't have any links.

So Greg asked me if I was going to be involved, and I said, sure, I'll be involved. Hopefully Greg and I will be a little bit redundant, but I think that he might be able to fill in some other areas more than I can. Obviously, from Laguna's perspective, it is the Homeland. So obviously **water is a critical piece to keeping Laguna and Laguna's practices going**.

They've been in the area since time immemorial. It's important that water keeps flowing down the Rio San Jose and the Rio Puerco, and is available for crops, but also for Homeland purposes for domestic, commercial, industrial, all of the normal aspects of culture.

One of the biggest issues, and we have brought this up with the Tribal Working Group and the 50 Year Water Plan that affects our particular region, is that **we're still in the process of having our water rights adjudicated. That's a huge barrier statewide to water resilience and having an understanding of how much water is available, because the tribes don't have numbers for how much water that they have to deal with**. Being where we are, similarly to other tribes, there were **developments developed upstream of us, and that has decreased the water availability** to flow down the Rio San Jose.

Having that issue addressed, and the state is, of course, very involved in the process as is part of the "Feds," as are the acequias in our region. I saw your map earlier that suggested the acequia region was up north. There's more acequias up there, but we have some over here, too. We worked with seven or eight different ones in our adjudication as well. They're all part of the community.

The biggest strategy to address that of course, is to finish the settlement, and we are pushing so hard right now to do that. I can't really talk much about it, obviously, but the concept, at least we're working hard to get it done, and get peace in the valley. To get everybody accounted for and settled, and bring federal money to the region to help with those sorts of infrastructure projects that may get water back flowing.

Now, if I go entirely aside from that and talk to my own vision as a former Environmental and Natural Resources Director, and now as a water guy, **I really see reuse recycling of water, of wastewater, water efficiency as being the winning strategy**. If we can turn all of that wastewater that goes into, in many areas, evaporation ponds, into clean water that gets re-injected into an aquifer somewhere. Because that helps people deal with the "ick" factor of drinking recycled water.

I think that's a big win, and the less you have to pump, because you have that resource available, you're going to decrease the drawdown on those mined aquifers. Understanding, of course, that a lot of the shallower aquifers are recharged by precipitation, and precipitation is going down or it's becoming more pulse-like.

So **we're getting the high intensity storms**

MRG FG#2 Values, cont.

that immediately run off and run past us. That's not useful. We need the slow, I've heard them called the "female rains", that are gentle and nourishing, that will seep into the aquifers.

If we help with that, if we make those re-injection basins, or follow the strategies that gets water back into the ground, flowing down the rivers the way it's meant to and getting efficient use of water for crops; I think there's a lot of opportunity for it all to work together.

But reusing the water, recycling the water as much as possible, and then letting some of the natural water flow are my visions for the future. That was probably too long. But I was a director for a while, so I can talk forever.

Connie Maxwell, NM WRRI

No, and you guys do have something else to go to as well. So I actually appreciate you trying to be succinct. And in that regard, my participant list is working for that, Greg, you're next, please introduce yourself and give us what is valued about the region from your perspective?

Greg Jojola, Pueblo of Laguna

Just a little introduction. So my name is Greg Jojola. I'm from the Pueblos of Isleta and Laguna, my mother is from the Pueblo and my father is from Isleta. I was raised mainly in Laguna, so I really consider Laguna my home. I grew up there, and now I'm back after getting my degree and now part of the dominant society, the whole big world out there. And I'm glad to be back.

It's something that I knew I wanted to do: get experience, come back to the Pueblo and try to give something back to where I'm from and to my people. I'm trying to get a whole grasp at it, to assist the tribal leadership and understanding what is going on.

It's really huge and it's always changing. It's always dynamic and it's a really tough thing to follow so, I'm back.

Actually, Adam was my boss when I first came back he was the director there. He taught me a lot there and he had a little hiatus, but now we're glad that he's back in another capacity. I'm actually acting ENRD director, right now.

My regular job is environmental program manager for the Pueblo. We're mainly funded by the EPA. We have General Assistance Program grants. We have a water, EPA water grants, 106 and 319. We periodically get multipurpose grants to assist us, and they come shovel-ready for projects.

We also have a superfund cooperative agreement. If you didn't know, we have the Jackpile Uranium Mine . It was once the largest open-pit uranium mine in the world in the late forties and fifties. So it's still a legacy mine that is still causing havoc for us and the people with long-lasting health effects and cultural effects. It's one of those things that is pretty high on our radar, and one of the programs that takes a lot of my time when we're not doing other things.

We also have a Department of Defense cooperative agreement, which assists us in cleaning up a former bombing range on our eastern reservation site. After World War II, probably towards the end of it too, they were doing training from Kirtland Air Force Base on our Eastern reservation and dropping a lot of ordinance out there, and we're still cleaning it up.

MRG FG#2
Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

So there's a lot going on in our programs, and Laguna is quite large as well. It's a challenge to keep on top of every issue that comes up and especially watering. **Water's at the center of everything, without water, we won't have anything.**

So, those are the things that are going on. Of course, Laguna has always tried to be front and center, especially with water. We went into litigation on the WOTUS changes to the new rules at the Army Corps and the new, the last administration and the U.S. Government tried to push through.

We were at the forefront of that. We did bring litigation in partnership with Jemez Pueblo. We just recently had a tribal consultation. We formerly asked for that, and that was just yesterday. **We wanted to be on top of that and show that we're not just sitting on the sidelines, we want to be on top of every water issue.** The tribal leadership sees this, and that's why they created a Water Rights Office, which Adam now currently leads. That shows their commitment to that because we can't migrate anymore. A couple people migrated with drought, with all these things from time immemorial, and now we can't. We're surrounded and there's nowhere to go.

What we have is what we have, and we have to protect it for future generations. That's going to be the challenge for generations not born yet. The ground has to be laid. Adam mentioned a little bit about the adjudication that is going on currently. We're trying to be proactive and we're on top of it.

Looking back at our vision, **our strategy of course, was adjudication. We're trying to fight for our rights that we have with water.** But for our future, we're just trying to protect what we have. Climate change is going to be a big factor in that. We heavily rely on runoff from Mount Taylor and rejuvenating our springs from there to support the wildlife or livestock. Even our drinking-water wells are heavily dependent on those upper level springs being recharged.

Climate change is going to bring big rain falls and the weather is just changing, it's not the same anymore. **When we do have those big rain falls, how do we hold it? How can we better hold it so it doesn't just wash away and continue to erode, take away sediment.**

We have to have good strategies on how to hold it, that way we can use it for livestock, for wildlife, maybe even for farming, because **our farmers are hurting for water.** Other things you talked about in your presentation about, water budgets and farming. The farming tradition is really fading away because the lack of water. **The farmers are frustrated because we're at the mercy of our upstream delivery,** which is depending on the Rio San Jose flowing, but also the Pueblo of Acoma sending down water that we need. There's a little tension there, and that's widely known. It's been going on for a hundred years on that.

Our farming and getting back to tradition is really being challenged along with all kinds of other things from the outside world, and now climate change.

MRG FG#2
Issues / Strategies, cont.

We're just trying to keep on top of all these things. It's a challenge, and we're not the only ones, too, you know? All pueblos and tribes across the U.S., the ones way to the north, the Alaskan natives, tribes on all the coasts, their salmon and all these things.

It's obvious that things are changing and we all have to be on top of it. In a nutshell, that's who Laguna is and what we're trying to do.

Connie Maxwell, NM WRRI

Fantastic, Greg. Thank you so much. Lynn, I think you're next on the list.

Lynn Montgomery, Coronado SWCD

Hello everyone. I'm Lynn Montgomery, and I'm chair of the Coronado Soil and Water Conservation District, which is ill named.

Anyway, our district goes from Cochiti Dam down through Sandoval County, along the river to Bernalillo county line, more or less, and contains five Rio Grande pueblos. That's pretty much the extent of the district. We have La Madera on the east side of the mountain and a couple sandwich communities like Pena Blanca, Algodones, Sile, and Bernalillo, too. Most of our farmers are actually Pueblo people and we don't really have direct relationships with individual farmers at this point. I don't know if that will ever happen, but there's lots of farmers outside of pueblos, too.

I think that all the farmers and some ranches here in this district are concerned about having a profitable farm, and that's their main concern. What we're doing is getting healthy soil grants from the Healthy Soil Act. It's pretty modest, but we're starting to work with farmers doing these projects, and we had a pretty successful one this year.

I think that what we really have to concentrate on in our district, and everywhere else is the uplands. We can get in the farmlands and regenerate them, and build carbon in the soil, and do all of that; but **our uplands are in sorry shape.**

Coronado brought the first European livestock, and the first place they grazed was in our district and growing up in Placitas. **We've been under what I wouldn't call a scourge, but I spent a real heavy weight on overgrazing for 400 years nearly.** That's just really hard to deal with.

Especially when people think that these horses that they let loose are wild, and **they do everything they can to keep us from removing them from the area that the horses have destroyed; our uplands, our former grasslands.** And we have to deal with that issue, too.

We also have three acequias in Placitas, and we get capital outlay to help with their infrastructure and everything else, and support them as much as we can. That's what I think. **We should get in these uplands and start trying to regenerate them.**

We've been talking a little bit with Tamaya and the resource people there. I'm trying to get together with them and maybe start restoring some areas, especially the wildlife corridors that they're really working hard on, and have been very successful up to this point. We want to get in on that and start restoring these lands so they have productivity. We should be using our lands and increasing productivity, which is true stewardship.

MRG FG#2
Issues / Strategies, cont.

Instead of just letting them sit there and look at them, and letting them rot, because when they drove all the natives and land grant people out, these places did not get managed. They just sat there and they deteriorated. Even our wildernesses need some hands-on management by people who know what they're doing.

We're promoting that, too, and trying to get away from the congressionally-imposed restrictions on managing our lands properly. That's another thing, but we want to get out there and start finding ways to restore the grasslands because that's where the water comes from.

Also, the water comes from healthy grasslands that are infiltrating water, keeping it from running off, keeping it upstream, and slowly releasing and restoring the aquifers. Right now, we're losing an incredible amount of sediment and soil from these places.

You just wouldn't believe it, **New Mexico has the highest rate of erosion, times three in the whole nation**. We need to work on that, and the only way to address that problem is to get out there and **regenerate the soil.** That means using animals and all of that stuff. The Healthy Soil Act spells it out.

But, I'll get off my soap box. With me here is my wife, Carolyn Kennedy, and she'll talk for herself.

Carolyn Kennedy,
Placitas MDWS

Hi, I'm Carolyn, as he said, and I've lived in the little community of Placitas since 1969. Right now, for the past several years, I have been a commissioner on the local acequia domestic water system, which is one of only one or two hybrid water systems in the state.

We have water rights to nine springs on the north side of the Sandias, and all of our water comes from those springs, which are totally dependent on snow pack on the north side of the Sandias. **So we have no snow pack, we have no water.** That's the huge concern here.

We're doing all we can. Actually, it's all the same water, like I said, that supplies the domestic and the acequia, and one of the springs mainly supplies the domestic water. We have five holding tanks there and they're all automated now, which was a recent infrastructure improvement. We can by phone, check the levels of the tanks and put one of the other springs online if necessary.

Before that in 2018, we had a pretty severe drought up here and we had to turn off domestic water 16 hours a day and there was very little irrigation water. This past summer, we didn't have to turn off the domestic water because of the automation and the infrastructure improvements, but we had very little water for irrigation.

The parciantes were able to irrigate about once every three weeks. Mostly, our crops up here are ancient orchards. There are some gardens and one or two small farms, and that's the extent of it. **But my concern is this is a wonderful place to live, and I'm wondering how it can be sustainable in the future with climate change if we have no snowpack.**

I would welcome any suggestions. I think like Lynn was saying, restoring the watershed would help on working on that. Our other big problem is that **this has become a population center, and there are way too**

MRG FG#2
Issues / Strategies, cont.

many domestic wells which affect the springs. I don't know what to do about that, except go through the bureaucratic process of getting this declared a Critical Management Area- which we haven't done, yet.

I would welcome any suggestions on how we can be more sustainable. **We are getting infrastructure money to replace some of the old pipes, which are the domestic water pipes.** They started piping to people's houses in about 1943, I think, and some of the pipes are almost that old.

Some have been replaced and some go across private land, which need to be rerouted up the right-of-ways and things like that. Our system supplies about 180 households. Everybody here has septic tanks, there's no sewer system or anything like that.

That's what I wanted to bring to everybody's attention. **What do we do about small communities like this that are dependent on spring flow?**

That's what I have to say right now, and maybe we can figure something out later.

Connie Maxwell, NM WRRI

Thank you, Carolyn. Yeah, I agree. Obviously at the Acequia Association Congreso, a lot of discussion of diminishing snowpack over time, is certainly a huge issue for the west. Clearly, as many of you have said, we'll need to figure out how to manage the precipitation that's coming at different times of the year, and coming all at once in intense systems. I personally have spent a lot of time looking at how upper watershed restoration can start helping to do that.

I've discovered that it does take a hybrid system. It takes some upper waters, it takes everything. We're basically going to have to do everything right in all locations. All of our quick fixes of the future have run their course.

We're going to have to do upper watershed restoration. We're also going to have to employ a little engineering. In between, we need to basically be dryland beavers- slow the water down, infiltrate it into the pond, create seasonal wetlands where we can, wetlands where we have flow all year-round, or we have springs, those sorts of things.

Okay. Let's finish this one section with Matt Mader. Please introduce yourself and talk a bit about from your professional perspective, what people value about the area. People also talked about issues and so forth, but go ahead, Matt.

Matt Schmader, AOSP (former)

Thanks, Connie, and good afternoon, everyone.

I worked for the City of Albuquerque for 25 years managing their open space program. A lot of it had to do with natural land management and restoration. But a lot of what I have to say is based more on being a resident of Albuquerque for over 40 years.

From my background are anthropologists and archeologists, **so what I feel like we value the most-- or should, is culture and environment. Those two things combined are very much what makes New Mexico.** If we didn't have the wonderful multicultural variety that we have, we might as well be somewhere else. And, of course, **water is inseparable from culture and environment.** It's like a three legged stool and you can't knock aside anything.

MRG FG#2 Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

I have a couple of observations. I've watched a lot of water conservation efforts in the city of Albuquerque go on for a very long time. The daily average use of water per household has continued to go down. **But what I saw was, we probably save water on an individual level or household level pretty well. But I think that all the savings end up going back into providing water for new development.** I'm not entirely sure, for example, if the Albuquerque/Bernalillo **County Water Authority has ever denied a development request due to lack of available water.** If we keep saying yes, then we're pretty much driving blindly off the cliff. So there has to be at a policy level, at least some rational thinking about what in the world to do as far as sustainability.

The Montgomery's are talking about what happens with the small communities and it's a terrible conundrum trying to figure out where that water comes from. **We are the biggest water-user city for hundreds of miles around. We save it penny wise and waste it pound-foolish by accepting every large-scale development proposal that comes down the pike.** To me that has to stop.

We can do a lot of small things, but if we're doing a lot of small things and it gets wasted on the other end, we're spinning our wheels. I was interested in what you had to say about that New York program about paying farmers. It seems to me that there are other ways to use that same kind of money.

I've seen it happen here with local farmers. A good investment is laser leveling. I've seen farms once the leveling got done correctly; they could water an acre an hour, which was four times faster than what they used to be able to do. But again, along the lines of what we save and what we waste, I'm not being totally naive at my young age.

I'm not entirely convinced that the choices of crops. So we try and save water and then we spend it on extremely high-consumptive crops that are probably sent out of state. I'm not sure if all the alfalfa that's grown in New Mexico gets used in New Mexico. I'm wondering if it doesn't all get shipped off to somewhere else.

I see huge trucks up in Colorado, they load up huge trucks and they send it to New Mexico. Then in New Mexico they grow huge amounts of alfalfa hay, and then they load it up on trucks and send it to Texas. So all this has to do with middlemen making money off of having their hands in the pie.

Again, my focus, today is how much effort are we bending over backwards to save? And how are we unwisely spending out what we've ended up saving?

Connie Maxwell, NM WRRI

Thank you, Matt. And one thing, from your previous perspective working for the City of Albuquerque in terms of open space program, I know you and I talked a lot quite a few years ago about the health of the Bosque and the natural functions of how the water system in this region should be working in terms of flood pulses and so forth.

Obviously when we don't have groundwater that's touching the bottom of the channel,

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we're diminished, our groundwater is down. We have effects on that riparian vegetation and so forth. And if you could just speak a little bit about how you think the overall system health supports the riparian area.

Greg Jojola, Pueblo of Laguna

I'm sorry to interrupt but we have to sign off to get prepared for our next meeting.

Connie Maxwell, NM WRRI

Yes. Thank you so much. Do you have just one minute, can I ask you one question before you sign off? One of the things that is really important as a vision for the future, like: we want to turn around groundwater levels to not be diminishing. Do you have just a couple minutes to give your vision for the future?

And then Matt, we can come back to that question.

Greg Jojola, Pueblo of Laguna

Sure. I think we touched on it a little bit about our location. We're in the high desert where Laguna Pueblo is located. We're right on the start of the Colorado plateau. We're heavily dependent on our runoffs and spring rejuvenations and the alluvial.

We have to protect that alluvial because it's paramount. We're trapped, really. We're downstream from a lot of, the the Grants uranium belt is just unfortunately upstream of us, and **all the contamination that has taken place up there.**

Those really deep aquifers could be in danger. It might not be 10 years or 20 years for it to reach us. Where the site is, it's possible. We have to continuously be aware, protect what we have, and we have to pass it on to the next generation, too. We're not going to be in this position forever.

It has to be well known with the leadership and it's continual education. Sometimes we get lost with other issues: economic, social, all these things we're bombarded. So another issue is that we have to keep on the forefront, and **teaching the young and the next generation about using the water wisely.** Those types of things.

Adam, if you want to finish that up with your thoughts.

Adam Ringia, Pueblo of Laguna

Sorry. The tribal secretary was calling and updating me on Friday's meeting. But it sounded like you were covering some good stuff- and certainly the Grants mineral belt.

What was that? Oh yeah. We're about to start our next meeting. So I'll keep this one pretty short. But as Greg mentioned, it is pretty critical for us to keep an eye on the water coming from upstream along the Rio San Jose. Right now we're watching the Horace Springs gauge, which is in Acoma, and watching the amount of water decrease on an annual basis from maybe seven CFS back 50 years ago, down to under two now.

We're expecting it to go to zero. And at that point, where does Laguna get its surface water for irrigation, for agriculture, and what have you, and is it going to be contaminated by upstream uranium issues?

With that said, I guess Greg and I have to jump off for the next call, but thanks for having us.

Greg Jojola, Pueblo of Laguna

Thanks for having us and consider us for the next discussion. We're always willing to

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share ideas and I appreciate all the other participants, thank you. I don't want to be rude or disrespectful, thank you for all the work that you do. Just the fact that you're on the call shows that you care. Thanks Connie for facilitating, we really appreciate it. It takes people like you and others, up and down the Rio Grande and all over the state and the world, to have these discussions and show that we care about the future.

Connie Maxwell, NM WRRI

Thank you both. We'll definitely be back in touch.

Adam Ringia, Pueblo of Laguna

Awesome. Thank you.

Greg Jojola, Pueblo of Laguna

Thank you.

Connie Maxwell, NM WRRI

All right. Thank you both.

Matt, I wanted to jump back. In terms of the values: you talked about culture and the environment, and I certainly recall that the bosque is one place that's at the heart of that. And I know that was your life for many years. I was wondering if you could speak a little bit about that.

Matt Schmader, AOSP (former)

Thanks again, Connie.

We had the chance here in Albuquerque to do a lot of terrestrial habitat management in the Albuquerque area bosque. It was about 2,700 acres or so, and really intensive removal of non-native species and a lot of partners; federal, state, local, the ISC is with habitat restoration with the middle Rio Grande and Endangered Species Program. So, in a sense, I feel like the local bosque is in pretty fair condition as far as the ecological state goes.

The problem with some restoration was that with the dropping water level, people would say without any overbank flooding, you can't do any habitat restoration. What I started advocating was if you can't bring the water up over the banks, then you have to lower the ground surface down to the water level, and start planting willow swales and things like that to get some diversity in the habitat.

I feel like for fire hazard and for overall habitat value, the Albuquerque area is not so bad, but the Rio Grande is. **You go outside the city limits, and areas of the bosque are completely choked out with saltcedar and things like that.** The use of the natural river groundwater is still being sucked up quite extensively by non-natives. It's not terribly expensive to do. I **think you probably get as much return on effort by continuing the removal of the non-natives, the water sucking phreatophytes up and down the Rio Grande. I think you'd get a lot of water return for the investment to continue that program** on.

In the open space program, luckily we were able to preserve a lot of upland grasslands and upper parts of the watershed, too, which has to be done in the urban areas. Just like Lynn was talking about, that protection preservation restoration has to go from the top, down. And I was used to the bottom end.

But I think a lot of return could be gained from investing in removal of the non-natives out of the other areas of the bosque up and down the river.

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Connie Maxwell, NM WRRI

Thank you, Matt. I appreciate that. You guys did a really nice job of covering your issues and challenges, and some of the strategies that you think should be pursued or should be investigated, should be looked at.

Certainly I know a lot of people, both in this focus group and another focus groups have said, we need to be studying these strategies, getting out the best science and figuring out what the best way to go forward is on a lot of these issues. Any other issues and challenges or strategies that we want to investigate, pursue, worth trying?

Things that people want to do that need some support: financial or technical to execute?

Lynn and Carolyn any other thoughts? Otherwise we can turn to visions for the future. But before we leave issues and challenges and strategies to address them, I just want to make sure we've captured them all.

Matt Schmader, AOSP (former)

Connie. I'll just chime in with a couple things really quickly. There's still a lot of other policy issues that probably ought to be looked at with stormwater runoff, because there is still a tendency, even though there's more enlightenment; but a **tendency to believe that storm water has to be shot down a concrete shoot straight into the river, without attenuating along the way.**

That's a policy decision, and I think that's a really important thing to be doing. The other thing is, I think **there needs to be better geologic mapping on these recharge areas.** I know there is one in Bear Canyon. There's also one on the west side near the Albuquerque San Antonio Oxbow. But, I don't know how extensive the structural geology mapping is up and down the Rio Grande to identify these recharge areas.

But, the better we identify them and the better we direct the runoff into those recharge areas, I think there's a lot of return in those spots.

Connie Maxwell, NM WRRI

Thank you, Matt. I agree. That certainly has been a lot of the focus we have in Southern New Mexico, where we are trying to do just that; identify those recharge areas.

Lynn and Carolyn, any other issues, challenges, strategies?

Lynn Montgomery, Coronado SWCD

Yeah. Following that, I think a lot of those recharge areas are going to occur from small tributaries. We have Jemez Creek, and they're doing some things up in Jemez Creek to try to make the river flow better by pumping groundwater.

I don't know if that's going to work, but Jemez Pueblo and the locals have always shown us how to get along and find solutions. I think we should pay attention to that. Plus, there's Las Huertas and even Galisteo, in all these places there is some restoration going on in some of them. We have to concentrate more because these are obviously recharge windows. We know Las Huertas is. All the water from the north Sandia Mountain goes down Las Huertas, and it eventually supplies the river.

We also need to know more about the hydrology of all of these things. We know Las Huertas is very complex. Even down

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Issues / Strategies, cont.

where it comes close to the river, it's pretty crazy.

We need more data and we're going to have to depend on the data. **Even if we love all the spiritual and cultural stuff, data is essential for all of us to be able to do anything.** So that's just a couple of remarks.

Connie Maxwell, NM WRRI

Absolutely. I think one of the things that you pointed at, Lynn, is critical. I'm curious to see how this will play out. Obviously some areas recharge into aquifers better than others, but we know that our riparian areas, our river systems, our flow systems, are the primary recharge areas.

I think talking about those small tributaries is exactly right. I take that same approach when you go into the uplands. So you take from the small tributaries and you go up the arroyos, and it's the green corridors of our dry lands that are such critical areas. They are the wildlife corridors. They are the quarters of life in our dry lands.

Carolyn, any other issues, strategies, before we move on to visions for the future?

Carolyn Kennedy, Placitas MDWS

I can't really think of any, but Matt touched on how people are conserving water and then they're using the water for more development. **Up here, it's just more and more domestic wells. The state engineer has told us that if anybody has a piece of property, they have a perfect right to drill a well.**

In our system right now, we had a test that was put in by the BOR in the late nineties, but it's never been used because it's in the same aquifer that our springs are. **If we pump the well, that affects the springs, but the well is deeper than the springs. So if the water runs out in the springs, if that's a possibility, but at the same time, with no snow pack a lot of the wells up here are going dry, too**. So I'm not sure what to do.

Back in the turn of the 19th century, there was a forest fire up here that destroyed the springs and everybody had to move. They moved down in Algodones and to the pueblos, and came back when the springs came back. What's a solution?

Connie Maxwell, NM WRRI

Yeah. It's a good question because a lot of times when we talk about recharging aquifers, people are really focused on the big rivers.

Carolyn Kennedy, Placitas MDWS

I wanted to bring this up because we're in a unique situation up here.

Connie Maxwell, NM WRRI

Right. In fact, when you look at a whole watershed, the whole flow system is important. The big river is at the outlet, really. I think it may or may not solve the problem, because the more you suck out of the ground, the more that you have to actually infiltrate in. But clearly, a watershed scale recharge focus I think is really important.

On the bigger systems, as much as people can do upstream, that's going to contribute as well, because that'll mean that groundwater will be more full. There will be less sucked from the ground. The more

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your groundwater drops below the channel surface, the more water sucks down into it. So, more surface water is affected.

If all of our groundwater is full, then that certainly helps as well.

Lynn Montgomery, Coronado SWCD

I'd also like to add that we have to better develop the concept of sharing. All this Albuquerque pumping, all the shell games up in Santa Fe over the water, all that stuff going on, the adjudications that are totally war, are really unfair to a lot of people.

When we pump all this groundwater, it prevents water going down the river to people down below who deserve that water. They have a club called the US Supreme Court; if they can hit us over the head constantly, they can come up here and say, okay, Albuquerque, you cut down your pump into a whole lot less. And you do this, you do that.

We're probably going to have to obey all of that if we want to share the water like we should. **We have to start being more considerate of each other, and stop trying to make a whole bunch of money out of the water all the time. That's not what it's for.**

Connie Maxwell, NM WRRI

I think that's one of the reasons, because the acequias are based on sharing agreements, as opposed to seniority rates; they have a lot to teach us.

Carolyn Kennedy, Placitas MDWS

And that's what we do up here. We share what water there is.

Connie Maxwell, NM WRRI

Let's turn to visions for the future. One of the ways to think about this is a very practical way. So you saw, very simply, very conceptually, how we model. Well, what's important to us is that we model strategies that you guys are interested in.

The goal, at the end of the day is the most important, and that's what I mean by vision for the future. If I had to summarize what Greg and Adam were saying, their vision for the future is something like being able to maintain some surface water flow that's not contaminated from their uplands.

Another way to think about visions for the future is, by 2030 I'd like to see X, or by 2050 I'd like to see X. That's one way to think about a vision for the future. It summarizes some things, but a lot of times it takes a lot of different strategies to achieve that vision.

So the vision is really the goal of where we're going. It helps if it's measurable, there's always ways to make it measurable. So that's not something you have to worry too much about. But what would you say your vision for the future is?

It could be a short-term vision, 10 years. It could be medium term 20-50, it could be extremely long-term for future generations, end of the century. Whatever you think captures most what you think your vision for the future is.

I know it's not an easy question.

MRG FG#2 Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Carolyn Kennedy, Placitas MDWS

Just to be able to continue to live here in this community. One thing we have done, and this has been in effect for some years now, we have a moratorium on new hookups. Because the way it is now, we barely have enough water for everybody. There's always friction about that, because if people have a little piece of land within the declaration they want to hook up.

So we've had to be very strong about that. They're always trying, though.

Connie Maxwell, NM WRRI

Yeah, that's a great vision. Continue to live here in this community. That is not an uncommon one. I live in a very small community, Monticello, west of Truth or Consequences, and I hear that here, too.

Lynn, vision for the future?

Lynn Montgomery, Coronado SWCD

That we really tamp down our lifestyles to comport with the problems that we have, and encourage the rest of the world to do that. New Mexico has a great opportunity to become a shining example for the rest of the world, with all our cultures and everything. We have all the resources we need, including not a lot of water as a resource. I think we need to realize that, and that's the one thing we should strive for.

And it would really help our economy, too. All the universities would immensely benefit from it.

Connie Maxwell, NM WRRI

Absolutely. Matt?

Carolyn Kennedy, Placitas MDWS

I agree with that also.

Matt Schmader, AOSP (former)

They've already said it all. No, it's along the same lines.

I think **we really have to be rational about evaluating the capacity. It's like a carrying capacity analysis,** and I don't think there's the capacity to sustain the level of growth. The biggest growth happened during some of the wettest years, in the eighties and nineties.

We seem to continue to churn out our growth pattern as if we're still living in the eighties and nineties. So, this is policymaker stuff. If you follow the money, and the elected officials get their contributions from the development community, and the development community thinks that rooftops are a beautiful thing, then rooftops are going to be sucking down the water. So it's this kind of self-generating monster.

There's going to have to be a break in there somewhere, and it's going to have to deal with the actual capacity of the supply.

MRG FG#2 Visions for the Future, cont.

Because the demand is continuing to outstrip the supply, as they've already said.

I think, **there has to be rational statewide analysis of the crop production, because I still have this nagging feeling (without knowing a damn thing about it), that more crops are grown that are more water-consumptive than is needed for economics**. Again, I don't know where all the alfalfa goes, but I'm sure that it's being shipped around.

All the water that we can get for chile, all the water we can get for small communities, all the water we can get for indigenous communities and traditional communities, I think that's all great. But if we're blowing it in a water budget--a true water budget, on water-consumptive crops and bad practices, then we don't have enough to sustain those other small communities.

I think there has to be a really hard-nosed analysis of the statewide agricultural crop production and practices. The Conservancy District is a really big player in all of this. I don't know if they're participating in particular, in your discussion, but they're more concerned about delivering water than getting involved in efficiency. They started to look at efficiency, but like I said, just even laser-leveling can stop wasting water.

So **I envision us being a more rational, kind, and loving community of people.**

Carolyn Kennedy, Placitas MDWS

I totally agree with that.

Matt Schmader, AOSP (former)

That came out of 2020.

Lynn Montgomery, Coronado SWCD

I'd like to say something about the Conservancy District.

They've just taken on Gabby Coughlin, who's a soil scientist and she's a very dominant person. They're going out and they take a type of crop, when they're doing this different, you want the water to run faster over your field in certain instances than in others. So, they engineer an incline when they level a field; it's not really level.

They're starting to do sophisticated things. We're building a Healthy Soil Lab in the North Valley. We have a regenerative agriculture center that's starting up there, and it's a big deal. That's there to support small farmers and even backyard gardeners.

They have a community guy, they have all kinds of things there. There's the hops, and NMSU is involved in this pretty deeply. They're doing hops, and there is hops being grown all up and down the Rio Grande now. Our brewers have something really good and et cetera, plus there's a, what is it? The Seed Alliance?

Carolyn Kennedy, Placitas MDWS

The New Mexico Seed Alliance.

MRG FG#2 Visions for the Future, cont.

Lynn Montgomery, Coronado SWCD

Yeah. And that's kind of out of NMSU, too. They have a Southern one and a Northern one, and we're going to be the fiscal agent of the Northern one. Extension is also super involved in this, and we're going to go out and collect all these native varieties of seed.

...proven ones and grow them, and make them available for everybody: backyard gardeners, farmers. We'll start to have our own crops that really are from here, and everybody can develop their own micro-strains to fit their own place very tightly. So that element is there, too.

Things are really building here and there through Gabby and the Conservancy District, with leaps and bounds moving forward. I have a lot of optimism that they're going to be a huge player. They sent their guy, Mike Hamman, to get the governor straightened out about some things.

Carolyn Kennedy, Placitas MDWS

Yeah. We have a very high opinion of Mike. I think everybody does.

Lynn Montgomery, Coronado SWCD

Plus we're involved in the basin study, and they're doing that with the BOR. So there's a lot going on there, too.

Connie Maxwell, NM WRRI

Casey Ish was going to join us yesterday, actually. His wife had her first child the day before, two weeks early. So it cut his activities short a couple of weeks early, but I'm going to catch up with them.

I'm really excited to hear about several of the things that you just talked about, the Regenerative Ag. Center, the Seed Alliance. The Seed Alliance, you're saying, is ramping up to be pretty active and growing out traditional crops with extension folks.

Carolyn Kennedy, Placitas MDWS

Yeah, they have some sites and when they get the funding, they're looking for grants now and Coronado via the fiscal agent, like Lynn said, but they're also going to build a website. It'll be an education hub for all of this, and where people can go for information.

Connie Maxwell, NM WRRI

Fantastic, that sounds terrific. Who's a good person to get in contact for that effort?

Carolyn Kennedy, Placitas MDWS

Her name is Sam Thompson. I can send you her email.

Connie Maxwell, NM WRRI

That'd be great. Yeah, that'd be great. That sounds like the sort of thing to partner with.

Carolyn Kennedy, Placitas MDWS

Linda Garvin is involved in it, too. She used to be the extension agent up here in Sandoval, and she still works, I think, with the extension service.

MRG FG#2 Visions for the Future, cont.

Connie Maxwell, NM WRRI
Gotcha. Any parting thoughts?

Carolyn Kennedy, Placitas MDWS
I think it's been a good discussion.

Connie Maxwell, NM WRRI
Thank you guys so much for your perspective, your time. We'll be back in touch when we start to put this together as a report to make sure we've captured things properly. We'll also be looking to do a workshop. I know we're going to be doing one with the Northern Acequia group later in February, mid to late February. Maybe we'll make that a bigger regional with you guys as well. We'll definitely be back in touch.

Carolyn Kennedy, Placitas MDWS
I was a delegate to the Congreso. Oh, great. Yeah. Matt, any parting thoughts?

Matt Schmader, AOSP (former)
No, it's just been really interesting, very stimulating, and I'm glad to have the kind of thoughtfulness and passion that even the small group has. I look forward to hearing more and great to see everybody, too. Good to see you guys.

Carolyn Kennedy, Placitas MDWS
Good to see you, we really appreciate your perspective.

Lynn Montgomery, Coronado SWCD
Yeah. So we're going to be starting up our project on the Placitas Open Space and putting our project together.

Matt Schmader, AOSP (former)
Fantastic. You guys have been great neighbors, partners and stewards up there. We have a shot, anyway, at keeping a little stamp of the land.

Carolyn Kennedy, Placitas MDWS
Yeah. Since you kept it all fenced.

Connie Maxwell, NM WRRI
Thank you everybody so much for your time, your ideas, and your perspective. We'll be back in touch.

Carolyn Kennedy, Placitas MDWS
All right, and I'll send you that email.

Connie Maxwell, NM WRRI
I appreciate it.

MRG Interview Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Casey Ish, MRGCD

The MRGCD certainly maintains a very traditional and holistic approach to flood irrigation here in the Middle Valley. We picked up the baton from a lot of individual acequias that were here, not only from when the Spaniards arrived, but well before that with pueblos actively using certain types of flood irrigation to grow crops along the riparian area.

There's a cultural significance to what we support. There's absolutely an ecosystem service in the way we manage our system, and the way we flood irrigate the valley. The Greenbelt is kind of an iconic place and an identification place for folks who live here. **Oftentimes identified as one of the favorite features of the middle Rio Grande Valley is the Bosque, and the access to green space**.

That's a really big part of it, but also the connectivity between urban and rural. **We have a lot of small communities that are starting to see more and more encroachment, more and more development around the edges.**

What the district values, is maintaining traditional flood irrigation that has all sorts of primary, secondary, and tertiary benefits to not only our constituents, but anyone who enjoys recreating in the outdoors.

There are impacts, obviously, that our infrastructure and our operations have on species in the middle valley, but there are also benefits that are found through our system as well.

That would be the value added bit of what I think the district brings to the area. **There's a lot of wildlife components that are more and more being represented and being understood as agriculture becomes more of a primary habitat for migratory and wintering waters.**

Our outfalls where we return water back to the river are becoming more important for endangered species like the Rio Grande silvery minnow. Those are all things that kind of function inside of our day to day operations that we are becoming more cognizant of, and that we are seeing as additional things that we need to manage for, while also sticking to our our primary obligations of flood management, agricultural delivery, drainage, and supporting all of that within the confines of the Rio Grande Compact and the Endangered Species Act.

Connie Maxwell, NM WRRI

Great. Thank you so much. Let's move to the second question. In terms of the issues that affect the region and strategies that you are employing to address those, or think that are worth trying experimenting on.

Casey Ish, MRGCD

Probably something that you already have on file from everyone else that you've talked to about this is; **One of the biggest issues we have in our region is going to be climate change and it's going to be creating a high variable hydrology for the area**, where precipitation that used to fall in the mountains as snow is more variable in its pack annually, and the location and timing of precipitation.

So all of those things are going to change the way we operate. We're used to cutting the top off of the typical spring when it comes down the river. There are models that project the changing and timing of that pulse coming down the river and also the

MRG Interview Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

severity of that pulse.

Changing our storage restrictions, becoming more flexible in how we can utilize the various dams and reservoirs upstream and downstream must best manage for whatever type of flow we've got coming down the river is going to play a really important role in maintaining what we do. But, also ensuring that all of the other important uses and features that comprised the middle Rio Grande Valley are able to sustain themselves as well.

Flexible storage, I would say is a top issue affecting the region. Lack of conjunctive groundwater and surface water management is probably another big issue that has been building on the back burner for a long time. I actually think, maybe in the last couple of years, it's started to see a little bit more of the spotlight as a serious issue. Where surface water rights that would typically be participating in shortage sharing because of the nature of it being a surface, are being put into wells. Those **wells are not being asked to shortage share like any of the surface water rights are.**

So, there's an imbalance in the checking and balancing of water resources as a conjunctive resource, which of course, it is. It's really legal framework that separates the two at this point. I think anybody who knows even a little bit about water here in the middle Rio Grande Valley would argue that it's a highly permeable area that sees impacts on the surface impact groundwater and vice versa. So, that's also probably one of the biggest issues that we face.

We have some pretty significant endangered species requirements here in the middle valley. As surface flows become more variable, the district's role and our obligations through the 2016 Biological Opinion are going to be tested for sure. So, how do we continue to support the minnow in a part of the river that has more and more straws, if you will, and less milkshake to supply, is another issue.

I would say development and urbanization is a really big piece of the puzzle for the MRGCD. Urbanization has a few different impacts, obviously. Municipal use on the aggregate is less than agricultural use through the course of time.

But what we're also seeing with that, and I think you alluded to, is a **reduction in shallow groundwater recharge**. **The agricultural communities that we supply play a really important role in maintaining those in- stream river flows, because whatever is in flow in the stream is either actively recharging groundwater, or is the result of groundwater that's returning back to the river.**

The agricultural piece of that is really important, and we are seeing substantial reductions in viable agricultural land, either because the water rights are being or that land is being developed. The water rights that remain are being bifurcated into smaller areas that have less of a recharge impact and more of a maintenance and landscaping use.

Let's see some of these strategies. If we go back to the flexibility of storage, some

MRG Interview Issues / Strategies, cont.

of the strategies that I think we should be looking at (and I think some of the folks up in Santa Fe--Mike Hamman probably has the point), is **ways to increase the operational flexibility of the various reservoirs along the main stem and along the Chama, to increase our ability to store different types of water at different locations in the basin.**

That's going to play a big role in us being able to capture and then adjust the hydrology to suit whatever type of year we're in, whether it be a really heavy rain or snow season, or an exceedingly dry year. Having that regional flexibility to move water into different facilities is something that I think is long overdue, and I think that's moving in the right direction.

Some of our ESA obligations, we're already addressing some of those through the use of our strategic outfalls and Environmental Water Leasing Program, where we are trying to match what we anticipate the need of those outfalls will be, based on river drying conditions and available snowpack.

So on an annual basis we basically raise or lower the enrollment cap on that program to try and match what we think those habitats will need on an annual basis. That's a strategy we've employed over the last two years in a really targeted fashion. Our outfalls have been returning since the district was created. So that's a strategy that maybe wasn't documented for a long time, but is certainly being documented now, and is showing promising results as a way to mitigate and manage for any habitat loss that results in the main channel during the peak irrigation season.

Conjunctive management is a really big strategy for the middle Rio Grande valley that I think needs to happen sooner rather than later. We have to get a handle on the pumping that's taking place, because the pumping is definitely outpacing the rate of recharge. Simply putting a surface right into a well and saying that you're reducing impacts to surface waters is not a realistic view of how hydrology operates here in the valley. So, that's something that needs to happen. I think there's going to be a lot of kicking and screaming on that one, but we've lost the luxury of kicking the can down the road. We've come to the cul-de-sac, so to speak.

Drivers and barriers, and **state policy is a big problem when it comes to that. Having the political will to do a lot of these big changes in how we manage water in the state; that's not an easy conversation.**

I think it's going to take a lot of patience and a lot of coordination with water managers, policy makers and constituents. Everybody needs to understand where we sit from a water supply perspective, and find that middle ground where everybody understands that this is the only way to move forward in a longterm fashion.

Funding. **Funding's a big barrier for a lot of the conservation projects and initiatives that the district has**. We've got a lot of plans for lining a lot of the major arteries of our facility to increase our delivery efficiency to those farms and fields that provide that really valuable recharge.

We understand that unlined channels do have an important recharge benefit in some parts of the district. But, I think we definitely feel there's more upside to having these main arteries lined, so we

MRG Interview Issues / Strategies, cont.

can get water where it needs to go quickly and efficiently, and allow that spreading on the agricultural land to serve as the place for recharge, rather than through our facility.

And constituent outreach and education on some of the constraints that the district has, whether it's under the Rio Grande Compact, or the Endangered Species Act in our 2016 Biological Opinion. There are substantial and important restrictions that we have right now on the compact that is limiting the district's ability to utilize some of our biggest tools that would include storage at our facility, a lot of which is currently under maintenance and repair.

It's timely that we're doing that while we are in articles outside of construction. **We would really like to regain the ability to store there. Because that's what allows us to maintain those late season deliveries, by capturing the peak of that annual spring runoff and saving that for later in the year.**

That's definitely a barrier, access to facilities based on compact restrictions. The need for us to manage our compact debt and manage our deliveries is really important. **One of the strategies we're using to address that this year, hopefully, if we can get some state funding, which I think we will, is an emergency fallowing program that will be paired with the environmental water leasing program.**

The idea being, we would ideally like to get about 10,000 acres fallowed for the year outside of any additional acreage that's enrolled in the leasing program. Probably about 14,000 acres total, would be our program cap for this year, with the idea that we can supply the outfalls with a small percentage of that.

We'd like to find a strategic time in the year, whether it's early in the spring or towards the end of the year, when ET drops to make those important compact deliveries to try and get down that a little bit, and get us closer to dropping out of Article 7 restrictions again. So that would be a big one for us.

Connie Maxwell, NM WRRI

Fantastic. One question I had in particular was you talked about state policy being a big problem. One thing that others have conveyed, and certainly in my past experience and my research, the way that prior appropriation law works, the use it or lose it, but also the water rate being established by use. Would you say that is a barrier to farmers pursuing higher value and more water efficient crop?

More water efficient in particular, I've noticed some farmers having strategies that appear to be putting in, and I don't know if they're part of the MRGCD, I'm thinking of kind of below Albuquerque, putting in the highest water use crops. It appears they're doing that to establish water rates to then potentially sell them.

But in general, would you say not only prior appropriation and beneficial use, but policy in general, I don't see anything being put in terms of incentives to try to help farmers choose more water efficient crops. There's obviously pressure. You only get so much water, you're going to want a more water efficient crop.

But would you say that policy is a barrier towards crop changes?

MRG Interview Issues / Strategies, cont.

Casey Ish, MRGCD

I don't know that policy plays as big of a role in what folks grow or don't grow. It's an interesting question. I think what it really comes down to ,"What's the local or regional economy?" is the basis for a lot of the crops that we grow.

We have a really large dairy economy here in New Mexico, and that is supported by a very robust forage crop production to provide for that. And also for boarding of horses and things like that.

But, where you have a large dairy market and economy, you're also going to have an equally large forage and hay crop production, as well. Now, where I do think the state could enhance the ability for farmers to reap the benefits of irrigating different crops or managing for wildlife, would be through the development of ecosystem services as a beneficial use of water. There are different degrees to which that could be implemented.

But, there's no doubt that you look at a lot of the Suburban areas and urban areas around Albuquerque, and there are lots of people who are benefiting for free from the carbon sequestration, the water recharge, the habitat, the recreation, the sense of place, the clean air, the heat island effect reduction.

All of these things are ecosystem services that farmers are providing for adjacent communities at no cost. These things aren't being realized as benefits to adjacent communities in a financial way.

I think if there's really an opportunity to encourage farmers to change their habits, to irrigate a crop that requires less water, would be to make sure that there are other sources of revenue that doesn't put them on the track of having to grow the most water consumptive high value crop, because they know they are being compensated for all of the other ecosystem services they provide.

I think that's a missing piece of the puzzle. I think that's also one reason why agriculture is usually the "low hanging fruit" when it comes to trying to pick up water rights and transfer them. It's because we're not really pricing agriculture at what I think it should be, which is a highly valuable resource that doesn't just produce a commodity. It produces ecosystem services for everyone who lives in the adjacent places to those agricultural operations.

Connie Maxwell, NM WRRI

And I'm not quite sure the right way to ask this question, because I want to be sensitive to the fact that you've got your own things going on, but we are, for example, going to be working with the New Mexico Acequia Association on a number of pilot projects, where we'll be looking at things like trying to do community recharge programs from arroyo flows.

But also looking at a full, integrated approach, so also looking at both incentives and support for farmers to be looking at different crops that have lower water consumption. It seems to me like an obvious place for that, as what you alluded to, is the ISC program, for example, for the lower Rio Grande paying for the emergency fallowing. But, you're describing that it could be an integrated program.

So what if somebody was planning on fallowing, but they allowed that field to be accessible to a young farmer that was interested in some alternative practices. This

MRG Interview
Issues / Strategies, cont.

is an extreme example, but let's say there could be arroyo flow that was supplied. So an alternative water source that wouldn't have been.

There's tricky aspects to that, but it's not necessarily the typical kind of source. Let's say it's something like a dry land harvesting irrigation strategy, where something that's normally gathered is planted, that kind of thing.

Or, I know in the middle Rio Grande, it's a little tricky because most of your arroyo flows when they reach the river are now compact obligation flows. But if they're removed from access to the surface, you're presumably recharging them straight into the ground water and they are, theoretically, we, like you said, shallow groundwater recharge is contributing to surface flow.

There might be some ways to start to look at some of those programs. I don't know if it makes sense to try to work with you guys to not necessarily implement, but try to design something like that.

The fact that you guys are already working with the ISC, the OSC, or the state, and you already have your own leasing program, and your own program, would it make sense to try to get a grant to try to design a more integrated approach to basically lowering.

The idea of fallowing of course is lowering agriculture, water demand. So a more integrated approach to that.

Casey Ish, MRGCD

Yeah. The way I've been describing it to folks who are asking me about it, is it's a way for the district to balance the checkbook. We have these different places that we have to deliver. Depending on what kind of water year it is, depending on where we're at in the compact, some of those kind of float to different levels of import or significance.

I'm by no means saying that at any point, does agriculture take a back seat to what the district does. But, there are those other compact considerations and ESA considerations that if left unmanaged, start to impact agriculture in a way that we no longer have control over. For us, it's kind of to balance the checkbook a little bit.

I don't think we would have any issue at all with sitting down and discussing a way to integrate some of those plans into a more holistic form of fouling or leasing.

Obviously we're anticipating more and more upland runoff as a result of climate change with more severe monsoons. The way our system is set up, we run parallel with the river, and because we're on the outside of the river, we typically take the brunt of a lot of storm runoff, unless it's inside one of our flood control authorities.

A lot of folks saw that firsthand this year in Socorro and Valencia County. There's not only a need to address upland storm runoff from a water quality standpoint, but also from a property standpoint.

Protecting people's property is going to become a really important piece of adapting to climate change, where we have more and more flows intermittent, but high impact, high intensity flows, that could potentially come in. Our facilities are not meant for storm runoff. They are conveyance channels for irrigation water.

When they get used as a storm flow, control, and delivery, that's where we have breakthroughs. That's where we have flooding. That's really a problem, so

MRG Interview Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

the need to look beyond our facilities to find ways to address storm runoff and use them as a tool to either supplement flows to compact delivery or allow for settling and water quality improvement. Those are all things I think we can discuss, and multi-agency solutions.

Connie Maxwell, NM WRRI

Fantastic. Let's finish with your visions for the future. Obviously, visions of the future a lot of times are things like, what is measurable by 2030? We'd like to see X happen. That is helpful, but not critical. It's really more: what visions for the future can maintain those values that you were talking about?

Casey Ish, MRGCD

I think it all goes back to how we value agriculture, and the benefits and products that agriculture generates for everybody who lives in the middle Rio Grande.

My vision for the future would be finding ways to generate that value, and increase that value to the point that we have a sustainable economy for agriculture here in the valley.

Right now, it's still the low hanging fruit. It's where everybody goes to try and divvy up a piece of the pie. **I think if the district, and if our constituents are really going to thrive, not just survive, we have to change the way we value all of the outputs that come from agriculture. That would be my vision for the future. It's redefining the value for agriculture.**

Connie Maxwell, NM WRRI

Thank you so much, Casey. We're going to be doing a workshop with the New Mexico Acequia Association, and we're going to be pulling together a steering committee to develop that workshop.

The idea is, in that workshop, we'd like to develop some pilot programs that would take an innovative approach and an integrated approach. And also, be in conversations with the ISC about different ways that we might be able to integrate these type of approaches into their fallowing program, and look as a water demand reduction program.

When we get a little bit further, we're going to hopefully meet early next week with that steering committee. I'll be very interested to see some of the ideas that come out of that. I'd like to circle back and meet with you, and see if there's a way that we can come up with something.

I know everybody's really busy. We're trying to seek funding to support these efforts, as well as to try to put them in line with some of the other current efforts that are already going. But as we get a little bit closer, and we have the example of what we'll be doing with the Acequia Association, I'd like to circle back and meet again, and see if there's an opportunity to partner and maybe, even, develop a particular site within the MRGCD. That might be a good place to either do a pilot project, and also monitor and look at the data, and think about all the different aspects of it.

MRG Interview Visions for the Future, cont.

Casey Ish, MRGCD

Obviously, I can't give you the thumbs up on it one way or the other from a district perspective, but we are always open for dialogue and any opportunity to improve resource resiliency in our area downstream of us or upstream of us. I think actually Mike Hamman probably put it best when he said, the district is quite literally in the middle of everything figuratively and literally, so we we try to play the role of being the good neighbor. Wherever we can plug in and help out and provide some input or resources, we'll try and do that if there's a benefit to us, and to the folks that you're trying to help. That's great.

Connie Maxwell, NM WRRI

Fantastic. Any other closing thoughts?

Casey Ish, MRGCD

No. I think what you guys are doing is wonderful, and it's long overdue, so I'm glad that I'm getting into the realm when all of this is happening, it's exciting. It's an exciting time to be in water resources.

Connie Maxwell, NM WRRI

Yeah, I agree. It is. There's nothing like a crisis to bring people together.

Casey Ish, MRGCD

Yeah. There's nothing like one toe over the ledge to realize how bad you wish you had a parachute, right?

Connie Maxwell, NM WRRI

Yeah, exactly. Thank you so much, Casey. I really appreciate it. When in our previous focus group, Altashin gave a bit of a description of your leasing program. And one of the things he mentioned was how impressed he was that you guys have actually measured those returns and are really documenting the ecosystem service there for habitat, and for endangered species, specifically.

Is there anything else about that leasing program that you think you'd like to describe that might be helpful in terms of pilot studies for other integrated projects in particular?

Casey Ish, MRGCD

Maybe what gets glazed over, but I think one of the most important parts of it, is that it's voluntary. **Giving landowners the option to opt in or opt out is always going to result in better communication and outreach, better repeat, daters. Making it voluntary is probably a must in my opinion, to do anything in pilot fashion.**

That probably sounds pretty straightforward, but again, we can't go in there in pilot fashion and tell people what to do. But, it's an important piece of the structure to let everybody know when we're talking about temporary fallowing, or leasing of agricultural land for these other uses, it's the landowner that sees the value in what we're offering and what we're doing. The district knows the value is there. What's important is that the landowner sees the value in that other day. Whether that's just, hey, I like the per-acre payment. That works for me.

We also did a pretty comprehensive post enrollment survey of everyone who enrolled in the program this last year, we got a 50% response rate, which is pretty darn good.

A lot of folks said, hey, look, I see that the district is trying to manage water in the

MRG Interview Visions for the Future, cont.

valley. I get that, and I didn't have to water this year. So I was more than happy to step aside and let the district manage the water. They think it needs to be managed. That was really good feedback for us, that tells us that we're on the right path.

Not only from a program design standpoint, but in the way that we market the program, right? This is not a buy and dry operation. This is a way for us to manage what we have on an annual basis, the best that we can.

Connie Maxwell, NM WRRI

I think that was the first point that Appleton made about the ecosystem, the famous ecosystem service program in New York.

I know that group did buy some lands in upstate New York in terms of sustainable protection of the lands, but their program where they supported farmers to do sustainable practices in the Catskills, was over 90% participation, and it was voluntary, as well.

I agree. I think that's an incredibly important point. Like you're saying, the response rate and the people participating, it gives you good feedback.

Casey Ish, MRGCD

I definitely plan to do followup surveys. I would say with any program, you design the follow-up surveys with folks who enrolled, and also folks who didn't enroll. It's really valuable information that's helped us craft our program year over year.

Connie Maxwell, NM WRRI

Yeah. And I think, one of the things that we're particularly interested in, is trying to pull together different technical support that will help folks like yourself, do what you want to do. So for example, like you said, the biggest barrier is the market, in terms of potentially moving towards the crops of the future for New Mexico.

In agriculture, the market is one of the most difficult support aspects. That's one important reason that we've had the economics department join to see if there's ways that we can actually build some of that support.

We did, actually make a connection with Ole Miss University, where they are experts in herbs and medicinals, which can be, high value crops in ways that there might be some opportunities there. But, I also know that a lot of the work I've done historically, is looking at things on a watershed scale and trying to capture those arroyo flows, trying to spread and slow flows in the upper watershed.

Like you talked about, the floods this past year were particularly hard on your systems. Cecilia Rosacker talked as well, about how hard they were on some of the fields down there. That's one of the things that motivates folks down in the Hatch to Mesilla valley is, as you can imagine, it's drier down there. The erosion in the sediment is dumping into the Rio Grande and causing flooding in places like Hatch. But then, really clogging up the irrigation systems is a real crisis. So that is an incredibly important part of the puzzle.

So ways that we can potentially do pilot projects where we're actually taking those problems, and like you said, then being able to actually take advantage of those flows, managing those storms that are going to be more intense. So pulling together ways that we might be able to help support developing the system in that direction.

MRG Interview Visions for the Future, cont.

So like I said, we're going to circle back with the New Mexico Acequia Association, see what direction things go, and then I'll approach you and see if we can set up a meeting with you and whoever you think, and see if we can identify a small pilot project that's not too much. Thornburg Foundation is really keen to support at least some of the institutional capacity to do these kinds of things.

Casey Ish, MRGCD

I assume you're planning on finding a capital acequia association, not a community farm ditch or private farm ditch in the MRGCD. What distinction between an acequia association, that is, wholly separate from the district. Is that your plan?

Connie Maxwell, NM WRRI

The plan is starting with the Acequia Association as a conversation, developing the conversation, and seeing how the pilot studies develop. Because as you can imagine, having the expertise of folks like Don Bustos, and we haven't asked him yet, but I have a feeling he is going to say yes.

Lots of other folks will learn a lot. But we're also going to be trying to pursue these pilot projects in the Hatch and Mesilla valley. For example, I've been working there for many years. So we've identified places where we're going to do aquifer recharge from arroyo flows.

It seems really valuable to also try to do it in the middle Rio Grande region because, both you have a lot of experience, and everybody has needs. We should, at that point, be pulling together quite a lot of good expertise that everybody can benefit from the ideas, to then start to look at each regions' distinctive needs.

Of course, there will be benefit, because some of the problems will be universal. Share that knowledge, but also understand the regions' distinction. Sorry, what were you saying?

Casey Ish, MRGCD

I'm agreeing with you, it's tons of overlap. Region to region, they all have their unique issues, but overall, absolutely tons of overlap on those solutions and problems.

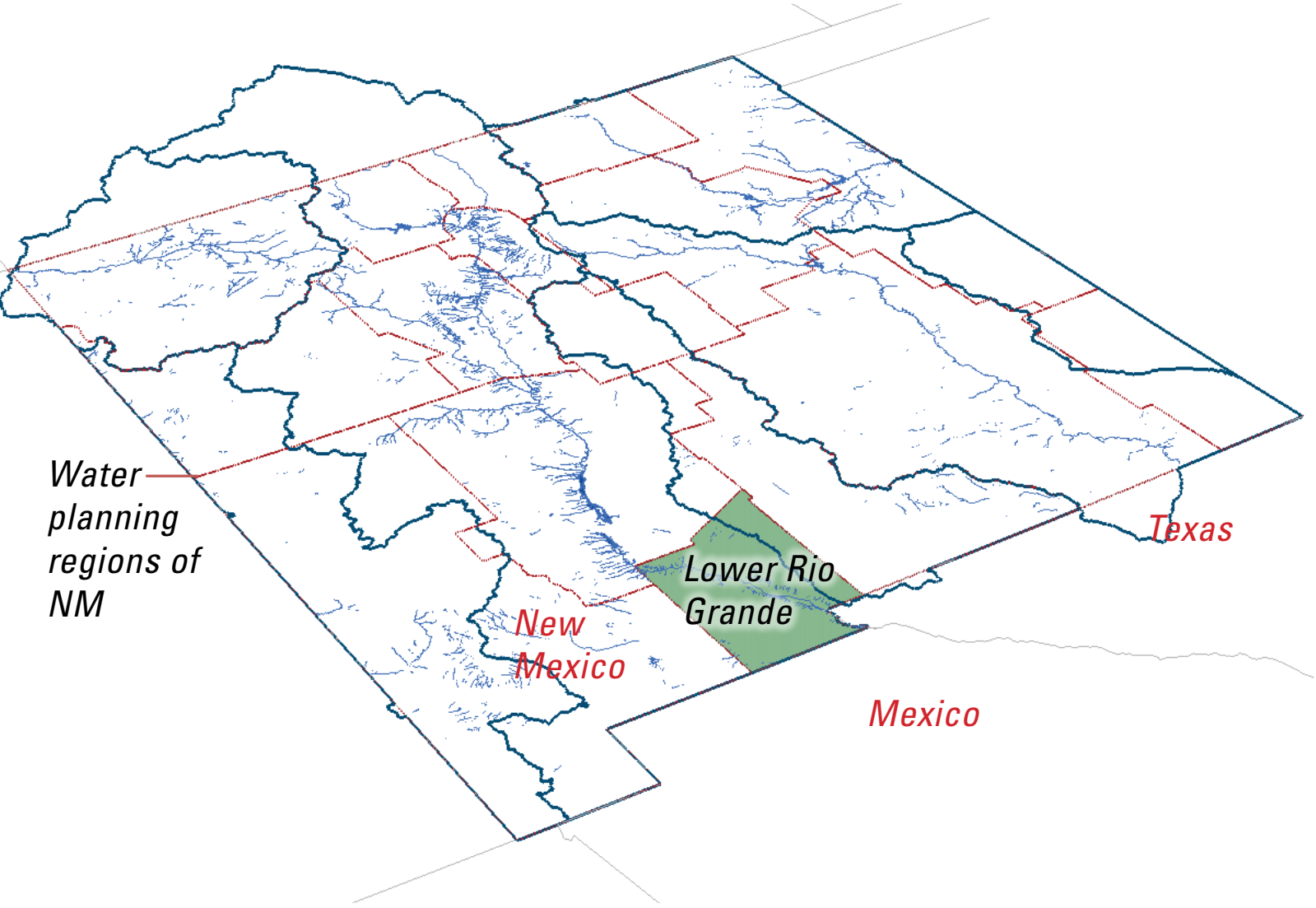
That sounds good. I actually have to hop off, but this was wonderful. Thanks for initiating it, and reach out to me with anything else you have. I'm happy to help.

Connie Maxwell, NM WRRI

Fantastic, thank you. Thank you so much for your time and all of your ideas and perspectives- very much appreciated, and I'll be in touch soon.

6.4 Lower Rio Grande (LRG)

REGION FULL TRANSCRIPTS



Lower Rio Grande (LRG) Stakeholder Visions for a Resilient Future

Workshop Participants

Katie Kruthaupt,
New Mexico Dept. of Agriculture
Soil and Water Conservation District Specialist

Caiti Steele,
USDA Southwest Climate Hub
Coordinator

Christopher Brown,
New Mexico State University
Professor

Davena Crosley,
New Mexico Environment Dept.
Surface Water Quality Bureau

Dennis McCarville,
Elephant Butte Irrigation District
Engineering Dept.

Don McClure,
Bureau of Land Management
Assistant District Manager

Phil King,
New Mexico State University
Retired Professor

Elizabeth Verdecchia,
International Boundary and Water Commission
Natural Resource Specialist

Jennifer D'Annibell,
New Mexico Dept. of Game and Fish
Southwest Habitat Biologist

Jessica Knopic,
Bureau of Land Management
Civil Engineering Operation Section

Nikki Dixon,
New Mexico Water Resources Research Institute
Project Coordinator
Subcontracted by NM WRRI

John Hayes,
Audubon Southwest
Executive Director

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LRG Stakeholder Visions for a Resilient Future, cont.

Workshop Participants, cont.

Patrick McCarthy,
Thornburg Foundation
Water Policy Officer

Bob Sabie,
New Mexico Water Resources Research Institute
Research Scientist

Rusty Stovall,
Bureau of Land Management
Chief of Operations

Sam Fernald,
New Mexico Water Resources Research Institute
Director & Professor

Zachary Libbin,
Elephant Butte Irrigation District
District Engineer

Ed Singleton,
Bureau of Land Management
Past District Manager

Will Barnes,
New Mexico State Land Office
Deputy Director

Xochitl Aranda,
International Boundary and Water Commission
Engineer

Craig Fenske,
Dona Ana Soil and Water Conservation District
Supervisor & Board Chair

Stephen Scissons,
United States Army Corps of Engineers
Engineer

Angel Montoya,
Partners for Fish and Wildlife
Biologist

John Gwynne,
Doña Ana County Flood Commission & Stormwater Coalition
Director & Chair

LRG Stakeholder Visions for a Resilient Future

Panelists

Craig Fenske,
Dona Ana Soil and Water Conservation District
Supervisor & Board Chair

Jerry Schickendanz,
New Mexico State University
Dean Emeritus

Gary Esslinger,
Elephant Butte Irrigation District
Treasurer Manager

Jeff Witte,
New Mexico Dept. of Agriculture
Director Secretary of Agriculture

Kevin Bixby,
SW Environmental Center & Dona Ana Soil and Water Conservation District
Supervisor & Director

John Gwynne,
Dona Ana County Flood Commission & Stormwater Coalition
Director & Chair

Gill Sorg,
City of Las Cruces
City Councilor

Don McClure,
Bureau of Land Management
Assistant District Manager (Las Cruces District)

Steve Wilmeth,
Local rancher

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LRG Workshop Introductions

This workshop was in collaboration with the Hatch and Mesilla Valley Watershed Planning process, funded by Bureau of Reclamation's Cooperative Watershed Management Program and led by the South Central New Mexico Stormwater Management Coalition with partnerships with the New Mexico Water Resources Research Institute and the Alamosa Land Institute

Connie Maxwell, NMWRRI.

Great. Thanks. I am going just by the participant list in case you want to know you're coming up. It's somewhat alphabetical.

Katie Kruthaupt, NMDA.

Katie, New Mexico Department of Agriculture. I work with the soil and water conservation districts.

Connie Maxwell, NMWRRI.

Great. Thanks Caiti Steele.

Caiti Steele, USDA-SCH.

Caiti Steele. I'm the coordinator of the USDA Southwest Climate Hub based in Las Cruces, New Mexico.

Connie Maxwell, NMWRRI.

Thank you, Chris Brown

Christopher Brown, NMSU.

Morning, Christopher Brown and the faculty member of the department of geography and also on the executive committee for the water science and management program from which county graduated with high distinction.

Connie Maxwell, NMWRRI.

Thank you, Chris. Davena.

Davena Crosley, NMED.

I am Davena Crosley with the New Mexico Environment Department, the Surface Water Quality Bureau.

Connie Maxwell, NMWRRI.

Thank you, Dennis.

Dennis McCarville, EBID.

Hello. I work in the engineering department with Elephant Butte Irrigation District. My name is Dennis McCarville.

Connie Maxwell, NMWRRI.

Don.

Don McClure, BLM.

Good morning. I'm Don McClure, the assistant district manager BLM here in Las Cruces.

Connie Maxwell, NMWRRI.

Phil,

Phil King, NMSU.

I'm Phil King, a recently retired faculty member from civil engineering at MSU, also on the water science and management executive committee formerly also with Dona Ana soil and water conservation district once upon a time. And I do apologize. I'm going to have to bug out at 10 o'clock here. I've got a date in court.

LRG Workshop Introductions, cont.

Connie Maxwell, NMWRRI.
Thank you, Liz. Liz. Can you hear us? I see. You're un-muted.

Elizabeth Verdecchia, IBWC.
Okay. My I'm trying to figure out the mic. I am the Natural Resource Specialist with IBWC Environmental Management Division. Liz Verrdechi. Yeah.

Connie Maxwell, NMWRRI.
Great. Thanks Jennifer.

Jennifer D'Annibell, NMDGF.
Hi Jennifer D'Annibell. I'm the Southwest habitat biologist for New Mexico Department of Game and Fish based out of Las Cruces

Connie Maxwell, NMWRRI.
Great, thanks Jessica.

Jessica Knopic, BLM.
Okay. Good morning, Jessica Knopic with the BLM civil engineering operation section.

Connie Maxwell, NMWRRI.
John Hayes.

John Hayes, AS.
Hey everyone. John Hayes, I'm the executive director for Audubon Southwest

Connie Maxwell, NMWRRI.
Nikki Dixon.

Nikki Dixon, NMWRRI.
Good morning. I'm Nikki Dixon. I've recently moved back to New Mexico and prior to that, I'd spent about 20 years in watershed planning and outreach and extension work. And I'll be working with a New Mexico water resources research Institute on the new grant doing watershed implementation.

Connie Maxwell, NMWRRI.
Patrick.

Patrick McCarthy, TF.
Yeah. Hi everyone. I'm Patrick McCarthy. I work for the Thornburg foundation running their new water initiative.

Connie Maxwell, NMWRRI.
Welcome

Bob Sabie, NMWRRI.
Bob Sabie I'm a research scientist at the New Mexico water resources research Institute.

Connie Maxwell, NMWRRI.
Rusty.

Rusty Stovall, BLM.
Good morning, Rusty Stovall all BLM Las Cruces, chief of operations.

Connie Maxwell, NMWRRI.
Thank you, Sam

LRG Workshop Presentations

Sam Fernald, NMWRRI.

I'm Sam Fernald, Water Resources Research Institute, and watershed management professor at New Mexico State University.

Hi, good morning, trying to put on my video. There we go. Good morning everyone. I'm the chief of operations and maintenance division for the happy.

Connie Maxwell, NMWRRI.

Thank you. And finally, Zach

Zachary Libbin, EBID.

I'm Zach Libbin with the Elephant Butte Irrigation District. I'm a district engineer here and I also help with the help John Gwynne with the storm water coalition.

Connie Maxwell, NMWRRI.

Thank you all. I will go ahead and play Edwin's video. It's not terribly long about 20 minutes. And apparently there's a good way you can share this particular.
It's funny that it's not on there.

Ed Singleton, BLM.

My name is Ed Singleton. I'm a past district manager for the Bureau of Land Management in Albuquerque, New Mexico. I wanted to talk to you this morning about partnering for watersheds and specifically the Rio Puerco Management Committee. My background is I spent nearly 40 years in the Bureau of Land Management. Started in the Forest Service in fire management. So I've got a broad background in fire and forestry across New Mexico, Colorado, and Oregon. And my way back to New Mexico when 1998 became the district manager in Albuquerque.

And in 1996, the Rio Puerco Act was passed. Sponsored by senators Domenici and Bingaman, which created the Rio Puerco Management Committee and the watershed restoration efforts. Next.
The Rio Puerco was a huge watershed in north central New Mexico. 4.6 million acres in six counties, involves numerous federal agencies, lots of state land, lots of tribal lands, and some forest service lands as well. It is a very complex landscape. It varies from coniferous forest down to salt desert shrub areas and grasslands in between.

So just a real diverse landscape. Next. The Rio Puerco Act was recognizing a citizen based group that also called themselves a Rio Puerco Management Committee, which formed in the mid nineties to advance a watershed restoration in the Rio Puerco. Probably one of the key individuals to start this group was Ben Casals an irrigator and representative of the Acequia association in Cuba.

And he recognized that if they were gonna continue to have viable agriculture in the Cuba area, they were going to have to do something to enhance the watersheds that fed into the water systems. They started talking with some of the congressional representatives as well as the government agencies.

That was the foundation for the Rio Puerco Management Committee. Next. The Act recognized the Bureau of Land Management as the lead agency for the Rio Puerco Management Committee. It also laid out an expectation that federal agencies, state agencies and tribal governments work together to come up with plans to restore this enormous watershed I believe key and critical to the efforts of the Rio

LRG Workshop Presentations, cont.

Puerco was the fact that we had this, I'll call it infrastructure, of executive leadership. I served the district manager position to BLM, served as the designated federal official, and was responsible for executive coordination amongst all agencies. And I believe the key to the success of the legislation, the key to the success of our real program management committee, was the fact that we had not only executive commitment, but we also had a level of scientific and technical commitment from staff in these different agencies. Then we had a commitment of on the ground worker bees to get projects done; studies completed all the work that we needed done. It was truly a large stakeholder group effort.

Next, we also had a number of special interest groups that chose to join us and support us at the time. The Quivira Coalition, the Rio Puerco Alliance, which was a 501 C3 that was developed off of the Rio Puerco Management Committee, Wild Earth Guardians, Audubon, the National Wildlife Federation, a New Mexico Wildlife Federation and RMEF Rocky Mountain Elk. All of these folks joined us. They attended meetings, they supported and helped us organize volunteer projects and project work. They helped fund some of the project work and training sessions. It was truly a large cooperative effort. Next.

One of the first things that we did as a group was we met four times a year every few months. And it wasn't unusual for there to be 40 to 50 people in the room per meeting. We had a trained facilitator to keep us on track and keep notes. Some of the responsibilities of the BLM was to hold meetings, take notes, disseminate information gathered at the meetings. We developed a website, everything was published on it. It became a very efficient operation.

One of the first things that we decided though, is that we needed a mission and a vision. We developed that. We also decided we needed to determine what the probable causes for the water quality impairment was. The Rio Puerco was a listed stream by NMED under the Clean Water Act.

So, we got all the technical people together and we also got anecdotal information from all the landowners and ranchers. People who had been on the land for many generations and through a number of different processes–some of them scientific, some of them with remote sensing, some of them with review of literature–determined that these are the things that really impacted the watershed and things we needed to address drought.

Unfortunately, we're still dealing with. And climate change today. Brush and shrub encroachment, gullies erosion. A big one in this watershed, and I think a big one in your watershed, is going to be forest conditions. We did find we had a sense that roads were a big problem. We subsequently funded a study that determined that roads was the number one problem in accelerating erosion–man-made erosion–in the Rio Puerco. Also, grazing, including wildlife, and stream bank destabilization.

We focused on best management practices. We're charged by EPA and NMED to develop long-term water plans. So the first plan that we developed was a water restoration action strategy that was completed in 2001 and approved by EPA. That allowed us to join a list of competitors nationwide in competing for EPA grants and

LRG Workshop Presentations, cont.

NMED grants. We were very successful in developing proposals that were funded to do work on the ground.

I should say, I retired in 2014 and took a year off. I told the group I wasn't going to be involved with them because it wasn't going to be my committee or BLM's committee necessarily anymore.

I started attending meetings again in 2015 and found myself drafted back into the effort, and assumed some leadership over the group. We were told that we needed to develop a watershed based plan in order to compete for new funding. So in 2016 we, the group, developed this plan that was approved by the EPA.

We did this plan as well as the 2001 plan in-house without contractors and without paying for folks to come in and do this work for us. So I'm pretty proud of that. I think the group worked really hard, both in 2001, in 2016. We were able to raise approximately $9 million that was invested in restoration practices in the Rio Puerco.

Some of that was appropriated funding. I would say less than a million dollars of that was appropriated funding. Probably nearly $8 million of that was grants and monies that were able to compete for input on the ground.

One part of the effort that I'm most proud of, and it took us a few years of coordination with the Native American communities, but we developed what we called the Navajo Youth Program. Every summer we were able, through the chapter houses, to employ about 25 of their school aged kids.

I think there were 16 or 17 to 20, in doing on-the-ground, resource work, watershed improvement work. Some of it was pretty hard and pretty dirty, but it was very effective.

These rock dams–and I call them modified Zuni bowls–in strategic areas in the upper watershed helped to stop head cutting and help these areas heal. It did marvelous restoration work. Next.

As you can see, this one the rocks catch the water. Seeds stabilize the soil and help the area to recover very quickly. This is the first year after the work was done. Fortunately we had fairly good rainfall. I don't remember exactly what it was, but it was normal to above normal rainfall. Got a good response. Just another drainage where we had done the same kinds of work. I think this was a different year, under a little different rainfall regime, but you can see the stabilization is working well. Next.

We ran the youth program for about ten years and it didn't cost us a lot of money. We used Navajo youth, crew leaders, and coordinators. They did quite a lot of pole plantings in the upper Rio Puerco and Upper Chuwillie drainages. One of the main impaired drainage's in the Rio Puerco. Many of these plantations exist today, were quite successful. Next.

Another area we worked pretty exclusively in was a Savoy Creek, over in Cibola County, near the National Recreation Area. We had some gullies coming at us in the Savoy wilderness from Savoy Creek. This happened to be a big National Wildlife Federation project. We did probably eight or nine years of projects with New Mexico and National Wildlife Federation doing one rock dams and backing up the water table in the Savoy Creek. Next.

LRG Workshop Presentations, cont.

Some of the work we did with NMED and NMED grants. We hired Bill Zedyke and Steve Carson to write up a restoration plan on the upper Savoy. They brought in some equipment which worked outside of the wilderness, but was able to construct Zuni bowls and other plug-in pond structures. They were able to restore that upper Savoy Creek area. Next.

There is a modified Zuni bowl that was just constructed. I don't have any "after" pictures. This was taken in '13. I retired in '14. I haven't been back to the look at these. That's on my to-do list. Go back with Cameron, take pictures of many of these. Next.

I think the the next thing I want to do is give you what I consider to be the key elements for success in the group you're trying to put together. And that is, you've got to have some fairly high level support in some of these agencies. In your case, that's going to be the Bureau of Reclamation, NMED, hopefully the Forest Service. They control the upper watershed and a lot of the streams that feed the Rio Grande downstream of the dam.

Hopefully they'll want to engage in and help with this effort because it is in their best interest, as well as everyone's, to help solve this problem. Elephant Butte Irrigation District, I've found initially, I'll say initially 20 years ago, was resistant to working outside the green line. I believe their leadership saw the light and they're completely on board. That's a great thing. They understand that water is produced in the uplands and they've got to worry about all of it. I think they're a key and critical partner. But it's that level of commitment that needs to happen.

The other thing is trying to engage all the stakeholders. I think we responded to NMED's advice, especially in 2001. They said you can't work everywhere in shotgun projects in a 4.6 million acre watershed. So we went through a prize prioritization process. USGS assisted with remote sensing, and we determined the worst watershed, the worst sub watersheds in the Rio Puerco.

We focused our efforts there for the first eight or nine years. And I believe we were successful in seeking grant monies and getting securing grant monies and getting work on the ground because of that. But it caused some of our other stakeholders to lose interest, walk away because they weren't in that priority sub basin. If you can treat everybody the same, go with the worst problems that exist across the watershed. It'll probably be in numerous sub-basins.

Going back to the Forest Service, I could never get engagement higher than the district ranger, but I also realized that the district rangers have a lot of power and authority in the Forest Service. I was trying to get the forest supervisors involved. At one point we had a forest hydrologist who was involved with the project for a number of years. She happened to have come from the BLM. Carol van Doren, the Santa Fe hydrologist, was very interested in this project. That gave us tremendous support. When she left, that level of support at the supervisor's office left. It's critical to engage those district Rangers and get them to buy into the vision of what you're trying to accomplish. They too will reap the rewards of good work on the ground. I know that the Gila is a fire forest. I know they do lots of prescribed natural fire.

LRG Workshop Presentations, cont.

I don't think they do nearly as much prescribed fire as they could because it's hard to get funding—the liability is worse. It's a lot easier to let one burn than it is to light one and worry about it for the next month. But they need to get more aggressive on the prescribed fire front, as well as continue with prescribed natural fire work they're doing.

One of the things I wanted to come back to because I think it was a critical mistake on my part. I had worked in the budget office in Washington in my career, knew the budget process very well. It occurred to me and in our conversations with the budget folks, that it didn't make a lot of sense that we were getting this mark. I mentioned we were getting a mark in our appropriation of about three to $400,000 a year from the BLM's budget. Upfront, we got, I think $300,000 one year, $400,000 one year. That was money, in addition to BLM's budget, which was great. After that, it was just a designation of monies within the BLM's soil, water, and air budget. But I thought in conversations with the BLM Washington office budget people, why don't, if that mark has been in existence for 10 years, why not make that a permanent mark? Just establish it as a permanent appropriation within BLM New Mexico's budget: $400,000 a year is going to be Rio Puerco restoration. And they agreed. We did the necessary paperwork. They coordinated with Office Management, put in budget. They got it all done in the first year. It was great.

We had the $400,000 mark and it was used on the ground and worked well. I think that was 2012. In 2013, they changed the language in the budget that came down: Included in your base is $400,000 to do the Rio Puerco restoration. Which meant what they were doing was earmarking $400,000 of New Mexico's soil, water and air budget to the Rio Puerco restoration. Which meant that $400,000 came out of somebody else's budget—some of the other districts or the state office. That didn't go over very well. The State of New Mexico BLM made sure that the biggest part of that money was within Albuquerque's allocation.

So in other words, we hurt ourselves. Instead of getting more money, we got less money. So that's just a trivial piece. I would say, try not to pursue things like that; they may backfire on you. Right now, you're in a formation period and you're trying to get people to the table to buy into a vision and a mission and support the restoration of, again, a fairly large watershed down there that has significant impacts on agriculture and irrigators and in the livelihood of a lot of people down through the river valley itself.

Any questions?

Connie Maxwell, NMWRRI.

Thank you. That was really terrific. I think incredibly helpful for our group. We really appreciate the information that you've given. I think it will both help the workshop that will come after your particular presentation in getting us started.

I have to admit you covered so much, I don't really have that many questions. I do have one specific question and I think you are better qualified to answer this than most, being a BLM district leader. The question is, were you able to come up with a streamlined strategy to do watershed restoration from the BLM, the different requirements to do the watershed restoration? Particularly NEPA and those sorts of requirements.

LRG Workshop Presentations, cont.

One of the reasons I asked that is, I know that our BLM office down in this area, who have been playing a really great leadership role on these projects, does have extensive requirements. But also did try to develop an approach, which I think they will be pursuing, where the idea was to be able to approve different practices.

Right now we have a focus project in the Hatch and Mesilla valley. It's the Rincon Arroyo watershed, which is a pretty large watershed within that region. The idea was to do an environmental assessment (EA) that pre-approved different practices and the practices could go into different areas. Things like one-rock dams and Zuni bowls and stone lines and things like that in order to make it easier when there was going to be a project that came in on the ground, most of the paperwork was already done. It was then just a simple addition of, "yes, this site looks good," type of thing. Did you have any other similar insights as you were going through, doing restoration in so many different areas? Did you find ways to streamline the process? Were you able to take results in one area and help replicate approvals for other areas?

Ed Singleton, BLM.

Yes, the methodology that you just explained is one way to look at it. Break up the area into sub-basins and then do EAs on sub-basins. The other thing you can do is, do EAs on practices. Do a programmatic EA on brush removal and then different brush removal methods. And you can apply that across the landscape. At the time you do the project, you do a very abbreviated EA face sheet process with, take a look at TNE species and certain critical items on the specific area you're looking at. So it's a very much abbreviated process and you don't spend a lot of time replicating paperwork. So I think it's programmatic by process or by geographic area, if you will. So that's worked well.

Connie Maxwell, NMWRRI.

Yeah. Does it have to be both? Because I know the programmatic EA that they were looking at was just for the Rincon Arroyo watershed. Could you then take that and apply those practices to say, in fact we don't see any reason why you can't put in a one-rock dam anywhere in the Hatch and Mesilla valley, or is that specific to the geographic area?

Ed Singleton, BLM.

I think that it depends on how they write it. You could do it both ways, but I think it would be most efficient to address common, best management practices within the entire watershed, within that sub-basin. And then that way you can say, this type of project would have similar impacts in this area, as well as other areas of the watershed.

I think there are ways of dealing with NEPA where you're not generating mountains of paper and duplicating lots of effort.

Connie Maxwell, NMWRRI.

I think one of the other things that's particularly inspiring is your youth program that you did for ten years. Did you find any other resources or any other youth programs?

Ed Singleton, BLM.

I know that you and I have discussed the idea of the YCC becoming common again.

LRG Workshop Presentations, cont.

And I know that you had mentioned that it looks like NRCS and BLM are going to be the lead agencies that are working that out. So we'll try to see if there's going to be some funding with that.

Connie Maxwell, NMWRRI.

New Mexico has several youth programs as well. It sounds like there's a lot of room for that. Certainly helping getting the community involved and the youth and their families.

Ed Singleton, BLM.

Yeah, I believe in using any of the authorities we currently have, I know we funded some work through Rocky Mountain Youth Corps. AmeriCorps talked to us about doing work. There was another youth program associated with a facility that was built up in the Cuba area, where they had at-risk youth that were looking for Civilian Conservation Corps type work. All of that work is really meaningful work. And I think it teaches kids the value of environmental work on the ground.

Connie Maxwell, NMWRRI.

Ed, I'm sure that our folks are going to have other questions, so I'm going to stop it there. But thank you very heartily again, and we will circle back.

Ed Singleton, BLM.

I did have one thing that I forgot. Just put this in the back of your mind. The Sierra de las Uvas mountains there are pretty unique landscape, and quite a number of years ago the BLM developed a special fire management strategy in that landscape. Primarily because it's a really dangerous place to fight fire. We've had some near misses in there historically with firefighters nearly being trapped and overrun by fire in that rough country.

I know that still exists today. But my thought was the BLM particularly, and probably the state, needs to do some proactive planning to put fire on the ground in there. Don't wait for the next natural ignition, because it may be 20 years and it may be a terrifically damaging fire. Put fire on the landscape at intervals that limit catastrophic fire.

Connie Maxwell, NMWRRI.

Thank you, Ed. Because Ed wasn't able to be with us, I'm sure there's some questions that are not answered. So if folks have questions for Ed, please do bring those up. Rather than spend a lot of time on that, I think what I'd like to do is switch to our conversation about visions for the future.

I'll be capturing some of your actual thoughts. Often, what we'll do is we'll start and we'll talk about issues and strategies first and then build to visions.

Because, as a group, we've met several times and though we have more discussion on issues and strategies and details to work out, I think it would be nice to try to, at this point, imagine this campaign that we've been talking about that we want to build. And start to document what our measurable visions for the future are, thinking about everything that we've done.

Like I said, as we go forward, other visions will arise. We can circle back and capture those. An example: "what would it take for you to revegetate the uplands to mitigate flooding and sediment transport by 2030?"

LRG Workshop Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Or, "by 2030, what would it take to refill, replenish, groundwater to the extent that is reconnected to surface flow?"

So open floor visions for the future. Any questions for Ed that I can pass along and have him send us answers back.

Zachary Libbin, EBID.

Connie, can you repeat the question just a little bit? I do have a vision, but I'm not sure if it fits the question you asked.

Connie Maxwell, NMWRRI.

I think that one helpful way to think about it is, there are lots of different strategies that we'll want to employ, but what is it about the Rio Grande area, down here in the Hatch and Mesilla Valley, that you value? Or that your stakeholders value? And what overall vision can capture several strategies? It can be just focused on one strategy as well. But let's say in ten years time, what would you like to see this group contribute to accomplishing? What sort of vision of the future would you like to see for this region?

Zachary Libbin, EBID.

So the vision I'm going to pitch to you first is a **significantly reduced sediment transport that leads to less sediment reaching the Rio Grande.**

Connie Maxwell, NMWRRI.

Give me a couple of ways to measure that. So by a certain time and maybe some way, some sort of trigger for less sediment, some sort of indicator.

Zachary Libbin, EBID.

I'm going to ask Xochitl to help us with a way that she thinks we might be able to measure that. But on that note, I think just requiring less sediment removal from the river would be measurable. These are all very hard to measure tasks, right? Reconnecting the surface water the groundwater recharge goal you have.

They're very hard to to quantify. For example, if it rains a lot, we have great precipitation, it will happen. If it doesn't, we won't. But measuring how much of a difference these efforts make is challenging, right? Similar for the sediment transport. If there's big rains, it will bring more sediment down. If there's not, they won't. Measuring how much of a difference these measures make is challenging, but **on a larger timeframe, having to dredge less sediment, haul away less sediment from the river would be measurable.**

Davena Crosley, NMED.

A question to maybe help me understand, though. Would it make sense to pick one specific spot? I'm thinking about the the bridge at the lower end of Rincon Arroyo. And think about how many times, under that bridge, it has to be cleared out to keep water moving. Would it make sense to choose a specific spot and think about how often maintenance has to be done in that spot to keep the system functioning? To keep people going over the bridge? I'm not quite sure how to put it eloquently.

LRG Workshop Visions for the Future, cont.

Zachary Libbin, EBID.

Davena, I think that's a great point, picking the spot. **Like the railroad bridge, specifically, is one that you can really see. They clean it up until you can drive a pickup truck underneath it. And then a couple of years later, you can't walk underneath it. That causes problems with our railroad. The railroad is willing to put effort into that to make sure that doesn't go all the way up and go over the tracks, as an example.** I like your point of picking a spot. Also the actual confluence with the river where IBWC plans to spend significant effort in their river management plan is sort of another location. But the river bridge is a very good example.

Xochitl Aranda, IBWC.

This is Xochitl. So rather than starting with ways to measure, I think **my vision is identifying the priority areas–the ones that we see we're having to clean out most often—like was mentioned, the Rincon.** And we've had studies that were done that identified for us nine priority areas.

And so for IBWC, in order to move forward with projects, we first identify the problem areas. Then we prioritize them based on a matrix to identify the different criteria in order to prioritize the different ones. And then, to me, the measure would be, how many of those problem areas are being addressed?

Start with that measure performance. We've addressed two out of nine priority areas. And then the followup to that would be, how often is that having to be maintained? How often are our crews having to go into the river and remove that sediment? **And so I think rather than starting with a volume, let's start with identifying the problem areas and how we can address them.**

One of the things that stood out for me and in the presentation we just saw was the erosion way upstream in the arroyos. I remember in the trip we took, going up to the Rincon Arroyo and where it begins, the earth cutting that occurred there. If we could implement some of those measures, the stone riprap to capture some of that sediment and prevent some of that earth cutting. Because, the earth cutting that we see way upstream in the Rincon Arroyo is what ends up in the river.

Try to address those problem areas but from the source, where we see it begin. And just to bring it all together, I think I would start with, identify the problem areas and then a plan. Let's say a five-year plan: 1. Year one, we're going to move forward with these, 2. year two, we're going to move forward with these two.

And then our measurement is going to be that. It's how many we've addressed. And then we'll continue to improve upon each one based on measuring how often we're having to clean it out. What is the efficiency of what we did. And is that going to work, further downstream?

So I'll give you an example. We did Thurman one and two, the sediment basins, and that was like our pilot project in addressing sediment before it enters the river. And we did see that it works. It captures a lot of sediment and they're full. They were full the first year they went into effect.

Now the issue we're seeing is that it's only dry enough during one month out

LRG Workshop Visions for the Future, cont.

of the year that we can go in there with heavy equipment to clean it out. Building upon that, what did we learn? What can we improve? What do we need to implement in any sediment basins that we move forward with? Like the lessons learned.

And because it is a pilot project and we were going to see, okay, will this work in other areas? And how efficient is it in capturing sediment? And how often are we having to go in to the river to clean out? In Thurman one and two, we haven't gone into the federal confluence to clean it up because it has been captured by the sediment basins.

That's my vision, just because of how, we handle our projects within IBWC. How our budget requests are two years out, in advance. And so we have to have a plan in place before we request funds. So for this group, **in order to address all the different issues, I think we have to identify them, prioritize them and plan it out. Then build upon that.**

Dennis McCarville, EBID.

Hello, this is Dennis McCarville. I'm thinking that it's very important to capture sediment. However, **if you remove the sediment and the water keeps flowing downstream, it's simply going to pick up more sediment and move it again. So what you need to do is work on increasing the infiltration and reducing the runoff.**

Connie Maxwell, NMWRRI.

Sorry, my controls keep disappearing. I'm going to put them one place. Thank you all.

Sam Fernald, NMWRRI.

Can I follow up on that point when Dennis is done?

Connie Maxwell, NMWRRI.

Yeah. Dennis, is there anything you wanted to add to that? Go ahead, Sam.

Sam Fernald, NMWRRI.

What Zach was talking about sediment and Dennis about water, I think that perspective of keeping the sediment, the nutrients, and the water on the landscape, that helps with everything we're talking about. The sediment downstream, the extra runoff that just like Dennis is saying, that's gonna eat up more sediment if it is just flowing water. The nutrients that are good for restoring the watershed, to keep the vegetation and the water on the watershed unless, of course, it can soak in and recharge groundwater.

So I think this perspective of keeping the water, the sediment, maybe add the word sediment, and nutrients on the landscape. That is I think it's not really a specific project-based approach at this point, but I think it **summarizes a lot of what would be healthy for the watersheds.**

Connie Maxwell, NMWRRI.

Great. So let's combine these two: keeping water, sediment, and nutrients on the landscape to increase infiltration. Would you also say, "promote revegetation" or "vegetation and reduce erosion"? Anything else we'd want to add there?

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Dennis McCarville, EBID.

This is Dennis again. I think you're on track. **Revegetation and other changes to the surface to increase infiltration, combined with spreading the water out**, like you've been talking in other presentations, are probably very important.

Connie Maxwell, NMWRRI.

Revegetation and other surface treatments. That's not the best word, but I know what you're saying because the restoration itself will also perform that function. Just like terracing kind of concepts can perform that function. What about other visions?

When we get into issues and strategies, I'll go over some of your survey responses and so forth. One of the areas that is becoming important for the region is the need to mitigate the land use affects of potential future fallowing and even agriculture that's been sold out for water rights.

The watershed health implications of fallowed fields and the watershed health implications of declining groundwater. Aquifer recharge programs can help with that. Anybody want to take a stab at a vision for that?

Alright. Let's go ahead and build this vision list as we go. One of the things I wanted to do was to give you guys a little bit of a summary of some of the survey responses in some of the programs that we're working on right now.

I know folks have, a little bit of a difficult time to stop and do the surveys. We have gotten some good responses so far. We've gotten 19 responses. So thank you all for that. One of the things that I wanted to do was share some of those preliminary findings.

I think it's not surprising that the top priority that people have focused on are the issues of vegetation conditions, productivity, and erosion in the upper watersheds. Coming in at number two: water supply, increased variability, shortfalls, and aquifer groundwater. Number three: a need to increase watershed scale coordination to achieve goals and reduce conflict, including educational and technical support and activities. Number four: soil deposited from upper watersheds. Number five: flooding. Number six: watershed effects from urban development expansion. And number seven: a need for coordinated watershed planning efforts in the Organ Peaks National Monument.

Some of the additional issues that people focused on: riparian restoration, enhancing recharge, rangeland health and restoration, sediment in the Rio Grande reducing its delivery efficacy, improving water quality, decrease in wildlife habitat and habitat corridors due to overall habitat degradation and habitat loss, surface water contamination, pollution, the need to have continual flow in the Rio Grande, allow the Rio Grande to meander and become a living water body as defined by lower amount of diversion, channelization and damming, strategies for stakeholder engagement in water conservation programs, adapting the water system to climate change, securing nature's share of water, promoting environmental flows and habitat resiliency in the watershed, while also tackling issues in water supply and demand, but in partnership with the ag community and municipalities.

Political issues. I'll read this a little more: "Federal land ranchers working with their soil and water conservation districts and the

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NRCS serve an integral role, but too often face exaggerated environmental regulations designed to be burdensome rather than sincerely necessary and productive. Either well-managed livestock operations serve a well-designed watershed plan on federal lands or they don't."

And finally, "the balancing of economic development, urban water use, agricultural water use and the health of the watershed." Some more voices here to add to the issues. The strategies that we identified, all of them got a fair amount of support. The question was, would these strategies directly or indirectly benefit the respondents?

Some of the strategies that were identified early on in our planning process were: expansion to the early warning systems to get better data and better warning for flooding, schematic plans–as we were just talking about–for low impact watershed restoration practices to slow and spread flow, plans for adapting flood infrastructure to capture sediment and water supply, expanding the aquifer recharge network, continuing the Rincon Arroyo watershed planning, a decision support model for land managers to predict the effects of different scenarios, planning and regulation to anticipate and mitigate future development pressures on watershed processes, critical flooding areas emanating from the new monument, and watershed educational and technical support programs to engage local youth and community organization.

So one of the top ones here was "developing the plans for our upper watershed restoration, low impact practices." One of the projects that we do have funding for, that hopefully we will start soon, is the Reclamation Drought Response Program. We will be looking at the potential effects of these different strategies. What it will enable us to do is, as we look at how the water budget functions in a watershed, we'll be able to say how much of these different strategies do we need in order to achieve a desired effect, like recharging the aquifer.

So the idea with this decision support tool that we have funding to proceed on is that we'll be able to look at the water system, as one comment mentioned, and manage the water budget itself. So you see here a very simplified version of a water model, which really talks about these natural processes. On it are some of the results from NM WRRI's Dynamic Statewide Water Budget model, from 1975 to 2018.

You can see a lot of variability of surface water. And this is just change in groundwater aquifer. A lot of variability. So some recharge in some years and some depletion. So we'll be looking at these in terms of this decision support tool and saying, so what are the potential effects on the groundwater itself?

So we'll have a strategy to add upper watershed restoration at recharge zones. Mountain fronts are good recharge zones in the uplands. And certainly, of course, the valleys, ditches and fields that are next to arroyos enable us to increase recharge. Decrease of evapotranspiration through water-low-efficient crops, efficient practices capturing and spreading flow. These are the sorts of strategies.

The conditions of our groundwater in particular, as Zach was mentioning, are very difficult to quantify. If we look around the state, of course, the upper basins have less of declining groundwater issues than we do down here in the south. In the middle Rio

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Grande, when in 2008, they started getting San Juan-Chama water, you can see that groundwater decline trend reversed itself and started to become more stable. The Mesilla basin has had different challenges. And of course the Hueco-Bolson basin is significantly worse. But actually measuring those levels is difficult, as many people are intimately involved right now with the lawsuit.

This is the USGS Mesilla basin observation network. Generally speaking from the last water year, you can see that the red indicators are that the levels are much below normal. So these are ones that they're just watching. You can see that the level in the last year of this particular well is all within the much below normal.

The network is quite extensive. You can see the blue dots here are the network dots. The red dots are our agricultural wells in the valley itself. One of the reasons why it's so difficult to measure is due to the amount of wells themselves. And you can just see the amount of noise that's occurring within the wells.

Certainly, when pumping occurs, there's an enormous amount of depletion. So these trends are bumping around this particular number 30. These are all wells within that watch area as well. The trend is a little bit more clear. And then here, in all of these are wells that are currently much below normal. Even in this, the trend is difficult to actually see.

So, managing the water budget isn't an easy thing, but it is certainly worthwhile in terms of a challenge. So my last few comments before we go to really trying to look through these issues and strategies are some of the strategies that have been discussed.

We know that watersheds are fundamental to the infrastructure for our region. California actually passed a law in 2016 that recognized that because watersheds are the source of runoff, they're recognized and defined is integral components of water infrastructure. It made things like upland vegetation management to restore the watershed's productivity and resiliency, a restoration of meadows, roads, and stream channels eligible as key infrastructure.

We know that there are federal infrastructure bills going forward that will likely enable us to garner funding for these type of efforts. And there are several key areas there. We also know that the ISC is in the middle of a pilot program to pay farmers to stop groundwater use. This is what's known as an ecosystem service payment, where the ecosystem service of less groundwater pumping and maintaining groundwater levels is paid for by the state because there is a general benefit. The best example of an ecosystem service program is when New York City helped farmers and its upper watershed regions do sustainable practices. They spent about $1.5 billion, but the estimated alternative costs for a water treatment plant was between $8-10 billion. So it's cheaper to do the right thing.

One of the questions is, what pilot programs would we recommend? As Xochitl mentioned in this vision, let's go through, identify our priority areas, our priority strategies, let's estimate what sort of effect they can have, and let's plan for them. That's one of the questions.

Just a few examples of managed aquifer recharge programs. I like this one in

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California where you can see the fields. Several of the fields are now turning into riparian areas and definitely areas that are targeted for aquifer recharge. California does a fairly engineered approach. And in Albuquerque there is an infiltration pit.

We've talked a lot about upper watershed management to spread and slow the flow also down in the fields as well. Finally, these fallowed fields, where we could be putting arroyo flows on–particularly in our region–could also be put to productive use through cover crops or through different crops.For some of the farmers that want to fallow their fields, perhaps those fields could be eligible for new high value herbs and medicinals things that would require almost no water. We want to be working with the ISC or other funding agencies to expand these ecosystem service type of programs. That includes water efficient practices. You can see cover crops here, and these are all in this particular region.

To end, we have a number of potential funding sources and existing funding sources. I'd like to ask Sam to tell us a little bit about a new funding effort, and Patrick to talk about some potential efforts as well.

We have the drought response program, which I went over briefly. EBID will be expanding its aquifer recharge network. We have a number of NMED watershed implementation programs. So we have the ability to look at how effective some of these watershed restoration programs are. We're working with the New Mexico Interstate Stream Commission on their 50-Year Water Plan and collecting visions and strategies.

After this meeting, you guys will get a chance to review this. And, certainly if you want to pull something, that's certainly possible, but we're going to be developing an independent NM WRRI report that really tries to capture your visions and strategies for the future.

We're doing that in different parts of the state. These visions will then potentially contribute to that 50-Year Water Plan as your visions. So I'd like to end here and ask Sam to say a few words about this very new recently secured grant, and then ask Patrick to say a few words about his perspective.

Sam Fernald, NMWRRI.

As I'm getting my slides up, does anybody have anything to say before I start the presentation. Perfect. I'm just going to run through a few slides quickly, and this is my vision. We just published a paper showing recharge in New Mexico has actually started declining since the nineties, meaning lower precipitation, higher evapotranspiration and less replenishment of groundwater.

If you look at the Doña Ana county water budget, this is from a water statewide water budget tool we have. It's interesting because note that in the lower Rio Grande, our surface water depletion started going down in the nineties and groundwater depletion started going up, even though there were big increases in 2000 with drought, and again around 2011.

So what happened? As Connie pointed out, we've seen groundwater dropping in some locations and I wanted to point out some efforts we have for water budget resilience. Really looking at the quantity side, even though quantity and quality are intricately linked. So I just wanted to point out a few of these -

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Of course, watershed management for increased recharge. I think that's a big focus of this group today. Adding water with desalination, innovating with irrigation, reducing demand, coming up with strategic tools for demand reduction, seeing what communities' resilience-brainstorms can tell us. And then this project that Connie wanted me to point out.

I really think we need a suite. Hopefully this leads into what Patrick's going to talk about. I think we need to really look at the big picture and throw everything we can at it, but also try to have a united front that brings these watershed programs together with all the other things we can do for water for the future, and the lower Rio Grande.

I think all of these efforts are important and I will skip now to the latest one, which is a project with UC Merced, and it's acronym is SWIM. And the idea is a resilient water future through measurement, management, and market. The three main sites are Central Valley, California; Utah; and the lower Rio Grande, New Mexico.

The great thing is, it's looking at states where we have this surface water and groundwater connection. It's a brand new, $10 million project, that just got announced last week. And NMSU is one of the three leads in collaboration with these other institutions. We got $1.6 million for NMSU to really invest in basically trying out some resilient future approaches.

So everything that we're hearing today and in the future, we'll hopefully be able to put together some examples, some real beta tests of how to put all of these efforts together and make a difference for the water future. I have two other slides. One of them depicts, you see here, the Southwest Climate Hub. We're working with that group out of USDA-ARS in Las Cruces.

With the three test beds in California, Utah, and New Mexico we're using a lot of great remote sensing for measurement and onsite measurement of soil crop water budget working with the faculty at NMSU and the researchers at the Water Resources Research Institute. The big management aspects that this project is focusing on are aquifer recharge and water banking.

Utah actually already has an up-and-running water bank that we'll look to. And regarding the lower Rio Grande and California, they're really important for ways to look at multifaceted aquifer recharge programs. One more slide on this project. The idea is to link across scales, get the detailed information from our farms and individuals, and then integrate these at the regional or district scale.

Again, recharge is a big aspect of it. We'll see if we can come up with some modeling approaches to provide decision support for the region. We can help the Interstate Stream Commission, EBID, the various agencies come together with some actual on-the-ground approaches, and we can quantify not only the recharge, but the implications for the agricultural industry, the ecosystems, and the community.

The hope is that this will be a model that can be used elsewhere and really help the USDA with some of these sites where we have coupled surface water and groundwater systems. That concludes a brief description of the program.

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Connie Maxwell, NMWRRI.

Thank you, Sam. Any questions on that particular program? I also asked Patrick McCarthy to give a few words about some of the thoughts that he is bringing from the Thornburg Foundation. He has been working with NMSU, with Sam, and now myself and others. Patrick, do you want to give a little introduction?

Patrick McCarthy, TF.

Thank you, Connie. I'll just say a few words about the the exploration we're doing right now with Sam of the Water Resources Research Institute and New Mexico State University. These ideas that we're exploring were inspired by some work going on in the Colorado River basin having to do with looking at how we can address these intersecting problems of water security, food security, agricultural economic viability, and essentially the sustainability and resilience of the water, climate, and energy system in the Mesilla and Hatch Valleys, the lower Rio Grande, of course. And how we can address those in an integrated way and bring resources to the table, federal state, and even private resources through corporations, perhaps through foundations like mine and others to achieve a vision of resilience for the valley.

Now that being said, clearly there's a lot of other work going on that we need to learn from and find a place within to figure out whether our efforts collectively can really advance and enhance the many initiatives like this one, that Connie you've described to us this morning, and like the one that Sam just described as well.

So clearly there are resources and a lot of interested folks and energy going into this area already to address this looming problem. It isn't just looming, it's here already. Climate change driven ratifications and a supply and demand imbalance in our water systems, plus watershed degradation. The idea here is to bring folks together to identify what I think of as an optimal suite of strategies of the nine or ten strategies that are laid out in that document that I linked to in the chat, coming from that source work that was done by Culp and Kelly and others. Take a hard look at those.

Clearly you all, the science and management community, are already identifying and, in many cases, already implementing these strategies. The question is, where and how can we implement them to best effect? And of course, how can we fund them at a scale that's really going to make a difference?

This is perhaps the biggest challenge. Just as the Rio Grande Water Fund has looked at how to accelerate and scale up forest and watershed restoration in the middle Rio [Grande] all the way up into Colorado, I think the challenge here is to figure out how to expand the resources and expand the sort of synergy and alignment of all the groups working on on these efforts to build resilience.

So the idea is not only to use science as a foundation to the evidence-based, to identify that an optimal suite of strategies, but also build community support across sectors. Not only the various water users, but also economic sectors in the community. Bringing folks together from the private sector and municipalities and, of course, water managers at multiple scales, including ag and municipal water managers. to develop a program or programs that might look something like a regional demand

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management program, combined with an agricultural water resilience effort that would be deployed over years to achieve this supply and demand, and improve water quality and quantity in the region.

Let me just say that we're really just beginning to explore this now. It would involve mostly bringing folks together, as I say, from multiple sectors and parts of society to reach agreement on a problem. Then set solutions and bring some funding, some resources, to the table to make it happen. So I'll end there.

Connie Maxwell, NMWRRI.

Thank you so much, Patrick. So as you can see, there are a number of funding programs that are supporting and potentially will further support a lot of our efforts. So with that, I'd like to open up the floor to us talking about these issues and strategies. I've got Google Earth open for us to actually identify where some of these issues are and to start to prioritize.

With that, if you have any questions for Sam or Patrick or myself, certainly raise them. I'll start with, in the chat, Davena, you mentioned thinking of visions that some of the visions would go beyond. I would say, if there are any particular visions that people have that require a different year, by 2050, or a climate change vision by the end of the century, certainly please throw those in.

Any time another vision comes up let's throw that into the list. We listed some of the issues and strategies. Anything that people want to add in terms of those issues and strategies? Or we can just get started with talking about the the ordering of how we want to approach these, where do we want to do these pilot projects? These priority first steps—what are some of our highest priority areas? So I'll open up to the floor. But I will also say, Davena, is there something you want to add from your chat, or that I haven't captured from all the chats as of yet. Would anybody else like to add, as well?

Davena Crosley, NMED.

I don't have anything else right now, but that kind of opens it up to where I'm not trying to come up with something that's achievable in one decade. Thank you for clarifying that for me, Connie.

Connie Maxwell, NMWRRI.

Yeah. And I think your point about interim steps as well is important. We really want to be thinking about what's our short term high priority items that we need to deal with. What's our medium term we know we could make quite a lot of progress steps on? And, you know, what are our longterm visions? So issues and strategies and any more visions? Or even just, what should our next steps be?

Will Barnes, NMSLO.

Connie, this is Will Barnes from the land office. And I'm sorry that I was not able to join early on. One, and maybe you've already talked about this, but really briefly one vision is a kind of an **economic and community resilience, integrated with ecological resilience. Just that sense of the human community being integrated with with the land community.**

So just as a vision for how we do land management in the future. And the

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collaborative requirements that are necessary for real resilience. I would just throw that out there.

Connie Maxwell, NMWRRI.

That's great. In keeping with the discussion about issues, I know that on one particular meeting that we had with BLM, we started to identify real hot spot areas. And I know that Dennis has developed a survey tool that would enable us to capture that more. I think that's one important aspect. I did hear one comment, which I thought was really useful. And when we talk about prioritization, sometimes it's difficult, cause it seems like we're saying one area is more important than another. Sometimes that's misleading because we need to be working on two things at once. But maybe think of it as really our sort of action plan and the ordering of what we want to focus on, which can have concurrent efforts. Issues, hotspots, what are your organizations facing?

And if those issues that have been listed so far and captured by those survey are good, then what are more of the sort of hot spots and places that you want to start? Where do you want to do the next pilot project?

Zachary Libbin, EBID.

So Connie, from John Gwynne at the flood commission's perspective and EBID's perspective, with the existing flood control infrastructure, as it's been relatively well covered, **we have sedimentation issues that impact costs of providing flood control. Sediment is reaching flood control structures**, especially John has some of these serious issues, where they have dams that are pulling up sediment way too fast and need some upstream efforts, like the one that we're talking about today and in other times. It would make a huge difference to their ongoing costs, to what is really similar to what I've mentioned, as a vision: finding ways to improve that upstream watershed health, the resilience or improvements to keep that sediment in the water up on the watershed.

Connie Maxwell, NMWRRI.

Great. Thank you, Zach.

Xochitl Aranda, IBWC.

I can add to that, Connie. From past experience and observation, when we do have localized flooding, it's due to the flood control structures that are in the communities. As far as the levees on the river and making sure that the flood capacity is maintained and removing sediment from the river channel in order to do that. That's for a design flood. That's where a hundred year storm that flows in the river and that's to keep it from flowing into the adjacent properties. And of course we want to make sure it's clear, so that any runoff does enter the river without any obstruction. **But when we do see localized flooding, it is because either the drainage channels or retainage ponds are filled with sediment and do require much more frequent cleanup and maintenance.**

Connie Maxwell, NMWRRI.

Thank you. That's an important nuance that the localized flooding is directly due to the flood control infrastructure being filled with sediment. Or the flood control system. Some of it. The river is obviously part of the system.

LRG Workshop Visions for the Future, cont.

What do you guys think about the idea, as we're going forward and talking about this as a campaign; I think the particular process that we're following is very much as Xochitl described. And I don't think I mentioned this particular slide itself. One of the things that we want to do is keep building these visions and goals. Because that really is what guides all of our process. We are building this collaborative network of partnerships across the landscape. We've obviously made quite a bit of headway. Then we're doing the knowledge and evidence building and exchange where we're characterizing the critical dynamics of the ecosystems and the communities that rely upon them.

And I think at this point, one of the things we really want to focus on is, what don't we know that we need to know? What more do we need to study? As Zach mentioned, and as is clear from looking at the groundwater systems, it's not so easy to really characterize what is happening with the aquifer itself.

So that would be a good gap that we want to work together on to make sure that we really have the most complete understanding and the best data to understand that. And then what are our triggers for action, much like a drought plan would call for? And then in every action, as Xochitl mentioned, the adaptive management component, we learned from everything that we do, and that gives us more knowledge and evidence.And it gives us the ability to assess the capability of these different actions to achieve the visions that we're describing. So given that as our process, different organizations have made commitments to this effort. BLM has been working on the priority project of the Rincon Arroyo, that the Stormwater Coalition identified. Perhaps, in your organizations, you could describe what commitments your organizations have made to date to addressing watershed health.

And then that could be part of how we start to work with producers. And when we meet with focus groups and we talk with producers about their perceptions and issues, that could be something that could be highlighted.

Sam Fernald, NMWRRI.

I have a thought, but I don't want to hog the floor if somebody else wants to go. So when there's an open space, I have a thought.

Connie Maxwell, NMWRRI.

Go ahead, Sam.

Sam Fernald, NMWRRI.

Basically I'm just reflecting on the watershed, because I think maybe we heard about the importance of project assessment on the ground. What's being done to go through some of these problems spots, which I agree is a great way to actually make a difference, especially when you start up in the watershed, because that's so important. Because if you don't start up at the top and you try and do a big project down in the watershed, you can still get wiped out by that flood that happens because your watershed isn't healthy. But then I'm remembering, Connie, some of the work you did to show the priority areas. The most recharge, the most amount of water that can be spread out on the landscape in many cases is where that runoff is concentrated farther down the watershed.

So I'm thinking there's room for everybody here to be looking at what's happening in the

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Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

channel where we have the most impact, and what's happening up on the watershed, where we have the most chance of doing a project on the ground that actually heals the watershed. That's why I didn't want to interrupt anybody else, but I think as we're prioritizing, thinking about the place on the landscape, and that also extends to the valley where all these other things are happening, might be a way to think of our watersheds.

It's a little different than what we heard about with the Rio Puerco obviously, where one of their biggest problems is sediment off the watersheds, and that's just one of the issues we have here. Watershed management is, of course, different without as much forest as they have in the Rio Puerco.

Some of the thoughts about looking at the watershed, having these multiple objectives is what I was trying to get to. Spreading the water is going to be most effective where you have water that can be put on the floodplain. Healing erosion, that's going to be most effective where you can get on the ground and have a project that heals the erosion.

So that might be a way to prioritize these multiple efforts to have multiple objectives. Thinking of the watershed scale.

Connie Maxwell, NMWRRI.

Yeah, I think that's helpful. It is true that when we go out onto the landscape and look across the landscape, particularly in terms of upper watershed restoration, it's overwhelming.

We remember from our field trip from the Rincon Arroyo, the Rincon Arroyo watershed itself is 135 square miles. Where do you start? So one effort would be to look at where we have the opportunity to spread water. As you said, Sam, I think that's an important objective. And we can apply the study that I did on the Rincon Arroyo to the rest of the Hatch and Mesilla Valley.

One thing I found was, like you're also saying, addressing erosion where you can access it, but also trying to really document all of the hot spots that you guys recognize. I think we can go in both ways. Where do we have larger floodplains where we can spread things out?

Some of those areas might not be that important because they are spreading out and therefore you don't have erosion down below. And so then you come out from the other end as well. Where's the problem occurring? And then look upstream from there.

Davena Crosley, NMED.

Connie, as far as prioritizing projects, **it makes sense to me to look, as you were just saying, where the problem areas are and look upstream from that**. And as Zach pointed out, places where there are safety issues, where there are dams that could blow out. We know that there's a problem in the entire watershed.

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As you were saying, it's just overwhelming. So **maybe prioritizing safety areas would be one way to try to narrow it down.**

Connie Maxwell, NMWRRI.

I think that's a good point. Where there is a safety issue, that's probably a good indicator for multiple upstream issues. Yeah.

Zachary Libbin, EBID.

And Connie, to add to what Davena is saying, go a little bit further down that path. Some of those hotspots, I could list the ones that come to mind for me, but two examples are **the Placitas Arroyo and the Rincon Arroyo, huge watersheds. They don't have any flood control structures on them or sediment control in the watershed. But addressing the issues in the watershed would both address sediment, water issues, improve safety like Davena was saying, and also reduce costs.**

So the Village of Hatch is looking at $60 million for improving the banks of the Placitas Arroyo to protect Hatch. If a few million dollars of upper watershed work could reduce their costs by more than that, we should definitely be looking upstream rather than downstream for some of those solutions and similar for some of these dams.

It would be hard to justify to go too far into the engineering realm, reducing the size of the spillway for a dam, because we're going to do something in a watershed that we hope will last, probably won't get all the way there. But the Plactitas Arroyo and the Rincon Arroyo, using those as examples, where there the flood control aspect of those is super expensive and upstream efforts would probably pay dividends compared to what they had to do downstream. And they're really similar—we were using John Gwynn's dams, for example—these dams that I think you've mentioned that if you clean out the sediment, more just comes right back in. We're not thinking enough about the upstream issues and keeping the water and the sediment on the watersheds. But those watersheds with existing flood control, those costs could be better spent upstream rather than always addressing them over and over again inside the flood control structures or the associated arroyo or whatever it is. Again, with the Placitas, that brings in a ton of sediment to the river so there are costs of the river there are maintenance issues within the channel itself. And there's probably some ways upstream that we could reduce those costs of the flood control and the maintenance just by improving the watershed health. Although noting that those two examples are huge watersheds with huge issues, but just using them as examples too.

There's upstream work that could pay dividends for health and safety as well as maintenance costs.

Connie Maxwell, NMWRRI.

Great. Thank you, Zach. Other examples of different areas in the watershed that are good examples for some of the issues. Xochitl, you'd mentioned you had a list that IBWC had identified a list of priority areas.

Xochitl Aranda, IBWC.

I do. Let me pull that up and I'll share with the group. Unless Liz knows them off the top of her head. I know she's worked this for a long time now, but let me grab it while she's doing that.

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Connie Maxwell, NMWRRI.

And any other issues. I know Jessica, you had given me a little bit of background on some of these issues that Rusty and Jessica and John and Zach, you guys had talked about, all within the west Mesa itself. Little Holla, La Union, Gardner Dam and then even issues up here at Butler-Cothern where there are issues with these two small structures and the NMED watershed implementation project was just approved by APA not kicked off yet, but we're getting close to that being kicked off. The city identified several areas where green infrastructure would be helpful for dealing with arroyos within the city itself. There are several areas there that are in that project.

Jessica Knopic, BLM.

I feel like up in the valley, you can find large watershed problems, anywhere you throw a dart and maybe we need to decide what values to prioritize off of. **I think safety is always going to be a critical value. Maybe review the programs we already have and other agencies have started. And what re-progress ahead in certain projects. And make that a project priority.** When you were talking about the city's urban infrastructure, we're looking at trying to look at doing more reports for Alameda Dam to figure out if Alameda Dam can be modified to improve safety, as well as that green infrastructure with the city.

Connie Maxwell, NMWRRI.

Where is Alameda Dam? This is Las Cruces Dam, right?

Jessica Knopic, BLM.

Beside Oñate High School, or south of Oñate High School.

Connie Maxwell, NMWRRI.

Oh yeah. Not being a Las Cruces native, that's tough. I'll add it later. Alameda Dam. Okay.

Jessica Knopic, BLM.

So just east of the Las Cruces Dam.

Connie Maxwell, NMWRRI.

Gotcha. I think that point that you're making, that the issues are throughout, I think that's a really important point. So there's two things that I think stem from that. You were saying review the programs that people have enacted. That got a little bit garbled. Was there something, programs, that different agencies have started and look at what's in front of them? Was that the point? Jessica, can you hear us?

Jessica Knopic, BLM.

Yeah. But **I feel like every agency has programs and every agency has things they are trying to do, but we're all limited.**

And so the goal of this is to come together to help, build this network and this working group and to achieve bigger things. And maybe we need to understand as a group, what other agencies have in their pockets already, but the maybe need help with. I'm sure road maintenance is already something everyone's doing, but we need help with doing it in a way that we're eliminating soil erosion.

Dennis McCarville, EBID.

Hi Jessica, this is Dennis again. Expanding on

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that, if you look at what they've been doing in Northern New Mexico, with the thinning in the forest and that type of thing, the amount of resources they have managed to come up with and the boots on the ground and all the labor they've done. If the similar amount of effort could be made down here, I think you would see some really big changes.

Jessica Knopic, BLM.

Yes, Dennis, I agree. I think we're all on the right track. And I think we all have the vehicles already in our offices to hire boots on the ground. We're just missing some of the large goal: to ask for funding, so we even know what to ask for. And maybe the small detail of the personnel that can actually manage a crew on the ground. But we all have vehicles in our jobs where we could do a lot of work.

We just need to see that overarching goal and how we can put our little fundings and contracts to the big goal. Possibly when we all have things already, if we had a little bit of help and a little direction, we might be able to point it all in the same place. So you get a big outcome.

Connie Maxwell, NMWRRI.

I'm hearing two visions from both of you guys. In particular, Jessica **build a network and a working group to achieve bigger things**. I think that's a good vision to start to achieve our goals on the scale of the region, maybe our goals right now feel like objectives, but, if we thought about it as the whole region, it is a bigger goal, a bit bigger vision. And then Dennis, **build a well-funded campaign?**

Dennis McCarville, EBID.

If I could help you out here. There is the New Mexico Watershed Land Owner's Coalition has been funding efforts towards watershed repair up there in the north, and they take their grants and they leverage those to get even more money. They have been able to do quite a bit of work.

Zachary Libbin, EBID.

So I think what Dennis is talking about is the **Rio Grande Water Fund.** And those guys are also interested in talking to us about efforts that they can do in our area. I think that's a great point. Dennis says those guys are experienced leveraging funds, and there's definitely ways to leverage funds and get outside support beyond the obvious .And those guys have some really good experience with sort of the NEPA side of things. In summary, they've helped with NEPA for the Forest Service, such that they can focus their efforts on actually getting the prescribed burns or whatever thinning or whatever it is done when the NEPA seemed to be the stumbling blocks. They paid for the NEPA, accomplished that work through the Forest service, or I think with most of the Forest Services. They were able to get them off of center and help them get those projects actually going.

Jessica Knopic, BLM.

That would be fantastic. And I'm also thinking that everyone is already accomplishing tasks on the watershed and for flood control that maybe we just need to know what to report for you to track widgets that are already happening in this network group. I think if we started putting all the

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little things together we do. We would have quite a list of widgets that we are already accomplishing.

Connie Maxwell, NMWRRI.

Yeah. I think that's a nice objective that would contribute to the building of this network. Because I remember one thing you and I talked about was **if we knew everything that each other was doing, then we would also start to see where some of the things that we're doing can help each other.**

And that coordinated effort then becomes that much stronger.

Jessica Knopic, BLM.

An example on that is I remember being in a meeting in T or C where they mentioned that the city or county maintenance, when they clean out a culvert are just now letting the local BOR know. And so they're going downstream behind them and cleaning out the entrance to the river in the same schedule order.

And that was just a matter of someone pointing out that they needed that communication and they're all willing to get onboard to do it.

Connie Maxwell, NMWRRI.

Yeah . Does anybody have a visualization of what that might look like? I know that there was someone, I think it was an Army Corps individual, and he was going to actually give us a presentation of that at our Stormwater Coalition meeting. Like in drought projects, sometimes there's impact reporting. That sounds like it's a lot of work and somebody would need to be paid to manage it. Can anybody imagine the cleanest, easiest way to do that?

John Gwynne, DACFC/SC.

Connie, this is John. Nice to see everyone or talk to everyone. So that was Bruce from the Army Corps and what he's was talking about is the GIS-based mapping system where individuals can go out and on their cell phone, mark locations and add photos and other comments for things that are happening. And you're right, that would take some effort to set up and some effort for someone to track and monitor and update so the formats all work. But yes, Bruce is still planning to do that. We just have to get him scheduled. He thought it would be better for one of our in-person meetings.

And with COVID still an issue, travels are still limited for some folks. We're still waiting to see, to get that set up.

Connie Maxwell, NMWRRI.

That sounds great. And that sounds like that would be really helpful with some specific items. I wonder as well. This idea had come up and I think it had come up when Jessica, you and I were talking. I think you had mentioned this idea before that people are doing a lot of efforts already.

What do you guys think about the idea of me sending an email to all of your organizations and asking you what current and future commitments has your organization made towards watershed health and would consider making. And that might accomplish two things.

One is, it would give us an ability to see how people are currently connected. We could

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do a little bit of a map of, whose responsibility is what, and what are the commitments that are being made. As well as, it would give a space for organizations to brainstorm about what additional commitments could be. What do you guys think about that idea?

Jessica Knopic, BLM.

I think everyone online feels that they're the ones that would have to fill that form out. It's another workload for us.

My only thoughts on that, when we talk there, we are talking big goals, longterm environmental goals, resource goals, watershed goals. But when you're asking for these projects already, are you asking for small things? Who do you ask for when I want to know when you do culvert maintenance, or are you wanting to know the commitment we've done for watershed health, like the large commitment? BLM has committed to watershed health through our programs and supported this. Or are you looking for like a whole laundry list of things?

Connie Maxwell, NMWRRI.

I think the former, the the overall bigger goals so that we could include it in this watershed plan. And it could give an idea of what different entities are already doing what. But it would also help give us a little bit of research to map out how the different organizations are connected.

And I think the idea of efforts that are detail oriented on every little effort, I think that's going to need some thought because we really want to make sure that we understand what the objectives are. Like, the example that you gave of one entity being able to see the activities of another entity and therefore follow up. I think we'd probably want to target that. And talk about that one a little bit more. So I was thinking bigger goals, bigger visions.

Will Barnes, NMSLO.

Hey this is Will from the Land Office. A couple of things. I think we might start smaller with just a meeting like this, where everybody is just meeting and you get a regular opportunity to hear what's going on and who's doing what. **Just as an example, the Land Office is meeting monthly with the Last Cruces BLM, and we just spend an hour a month and share joint projects that we're doing together.**

And it's been incredibly helpful just help us both know what the other is up to and how can we collaborate, to get things done differently and better. So perhaps a face-to-face every once in a while conversation like this would be really helpful.

It also sounds like you're thinking of kind of a portal or a location that we could go to to find out what other people are doing. And I think those generally work okay, as long as people use them. But they get to be old and it's hard. You need to have somebody to keep them up.

And so I'm not sure that can ever really replace the getting together and actually talking about what we're up to. But those are just my thoughts,

Don McClure, BLM.

And then let me expand on that a little bit. In some ways that was where the Stormwater Coalition started is getting together to share

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what we're doing and to see how we can coordinate activities together and help others. I think that's still a target for where the organization would like to go, is make those meetings part of doing that.

Obviously COVID has made those things more difficult, but I think it's something that would really help us to understand what each institute is doing. Because I can tell you just from working with Zach and in the flood commission, if you just put the two of us together, we have things that we're working on north, south, east, west everywhere throughout the county.

And we intersect all over the place. And so even with the BLM folks we do the same thing. We have projects everywhere, and we intersect with them. I think it would be very helpful to continue that sort of conversation. I think the Stormwater Coalition meetings is a good place to do that.

Connie Maxwell, NMWRRI.

Yeah I agree that the Stormwater Coalition has done a great job of bringing people together and starting to accomplish that goal. I think that's something this project is: a Stormwater Coalition project, and it's occurring because we've all come together. I think one of the questions, John, and others as the Stormwater Coalition, playing a really great collaborative role in the region, any ideas on how to improve that or how the organization can help further that?

Don McClure, BLM.

I know that the Coalition is working on revamping itself in order to keep up with all these efforts that we're doing. Part of it is reassessing the organization itself in terms of bylaws and who are the main member entities in all the key strategies that puts it together.

I think that's going to be continued and an ongoing effort from now until forever. I think that's part of what will, as this project moves forward, help to reinvigorate some of the membership that has dropped off. To keep everyone in, to keep everyone interested, but also to energize them for the organization, being able to help others. Because let's face it, since we work with BLM and we work with EBID and the state Land Office, we're probably a little more fluid with those entities than say the Village of Hatch. So we may be able to help make those introductions and help make those things work for the places that can.

But I think that sharing projects and showing how all of those efforts compound over time is what will really show evidence of what we're doing. Not just having conversations about them.

Connie Maxwell, NMWRRI.

I think we've started to build a nice kind of list of visions. I think we've got methods here and in some of the kind of nuanced areas. Any other visions for the future that folks want to add?

Will Barnes, NMSLO.

There's something I've been wanting to say. I'm not quite sure where, or how, this fits, **but one of the themes I think is there's a scale there. Scale problems. There's a scale issue here about how we use, how we address the problem. It's easy to spend money on a single point, and those tend**

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to be more expensive, but you can, as an agency, just say, "Hey, let's throw money at this and fix the dam or whatever." But that's a single place. The problem with working in the upper watershed is that it's really a diffuse problem.

And it's a lot of little bitty structures that you want to do. And it's grass. Those are much less expensive maybe, but they're spread out all over the place and they require a different kind of maintenance that's maybe more annual rather than decadal or something.

If we can start to think about how do we think about scale because we need to work at both scales. And how do we really integrate long-term maintenance into our thinking about these projects? It's easier to do a big dam fix and walk away for a long time than do the watershed structures that you're talking about in the upper scale. And you need to go back in there and work on those on a regular basis.

So that implies engaging a longer term sort of community training effort. Who's going to do that work. Where do you get those people? How do you build the maintenance of those structures into your grazing practices? So that it's part of the people that live there need to know how to do this, and it needs to be part of what they do.

I think to be thinking about training, to be thinking about integrating this work into the long-term scale of the life of the community, those are things that we have to wrestle with. I think one example is the Land Office has at least two of those work project dams east of Las Cruces that were given to us by WPA in the thirties.

Nobody actually owns them, but they're on our land. Nobody's maintained them ever as far as we know. And so they're a big problem and we can't fix them by ourselves. So we have to find a community approach to that. That's just an example of something we're settled with that we have to figure out. That's my thought. How do we integrate the scale question. If we really want to fix this in the upper watersheds, we need to find ways to get the communities involved and have it be part of the community. Maintenance of that landscape.

Stephen Scissons, USACE.

Connie, this is Stephen Scissons with the US Army Corps of Engineers. Can you hear me?

Connie Maxwell, NMWRRI.

I can. Thank you, Stephen. Sorry. I don't know how long you've had your hand raised.

Stephen Scissons, USACE.

Yeah, it was virtually getting tired. No I just wanted to offer a few comments. And on the dialogue, of course, that's been said by many folks and underscoring this watershed concept.

We saw a lot of this and continue to see a lot of this with the Army Corps when we do a lot of our bigger projects. One example is I know, obviously the focus is in the Mesilla Valley and Southern New Mexico, but, just underscoring it. And a lot of folks here get it. Colorado Springs definitely had a big impact in its development in terms of Pueblo, Colorado. Pueblo, Colorado saw a lot of that upstream effects and how it's been dealing with its sediment management

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flood conveyance. So obviously there's a lot of examples like that to be learned, in terms of development. And then on the other side, in regards to the nature of the natural environment, our wildfire experience at the Army Corps definitely has had an impact in the way we look at watershed scale problems, right?

Santa Clara Pueblo, for example. We all know Santa Clara being out there with the forest managers and talking about planting a million trees over the next 20 years. How doable is that? Things like that, you got it, Will. That's exactly right. **Scaling these problems in terms of what is it going to take at the watershed level?**

Because you've got guys like Zach and John handling it down at the terminus point, and how is that balance all achieved in regards to what the outcomes that the coalition is trying to get to? It was obviously that watershed concept. I don't think can be any more underscored. It's definitely a priority that the coalition needs to be seriously thinking about. And then my other question, related to the ability of the Coalition to carry out lobbying efforts. And full disclaimer, we always say this at the Army Corps, we can't lobby for anything.

We more or less let local communities and others lobby for funds and things like that. But as a coalition, and I think Zach has some great examples with New Mexico Dam Owners Coalition, and John, that the voice of a coalition like that in Congress is probably a bigger voice than smaller communities trying to hit up their rep or state rep.

So, what would be the goal of the Coalition as a unified voice to obtain funds for some of these larger scale problems? Because you're easily in the millions of dollars in trying to address these concerns. So those are just some of my comments, Connie. And I'll stop there.

Connie Maxwell, NMWRRI.

Thank you so much, Stephen. One of the things that we had started to envision, and I remember having this conversation with Angel Montoya a long time ago and saying, it feels like we need a crew for the region. Like the golden gate bridge. A crew of folks goes in and does watershed restoration across the region and just keeps going. And it goes back and does maintenance when it's required and so forth. That might be a nice target for funding. That the crew be large enough. That the crew have priorities to integrate youth. I remember, Angel, you had made the point that the involvement with the Soil and Water Conservation Districts would be a really nice structure.

Certainly they play a leadership role. And we heard Ed talk about the crew that was run through BLM. What do you guys think about that idea as a focus?

Angel Montoya, PFW.

So I have a comment coming. This is Angel again. The thing that I keep hearing from this group, and it came out with some of Zach's comments, is **how do we reduce recurring maintenance activities by building a healthy watershed; ecologically and economically, because it's got to benefit everybody in the big picture for it to work.**

I think it has to benefit everybody. And I think you bring up a good point. I do see the Soil and Water Conservation Districts as a really

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good outlet for educating the community as a whole. Your Soil and Water Conservation Districts have a good connection with the people on the land, where I think you're going to make the most change. So that's my comment.

Connie Maxwell, NMWRRI.

Vision: reduce occurring maintenance issues by restoring the watershed. You said ecologically, I think you said a couple of more things. Is there anything else in that vision?

Angel Montoya, PFW.

I said by building a healthy watershed, ecologically and economic.

Connie Maxwell, NMWRRI.

Got it.

Dennis McCarville, EBID.

This is Dennis. I just wanted to jump in and Connie, maybe you could just mentor in the Master Conservationist Program.

Connie Maxwell, NMWRRI.

Dennis, why don't you describe it?

Dennis McCarville, EBID.

I think I'm not the one to do that. Basically, their goal is to educate the community. They are providing courses right now at this moment that can start that process. And they're trying to get a lot bigger. And for anybody who doesn't know about it, they can probably use your support.

Connie Maxwell, NMWRRI.

Craig, I see you're still with us. You want to add a couple of words to that?

Craig Fenske, DASWCD.

Craig Fenske. We worked two years putting together the Master Watershed Conservationist Program. It's a series of eight community forums and we have a large number of partners, some of which are on this call, that are contributing to those educational efforts.

As an example, the next forum will be John Gywnne and David Dubois talking about climate. To find out more information about it or sign up for it you can go to the Doña Ana Soil and Water Conservation District website, and we're going to archive each of those eight forums and have that for future reference.

We're engaging volunteers to participate in some of these projects that are being described in the upper watershed, the green infrastructure kinds of projects that we're looking to engage volunteers to actually do some of that work. I think the bigger side of that is not just the onsite projects that they will accomplish, but I think the important element is also the educational and people in the community will be able to help advocate for the watershed itself.

So for more information, you can go to the Doña Ana Soil and Water Conservation District site. Connie has been one of the huge participants in that. And I think help us with the vision and to put that together.

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Connie Maxwell, NMWRRI.

Xochitl, are you still with us? I know we had we had talked about you giving us some examples of some of your priority areas.

Xochitl Aranda, IBWC.

Okay. I'll just share the problem areas that were identified and their reaches.

But we can attribute that to the confluence. So the problem location number one, and this is from upstream to downstream this is the Tierra Blanca Creek to Sibley Arroyo.

Connie Maxwell, NMWRRI.

Do you have the ability to copy and paste that into the chat? I'm thinking I'm not going to get the spelling, let me see if I can, cause I'm looking at a map. So let me see if I can. Did you try to share and not have the ability? I realized I hadn't said it to multiple participants. Would you like to share what you're looking at?

Xochitl Aranda, IBWC.

Okay. Yes. Let me try.

Connie Maxwell, NMWRRI.

Okay. And Will, I just saw your comment that you liked the idea of a crew perhaps funded by a water fund . That's a great idea. Thank you.

Xochitl Aranda, IBWC.

Are you able to see my screen? Okay. And I'm sorry, I can't zoom it in any further and I couldn't open the PDF. So this is as good as it's going to get.

So at the top, you'll see the problem location number one, the Tierra Blanca Creek to Sibley arroyo. Downstream from that, we've got the Salem bridge to Placitas Arroyo. We've identified here Thurman one and two arroyos and that's where we have our pilot projects. That was going to take care of that problem area. But then, of course, we still have the Placitas Arroyo that's a big contributor of sediment.

Problem area three is Siphon A restoration site to Rincon Siphon. And basically all of that is due to the incoming sediment from the Rincon Arroyo. We've got Rock Canyon to an area that's below a Rincon Tonuco drain.

And then we've got down here in the Las Cruces area, the Picacho Drain to downstream of Mesilla Dam. I'll scroll down. We've got the east drain at Vinton to Vinton Bridge. And then we moved further into the El Paso/Sunland park area at the Nemexas Drain and the Montoya Drains. Most or all of these we clean out on an annual basis just to maintain the flood capacity.

So the purpose of this study was to identify the problem areas where we see sediment aggredation and deposition. It studied the whole reach of cannalization. And then from there were recommended channel modification alternatives instead of going in and cleaning out the channel, what measures can we put in? A lot of them had to do with improvements within the arroyos themselves. And for us, basically any project we can carry out is constrained to our right of way. In many of these locations, we have a very limited right of way in which any improvement that would provide any significant benefit could be built.

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And so that's why the Thurman one and two were selected. We did have ample space there to build something of a size that could provide a significant benefit. The other area we looked at was doing some form of sediment basin there. But again, that's a very restricted space that we have to work with. As well as the Bignell Arroyo, that's another location that we looked at.

So in looking at the different alternatives and ways to prevent the sediment from entering the river, our greatest partners are going to be the stakeholders and the adjacent property owners and the municipalities.

Because it looks like we're going to need to implement something further upstream that's not within our right of way, we were working with the Village of Hatch for some sort of spreading of the arroyo water before it reaches the river.

Things like that, we definitely have a lot of interest in trying to find solutions upstream of the actual use, within the watershed, so that we're not having to spend so much time. Our operations is basically cleaning out the sediment every year when it's not irrigation season.

Non irrigation season, we're removing sediment from the river channel and the arroyo confluences, and then irrigation season comes that sediment that we removed that's being stockpiled, we'll be transporting to deposit sites.

So really our main focus in this area, for IBWC, is sediment removal and, of course, maintaining our flood control structures. We are currently carrying out another study using LiDAR, using sediment transport modeling in order to determine a more detailed study than what was done here.

So we're looking forward to the results of that, and identifying more concrete alternatives, more specific approaches that we can take, because we have removed sediment in the last couple of years and significant amounts of sediment, it does reflect that change.

It does reflect the channel geometry after the sediments been removed. So we're looking forward to that and, of course, being able to share that with our stakeholders and our partners in order to be able to come up with these solutions.

Zachary Libbin, EBID.

Xochitl, this is Zach. I think your comments are great and we definitely like to work with you on all those efforts. And certainly those are some of our big picture items that you're talking about there. I think it's important that we all think outside the box, too, in terms of right of way. For example, the Rincon Watershed is really nobody's property besides the BLM and the ranchers that are grazing out there, but we all are impacted by it.

And so we have to think outside the box in terms of right of way. That there's not just a bid to just stay within our right of way. We don't have very much besides canals and laterals and drains and our 25 flood control dams, but thinking outside that box we can all work together on some of these efforts, like bringing in funding for some of these projects.

We may not move our equipment up onto the watershed, but we can support the efforts beyond just focusing within our right of way

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Connie Maxwell, NMWRRI.

And Xochitl, is that study just looking at the channel within your right away, or is that also looking at potential upstream threats to the Rio Grande valley?

Xochitl Aranda, IBWC.

I'm not too sure, Connie. I'm not managing that project, but I believe it's focused on just the river. And then of course looking at the watershed and runoff and the sediment that enters the river from all these different arroyos. As far as flow and sediment transport, I do believe it's just focused on the river.

Connie Maxwell, NMWRRI.

It certainly will be interesting to see that particular study. It probably will validate the hotspots that you have identified. But it'll be interesting to see some of the estimates that come out of that.

And Zach, thank you for your point about thinking about things on the watershed dynamic scale and needing to think out of the box and our right away. I think that would warrant a particular vision. I know, folks have said, Jessica build a network and working group and achieve bigger things.

People have talked about coordinated efforts but I think something along the lines of, a coordinated approach where we're working better together. I don't know. Zach, could you maybe put that into a vision where we're more in step with each other or going beyond thinking outside the box? Put it into a vision.

Zachary Libbin, EBID.

If John's still with us, I'm going to kick that to him.

Connie Maxwell, NMWRRI.

What do you think, John?

John Gwynne, DACFC/SC.

Sorry. John was multitasking. Say again?

Connie Maxwell, NMWRRI.

Zach mentioned the point that it's important we all think outside the box, that we're coordinated. The IBWC has its challenges legally, being constricted to their right of way. But as you just heard, Xochitl was talking about how they're definitely concerned about upstream and the need for their greatest partners to be stakeholders and municipalities.

Maybe putting a vision to that, that in this watershed, one of our visions is that our coordinated efforts do think outside the box, do go beyond our own right of ways. I'm struggling for a good way to put that into a vision.

John Gwynne, DACFC/SC.

So the way I look at this is, and maybe this will help, is that **each of us have our constraints by our organizational rules and regulations, policies whatever they are.**

I think we all see the problems and we know what the problems are, or at least have a general understanding. I think it behooves each of us to see what we can do within our own framework that will help us achieve

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these goals together. And as an example, we were having issues with getting sediment out from behind dams. These particular dams were on the BLM property. Well, BLM has a tool in their toolbox that basically is a free use permit that allows us to get rid of that material. But if we don't know what to ask for when we talk to them, then we don't know that tool even exists. So one of the things each of us can do is to help the others by saying, "here's something that we can do that's within our realm and lets see if we can find ways to make the tools that we already have work."

And I think that's the important part here, is that we do have constraints. **Everyone, we're constrained by state law and federal law, as well as local policies. And I think the key is to be able to work together, to find ways to get things done within the frameworks that we have already put in place, not necessarily to breaking any of the rules or to take someone outside of their levels of expertise, but to find ways within our own processes that we can get things done.**

Connie Maxwell, NMWRRI.

Yeah, that helps. One thing I'd like to end on, and I don't mean to open up a whole other topic, but it occurred to me that as you were talking, John, that's one thing that we haven't really talked a lot about. But as a final note, are there barriers that are in place now that make the objectives and the visions that we've talked about more difficult?

And the one that I can think of in particular, certainly in terms of water availability and water quantity, one of the issues of the valley itself is that water use with farming really incentivizes trying to pick the crops with the highest consumptive use because that establishes your water rights.

So there's a barrier to water conservation practices by farmers in particular. And perhaps there are ways that we can do pilot projects that maybe don't change priority appropriation, but we can come up with agreements that can mitigate some of those. Or do an ecosystem service payment kind of program that incentivizes a different approach.

Any kind of final visions on turning around any particular barriers that might be a strong dynamic for our region?

John Gwynne, DACFC/SC.

I think we've talked about this in the past. In that, obviously this entity- as Stephen puts so eloquently- is that lobbying for us is probably a really big thing in trying to get some of the rules modified to help us. Some of them could have to do with water rights. As an example, you're supposed to empty a dam within 96 hours- flood control dam.

And so maybe that could be a way that helps, and it requires developing the tools to make that happen. I think those are some of the hurdles; that we have to look at procurement regulations in all of this we're planning to do all these things.

When we look at the procurement regulations themselves, things get really tricky for public entities in terms of procurement. Can you spend public dollars on private property as an example? Not really. The state pretty much precludes that it's in the constitution. And there needs to be some ways to figure out how to make some of these things work.

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And so there's a lot of pieces and parts that I think that can be moved forward in terms of policy. But I think they're also very far out there. They don't happen overnight. We've also talked about, and there's some movement about developing, the maintenance fund within the state for flood control facilities. **There are so many of these orphan structures out there that are really not ever meant to protect people. But because of hazard creep, there's many entities that don't have the dollars to go out and operate and maintain these facilities properly.**

And that puts the public at risk. There's some movement to try to develop a statewide fund to help. So, does that answer your question, Connie?

Connie Maxwell, NMWRRI.

Yeah. That definitely helps in terms of some of the barriers. I think that gives us a nice kind of vision. That question. And I'll ask one last question as we go.

So we're working towards a bigger workshop that would include producers and so forth in the winter—January, February, maybe March. It seems like a good way to structure that workshop, would be for us, as different people working together, to come up with presentations on things that we're doing, certainly ask again if we've got the visions and the issues and the strategies right, but then also present some preliminary plans ideas and get feedback on those and use that as a place to build actual projects.

What do people think about that? Or if they have any other ideas of other barriers that we need to address?

Zachary Libbin, EBID.

Connie, this is Zach. I don't think this answers your last question. Building off a little bit of what John was saying and leading them to your question, a good example is the NRCS watershed project coming down the pike. Using that as an example, previous NRCS watershed projects, like the Green, Jaralosa, the dams that IBWC does. Most of that maintenance was cooperative between IBWC, EPA, DA, Caballo's Soil and Water Conservation District with the NRCS. So it was combined and nobody said, this is off of our right away. We can't help with this. It was documented that those were necessary efforts up on the watershed.

And so **further discussion on the value of these projects to the entire system, to the different entities.** I think that's a discussion and working together on those visions that gets us to being able to work together beyond our right of away.

Connie Maxwell, NMWRRI.

That's a great example, **that there are mechanisms that do allow different agencies to work together and leverage each other's right of way, so to speak. And then maybe, this is going back to that original question of thinking outside the box and collaborating together, we utilize existing mechanisms that allow us to collaborate. And maybe expand mechanisms like that.**

That's a great example. And I'll hit you up for some more details on that example. We've got a lot of things going on. I think that's part of the challenge with us as a group is that we've got a lot of little things going on and now we're trying to build it into a cohesive movement.

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So if people have any ideas about how we should structure that workshop in the winter, please send them along. But also, let's think about how that should be structured, the different things that we want to start to put together as presentations. Who would want to present? Which projects? Different models and hit the different topics that we addressed today.

We'll put together today's discussion into a bit of a synthesis document and send it out to you guys. You guys take a look at it and add to it as you see fit. But any final thoughts before we head off to lunch for a much needed break.

All right. Thank you everybody so much for spending the time today and exploring these ideas and moving this forward. Have a great rest of your day.

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LRG Panel

This panel was in collaboration with the Master Watershed Conservation Program, and began its first program organized by New Mexico Water Resources Research Institute. The program is led by Doña Ana Soil and Water Conservation District with partners NM Water Resources Research Institute; Caballo Soil and Water Conservation District; City of Las Cruces; Dona Ana County Flood Commission; Elephant Butte Irrigation District; Natural Resource Conservation Service; New Mexico State University Extension; Paso del Norte Watershed Council; and Spring Rains Consulting

Connie Maxwell, NMWRRI.

Welcome everybody, thank you very much for coming to our first Master Watershed Conservation Program event. This is a panel, The Future of Our Watershed in the Hatch and Mesilla Valleys. The agenda is in front of you. My name is Connie Maxwell, I work at the New Mexico Water Resources Water Research Institute, I'm a postdoctoral researcher and the lead of the Institute's Water and Community Collaboration Lab.

We are going to turn it over to two folks that really started this program. Craig Fenske, he's the supervisor and board chair of the Dona Ana Soil and Water Conservation District and Jerry Schickedanz, dean emeritus at NMSU. I will after that give a introduction Watershed and Watershed Planning and then we'll turn it over to our panelists. They will each make some introductory remarks about their perspective in this particular watershed. We have Gary Esslinger, the Treasurer Manager Elephant Butte Irrigation District; Jeff Witte, the Director Secretary of Agriculture for the New Mexico Department of Ag; Kevin Bixby, supervisor for the Dona Ana and Water Conservation District and the Director of the SW Environmental Center; John Gwynne, the Director of the Dona Ana County Flood Commission, and the chair of the Stormwater Coalition; Gill Sorg, City Councillor for the City of Las Cruces; Don McClure, the Assistant District Manager for the Bureau of Land Management Las cruces District; and Steve Wilmeth, a local rancher with extensive rangeland conservation experience.

I am excited to be participating with all of these panelists today. After they give introductory comments we will turn to a panel discussion, answering questions from the audience and from each other.

Jerry Schickedanz, NMSU.

I'm a retired NMSU administrator from the College of Ag and Home Ec.. Tonight is our culmination of a **concern I've had over a general lack of understanding and knowledge of agriculture and food production along with the importance of water**. In Dona Ana County we have a population of over two-hundred thousand citizens and there are approximately only 1,200 agriculture producers who are qualified by USDA for tax purposes. Therefore, it is no wonder why there's a lack of knowledge on food production and the importance of water with less than six tenths of a percent of the county involved in production agriculture. This example plays out all over the US same as here.

With the West in a major drought for the last several years and no improvement in forecast for the near future, the importance

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of water has come to the forefront. I envisioned some type of program that was patterned after the successful extension Master Gardener program where local citizens concerned about water could get unbiased information and what they could do to continue the education and informational process after they've been trained.

I brought this concern and vision to the attention of the Dona Ana Soil and Water Conservation District board when I was a supervisor. the board got the ball rolling and applied for a small grant to develop the curriculum. We began organizing and looking for partners who would help with the educational process.

The Covid lockdown came along and I was no longer a member of the board. But Craig and Jennifer kept the ball in the air and conducted meetings through Zoom. Many meetings later we've come to the time to reveal what many have been working toward. I hope you'll find the program educational and useful. Thank you.

Craig Fenske, DASWCD.

This briefly is our goals. Education is the first one, and we have eight forums that I will describe briefly. We also want to engage a service component of this and we're asking citizens that participate in the educational component payback, a little like the Master Gardener Program in the form of advocating for the watershed. That might be in a planning and engaging yourself in a planning process or engaging yourself in educating your peers or people in some form in our community. Then the second portion of that can be a hands on kind of project. We do have a grant to do projects on several different locations around the Soil and Water Conservation District: Tortugas Dam, some of the flood control dams, and the New Mexico Water Resources Research Institute will be taking the lead in that. But we'll be rolling out some of the opportunities for engagement in our community on the watershed as we proceed through the forums.

These are the forums, I want to say a big thanks to Connie for taking the lead, she's been a tireless participant in the planning and has been a visionary and I really want to say thanks Connie for taking the lead and stepping up to do the first forum.

We have over the course of the next nine months we have eight forums. Next month John Gwynne is taking the lead with the Dona Ana County Flood Commission and Doctor Chung, David Dubois will be one of the co-speakers on forum 2. Forum 3 we have several lead people, Kurt Anderson, Kevin Bixby, Doug Cramp with NMSU Extension and Mickey Dixon will be presenters kind of giving us the hydrology and (see?) processes for the Rio Grande.

The soils component will be in January and the Natural Resource Conservation Service District will be sharing their expertise in soils and geology.

The City of Las Cruces and Elephant Butte Irrigation District will be sharing watershed management and water quality. The city will be giving their perspective on water and water use, water treatment, and Zack Libbin with EBID will be presenting the EBID infrastructure and the agricultural uses of water.

Water laws and regulations is the next

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month. Regulations is a real maze and water attorney John Smith, who is also one of the supervisors of the Dona Ana Soil and Water Conservation District, will be taking the lead on that one.

Session 7 is Water Supply Management. Leslie Kryder owns the Spring Rains Consulting and will be the lead for that discussion.

Jerry and I will be taking the last session working together in the volunteer projects and that will be our concluding forum.

These are our partners (slide) and they've been planning these different forums and have been supporting us in different fashions so we really want to thank our partners, especially the people that have been engaged in the planning through the last two years. For more information, here's the link for the Dona Ana Soil and Water Conservation to register: https://daswcd.org/master-watershed-conservation-program/. If you register it will put you on the email list for notifications for he future forums and opportunities to engage in the program. With that, I turn it over to Connie, thank you very much, Connie.

Connie Maxwell, NMWRRI.

This forum is convened in partnership with the Hatch and Mesilla Valley watershed plan to inform the plan with the Visions, ideas, data, and issues that are discussed at this evening event. the planning project is a South Central New Mexico Stormwater Management Coalition, which we often call just the Stormwater Coalition. It's a Stormwater coalition project with the planning efforts led by our Water Institute. I put this presentation together in collaboration with our director Dr. Sam Fernald.

You can see that the Hatch and Mesilla Valley watershed, which is technically called the El Paso Las Cruces Watershed does somewhat coincide with Dona Ana County and it spills over into Sierra County. it extends from the Caballo Reservoir to the border with Texas and Mexico.

We all want a sense of what watersheds are but the technical definition is that a watershed is an area of land that channels all of the rainfall and snow melt to a common outlet. So, you can see in this diagram on the left the dark red dashed line. The ridges of a watershed really separate the watershed. So as the rain hits that land it all funnels down to a particular outlet. John Wesley Powell, who proposed in 1879 that the boundaries of our states be divided by watersheds, describes watersheds as "that area of land abounded hydrologic system within which all living things are inextricably linked by their common watercourse and where as humans settled, simple logic demanded that they become part of a community." And really that is what a watershed is. A watershed is filled with lots of ecological and human dynamics.

The Rio Grande, or Rio Bravo as it's called in Mexico, watershed is the largest watershed boundary of our region. Those large watersheds are often called the basin. It begins in Colorado and flows to the Gulf of Mexico. The 1900 miles of flows of the Rio Grande link us to 335,000 square miles of land area, three states, and two countries.

The dynamics of our watershed, you can see here in the state of New Mexico in perspective, in the valleys depend mostly

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on upstream surface flow from the north. But our upland conditions of course depend more on our local climate conditions. Watershed issues can include anything that affects the health of the natural resources and the ecology, as well as the community and the land managers which rely upon that ecology. The preliminary identified issues in the Hatch and Mesilla Valley Watershed Plan are that increasing erosion and flooding from degraded upper watersheds is the critical underlying factor.

Of course, water scarcity and aquifer depletion are huge dynamics in our Watershed. We have urban development that comes very close to flows. You can see here on the upper right, we have a need to increase coordination to achieve goals and reduce conflict and there's a need for coordinated Watershed planning efforts in the National Monument.

So our planning process begins right here in the upper-left. What are the visions and the goals built from what the community in this region values? What creates our sense of place? We then of course build a collaborative Network of Partnerships across the landscape. We then identify what do we need to know. And the bedrock of that is characterizing the critical dynamics of the ecosystems and the communities that rely upon them. Out of that we can then identify triggers for action. What are our priority projects? When do conditions fall below a threshold in which we need to do something? And finally, when we implement those experiments or those actions we need to rigorously assess their ability to achieve the visions of the community.

So let's start with the dynamics from the uplands. Increasing temperature and drought are increasing water scarcity across the landscape. It all starts with the vegetation. Decreases in upland soil moisture result in diminished vegetation cover. Then with that bare ground, the storms, which are becoming increasingly intense around the world, then increase erosion and wash the soils downstream. That soil, washed from the uplands, deposits in arroyos, clogging up those arroyos. Imagine it's much like a confined pipe, it clogs up the Rio Grande, backfilling it and it clogs up the agricultural system in the ditches. This reduces flow capacity for the farmers but flow capacity for flooding as well. And it increases that flood energy, which then erodes the berms [of the fields?]

Looking at the valley dynamic next you can see here right downstream from the Caballo Reservoir, this was a particularly green year, this was 2006, Google Earth from 2006. We know that a natural function of rivers is that flood pulses overbank flow onto flood plains. But in our age of dams overbank flooding at least in this region no longer occurs and it's really the farmlands that perform that function. When farmers spread the surface flow, the water from the reservoirs, across the floodplain fields, it recharges the groundwater and it maintains this floodplain as an extension of the riparian area.

So what we need to do is understand the natural dynamics so that we can understand how our management can mimic and restore those natural dynamics. When we use management to spread and slow flow that's when we can start to support that vegetation cover. Vegetation is, as I mentioned, central to everything. The more vegetation we have on the land, the more infiltrations that we're going to

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get. Vegetation acts like a little barrier to that storm flow and the roots as paths into the soil itself. We have more vegetation, we get more infiltration and recharge of groundwater aquifers.

This particular process is a feedback loop, the more infiltration we get, the more soil moisture we get, which then in turn supports more vegetation. This feedback process can disrupt some of the processes that are causing the issues that we experience in this area. When we infiltrate we reduce the flood volume and the flood energy that we get from high intensity storms. We might not be able to get all of it, those storms are producing an enormous amount of water, but we can get some off the top and importantly that can then support more vegetation. Over time it becomes a more powerful process. With that flood energy reduced, we have reduced erosion and reduced soil transport.

What does this spreading management look like? Ultimately, we're applying an approach that has similar dynamics as beavers. Beavers in perennial, in streams that flow all the time, have been shown to increase stream flows because they're slowing the water down, they're spreading it out, they're filling the soil moisture in the bottom of the channel and the sides of the floodplain, and on into the floodplain. And that whole system is holding water and releasing it more slowly.

Our management can mimic those functions. Here you can see a project that we did near where I live where we put logs from thinning projects strategically into arroyos and bumped the water onto the floodplain and you can see the grass response to that management. Then we go into the little rivulets up in the Watershed. Here it looks like this is tall, but this is really only one rock tall, so we're not creating waterfalls here. This is really a shallow, porous terrace where in the arroyos we can create these terraces, collapse that water, and slow it down. As we get onto the larger fields in our rangelands we can put stone lines or net wire fencing, debris dams or brush weirs along the contours and create very shallow pooling to infiltrate the water down.

As we get closer to the fields we can create passive ponds, not larger dams. We're having issues with larger dams filling up with sediment and then when you clean them out you start a head cut process which creates more erosion. These passive ponds bring water in and over bank and they can become sediment traps outside of that process.

And then, as I mentioned, in the valleys below flood irrigation from surface water can happen on fields, can happen in ditches, can happen on pastures. We need to know how much of this restoration can actually achieve our goals. And to do that we have to do studies on several scales. Here you see the scale of the restoration practice, the small-scale, the fine scale, the microscale.

This is a pilot project in the Rincon Arroyo Watershed, which is you can see, on the other side of the Caballo Mountains from the Caballo Reservoir. The outlet to this watershed is just downstream from Hatch, it's the village of Rincon. It's a large watershed, 134 square miles. It's the watershed in this region that contributes the highest estimated sediment into the Rio Grande. An estimated 36.2 acre-feet per year in a study done by the IBWC [Tetratech

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for them?] This particular study, which is funded by the New Mexico Watershed Implementation Grant, it's the Clean Water Act section 319 funds, implements restoration into sub-basins. A sub-basin is just a name for a small watershed.
Where we're installing these restoration practices upstream from our issues. We're pairing them with control subbasins and we're rigorously monitoring this practice to see what is the effect of the restoration practices on the runoff, on the soil moisture, on the E.coli transport, and several other factors.

Then we have to say, once we understand the dynamics of individual practices, we need to go the next scale, the watershed scale. Here's a study that I completed on that same watershed to identify what are the best locations for our management. Watersheds have complex ecosystems, ecosystem indicators, so I synthesized topographic indicators, things like where are the widest floodplains, where are the best soils, and where in the watershed does it rain more frequently, which is usually around mountains of course. And then we estimate the actual facts of putting these restoration practices in. Right here you can see what's called a hydrograph. All it is is the amount of water over time in a storm event and this represents a medium event. This is a little over 1300cfs and you can see if we installed watershed restoration in our priority one ranked locations we can bring that quantity and that energy down to this level and so forth.

So this starts to tell us what are our best locations and how much do we need. But ultimately we need to synthesize things on regional scales to understand if we can achieve our visions. We all know humans are a main driver of ecological conditions, making it critical for collaboration across land and water managers and the larger community.

The larger community we need to understand their visions and the challenges that they face. In this region resilience in our agricultural communities is [?]. Across the world nearly 40% of the earth's lands are managed agriculture and here in New Mexico that's 55%. But collaboration is not as easy as wanting to do it. There are real differences between for example upland range, flood, and irrigation managers in the tools that we use. The vulnerabilities that our stakeholders face, the objectives, the decision, and the time.

So for our Reclamation Drought Resiliency Project, which is led by EBID [?]. The New Mexico Water Resources Research Institute will task [?] the ability of strategies to [?] the stakeholder visions using customized models where we integrate the best science and data. The Institute has additional funding from the Interstate Stream Commission's 50 year water plan and we will be collaboratively developing an independent Water Institute report that documents the visions and recommended strategies from the stakeholders.

We're going to be synthetizing information, [hosting] focus groups with farmers and ranchers, workshops, broader community conversations. At the Institute we have a statewide water budget model, we use inputs from that but we also add data from regional unique dynamics and socioeconomic factors. We can't just look at water, we can't just look at one silo. We have to integrate across the region and we'll be doing that with the drought resiliency project.

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So what do these visions look like? I'll just run you through quickly a couple. We've identified a couple of visions to slow and spread the flood flows. To one, mitigate the scouring floods, reduce the soil erosion, and the soil transport downstream into to the Rio Grande, the ditches, and the flood infrastructure. The second vision is to contribute to recharge of groundwater, both in key upland areas and in the valleys downstream.

You can see here at Caballo Reservoir this is the Hatch Valley, here is the flows from the Rincon Arroyo Watershed. The idea is to manage these flows, this isn't just a surface water network. To support the ribbons of green we're spreading these blows onto the fields, onto floodplains in the uplands to support these ribbons of green across the landscape.

So a couple of different strategies. One, agriculture is a system for recharge. Like I said, ranchers in the upland and farmers in the valleys spreading flood flows. Second strategy, combining the aquifer recharge with ways to reduce water demand means looking at alternatives in addition to the popular policy of fallowing, such as extreme water efficient crops.

What we're going to do in this model is test to what extent can alternative strategies achieve these future visions. The benefits of the strategy of agriculture as a system for recharge are
recharge soil moisture at aquifers to decrease flood energy. The benefits of the strategy combining aquifer recharge with ways to reduce water demand needs is a reduction in pumping and water use competition.
So I'll conclude with what are some of the policies that folks are doing other locations? And I'll start with the recognition of watersheds as our fundamental infrastructure for our region. In 2016 California passed a bill that recognized watersheds as fundamental infrastructure because of the storm runoff across the landscape. Eligible maintenance includes upland vegetation management to restore the watershed's productivity and resiliency, meadows, roads, and stream channel preservation.

I'll also turn to water banking. Two current dynamics dominate the need to address water competition in areas with significant agricultural water use. The sale and transfer of water rights out of agriculture and strategies to fallow land and water banking agreements [?]. Yet, these
Policies in many areas often do not comprehensively consider the resilience of the agricultural system over the long term, which can result in unintended consequences, such as soil degradation. You see soil coming off of fallowed fields in many regions and reduced farmer livelihoods.

Water banking is an important strategy EBID has been a leader in with some of the most progressive water banking policies but there's also a critical need for additional choices in water banking beyond fallowing such as support for high water efficient crops, water conservation measures such as cover crops, and flood flows as an alternative source of water in these programs. This is something that we are looking at with the ISC.

Floodplain reconnection has been around for a long time but is starting to become large programs in certain areas. California in

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the thirties created the Sacramento Valley bypass where floodwaters go onto flood fields in that area. The Dutch River Room for the River program, begun in 2007, consists of over 30 projects to strategically restore the river's natural floodplains.

I'll end with managed aquifer recharge for the valleys. Our own Albuquerque and Bear Canyon has infiltration basins in an arroyo itself. The Central Arizona Project obviously does this more infrastructure approach of spreading pools. But this one particular project in California I think is really pretty terrific. You can see the fields here some converted fields to riparian wildlands where it recharges excess water supplies for future recovery.

Thank you very much for your attention, I'll end with asking you to join our Hatch and Mesilla Valley Plan workshop which will be Wednesday, October 20 from 9 a.m. to noon. We'll send out information about that. Finally, just acknowledging our funding, we have two Bureau of Reclamation projects, the Cooperative Watershed Management Program for the plan and the Drought Resiliency Project as well as the State of New Mexico funding our Institute with our Community Hydrology Program, the NMED project I mentioned and the NRCS has started a Watershed Restoration Project in the Rincon Arroyo.

Thank you very much, I'm going to now turn to our panelists and ask that we start with your five minute introductions and then we'll get started with the panel discussion. We will start with, go all the way to the beginning, we'll go in this particular agenda order. We'll start with Gary.

Gary Esslinger, EBID.

Thank you, Connie. I appreciate this opportunity to come before this group and certainly want to thank those who organized it. When I was asked to present I thought about what I do in my job as manager of the irrigation district is to supply surface water to the farmers here in this valley, over 90,640 acres. This case study that I am presenting is something that I presented back in 2016 under the Obama administration to the White House Water Summit. We were asked to participate and the case study that I presented was Adapting to Drought in Climate Change, Stormwater Capture in the Elephant Butte Irrigation District. That's my passion.

Certainly what you see before you is what I refer to and we refer to at EBID as the sleeping Giants. These summer monsoon events, you've seen them all through August of this year, they happen just about every year somewhere between July and September. These Sleeping Giants lie in our watersheds from the Hatch Valley all the way down to El Paso. And you never know when one of these is going to wake up. Certainly it is our concern dealing with the profound droughts that are occurring now, the intensity of the droughts that started back in 2003 and we're still living in them. It has raised the awareness at EBID to begin to manage how we can foresee these events before they are destructive. And if we can get a handle on how we can at least begin to evacuate our irrigation water to receive stormwater then it's to the benefit of the whole entire valley if we can manage water and slow this water down as Connie has referred to.

So, those Sleeping Giants right there that you see are a result of what you see in

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the bottom of the flooding of arroyos. This is the Rincon Arroyo going directly into the river. What do you do with this water once it's in the river? Well, my goal and part of my management scheme under our Stormwater Management Program is to capture this water, to reuse it, to either irrigate with it, or recharge the aquifer.

These are clearly issues that we see all summer long specially in the drought season. So trying to manage water when it's already in the valley floor is difficult. **What we try to do within EBID is try to capture this water, put it in our system, and then spread it out across the valley floor.** That way we're doing exactly what Connie is suggesting is that we take this water and spread it across the valley and recharge our aquifer when we can and we can irrigate it when that's possible.

The bottom slide shows where we have a flow of water going directly into one of our drains. This drain is normally dry because of the drought, so here we are capturing and putting this water to use in a drain. If you went out to that site today you would see a forest of cottonwoods that have come up because we have been able to utilize our drains as a way to feature habitat restoration. So when you have 300 miles of drains to work with, there's a great potential for spreading this water out and also growing these habitat restoration sites.

Here's an example of, the pink flow is the Placitas Arroyo that broke in 2006 and flooded out Hatch. The blue line is the Rincon Arroyo. They both came on at the same time and put a little over a thousand cubic feet per second in the river on top of what we already had as irrigation flows going to Mexico, to EBID, and to El Paso #1.

So what do you do with these spikes? We have these gauges in the river to tell us where these flows are hitting, the amount of water, and then our reaction to this event was well then we'll put it in the Leasburg Canal which is downstream of where these arroyos were coming into the valley.

Strategic timing, preparation is a key, understanding where this water is coming in, and then how to manage it is what EBID is, that's our goal is to actually prepare for these events and then deal with them.

You can see that the time frames to do this is basically what we use as weather stations, Doppler, we can track the storms coming in from Deming or from the south from Mexico or even from the East coming over the Anthony Gap. We can determine through these Doppler Radar where we may have an issue coming 20 miles out. We can then start determining where we would deal with this water when it hits the valley floor, our watershed.

The slide in the bottom is a watershed weather station. We have over 15 of these watershed weather stations already up and down the valley and now we've added another 30. So we have about 40 weather stations with rain gauges where 20 and 30 miles out we can determine what kind of event is going to happen in a certain area and then be able to prepare for the flooding that will occur in the valley floor and see if we can manage it the best we can.

We adopted our portable rain gauge to work with the Bureau of Land Management who of course we're dealing with them right now trying to put in about 16 more of these type of rain gauges. What they are are telemetry units where we get real-time data

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every 15 minutes sent into our office so we know where these rain events are, we know the amount of water in that rain event and then we can determine what we do once it reaches the valley floor.

This event happened at Leasburg, you can see the first chart the water came into the river upstream in Hatch. We captured it at Leasburg diversion, we put it in our canal which is the second slide, and from there we dumped it into a drain. Well we have groundwater monitoring wells along these sites where we can actually see that the recharge is occurring. If you look at the bottom slide MP428, that's a monitoring well. You can see that as we dump the water into the Seldon Drain, it slowly brought the water table up. You can actually see that the recharge is occurring. This is happening up and down the valley as we speak right now.

When you're monitoring rainfall you need to be able to receive it. This is the Leasburg Canal, this is a place where we can accept this stormwater and spread it out through the valley. If the farmer can't use this water because of sediment or the trash that comes with the storm event, then what we do is put it in our drains which parallel these major canals. And then, of course, the drains spread that water out and recharge the aquifers. So the diversion of stormwater is all planned out. We use our radio telemetry to meter and monitor and understand where the water is and then we try to deal with it during the flood event.

This is basically what happens, you get a weather station way up in the Alamo basin, which is above the Robledos. We track that storm, we find out that it comes in above Leasburg Dam. From Leasburg Dam we divert it into a canal and from the canal we divert it into the drain or a farmer uses it.

So our primary goal in stormwater capture is to either use the water directly for irrigation or infiltrate it into the aquifer recharge of the District. That brings a whole lot of benefits with it. Stormwater capture helps ensure the safety of the people and the property downstream. Secondly stormwater capture sites such as Seldon provide habitat for many birds and wildlife species and finally by slowing the water down in our drains we can potentially stop the harmful microorganisms like e-coli from getting into the system by just slowing it down and allowing the sunlight to kill the microorganisms.

There's multi benefits to this approach and certainly it's something that we want to improve. We think that cooperation with BLM, with the Soil and Water Conservation District, with other folks here in this valley. We need to go to Santa Fe and explain to them that there is a benefit here when we have a monsoon event. It's just that we need to do more of this type of monitoring and metering to capture and reuse stormwater. Thank you for the opportunity to speak .

Connie Maxwell, NMWRRI.

Thank you Gary, your efforts are very inspiring and I agree, we need support to allow you guys to be able to extend this program. Jeff, you're next.

Jeff Witte, NMDA.

Thank you…I want to start by really recognizing Gary and the team that thought of this series. **As a society we take this stuff for granted. We take watersheds for granted.** I think there are very few people around

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that understand the impacts of watershed. We think about watershed and you look at the mountains, like my background, you've got the Organ Mountains behind, you've got the Sangre de Cristos and some of the other big mountains. You think about watershed tradition. But watershed in the desert is a whole different creature. I think it's something that we need to pay attention to. The presentation that you gave, Connie, was a great overview of the impacts of watershed. What Gary is doing at Elephant Butte Irrigation District tis one of the greatest tools that we've got to really help.

I'm going to talk about some of the things that I think about in this five minute introduction and be able to get into some of the stuff during the discussion. As I drive to the office on a daily basis down here in Dona Ana County, I pass fields where farmers are farming and I also pass fields where it's fallowed. I pass fields that have been converted into that final crop, families with houses. And every time we do that, we have a change in the dynamics of the watershed. If you think about all the concrete and pavement that has been put up in the outskirts of Las Cruces, in the desert areas, and then you see with these big monsoon events, the new dynamics of the floods and the higher volume of concentrated water that comes through, there's' no doubt in my mind that we've had some impact on the watershed just from our development.

That's not a good thing, that's not a bad thing, it's just a fact, it's a fact of where we're at in this society and how we grow. We have to consider that. The other thing that I think about, my wife and I went on a little hike the other day up into the Organs. The greenness of our valley is something we've never seen before. We haven't seen in a long time. And some people think there may never be another dry day in New Mexico when they look at the green grass and green weeds, it looks like a green grass that's flowing up there, but it's not, there's a lot of different vegetation. I think that's something we need to be paying attention to because **when I talk to my noxious weed team at the Department of Agriculture, one of their concerns is when we have these kinds of monsoon high moisture years, kind of like what we've had, …the invasive plants take over and kind of push out the native plants. I think that's an opportunity that we need to be paying attention to because they don't go away.** Weed seeds can sit in the environment for hundreds of years. The ranchers have good grazing techniques over the years and that grazing can really help manage some of that stuff as well. Things that we need to be paying attention to.

I'm glad we're having this kind of discussion, we need this, there's never a bad time to have a discussion about the impacts of watershed, on the watershed, especially with our aquifers in the condition that they're in and our reliance on groundwater. What EBID is doing is a good tool to help us for the future. I look forward to the rest of the presentations and getting in a little bit deeper on the watershed.

Connie Maxwell, NMWRRI.

Thank you, Jeff, much appreciated…all right Kevin, take it away

Kevin Bixby, SWEC.

Hello everyone, thanks for joining us today, my name is Kevin Bixby, I'm the director of the Southwest Environmental Center and

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also on the board of the Soil and Water Conservation District. I really want to thank Craig Fenske and Jerry Schickedanz for hatching this idea and getting the ball rolling and then all the folks who have helped bring it to fruition, including Connie and Jennifer Klitx (?) and other that I'm not really aware of but I know you're out there, so thank you doing that.

So my focus, as you might expect, being director of an environmental center, is on the Rio Grande and the environment. From my perspective, **the river reflects the health of the watershed. Everything ends up there. The timing and amount of flows, the diversity of plants and animals that the river supports**, it all reflects not just what's happening in the upper watershed but on the river as well.

So the river is really a stakeholder in the watershed and I think we should try and keep that in mind. **My metric for watershed health is the health of native fish in the river. If the river reflects the health of the watershed, fish reflect the health of the river.** They're the canaries in the coal mine and they're not doing very well.

To understand why we need to talk about changes that have happened over the past, since the mid-1800s. Back then, it was perennial for most years, year round. There's' a pattern to the flows, the flows were highest in the late spring, early summer following the snow melt up north. The floodplain itself was a gigantic sponge where water did recharge, surface water recharged the groundwater. It was a very lush mosaic of riparian woodlands, we call bosques, wet meadows, wetlands, oxbow lakes. The river itself had multiple channels. The rivers floods were not a bad thing they actually the key factor that maintained and shaped that mosaic of habitats. All of those supported an abundance of wildlife, including at least 20 species of native fishes.

Well, today because of lots of different changes, changes in the upper watershed, the decrease in vegetation that somebody talked about, the building of the dams and the channelization of the river channel itself, there's been a lot of changes to the river and not good changes from the point of view of ecological health. The river only flows when water is released from the reservoirs for irrigation. So it is dry much of the year, especially in the past 15 years or so. It also flows when we have those big storms as has been pointed out.

Sediment now is a constant problem that has to be removed continually. The natural flow patterns with that peak in the late spring and early summer, that's gone, it's now a flat sort of plateau during irrigation season. The mosaic of natural habitats that once filled the floodplain has been mostly, 90 or 95% replaced with farms and houses. The river itself has been channelized so it no longer, it can no longer flood. At least, not with the way that we manage water that's released into the river.

The effect on wildlife has been not good and speaking about the fishes, there's only about eight of the native fish species of those original 20+ that still survive. It's really remarkable that any of them do given how the river dries up every year. It was mentioned that with the age of dams, overbank flooding has disappeared and I would say that's not anything that's a necessary consequence of building dams. **We could manage irrigation releases in a way and we could manage the channel of**

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the river itself to allow more for overbank flooding. There's been some discussion of doing that but it really hasn't been implemented on very much.

I want to also say that's there's going to be a lot of talk tonight about controlling floodwater. Wetlands in the floodplain, along the river, those are nature's flood control structures. When the river would flood it's banks, the vegetation, the wetlands along the banks would slow that water down and allow it to seep into the ground and recharge groundwater. So I think **when we're talking about restoring watershed health we should definitely look at the habitats along the river, particularly wetlands.**

My vision for the watershed is that the river is recognized as a stakeholder in watershed health and that we reimagine how to manage the river so that it not just functions to deliver agricultural water or get rid of flood water or runoff, but that it's restored to ecological health and it functions like it once did, albeit on a much smaller scale, with less water. I think that's very possible to do if we had the will to do that. I think that there would be great benefits not just to the fish but for also the people of this area who would enjoy a living river year round and all the benefits that that brings.

Thank you for the opportunity to be on this panel and I look forward to the discussion.

Connie Maxwell, NMWRRI.

Thank you, Kevin. John Gwynne, you are next.

John Gwynne, DACFC.

Good evening everyone, thank you for allowing me this opportunity. One of the things that I really would like to say is that there is quite a diverse panel here that has got lots of different experiences, lots of different ideas and I think it's great to have them all together in one place. I hope everyone will take the opportunity to dig in and ask some good questions.

I'm from the Dona Ana County Flood Commission. We were created in the mid-80s to operate and maintain flood control structures, mostly dams. In Dona Ana County there are over 70 named dams. If you count some of the ones that are smaller and pushed up by a farmer there's well over 130. Within a 5 mile radius of Las Cruces there are about 34 dams. So there's an awful lot of these structures, some of them are owned by private individuals, some are owned and operated by folks like us, the Flood Commission, EBID have some that they operate and maintain as well, soil and water conservation districts do the same, International Boundary Water Commission has some pretty big ones as well. So this is a pretty diverse group that manages them and they all serve pretty much the same function, which is to slow the water down, capture the sediment and release it slowly.

Most of them are above, to the east and west of the river if you want to look at it that way. They're usually above population centers. They weren't originally planned that way. Most of those dams were designed to handle sediment and storm water for farmers' fields. And so as our population has grown, these dams are now above homes and above communities and that creates a big issue in terms of how do we manage those? **They don't meet any of the current**

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design standards. Most of them were built in the 50s and 60s and there's a few of them from the 70s, and I think there's even a couple from the 80's. but most of them were in the 50s and 60s and they have a 50 year life span based on sediment loading. So you can imagine that they're already at their service life and so as Connie spoke about before, **when we go to remove the sediment from one of these structures, we create a big hole, because the watershed has adjusted to the sediment level in the pooling area. So when we remove it, we all of a sudden create a hole and then we headcut up and it creates more of a problem.** There's a lot of issues with this many structures and what do we do with them?

That's part of what we're here about and the Food Commission in the past has been mainly worried about operating and maintaining the structures, but one of the things that we recognized is that **watersheds are going to play a key role in trying to make these old structure s last and to also slow the sediment down so there's less sediment to remove. That also creates better recharge for us.** There's a lot of key components of each of these parts from each of the individuals that you have in this group that basically have a different view on how things are done but they all see the benefit of a healthy watershed that will help us both in terms of having adequate water and protect people from the dangers of flooding.

Like the irrigation district, the Flood Commission began in 2013 to install weather stations throughout the country in order to try to track the storms, try to find out where the water's going so that while EBID is moving the water, trying to get it to places where it can be used and safely discharged, we're trying to get the message out to the people that are in the way of he water so that they can get out of the way. So that they don't get flooded or so that people don't get harmed from it.

We' operate a series of them and we're currently monitoring. We started with one station in 2013 and we're up to monitoring over 70 stations now. These are all across the county. We monitor all the local airports and we even look in places like Alamogordo, all the way up to T or C and Deming. We're trying to see the storms as they approach and know kind of the energy they have before they get here.

We play a different kind of role in that we're trying to handle the storm water when it gets here. **One of our biggest challenges is once the water hits these dams where does it go?** 99% of the time it has to go to one of EBID"s facilities. And that's a problem for them and it's also a problem for us unless we can get a handle on it and be able to get it to a place where it can be used properly.

So that being said, there's an awful lot of talk about. I'm sure we'll get into some discussions about some very recent flooding and I look forward to how we go through this discussion. Thank you.

Connie Maxwell, NMWRRI.

Thank you, John. As John mentioned, as you're thinking of questions, please feel free to add them to the chat. Once we're through these introductory comments we'll go right into questions. Gill, you are next.

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Gill Sorg, LC.

Yes, thank you. Let me put this map on the screen here. This is a portion of the watershed that the city is connected to or part of. Las Cruces is surrounded by the Rio Grande Watershed and it is of course part of the Rio Grande Watershed and so the health of the watershed is important to what we in the city, as well as the farmers and all the other people that live in the watershed.

So I kept thinking, **well what is a healthy watershed? To me, a healthy watershed is one that controls erosion but also prevents flooding and in the process of doing that provides open spaces that are good for growing vegetation, which of course in turn provides habitat for the animals lives we have.**
So the city has a system of multiple ponding and as the arroyos get their floodwater, it is held back by ponding, either in a detention pond where the water is held for a while and then it is released slowly, or it's a retention pond. There's some of those too, where the water isn't let go, in fact it all, it's supposed to, I won't say everyone does, but it's supposed to go into the aquifer, infiltrate there.

We believe in stormwater harvesting which is something Gary mentioned about harvesting the water for their purposes but we also harvest the water for growing more vegetation. **That's one of our key things in the city due to climate change as we get hotter and longer hotter periods, we need to have more vegetation which helps keep us cooler.** It also sequesters carbon too, form the atmosphere and so we're [?] on trees in particular and so this is what we're trying to grow more with our ponding area and our open areas where we can store capture the stormwater.

Also, I don't know how many people here know, most of you do probably, that the city is in the process of working with the IBWC about making a wetland along the Rio Grande that uses our wastewater outflow and makes a small wetland. It's not going to be very big but it's going to be at least a wetland there where we can have a few fish Kevin, a few fish in that little ponding area in the wetland, yes. So every little bit counts, so that's what we're trying to do, it's in the process, it's had some slow times lately but it's still moving along.

I've always been an advocate for having little, small check dams to slow the water down. I'm a disciple of the NRCS which has a motto that says, "keeping water on land longer". And so, same thing Connie was saying, is to keep the water there so it will allow more vegetation to grow and capture the sedimentation.

And these little check dams, I'm sure most of you have known that during the Great Depression the Conservation Corps would build the check dams in our watersheds. Of course, being that it's a long time ago, their use has been lost over time. It might be something we want to think about doing in the future . and of course, [Tom and?] Connie is doing some of that. That's all I have, I'll be open for questions.

Connie Maxwell, NMWRRI.

Thank you, Gill, much appreciated. Don McClure.

Don McClure, BLM.

Hello everyone, I'm Don McClure, I'm the assistant district manager for renewable

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resources for the Bureau of Land Management. I'm very happy to be here tonight, be part of the panel and it's great to see so many folks who are here tonight to discuss the watershed issues. I think listening to Connie's program I think we all understand that this is a community led effort. It can't just be one agency or one entity, we've all got to work on this as a community. And BLM of course is part of that community and we're committed to working through watershed issues.

I'm very pleased that the discussion has already started to hear what each of us values about the watersheds, about the landscapes and to me it's **starting to be framed up in terms of not only the environment but the economic aspects, the uses that we value on the landscapes and the social aspects. We've got to take those into account in every decision we make.** I mean that for this whole group. We all make use of the watersheds, we all make decisions on how that's used, not just BLM as the land manager. So we look at this watershed issue as part of our Restore New Mexico Program. It fits under there.

And Restore New Mexico got started in about 2006 and it was an effort to maintain and increase the productivity of our landscapes with a focus on eradicating invasive vegetation to hopefully bring back the native vegetation, mostly our grasslands. In the past several years we've started to take a focus on erosion. So this group, to work with you all is very very timely. Connie showed some pictures in the Rincon Watershed that show very extensive erosion. And if we allow that as a group, as a community, to continue, we're not going to have the soil left to grow any vegetative, much less native vegetation.

This is a priority for us, to stop the sedimentation or erosion, keep it in place, slow down the water, let the vegetation cover increase. I look forward to our discussions further tonight, thank you.

Connie Maxwell, NMWRRI.

Thank you, Don. And finally Steve Wilmeth.

Steve Wilmeth

I'm the only rancher or farmer here today. I'll start by saying that when my great great grandfather reached El Paso in 1882, late summer of 1882, the Rio Grande was flooding and they could not drive their cattle and cross their wagons but the railroad had been built to Deming in 1882. The trestle was in place in what was then El Paso so my grandfather made a deal with the railroad and they loaded everything across the river. Was the first time that the kids had ever seen a railroad. That was in 1884, in 1888, when my great grandfather crossed the river, the river was essentially dry in early spring. So, the issues of today were certainly magnified at that time.

I will say that I'm a rancher, I'm a past supervisor of the Dona Ana Soil and Water Conservation District and I will also say that as a rancher, I'm going to point to Kevin Bixby who suggested that I be on this panel, and indicate to those panel participants as well as those who are listening that we can bridge across different disciplines and different beliefs. I think Kevin and I demonstrate that .

I'm also a desert dweller. These slides recently, this was during cow work this week. Reminds me that I'm a turf manager. I'm a converter of sunlight. I am a water manger

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and I'll go so far as to say that **I believe that what falls on our lands should be retained for a period of time. I want it to stay and I work very hard to do that.**

As a rancher many times you will here the response "well, we've got tank water." That's an earthen reservoir, that's vernacular of the west. But I don't like tanks. Our tanks have essentially become settling ponds. In that regard and that use they're important but I don't want water running off. The slide you see on the left is an indicator. What falls on this land I want to keep it.

I'm a protector of open space. My existence depends on that premise. And I hope that you understand the impact of that. I don't want development on these open spaces. The rancher community is a safeguard against that. Embrace that.

I'm a recipient of these various natural gifts, and that includes drought. I think that will come somewhat of a surprise to most of you tonight but **I think every time we have drought we emerge as better managers.** Dr. Schickedanz behind me here is aware of the discussion, that we literally have thousands of acres of broom weed that has died as a result of drought. The lifespan of broomweed, Gutierrezia genus, is 5-7 years but we think that the drought precipitated this wholesale die off. So good things come from drought.

I'll talk a little bit about livestock and I think it's very pertinent to the livestock and what we're trying to do to create a cow that is more drought tolerant. As such I am a livestock manger, I believe in the complexity of grazing but at this time I'm restricted to one basic ungulate directly and indirectly, relatively scarce wildlife complements. You see photos of Africa, it's no surprise, every ungulate has a particular niche and everyone adds to the complexity of grazing and ultimately a more sustainable grassland.

Don McClure who is here and who is my good friend, he and I work together on projects that I greatly appreciate, **but I think I'm the only rancher in his district that has developed an algorithm that basically directs our rotation of cattle in a rest-rotation process. Extremely important in health and the long term sustainability of these lands.**

I'm also an advocate, a purveyor of sorts, of trying to manage turf under the conditions of how grass has evolved. I want to speak briefly to that. Plant evolution and those folks who study it will indicate to you that turf evolved under conditions of seasonal rainfall and periodic but continued drought conditions. Fire has been one of the factors of grass evolution. Wind has been a factor. Hoof action in ungulates are absolutely a factor. And rest, and permanent rest.

Our program has built that into the planning whereby we have a minimum of 12 months of rest before we return cattle to pasture and I am attempting to extend that. There are a few people who are involved in this who are original thinkers. Friends, colleagues who now believe that we should be extending that rest period to 14 months. Don knows of my strong beliefs in that. But that takes lots of water and we discuss that situation as this thing unfolds.

Water is the biggest shortfall of southwestern ranches and it is the determinant factor in being able to rotate. I have neighbors who have watched what

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we're doing, have attempted to do it, but have found it impossible without the ability to transport water, to store water, and to provide water in whole herd rotation processes that are akin to the movement of buffalo.

I mimic natural tendencies, natural flows, as seasonality…our approach to cattle, and basically we have red cattle, against a backdrop, a sea of black cattle. **Red cattle are more heat tolerant**. We want that characteristic in our herd. **But more important than anything, we want a cow that can calve on her own.** We cannot see every cow that calves in this big country, nor do we want to assist in difficult births. We want a cow that can calve. We want a cow that can breed back. But most importantly, and it factors into this discussion and others is that we want a cow that converts, not to a traditional 8:1, and that infers that 8 pounds of dry matter will convert to one pound of gain in calves. **I want cattle that will convert at 5.7:1 or better.** That is a huge factor in drought tolerance.

A number of years ago the Sitz Brothers in Montana said that most of us in the west will not be breeding cattle to carcass characteristics or what a feedlot wants or what a packer wants necessarily, we want a cow that will wean a calf on our conditions, and we want a very drought tolerant calf and cow. That's what we're attempting to do with our ration of 5.7:1. Thank you.

Connie Maxwell, NMWRRI.

Thank you Steve, and thank you to all the panelists…let's start with Madison…

Madison Staten

Thanks for the opportunity to be here tonight, I'm loving this discussion around watersheds and I would love whoever feels called to answer to just tell me a little bit about how do we better manage surface and groundwater together to better maintain a healthy watershed?

Connie Maxwell, NMWRRI.

Great question, who would like to respond?

Gary Esslinger, EBID.

Madison, this is Gary Esslinger with Elephant Butte Irrigation District and certainly within EBID we already have a system in place that is pretty robust. We have over 60 monitoring wells in the ground on telemetry where we can monitor what the effects off the drought are doing in the aquifer and certainly we can determine through those monitoring wells the depth of the water table and certainly where there could be a cone of depletion created by pumping, ag pumping. When we know that, then we use our surface water monitoring system to then direct the flood flows to those area where we could then infiltrate those areas of depletion and bring the water table back to a reasonable condition.

Overall, we aren't cratering the aquifer right now as many think. But certainly the drought has not helped the conditions we are in right now and certainly we need periodic good winter runoff and we haven't had those in the last 5 years so it makes it difficult to recharge the aquifer in it's entirely. But when we do have monsoon events like we've had over the past month we do take those opportunities to move that floodwater around to our drains, who

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are connected to the groundwater. It shows as the graph I presented in my presentation, that there is an immediate response to the aquifer when we can do that. That's my best answer for you is that **you have to have a great metering and monitoring program in place so that you can use both of those systems to coordinate together the connectivity that's between the river and the aquifer because they are one water source, it's connected.** Thank you.

Connie Maxwell, NMWRRI.

Thanks Gary, anybody else want to tackle that, "How do we better manage surface and groundwater together to maintain a healthy watershed?" I will mention a couple of points that, one thing that people are aware of is that surface water and groundwater are generally managed separately in many states. We do have what is called conjunctive use management here in New Mexico to a certain extent. But the coordination of those two regulation systems is something that is always really critical to do. I think one of the things Gary responded to is that it takes the nuts and bolts of figuring out how to actually get the surface water in the ground. And **one of the things that I think the state could support us on is helping us develop a managed aquifer recharge program where when we do recharge water into the ground people that have rights to be able to recover it, that works for everybody as well as the healthy watershed.**

Anybody else want to tackle surface groundwater?

Our next question Craig Anderson – "Would Rio Grande Project water be better stored underground in the Mesilla Bolson than Elephant Butte Reservoir?"

Steve Wilmeth

Connie, this is Steve I'd like to take that question. Having farmed in the Arvin Edison Water Storage District in California before I came home to go back into ranching, the Arvin Edison district was formed in the early 60s and by that time there were fewer opportunities for surface water storage. But it was discovered that there were natural barriers under the district. When I left California in, at the turn of the century, I think the overdraft at that point in time was only about 10,000 acre feet. Having deep wells and experience in it, we had a very stable water table. However, the issue become is structure there to retain that as opposed to off slope plumes.

I think Gary probably has a response to that, if that structure is there. It works very well if there are structures to hold that water within that basin. If there's not another geologic structure, then your losses could be substantial. So, it's not just a "yes, it's a better opportunity", you should say it's a parallel opportunity and there are examples where it works very well.

Connie Maxwell, NMWRRI.

Anybody else…would Rio Grande project water be better stored underground in the Mesilla Bolson than in Elephant Butte Reservoir?

Gill Sorg, LC.

Yeah, I could mention the fact that getting the water into the bolson and then bringing it back out, there's quite a bit of cost involved in that too. So you've got to weigh

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the benefits as well as the costs to see if that would work out.

Connie Maxwell, NMWRRI.

Let's go on to Vic Crane's question… his question is "How does stormwater capture affect the water rights downstream for Texas and Mexico?"

Gary Esslinger, EBID.

Let me give that a shot to try to try to say it in a few words. Wild arroyo water is something that comes in below Caballo is what we consider "wild water" and the Bureau of Reclamation used to allow that wild water to go to anyone that could use it, whether it was in EBID or a delivery to help EP#1, or even Mexico. So, **over time, we began to understand the importance of capturing stormwater. So in the 2008 operating agreement that we made with the Bureau of Reclamation and with EP#1, the irrigation downstream in Texas, we made a determination, and it was approved, that we could capture as much water as we cold upstream, without affecting the downstream users water right.**

So, it's a great benefit when we can capture as much water as we can in the upper valley of Mesilla and Hatch because if that water gets past Mesilla Dam in huge amounts of water, it will flood downtown El Paso. That was the case in 2006 and 2008 where there was a high concern that they may have to evacuate downtown El Paso. When we talked about that in our discussions of developing the operating agreement, we brought up the benefit if we could capture the water upstream and use it and it was agreed upon, Vic.

And so, that's how we've been able to, then, from that point, improve our water capturing system with more monitoring and metering and then even widening our drains to put this water into our system and then store it. So we've done a lot since 2008 to improve our stormwater capture which doesn't have an affect on the downstream users.

Connie Maxwell, NMWRRI.

Thank you Gary…as most people know, north of Elephant Butte reservoir there are compact requirement regulations and it's a very different system and it's really not possible. However, I think the points that Gary made show that this region can be a model for other areas and we can start to help other areas in New Mexico develop regulations…Jerry question… "Steve Wilmeth, what is your current watershed problem?"

Steve Wilmeth

My initial response would be an issue that repeatedly was brought up in our board of supervisors in that…in Dona Ana County we are creating arroyos across 600 miles of roads, the way roads are maintained. And it's not just our ranch, you can go to the Corralitos, you can go to the Portrillos and it's a consistent problem where roads are graded flat and little effort is made to shed that water from these roads. Luna county, which has a much smaller budget to do that work, have maintained roads, at least the basic structure of the roads. Now, **what that does is that it creates arroyos in our roads but it also diverts off slope flows of water and starving those downstream site turf stands. It's a huge issue in my mind** and those who have been on the board have heard me talk about it. We've had a county manager there, we've had the county

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engineer there and we have basically been blown off. We need to fix it.

Connie Maxwell, NMWRRI.

Thank you Steve. Yes, we've seen that in so many areas around the watershed. Question from Patrick DeSimio…"From the discussion it sounds as though we have several promising options for responsibly stewarding and restoring the watershed. Who else needs to be involved to make these options happen?"…Patrick do you want to add anything?

Patrick DeSimio

Just that this might be looking forward a little bit to the education and outreach activities that seem to be envisioned as part of this Master Watershed Conservationist Program. There are plenty of us gathered here today but there are also a lot of familiar faces from in general agricultural and conservationist work. Who else do we need to start thinking about involving to really start making a difference? Who are the key players who aren't yet involved?

John Gwynne, DACFC.

Connie this is John, I'll start the ball rolling. I would say that in a lot of what we do, **it takes dollars and it takes support. And so, number one you have to get public support for any of the projects that we do.** We would also need to get money because these projects, you saw Connie's project that we're working on up in the Rincon Arroyo. It requires dollars to do that. **We need to get our legislators involved, we need to get our youth involved in terms of managing this once us older guys are moving out into our own pastures. I think it becomes really important that we pass these ideas that we've been working on to younger folks who will then take the ball. Because these watershed projects are not short lived.** They don't do a whole lot in the first couple of years. They take a lot of work ad a lot of time. The same thing with the projects that Gary has been working on with EBID, they've taken a lot of years to come together. I would say the projects that the Flood Commission works on, these take years and years to develop to try to find the best way to do things and then to get funding to make them work. Who do we need to get involved? I would say legislators, the general public as well, a well as our youth.

Gary Esslinger, EBID.

I'd just like to add to that. You know there's this persona out there that the forests' health is the goal of the watershed. I'm not denying that fact, that we need to improve our forest watersheds in order to control and slow down that snowpack runoff. However, **a lot of people, when I talk to our legislators, don't understand we're in the Chihuahuan Desert, our watershed is completely different and I think there's an educational opportunity to try to do exactly what Connie shared with us today** and bring it to the awareness of our local legislators as well as our congressional delegation that you can't put all the money into forest health. You've got to bring some of that our for areas like ourselves, the Chihuahuan Desert, where ranchers like Steve and others can benefit from some kind of funding that would provide them more opportunities to do more of the good work they're doing. It's the same for the City of Las Cruces or Dona Ana County. We don't seem to have the same representation that we need that,

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I think it was only two years ago that the Forest Health Act was passed by the State of New Mexico legislators that funded huge opportunities for the conservation folks up there in Santa Fe and Albuquerque. To answer the question by Vic, we need to do a little bit more educational outreach down here.

Connie Maxwell, NMWRRI.

Thank you Gary.

Kevin Bixby, SWEC.

Connie, I would like to chime in here. I would echo John's suggestion that **congress needs to be involved** and Gary's suggestion, but probably for a different reason. The Rio Grande Project, it was one of the first irrigation projects I the west, one of the first Reclamation projects, it is a single purpose project. It includes all the water in the river and it's solely for the purpose of irrigation. So we would never, that was authorized by Congress, that was a congressional decision back in '04. I doubt that congress would make that decision again, today, to create a single purpose, to create basically, to convert a river into an irrigation conveyance channel. Which is basically what they did when they authorized a single purpose project. So, **I would like to see congress reauthorize the Rio Grande project to be a multipurpose project.** So it would still serve agriculture, but it would also authorize the use of river water for the river itself, to keep in the river itself for the purpose of sustaining native fishes but also for water based recreation and fishing and what have you. Politically, I realize it's probably never going to happen, but that would be great to see. And I also echo John's suggestion that we need to get young people involved because I do think that watershed health is more about check dams and all the technical details, it's about how do we live sustainably in climate change and a mass extinction crisis. I think young people are going to pay, to should share the burden of those two existential problems that face the planet so they really should have a seat at the table.

Jerry Schickedanz, NMSU.

Connie, I'd like to add to that, if I might. I think the people that we need to get involved, that maybe aren't here speaking today is what this forum was established for, to **educate the general public on the importance of the watershed and the value of water for our future generations. I think the more we can get the general pubic involved in seeing what the issues are and how they can be solved, that will go a long ways toward getting Congress or the legislature, the local officials**, moving toward some answers to some of these questions.

Jeff Witte, NMDA.

I couldn't agree more. I've been on tours to different parts of the state where maybe some of the soil and water districts or some of the other folks have invited opinion leaders out of Santa Fe and even out of Albuquerque to places like between Corona and Vaughn. What they did is they looked at different aspects of watershed, different impacts of soil and water conservation district projects that have changed the landscape and really improved the watershed. I think there's a great opportunity here in Dona Ana County.

I guarantee you, not very many people would understand how any dams there are

LRG Panel, cont.

or the impacts or the uses of those dams and why it's important. It became very evident a few weeks ago with the floods at La Union and a few years ago up in Hatch. That's when people pay attention. Other than that, people don't pay attention. So I think there's a great opportunity to showcase some of these in a visual fashion to show the societal benefit to your opinion leaders in Dona Ana County but also from other parts of the state so that they can see the impacts and the good things and the challenges that are in front of us.

Connie Maxwell, NMWRRI.

Thank you, Jeff. Couple more questions, Vic Crane – "with the increased planting of pecans, adversely affecting the ability to fallow, what else needs to be looked at to provide the benefits that we're seeing as fallowing?"

Gary Esslinger, EBID.

I don't know if I have the answer. I can't stop a farmer from doing whatever he wants to do on his own farm but clearly we do have in place our policy for a fallowing program and certainly I think the Interstate Stream and OSE is developing a pilot program for a fallowing program. But clearly, the benefits that I see is within EBID we have 90, 640 acres but our boundary is 133,000 acres. Which means that there's an opportunity for that land to be used if we have to negate some of the land that may be in houses now downstream. So, our challenge is to keep the 90,640 acres irrigatable. That's something we work on all the time.

With this drought going on, there is a volunteer fallowing going on with a lot of the diverse croppers just in the fact that they're just not planting a crop because they can't get enough of their groundwater around to irrigate all of their crops or we can't supply them with the surface water. So there's a voluntary program in place that's been pretty beneficial during these severe drought times. It's really the farmer that's making that decision, EBID is not involved at all. As long as we have that opportunity to spread, to move our water righted land around is one thing. For the farmer to choose and voluntary his own farmland to a volunteer fallowing program, then we also take advantage of that. So far, it's been beneficial to our overall operation at EBID. But it's really the farmer that has to make those choices.

Connie Maxwell, NMWRRI.

Thank you, Gary. I'll point out that Patrick DeSimio had put a link to a new pathway of connecting teachers and getting into the schools in the greater Las Cruces area. Patrick do you want to speak to that, quickly?

Patrick DeSimio

Absolutely, so thanks to some funding from the WK Kellogg Foundation and the Stocker Foundation and relevant to our whole involving the youth as stakeholders, there's a new free to use platform for all schools in greater Las Cruces, (the El Paso Community Foundation provided funding for classroom mini grants to support projects). https://www.communityshare.us/las-cruces/ that's basically a matching program to connect teachers with partners from the community who can come into the classroom to share specialized knowledge, support project based learning and provide real world examples for academic content.

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So, it's basically a great way to connect with teachers who are already interested in working with members of the community and across all sorts of sciences and even the arts. There would be lots of opportunity to get involved in the district. It's expanding from a pilot in the five community schools last school year into again every school at the greater las cruces area. It's going to become increasingly useful for us.

Connie Maxwell, NMWRRI.

Thank you very much. I would like to ask, many of the panelists have touched upon their visions for the future. I'd like to give it one more go around and say if each of you could even put kind of a metric to it, what would you like to see by 2030? ..relating to some of the conversation we were just having, what could we start to put together for the legislators to say "this is what you should be funding for this region. This is what we should be taking to congress and this is the actual funding programs that would help producers on the ground." … Folks have referred a little bit of some of their visions but give it a couple dimensions in roughly the next decade, what would we like to see by 2030?

Gary Esslinger, EBID.

Connie, **one of my greatest visions and opportunities that I see right now is this water infrastructure package that congress is trying to pass.** There is a whole lot of money there if the right people put their program together or write the grant, or come to an agreement of how that water [money] could be used for this aging infrastructure. John is correct, these sleeping giants of these monsoon events are going to wake up and they're going to walk over one of these flood control dams that is 50 years, 60 years old and it's going to be like a bleep on the radar and that flood flow is just going to come right into this valley. It's going to do a lot of harm.

I think there should be an awareness of that we put together to send to our congregational delegation the need to improve the aging infrastructure. We're already…it's working, it helps, there's just not enough of it and now with some of these high risk dams that used to be low-risk, it's almost impossible for an agency like ourselves, EBID, to fund the improvement or the reconstruction of that flood control dam. So, I would hope that from this forum that we could get the consensus of everyone that we need to put a package together that could maybe tap into this water infrastructure funding that NRCS has, the Bureau has, probably now some of that money will go to International Boundary and Water Commission. **So there's a bunch of federal agencies that if we could cost share with them or cooperate with them, then certainly I think there's an opportunity to improve our watersheds.**

Steve Wilmeth

I would support Gary's approach, I would be somewhat more specific, predicated on the suggestion that **past glory is not our future, we have to discover future opportunities**, I would support what are we doing on a rider, like Gary's talking about, or as an adjunct to the original Reclamation project and authorization by congress here to number one, protect that 92 plus or minus thousand acres of irrigated lands. this is a very interesting and unique little agricultural universe here for market windows and other things. But I would

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also support a complementary approach whereby new water sourcing would be directed to some of these other issues like community activities, like improved habitat for wildlife, I would support that and I would support it ion the basis that we would seek water supplies and/or storage that would be able to provide both avenues.

Gill Sorg, LC.

I'm looking at the question what does a healthy or restored watershed look like? To me it looks a little greener than it is now. That all comes back to my idea of having water be used by the plants or be added to the aquifer, one or the other. Any water that's standing around and evaporates away isn't doing anybody any good here, it might do somebody good downwind with additional rain but for us it doesn't. so whatever we can do to recharge the aquifer as well as grow more plants, is something that I would like to see as a restored watershed. And of course our agriculture, there's a lot of plants there, a lot of trees.

Jeff Witte, NMDA.

I agree with what Gary and the others have said as well. We have an opportunity to really look at these dams and some of the things that are controlling the floods or potentially going to control the floods that aren't controlling the floods. With this infrastructure money that's coming now, and I'm just going to talk about this one part, there's many other things, if we don't get the basics straightened out soon, what Gary alluded to with these monsoon storms in the future are just going to keep growing. The floods will come and in what shape or form they're going to be in , we don't know, but we have a good suspicion from what we've seen at the storm events we've had just this year at La Union and in the past at Hatch and other places.

If we don't take that opportunity to fix those 100+ dams in this area, we're going to lose that and then it's going to be reengineering the entire part. Some of that we may need to reengineer. We did a project a few years ago, the legislature funded some inundation mapping and whatnot that we did at the Department of Ag for the dam bureau out of Santa Fe. I think we've got to do more of that and we need to do it quickly.

John Gwynne, DACFC.

I agree, there's' an awful lot that can be done and needs to be done both in terms of reducing the amount of floodwaters that we have by having healthy watersheds, that's a big effort, it takes a lot of time, it takes a lot of individual work, but we also have to think about these large storms that come in like the one that hit La Union a couple weeks ago. **That was a 100 year event and those dams were basically sized for a 50 year event. So, this is the issues that we come into is that we have all this aging infrastructure that literally cannot handle the events that we have to deal with.**

The Flood Commission over years has put together a list of projects to help reduce some of the flooding in some of these communities. That list of projects is over $160 million, that doesn't include any of the dams. That is literally everything but the dams. If you start including all these dams then you're talking hundreds of millions more and so there's no way that any entity here can afford that and so we have to find ways to reduce the stormwater, maybe even get rid of some dams, maybe find

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other ways to deal with the water. You know, let's get it directly into the systems that can spread the water and take it to places where it's needed and recharge aquifers. But there's lots of opportunity here and with the individuals that we work with I think we have good opportunities to do that.

Kevin Bixby, SWEC.

I think John's right, **we have an opportunity, climate change, the prospect of more intense storms plus aging infrastructure, it's an opportunity to rethink everything; how we deal with floods, and it's an opportunity to restore the river.**

I would like to see probably congressionally convened stakeholder process, or possibly under the direction of the Secretary of the Interior, to bring together everybody to think creatively about how do we do this, how do we fix all of these different problems in a way that provides some resiliency against climate change, protects people from flooding, meets the needs of irrigators, and restores the river and the environment generally. No one here has the ability to bring everyone to the table and sit down and figure these things out so I would like to see an outside agency bring us all together to figure that out.

Connie Maxwell, NMWRRI.

Thank you so much Kevin, thank you everybody, this has been a very inspiring discussion. We will be getting int touch with everybody to let you now about the next Master Watershed Conservationist. Also another plug, we are going to be having a Hatch and Mesilla Valley Watershed Planning Workshop next month October 20th, a Wednesday, from 9 – 12. We'll let you all know about that.

Thanks again and thanks to Dr. Craig and Jerry for putting this together and Jennifer helping us run through it all. We look forward to keeping the discussion going and convening some major projects to make some real progress for this region.

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6.5 Northwest NM

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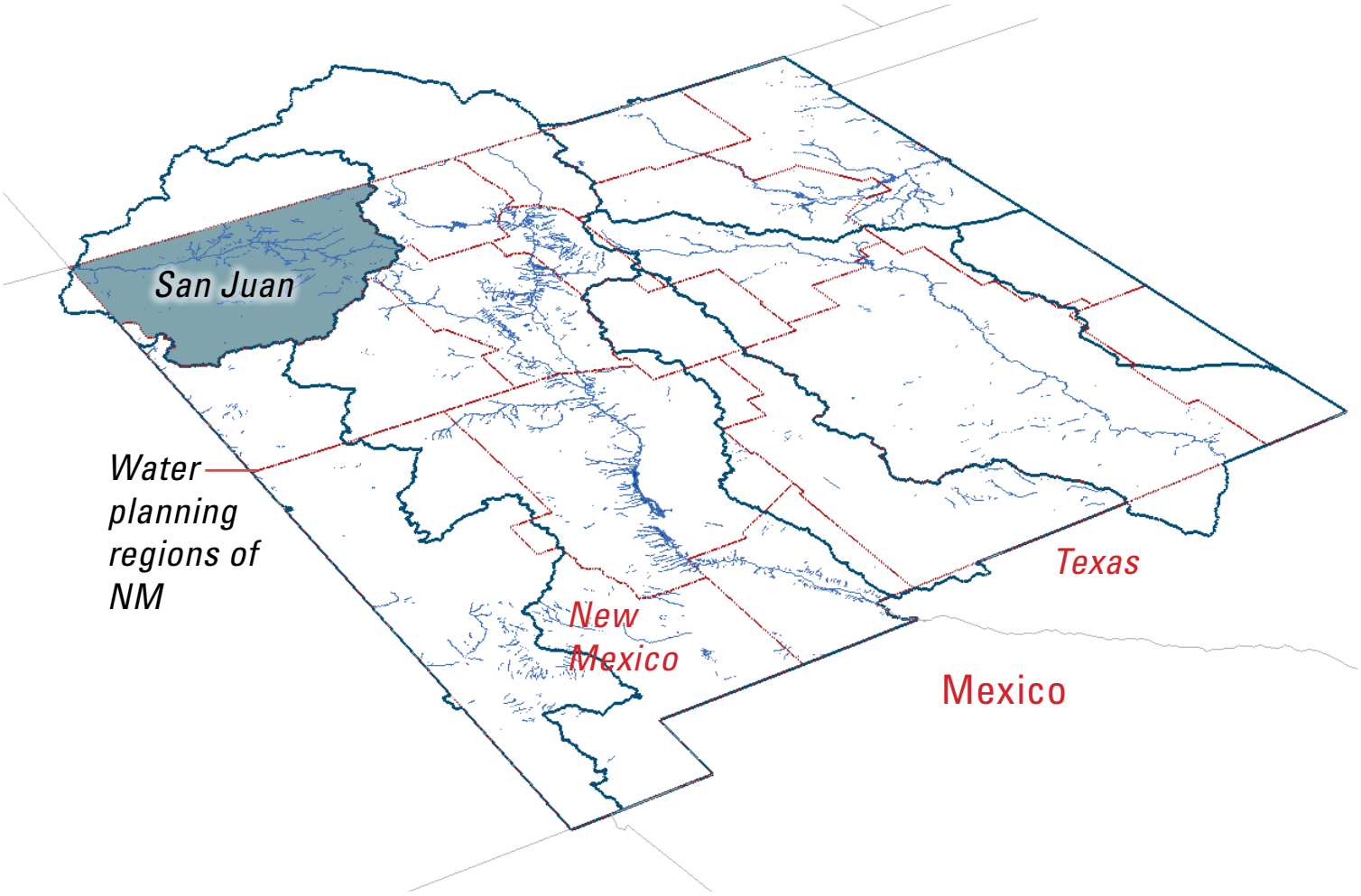

Northwest NM Stakeholder Visions for a Resilient Future

Focus Group Participants

Susan Behery,
Bureau of Reclamation
Navajo Reservoir Operations Manager

Melissa May,
San Juan Soil and Water Conservation District
District Manager

Forrest John,
Environmental Protection Agency
Region 6

Paul Montoia,
City of Farmington
Water Resource Specialist

Billy Weaver,
Hammond Project

Shelly Lemon,
New Mexico Environment Dept.
Surface Water Quality Bureau Chief

Kathy Smith
Hammond Project

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Northwest NM Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Forrest John, EPA

Sure. Yeah, my first name is Forrest, last name is John, and I work for the EPA regional office in Dallas. I've spent probably 40 plus years working on and off with the state of New Mexico, as well as going to school at New Mexico State in the fisheries program there. **So obviously I have a vested interest in water resources in the state, and it is definitely near and dear to me.**

Paul Montoia, CoF

Good morning. My name is Paul Montoia. I'm a water resource specialist for the City of Farmington, and my responsibilities are looking at future water supplies, obtaining water supplies for water rights, water quality issues, all that sort of things. My main concerns are in two areas. **What happens if the temperatures warm and the snowpack decreases significantly**, how are we going to handle that? **Then, if there's just a minimal amount of precipitation every year, how do we keep up the water quality so that we can make the maximum use out of it?**

I need to look at what the population of Farmington is going to be as well as Northwest New Mexico, because we have four smaller water utilities that we provide water for. One of them is Shiprock, so that is of concern to me. That's where I'm coming from today.

Billy Weaver, HP

Good morning. My name is Billy Weaver and I'm a small landowner just outside of Bloomfield, here in the Four Corners. **I'm a little concerned about our future irrigation water and the loss of it due to lack of snowfall** and particularly **how much are we sending down river for other uses**. So just looking out for my future and the future of others up here in the Four Corners.

Shelly Lemon, NMED

This is Shelly Lemon. I am the Surface Water Quality Bureau Chief for the New Mexico Environment Department. I work in watersheds throughout the state of New Mexico. We do water quality, so **we're looking at the Clean Water Act and the state's water quality act to assess the surface water quality throughout the state of New Mexico**. So rivers, streams, lakes, and wetlands. **We also implement planning documents to help improve water quality and restoration projects to restore or protect water quality**. For this region I've been working with the larger watershed group.

It's a really beautiful area**. I value the recreational aspect of it**. You have Navajo Lake—which I think is probably the best outdoor recreation area for a lake in the state—and amazing fishing and just enjoying the river. **I know that it's also used intensively for agriculture, which is a big part of the economy up there and part of the culture up there**. So I'm here to serve the state of New Mexico.

Melissa May, SJSWCD

Good morning, everyone. I'm Melissa May. I'm the district manager for the San Juan Soil and Water Conservation District. This is one of the fun instances where are our values are hopefully right in the name of our organization: **soil and water and conservation**. We serve all the land users within our district. We work a lot with the private landowners, and most of the

NW NM Values, cont.

private land within our area is concentrated right along the river corridors. **Working with the farmers and ranchers on really active stewardship and to find win-win solutions that help with agricultural production, help meet their goals, as well as doing what's best for our soil and water resources in the area**.

You can see my little background picture here is up at Navajo Dam. This was actually one of the river stewardship projects that we did with NMED, and was an invasive species removal project along the rivers. **Habitat restoration is definitely something we've worked on a lot and recently**; really trying to focus on soil, being the first word in our organization name. I was really happy to see the slides include **soil health, recharge, and things like that as part of the strategies, because that's something that we're really trying to shift our focus to**. **I think that's going to be one of the the really big win-win solution that's going to help the land, help the water, and help our agricultural producers.** Thank you.

Susan Behery, BoR

This is Susan Behery. I work for the Bureau of Reclamation. I am a hydraulic engineer and I operate the Navajo unit, which is one of the four initial Colorado River Storage Project units. My primary concerns are with operations at Navajo Dam: I am responsible for **delivering the contract water to the Navajo Nation, the Jicarilla Apache Nation, and a few other smaller projects.** One of the other components of operations is **fulfilling Endangered Species Act requirements**. We make releases to comply with the Endangered Species Act. So, the two primary causes of concern are our endangered species and irrigation on the San Juan corridor. Obviously you're aware that the Navajo unit is part of a larger system, the Colorado River Storage Project. I'm sure everybody has heard about Lake Powell and Mead. As part of the Upper Colorado Basin Region of the Bureau of Reclamation, I work **closely with the Lower Colorado Basin Region**. It's a much larger picture when you look at all the initial units. So I am also concerned with operations outside of just the San Juan Basin.

Connie Maxwell, NMWRRI

Mark, I'll just point out that Kathy Smith did put something in the chat. I'll go ahead and read it. She says she represents the farmers on the Hammond Project. **They're concerned about water shortages**. A lot of these farmers depend on their crops financially, and for livestock feed. **We are all are willing to help, however we can, to conserve water for the future of farmers. Issues and strategies in the region.**

Mark Sheely, NMWRRI

NW NM Issues / Strategies

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Looking at those concerns a little bit further that you've mentioned, such as less precipitation, less water, less surface water overall. Could you expand on what some of those issues are, and what do you see as some of the strategies in addressing those issues?

Paul Montoia, CoF

I'd like to point out that we're really unique up in this area. That for the most part, **we rely on surface water**, which is an annually renewable source of water. We don't really mine our water, like many other areas in New Mexico. It's just a matter of how much. So we're working really hard with our Southwestern Colorado people in **recognizing the fact that it's not two systems, it is just one system and we all live and die by the fact that we share these water resources that are developed along the river there.**

We're not really importing water in the traditional sense, but **the coalitions that we have put together have worked really well in working on water quality and water supply as well.**

Mark Sheely, NMWRRI

I know from the, the perspective of the Animas and San Juan Watersheds Conference, those ties and collaboration that have developed and been presented at those conferences are remarkable to see. From your perspective, Paul, at the City of Farmington, looking at those issues like the reliance on surface water and looking at a future of diminishing surface water, are there any strategies that you see to address those?

Paul Montoia, CoF

I participate in the San Juan Water Commission a lot. And for this area, The San Juan Water Commission is primarily for a municipal water supply. And **we're looking at trying to develop as much storage as we possibly can**. There are two things that we think are very important. We have water supply at Lake Night Horse, Colorado and we release water out of the lake into the Animas River. Then it travels up to 80 miles, so we have a possibility of a lot of water loss. **If we had a pipeline, could that better distribute the water?** The other thing too is, we're looking at the fact that the majority of our water rights are primarily on the Animas. **So is there some way that we can take water out of the San Juan and use it for municipal purposes?** The water comes down the Animas River and flows into the San Juan, so does it make a difference whether we take it from the Animas or off the San Juan? That's one of the things that we're exploring, calling it an exchange.

We're also making inroads on our 40-year water plan and trying to figure out what our water right inventory actually is, who our main users are, and where the City of Farmington going to be going in the future. **We see the growth patterns changing quite a bit. I don't think we're going to be as reliant on oil and gas and coal as we have been. Maybe we will be developing recreational uses of water, and maybe shifting to more of a retirement area.**

I think Melissa could really add to that. Her input is pretty valuable because she addresses a lot of the agriculture uses, which is who we're trying to share water with and also water.

NW NM Issues / Strategies, cont.

Melissa May, SJSWCD

Yes. Paul mentioned the San Juan Water Commission. There are also the the San Juan Watershed Group and Animas Watershed Partnership in the area that are basically working on collaborative solutions mainly focused on water quality, but water quantity is also always part of the conversation.

I think the lowest hanging fruit, as far as projects go and future opportunities for improvement. When we do get precipitation in our area, it ends up creating a pollution issue or a hazard when it could be used more efficiently as a resource. There are a lot of examples, both in the uplands in the cities in the irrigated lands, but one example that I've seen that's been discussed a lot at our board meetings has to do with the oil and gas development in our area. **There are thousands of miles of dirt roads in San Juan county and in the San Juan basin that crisscross the upper watersheds.** Most of them are not engineered. Historically, you would have had water sinking in and having surface flow over a large area and kind of promoting grass growth. Then, once you have this road and well pad network, you end up having tons of water that's kind of shunted along culverts and things like that. **You have downcutting in your arroyos and cutting down a channel, as opposed to spreading over the landscape actually growing grass that is beneficial for livestock as well as for wildlife and infiltrating.**

Going back to groundwater, all those things are beneficial to the watershed as a whole. I think there is a ton of room for improvement. **There is a lot of water that is basically being lost and causing problems instead of causing a benefit**. I think there are similar examples on cropland in the valleys. **When you have bare soil and you have a sudden rain event and then your soil is not ready to absorb it, so it just washes away the top soil and you're getting nutrients and bacteria and things like that in the rivers** as opposed to having water soak into the ground where it can be beneficially used by plants and crops. I really liked in the initial slides listing some of those upland arroyo, slow-and-spread strategies.This is probably a loaded question, not relevant here, but I know there's been changes or back and forth with the Waters of the U.S. role, whether arroyos or count as jurisdictional waters. So I know depending on the situation there, **you may or may not need Four-Four permits to do work in those arroyos.**

So if this group was looking at larger-scale projects, **if you could get some sort of blanket permitting to do a lot of those small structures in an upper watershed that could be a really cool opportunity**. If you are doing something piecemeal and there are a lot of permits required, that can be really difficult for one organization to do all at once. For instance, it ends up being easier for the City of Farmington to build one giant stormwater retention basin, as opposed to twenty small structures up upstream in the watershed.

Connie Maxwell, NMWRRI

I have some experience with that and I know. The strategies that I have been pursuing are to slow and spread water, not completely contain it. Check dams in the Southwest have a history of being a little over-engineered. Any time you are actually trying to stop water, you are courting a breakage and you are courting disaster. **Where you are not**

NW NM Issues / Strategies, cont.

actually trying to hold all of the water, those four-four permits look at that very beneficially. I like your idea of being able to collect a number of those into a permit. What you were describing is very much the same aquifer recharge practices which supply that filtering function and improve water quality an immense amount as well. **It's kind of like trying to think about instituting a lot of seasonal wetlands across the landscape and be dryland beavers**.

Paul Montoia, CoF

The things that I'd like to point out too is that we have a pretty good relate working relationship with the bureau of reclamation and the way they operate Navajo Dam. I was thinking maybe Susan could talk a little bit about some of the challenges that we are facing in trying to keep the San Juan river flowing and for downstream users specifically, and for the fish habitat that we're trying to protect through the San Juan Recovery Implementation Program.

Susan Behery, BoR

Everybody knows that development in the basin, along with climate change, every year water supply is a little bit worse, that we don't have enough snow. One thing that I think is really interesting is that **some of the climate models show that any snow that we do get falls as rain in the winter more than it did in the past.** We get a little more runoff in the winter time and a lot less runoff in the spring and summer when we actually need to use that water. **If we don't have as much runoff, the releases from the dam have to increase to satisfy the water users.**

So we make releases for our contract water users, and we make releases for ESA. **One of our challenges is that New Mexico has not begun administration of the river just yet**. **Sometimes we have to make high releases that exceed our inflows by a lot**. We're potentially sending contract water down that's being diverted by non-contract water users. That challenge is probably going to increase in the future.

Paul Montoia, CoF

I'd like to toss something out here, Susan. There is a lot of discussion about the 1922 Colorado river compact. **If there's continues to be the shortages, what would you see as the possibility of reopening that compact and trying to do something different?** It seems like it was constructed in a really wet period. Now that we're in a really dry period, it just doesn't seem to be working like it should be.

Susan Behery, BoR

Yes, it was negotiated during an exceptionally high set of water years, which we know now, but obviously they did not know then. Soon we will be beginning the process of renegotiating the interim guidelines for Powell and Mead. Those guidelines do not directly direct the way that Navajo operates , as it is an upstream reservoir, but they do have some impact on some of the operations, especially when we get into things that we're contending with now, which are drought operations for Powell.

Paul Montoia, CoF

What do they call that plan where they're Arizona and, and California and Nevada are

NW NM Issues / Strategies, cont.

taking real water hits?

Susan Behery, BoR

The 500 Plus Plan. So, as I understand it, under the interim guidelines for Lake Powell and Lake Mead, Arizona, Nevada, and California are taking shortages next year. Starting next year, they're going into a tier one shortage. That's a pre-negotiated value that they are they're going to be shorted next year. Then yesterday at CRUA they settled on something called the 500 Plus Plan, which is where Arizona, Nevada, and California have agreed to take an additional 500,000 acre feet of cuts in water year '22 and '23.

But regarding Navajo's operations and those challenges, **one of the big challenges is obviously meeting contract water users and meeting the endangered species flows downstream. They are often competing values**. They are two of the many and varied competing values on the river. If anybody is familiar with the San Juan River Recovery Implementation Program, on their committee they have a variety of water users and water user interests to help the program's mission to recover the endangered species while allowing continued water development in the basin. **I would say that the major complication that we are going to be seeing in future years is the increased likelihood of shortage, Which would potentially impact contract water users and commitments to ESA.** And the threat of increasing temperatures, decreasing soil moisture, and water basically falling not in a way that we are set up with infrastructure to capture—we're set up to capture snow melt and then release it in the spring and summertime when the water is needed. We are not set up infrastructure-wise to make the same kind of operations through capture of extreme and unpredictable rainfall events. it depends on when the precipitation is falling and in what manner we will use water. **The infrastructure that we have is not going to keep up with the way that precipitation falls if we start seeing our water more as rainfall events that are extreme and variable in volume, timing, and location**

Connie Maxwell, NMWRRI

Do you have ideas for how you might be able to do that? Certainly it's an area of work that I have focused on quite a bit. It certainly seems that for the Southwest, not only more of our water coming in the form of rain as opposed to snowpack, but also there are indications about those rain events also becoming more intense. So flooding is the flip side of drought and that water quality coming from the upper waters, it's a bit of a spiraling issue. I would be curious if you have thoughts about how to start to integrate that with your infrastructure. Paul Tashjian from the Middle Rio Grande made the point that we need to mimic the natural systems and use all of the tools, from natural solutions to large infrastructure to achieve those functions. I was just curious. I'm sure you've got some idea how you might want to pursue it or think about it.

Susan Behery, BoR

I can't say that I have infrastructure specific ideas. I mean, what is the natural system? If we're going into a period of time where climate change has changed the natural system. **If we continue to be making high releases in the spring to mimic the natural**

NW NM Issues / Strategies, cont.

hydrograph, is that really the natural hydrograph anymore? I have questions like that, I am not qualified to answer. Regardless, I think that's an active area of research at Reclamation. If we are going to continue operating the same way that we have always tried to operate, growing plants in the summer, which is when you grow them, there's no way to change that. That's when things grow, so we need to have predictable available water in the summertime for releases.

Connie Maxwell, NMWRRI

It's not an easy topic. I agree that we might lose something in terms of those pulses. I think trying mimick some of the natural processes. If you think about beavers on a riparian system going upstream from the reservoir, anytime that we can do things to slow the water down and spread it out, we're almost mimicking a snowpack. The water then infiltrates into the ground. So you're reducing evaporation. Obviously, it has to be in strategic areas that actually do percolate down and then contribute to that surface flow. But that's one kind of overall way to look at it.

Mark Sheely, NMWRRI

Let's take the chance to see if two of our participants from the Hammond Conservancy district, Billy and Cathy, if there are any strategies or barriers to those strategies that you want to want to weigh in on.

Billy Weaver, HP

I'm just joining this discussion trying to get a little educated about my irrigation water and the irrigation water of this whole area here**. I know it's an economic boost to the area**, all the hay that is raised here and the livestock. Recently, I was told that we were sending our water, our winter reserves down to Lake Powell. So I became concerned as to what is our obligation to send that water down to Lake Powell and Mead. Can anybody help me with that one?

Susan Behery, BoR

Navajo Dam is not going to be making that release to Powell this year (2022). That decision was handed down a week or two ago because there is the potential for shortage in the San Juan River basin. The active storage at Navajo is only about a million acre-feet, mainly because of the elevation of the intake for the Navajo Indian Irrigation Project. One of the main purposes of the water Navajo Reservoir is to fulfill those tribal water rights. So half of the water that is active storage in Navajo Reservoir is contracted to the Navajo Nation and Jicarilla Apache Nation. There's water in there for other water users that are in smaller quantities, but the bulk of it, about half a million acre-feet, is to fulfill portions on the New Mexico Navajo Tribal Water Settlement, and then any of the other water in Navajo Reservoir is basically what's called CRSP system water, the Colorado River Storage Project system. CRSP System water is generally timed in a way to target Endangered Species Act goals, and is also the water that could be used to fulfill Drought Response Operations releases (DROA releases).

We didn't make a DROA release this year because we're currently forecasting the potential for shortage next year. It's about a 10% chance right now. .The Drought Contingency Plan was signed by the Basin

NW NM Issues / Strategies, cont.

States and the Secretary of Interior in 2019. That's a plan for if Powell and Mead dropped below their minimum power pool, or were forecasted to do that, several things would happen to prevent that. One of the potential actions would be a release from the upper initial units, which are Navajo, Flaming Gorge, and Aspinall. They could be made available to contribute any of their available CRSP water downstream to keep Powell and Mead from dropping below this minimum level. That is a quick summary. If you have questions, let me know.

Paul Montoia, CoF

Melissa, you might talk, talk a little bit about the plan that you're doing with the San Juan Watershed Group on the San Juan.

Melissa May, SJSWCD

I can mention that, but I think Billy had a question though first.

Billy Weaver, HP

It's a lot of information. I'll be honest with you, I don't totally understand, but all the information helped. **I was really concerned about first of all about the value of our land up here** in the Northwest corner. A lot of it depends so much on that irrigation for the value of the land. I have a very small place, but without that irrigation water it's going to turn to dust. I was concerned how much we were sending out, if we still were sending it down, and what the projected cut back on irrigation water was for this coming irrigation season. This is all helping. I'm just taking it all in or trying to.

Susan Behery, BoR

Hey Billy, I just sent you an email not too long ago. I think you requested that be added to our list. So I sent you an email and my phone number is on there and my email address. If you want to talk about any of this stuff further after this, just give me a call and I can talk about any of the forecast or updates or any of that.

Billy Weaver, HP

Okay. I appreciate that. I'm just starting to get involved in it and see where we're headed with. I appreciate the information.

Susan Behery, BoR

Yeah, sure. We post all our stuff to the Reclamation website. We have meetings three times a year where we try to share all this information and then I have email lists. People can always just call me too. My phone number is everywhere, so people call me all the time just to ask for updates. So feel free to do that.

Paul Montoia, CoF

One of the things that I find very useful that you send out Susan is when the you're going to change a flow in the river. Those are really helpful for us here at the city. So thank you very much. Let me get back to what I was talking to Melissa about. Could you update us on that?

Melissa May, SJSWCD

We're doing a San Juan River restoration plan. **We have a grant right now through the Bureau of Reclamation WaterSMART**

NW NM Issues / Strategies, cont.

program. And we've also applied for some additional funding through **NMED's watershed basin planning program** to get a little bit more water quality details involved in that. Basically we've had almost two years of stakeholder outreach work to put together a wishlist of projects. We've been going through different categories of projects and then slowly narrowing those down to specific on-the-ground project locations that would be beneficial to the watershed. This process that you all are involved with is really exciting. **And I think the more we can collaborate and share information, the better for both.**

We've also been working with San Juan College. My coworker, Andy Buckinger has been teaching a series of classes on a variety of topics, including **rainwater harvesting, wildlife habitat, invasive weeds, soil health**, all sorts of different topics. **We're trying to make the practices that are used in agriculture on a larger scale available on the homeowner scale**, really. So **anybody could feel empowered to do that work and make improvements in their own backyard.**

Paul Montoia, CoF

I think this is really important because has a 10th of an acre or something like that. **There's more opportunity to conserve water and reduce pollutants that are going into that water supply**. This program is really needed in our community and I appreciate you guys putting it on.

Mark Sheely, NMWRRI

Thank you. And I want to give a chance to either Shelly or Forrest John, to jump in with some comments on possible strategies for some of these issues in the watershed,

Shelly Lemon, NMED

Through our bureau and our department, **we have funding opportunities to help implement different projects**. You know, we work a lot with this watershed group, with the Soil and Water Conservation District. We work to not only develop planning documents, but also on-the-ground restoration projects or implementing best management practices. I will help in that regard to help implement whatever the watershed wants to do, because I think all of the ideas talked about are super relevant and will help with that water supply issue into the future.

I will mention that House Bill 2 passed this week and it provides $10 million to the Environment Department for It's River Stewardship Program. **It's for water restoration throughout the state of New Mexico**. But thinking about larger projects like Melissa was talking about with a larger scope, it could be doable with this funding that we received and the funding to be used through FY 25. We are working to develop a request for proposals. We'll probably start that process earlier than normal, so we can get that out soon after the legislative session. We're asking for additional funding in the legislative session to help with water programs and water quality. so we'll see where it goes. But we might be getting funding to assist with these things.

Mark Sheely, NMWRRI

Thank you so much, Shelly. I'll transition now to this last question we have scheduled here, which is, taking into consideration the issues, strategies and barriers that we've talked about in regards to water in this

NW NM Issues / Strategies, cont.

region of the state, what do you see as some of your your visions and goals for the future?

One of the things that we would like to do is to be able to develop regional offshoot models of our statewide water budget that can take into consideration socioeconomic factors in looking at the overall kind of water balance in different areas of the state.

And so one of the ways that we can utilize this model would be to test some of these strategies and look at which ones can be effective in attaining these visions. So if you can quantify your visions, that would be great. One example would be in the lower Rio Grande valley where one possible vision could be to reverse the declining groundwater rate. I'm curious to hear what are some your visions for the future?

Paul Montoia, CoF

I think one of the interesting things is that for years we've always just looked at water use in the and the San Juan watershed has been municipal and agricultural. I think with the 50-Year Water Plan, we started seeing a lot of different segments, which I think is really great. **I think it's really great that we're looking at this as a multi-demand situation and from both a use and availability standpoint**. I think that's really been lost over the years. Nobody has really talked about that issue at all. Now that we're recognizing that there are multiple users and demands on the river **how are we all going to work together on this and how we're going to keep water affordable and available at the same time?**

NW NM Visions for the Future

Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Connie Maxwell, NMWRRI

It certainly sounds like many of the folks have the vision**, that the surface water will be plentiful enough to meet the current needs**. So I imagine there's some sort of version of that that's more nuanced and educated than what I just described.

Susan Behery, BoR

I don't know if being a federal employee I'm allowed to have a vision. **But we have an over-determined equation, we have mathematically not enough water for the use and the inflows that we're getting**. I think as an agency, we are open and actively researching adaptations. There is no assumption that things are going to be able to continue as they have. There is no, there is no active area of research or status quo. Obviously as humans, we just adapt and change to survive, I think this year has really pushed us over the edge to making definitive statements. **Things are going to have to change and we will have to adapt.** I think the vision that we have is that **people will really get on board with the idea that things are going to have to change**. You may not be able to do things exactly the way that we've always done in the past.

Paul Montoia, CoF

I think that what you're providing the research tools and everything that you guys bring to the table is really going to be helpful in our future.

Susan Behery, BoR

I think a lot of money is being put into this area of research and into big changes. It's not like we're going to be able to make a big change to suddenly make water available for everybody who has always used it and will always want to use it. It's more research into how we can adapt to the fact that we can't necessarily completely control the soil moisture and all of these other factors. What can we control and where can we adapt to it?

Paul Montoia, CoF

Well, I think **one of the things that we really have been kind of lacking on is education**. **And I think if we can promote education to different water users that it's a necessity, that it's better that we all share a little bit, rather than one person gets all and one person gets none.**

Shelly Lemon, NMED

I would agree with that as well. Thinking about how to educate the public about things they can do, you think about these issues and they're really big and bringing it down to that personal level of those small changes, when you add them up with each individual are large changes.

Also thinking about how to reuse water more effectively and how to capture water more effectively, which is what we've been talking about because those issues, those strategies will help provide water. Multiple uses of water as it goes through the cycle, right? **It's not just one user. It may be 10 users who ultimately get to use that water if we're managing it properly.** So thinking about that type of idea and those creative solutions where we haven't necessarily done that in the past and providing those water efficiencies throughout the system from point A to point Z, that's where my department and my bureau can assist with

NW NM Visions for the Future, cont.

implementing either pilot projects to test out new methods or implementing best management practice practices that are known to be effective.

Paul Montoia, CoF

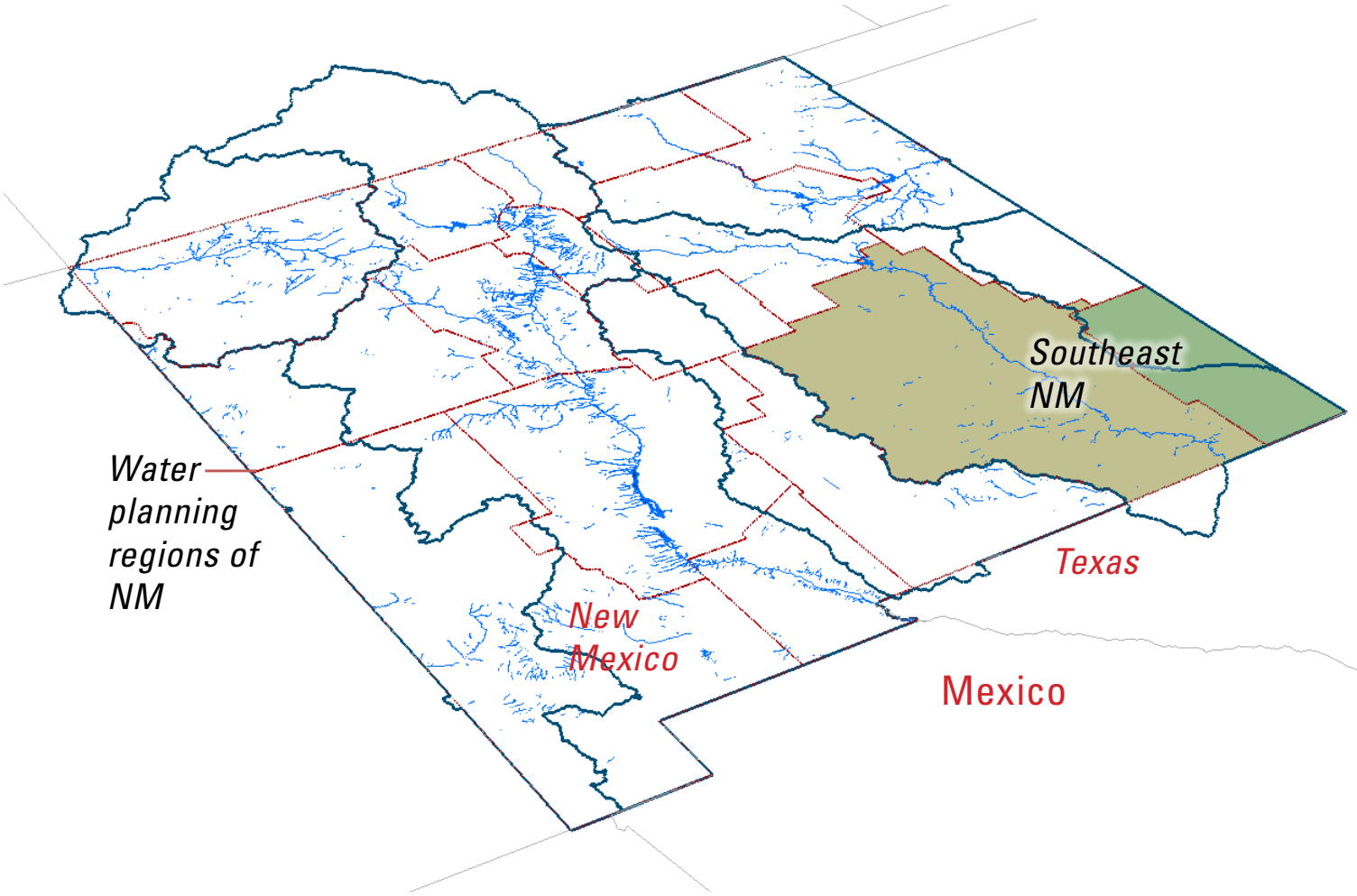
One of the things that we've done up here is the ditch rotation on the Animas River. And it was originally thought that just a senior water right users would get water. This was back in 2002. So all the irrigator ditches and the city got together and said, okay, let's just rotate this. We can write X amount of water, and you water on Thursday and I'll water on Friday. We're using the same amount of water for the two days, but we're both getting at least some water to help us in that area.

Mark Sheely, NMWRRI

Thank you so much everyone for your time, and have a great rest of your day.

6.6 Southeast NM

REGION FULL TRANSCRIPTS



Southeast NM Stakeholder Visions for a Resilient Future

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Lynette Guevarra,
New Mexico Environment Dept.
Groundwater Quality Bureau Chief

Mike Hightower,
NM Produced Water Research Consortium
Program Manager

Southeast NM Values

Question: What is your professional perspective on what you, your organization, and the stakeholders your organization serves value about the region?

Mike Hightower, NMPWRC

Thanks for letting me go first. My background, I graduated from New Mexico State a long time ago. I actually worked as a graduate student at the Water Resources Research Institute when John Clark was the Director.

I worked at Sandia National Labs for about 40 years on national security issues, most of them around natural resources, including water. So I've done a lot of work with the Department of Energy on long-term water issues for the energy sector, which is big in Southeastern New Mexico. I've looked at a lot of issues around desalination. I think that gives you my perspective of my background. In my interactions right now I'm working with New Mexico State and the New Mexico Environment Department on the Produced Water Research Consortium, specifically looking at the utilization of fit-for-purpose uses of treated, produced water as a way to supplement resources in oil and gas producing areas in New Mexico, so both southeastern New Mexico and northwestern New Mexico.

With that background, let me just tell you what I know right now from my interactions with industry and elected officials in southeastern New Mexico and some of the trends that I see. **I think we're going to see down the road in the next few years additional limitations on use of fresh water for oil and gas.** For industry that means that some of the resources down in Southeastern New Mexico that are non-traditional, including large supplies of brackish water in Southeastern New Mexico, as well as large supplies of produced water, which is also saline and brackish, I think are going to be two resources that over the next 10 years are going to be developed. I think those brackish resources should be included in long-term planning for the State Engineer. Both the brackish groundwater and the produced water.

We don't know exactly right now how much produced water is going to be able to be used. It's going to depend upon how well we can treat it for fit-for-purpose uses. Some of the projections are now looking at the maturity of desal technologies for produced water and some of the other limiting factors on disposal of produced water.

I think we're going to see a significant volume of produced water being utilized. When I say significant, I think my projection would be in the next 10 years, maybe something on the order of 20 to 40 MGD. That's big from a municipal standpoint. It's not necessarily big from an agricultural standpoint. I think there are a lot of resources for brackish reuse and shallow brackish water in Southeastern New Mexico that are probably pretty easily treated. I think that's going to be a resource that people are going to move to. It's pretty ubiquitous in Southeastern New Mexico.

The other thing that you might not be aware of is the Palisades Pipeline. It's a pipeline coming out Lubbock taking municipal wastewater out of some of the cities around Lubbock, and moving it into the Lovington area. That's about 20 MGD of, I would say, high quality effluent from from wastewater treatment plants. Texas doesn't want it, but they're going to send it to New Mexico. **I think that's a resource that we ought to look at.** I'm following that pipeline pretty closely. It's on and off again, but I think it's on again right now, and **it's something that we ought to consider, as well as reuse of municipal wastewater and industrial**

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wastewater in Southeastern New Mexico to supplement supplies.

The last thing that I was going to mention is that the two major industries in Southeastern New Mexico are oil and gas and potash. From my interactions with the oil and gas industry and potash industry, **my thoughts are that they'll both be around for another 40 years, and then they'll begin to wane.** I do think that after this next 50-year water plan is done, the next 50-year water plan might have a little bit different planning for Southeastern New Mexico. What I'm seeing right now, at least the big industries are still going to be there. Their water demands are going to need to be addressed. That region, I think, understands that, and they're looking for other industrial opportunities. So I think in the nearer term, we will still have oil and gas, but we'll see Southeastern New Mexico trying to transition to some other industries. T**hen as the water needs for those industries come up and oil and gas go down, those will probably need to be balanced**. Those are my opinions of what I see as far as the trends, the opportunities with potential solutions, and maybe the quantities of water that might be available to include in any of your system dynamics modeling that you're doing or modeling that you're doing for the State Engineer.

The last thing I didn't talk about was freshwater. Through my interactions with west Texas, my thought is that Texas is not going to change their water law. Their right-of-capture is going to be there for at least another 20 years until it gets even more dire. We're at the edges in Southeastern New Mexico of the Ogallala Aquifer. **I see fresh water as being a real problem in Southeastern New Mexico.** I've had some interactions with Texas Tech trying to develop a cross-boundary water management structure for groundwater. Texas is not really interested in doing that. So I see freshwater as being a bigger issue than it is today, which is pretty dire today. Those are my thoughts. Hopefully that's what you were looking for.

Mark Sheely, NMWRRI

Yes. Thank you so much.

Connie Maxwell, NMWRRI

Mike, it sounds like you've got a couple of visions here, that there's a strategy for fresh water in the future.

Do you think maybe you could put a little bit of quantification to that? I see you're considering years. "In 20 years there's also a vision of having a good transition strategy from oil and gas to other alternative forms of energy." Would you also say that's a bit of a vision as well?

Mike Hightower, NMPWRC

I don't know that I should be giving a vision of Southeastern New Mexico. That's the job of elected officials. (laughs) All of the elected officials understand the issues, complexities, and limitations with freshwater. **They're all interested in looking at the use of non-traditional water resources, maximizing that to minimize freshwater consumption, so that they can maximize the period of having fresh water available in those regions.** I've got a quote from the mayor of Jal that said that, " we've been using wastewater in Southeastern New Mexico for 40 years. We're not afraid of it. We have to use it. All we want to do is use as much non-traditional waters as we

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can to save as much of the fresh water as we can." I think that's pretty much the vision of Southeastern New Mexico: **figuring out ways to use non traditional water resources and save as much of that fresh water as they can, realizing that they're in a precarious situation with fresh water supplies.** That means looking at brackish water, looking at produced water. It may be a little more expensive today, but it's not going to be expensive when you compare it to having no fresh water. **The vision that I see is that they're going to try to transition to other industries and begin to move away from oil and gas and potash as their big employers and come up with other industries that can utilize these non-traditional waters.** You can treat a brackish water to a level that's an industrial level, that's not at a drinking water level, and still create economic development opportunities.

Amanda Eavenson, BLM

My name is Amanda Evanson and I am currently in Carlsbad as the hydrologist here for the BLM office. A little bit on me: I got my degree at Eastern New Mexico University. Then I moved to Arizona and I worked there as a hydrologist for a BLM office in Southeast Arizona. I recently moved here. I'm obviously familiar with the issues, but I'm still learning them and I'm trying to have a better understanding of them.

Everything that Mike said are my concerns. The fresh water and the use of it and how much we're using it in the industry, I think is a very huge problem. Because of that, it has effects for other industries, including ranching, livestock, all that stuff, but also the wildlife aspect of it. The fresh water and the surface water are some of my biggest concerns. Going with watershed restoration and working with our wildlife department and issues that they see there. For example, the Delaware river. **There are times where we have little to no flow through there**. So the wildlife aspect, with the Texas Horn Bill in mind, I think is one of our biggest concerns, along with the black and the Pecos obviously. Other than that, I think Mike really summarized all of the big issues and everything that I've seen so far. I really don't have much else to add.

Aron Balok, PVACD

Good morning. My name is Aaron Balok I'm the superintendent with the Pecos Valley Artesian Conservancy District. Our district is on the west side of what you would consider Southeastern New Mexico, with a little different issues that are faced by the rest of the corner of the state. **We are truly blessed to have an artesian aquifer with an incredible recharge ability.** We are however, still bound to a **prior appropriation doctrine** that links that groundwater to the river. That concept linking groundwater to the river was actually developed here. Conjunctive management was literally born here in the district. **Probably our biggest challenges as we look to the future is how we come to understand that link between the artesian aquifer and the surface water, and try to come up with some responses to limited inflows.** One of the great assets of this aquifer is the efficiency that you get with being able to store that water in the ground. **It's maddening when we see the inefficiencies of a surface water system where we lose a little less than half of the surface water that's released from Santa Rosa in Fort Sumner for Carlsbad Irrigation District.** Then we lose almost

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half again, sometimes between Carlsbad and the head gate at the farm. From our perspective, that's a really inefficient use of that water. Some of that is beyond anything we could hope to influence, however, within our district, we've put a lot of effort into improving on-farm efficiencies. **We've spent a ton of money investing in center pivots and transitioning away from flood irrigation.** There's still a significant amount of flood irrigation in the pecan orchards, but most of the irrigation is either with side rolls or center pivots now.

Now we're looking at how we can be more responsive to periods of drought. One of the things that we're trying to come up with and develop is a conservation program. I'm not real comfortable with naming it yet, but one might envision some sort of water bank where **there's an ability to impact the withdrawals from the system during drought conditions**. I think it's important to point out that for people that are using water, that water is money. That is their income. And they are interested in how they can maximize their income by using that water. To me, that's a pretty simple equation. I get frustrated when I hear the conversations about, "how can we get people to grow a different crop?" That's a no-brainer. If it's worth doing they'll look into it.

If you're asking them to use less water, you're asking them to make less money; you're asking them to take a cut in pay. How can we influence that while remaining grounded in the reality of a free market system, where those assets are a lifetime of investment, and not ask people to just give up part of their paycheck? That's where this idea of a conservation program has started to develop. **If the district gets itself into a position where it can withdraw water from production when the conditions dictate that's necessary, and then put that water back into production during times of plenty, that gives us a mechanism to react to changing conditions.**

One of our greatest assets is that my board of directors are all from the valley. While we are a government entity, it's local government, **it's local input**. We've invested heavily in trying to understand the system that we have. We've done a lot of hydrological studies here and feel like we've got a fairly good grasp on what we're working with, but also realize that the **vast majority of what's out there remains unstudied, and therefore not really understood**. We're working with what we've got and not trying to pretend that we know everything that goes on here. Another one of my frustrations is when I hear the terms, "... when we enter into a normal weather pattern." We don't have normal weather patterns. It's an extremely flashy system: long periods of drought sprinkled with intense flood events. In the system, the ability of this artesian aquifer to absorb water from those flood events is pretty remarkable. **This is where I think we've a real opportunity to improve inflows through our watershed management.**

There are a lot of bloodsuckers that are stealing our water before it gets into the system, so I'm a big fan of any kind of watershed management we can do to maximize the efficiency of that water getting into the system and being able to store it for future use. So with that, I will answer any questions.

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Mark Sheely, NMWRRI

Thanks, Aaron. I want to make sure that I captured the most accurate version of what you were saying: looking at the unique aspects of the artesian aquifer, it can be really useful in storing groundwater, although that there are some water delivery challenges in that surface water making its way down the down the river to your valley.

Aron Balok, PVACD

Sure. If you're not familiar with our current Hatfield McCoy dynamic that we have with the Carlsbad Irrigation District, **it's a generational dispute over what those impacts of groundwater pumping upstream have on what are primarily senior water rights downstream.** It's a completely understandable frustration. The perception of the upstream user is that they are being penalized for lack of supply upstream from them. In other words, there's no water in Fort Sumner and in Santa Rosa, therefore Carlsbad Irrigation District is going to have less than a full allocation of water. Yet **that puts those groundwater rights within the PVACD at risk through a priority call**. Great strides were made when we entered into the settlement agreement, which sought to remedy some of those problems, but we're not there yet. I firmly believe there's nothing that you can put in writing that is going to have enough foresight to react to situations that change. Every drought highlights some places where we need improvement. We have the augmentation well field. It did a great job of addressing our shortfall with our ability to deliver to Texas, **but we still haven't remedied the problem with Carlsbad Irrigation District not having a full supply of water.** That's something that needs to be addressed. It sounds like I should be anti prior appropriation doctrine given our situation, but that's absolutely not the case. In fact, I think it is only because of the prior appropriation doctrine that we've made the strides we have made that is the worst case scenario.

Facing a priority call forces other solutions. I think it's easy for people to view the prior appropriation doctrine as ineffective, antiquated, outdated, and doesn't work, when in fact it is effective. It's kinda like abstinence for birth control. It's a hundred percent effective every time it's implemented, but nobody wants to implement it. But what it does do is it forces alternative solutions and I think that's worth preserving and protecting.

Kelli Goodpasture, PVACD

Good morning. I'm Kelly Goodpasture, I'm with PVACD. I've only been here a short time, about seven months. My background is in education and I'm here to learn about water. I'm doing as much as possible with PVACD as I'm capable, but I hope to be learning more and getting to know different people in different areas of water and the industry. So I appreciate the opportunity to be here and learn about all of this.. So thank you very much.

Lynette Guevarra, NMED

Hi, I'm Lynette Guevara. I'm with the Groundwater Quality Bureau of the Environment Department. I have 25 years' experience in water quality design, sampling, analysis, and assessment. I was the 303D 305B assessment coordinator for 20 years in New Mexico, TMDL development. About a year ago, I switched over to the Groundwater Quality Bureau from the Surface Water Quality Bureau and became a regulator.

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I work in the pollution prevention section and I'm the reuse team lead. I moved over because **I'm very interested in water reuse and helping encourage and promote additional water reuse where appropriate and safe in a way that protects public health and the environment**. I work quite a bit with Mike Hightower. I'm on the NMED Produced Water Act Implementation Team. We work with the NMSU Consortium on produced water, trying to help promote increased treatment methods and ways to ensure that if we are going to get to a place where we can increase our reuse of produced water, that it's done in a way that protects public health and the environment. I echo everything Mike said, and really appreciate the comments that Aron was making about surface water losses. One of the things I permit is the aquifer storage and recovery efforts (ASR) around the state. I'm not an expert in Southeast New Mexico. I haven't spent as much time there as I wish I had, now that my focus is more down there with produced water. **I'm interested in ways that as a state, we can promote more use of our revolving fund to increase infrastructure for increased reuse in the region.** I'm interested in learning more about ways to promote and make changes to crops that work for the growers in the region and don't negatively impact their livelihood, but help with water conservation through more potential reuse. **I'm really interested in helping automate some of the state regulatory processes and working on some initiatives there** so permitting **becomes more efficient,** and doesn't take quite so long.

Mark Sheely, NMWRRI

Okay. All right. Thank you, Lynette. I just wanted to go back and make sure you see the challenges of reuse that's accomplished in a safe way for the region. About, I guess the other challenges you echoed from Aron about surface water losses and the ways for producers to make crop changes without impacting their livelihood.

Lynette Guevarra, NMED

Yeah. And to comment about the state revolving fund are river stewardships programs, **ways to promote watershed improvements to help with water storage**. And also regarding the state revolving fund, **better ways to get the word out about that and get people interested in those programs**. And I'm interested to know what is going to come out, hopefully nationally, about infrastructure related water reuse.

Martha Graham, NMRWA

Good morning. My name is Martha Graham I'm with the New Mexico Rural Water Association. I have the source water protection program and I was born in Artesia, so I come from the southern part of the state, but I left there a long time ago. And have only done a little bit of work with the the public water systems in Southeastern New Mexico. I'm by training an anthropologist. There's a lot about water and hydrology and watersheds that I don't know anything about. But I've learned a little bit, at least about public water systems in the time that I've been with New Mexico Rural Water.

Some of my concerns are similar to what people have already talked about in terms of the availability of fresh water the availability of water that's suitable for drinking water, and strategies for taking the water that

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is available in the Southeast and using it most efficiently and appropriately in terms of where it can be drinking water, use it as drinking water, where it's not, maybe funnel a different direction. And the whole concept of reuse and what that might mean for these tiny water systems in the Southeast region who **don't have a lot of capacity** but could really benefit in terms of ideas, innovation, help with infrastructure, and those kinds of projects that might help them conserve and reuse water.

As I said, this is where I feel like an anthropologist and no water expert. So how much of that is actually doable or applicable? I don't know, but I think there may be some interesting questions that could be asked and then followed up. One other concern that I have, which is probably interest adjacent here, is that I've been working quite a bit with **small public water systems that have been, or could be negatively impacted by cannabis production,** both medical, and now, especially recreational, in terms of the use of drinking water for this agricultural crop. One of the things that has played out recently is that the Office of the State Engineer is encouraging producers, and applicants for licenses for cannabis production to use the Water Lease Act to acquire water for growing their crops. My understanding is that the Water Lease Act has been interpreted by the Office of the State Engineer in such a way that water is immediately available to the applicant, and there is no space for prior senior water rights users to object before that water is used for whatever the applicant wants to use it for.

The model for this comes from the oil and gas industry. Whereas it doesn't have a large impact on potential drinking water in the areas of oil and gas industry, it's going to have a very big impact in terms of the rest of the state and the Office of the State Engineer applying this interpretation elsewhere. Those are my thoughts. I'm also mostly here to learn because there's a lot, I don't know about.

Mark Sheely, NMWRRI

All right. Thank you so much, Martha. That's ultimately what we hope as well, for these conversations to not only provide the the Water Resource Research Institute with some insight into the regional water management dynamics, but also for organizational stakeholders to get a chance to listen as well.

I do see somebody who has called an on the phone. Whoever is calling in, are you able to introduce yourself?

Dustin Brownlow, MA

This is Dustin Brownlow here with Mesa Advisers calling in just to listen and understand what the state is looking at for long-term water supply issues that they have, and where I can maybe have some thoughtful input on produced water reuse. I'm just here to learn and understand what the state is looking at over the next 50 years and some of the issues related to ag and the oil and gas industry. I have been doing work in the state for the last three years or so around water investments, around infrastructure technology, and I've been really tied to oil and gas activity and starting to look more at ag and other regional supply-demand constraints. I'm also a

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member of the Produced Water Research Consortium.

Mark Sheely, NMWRRI

Was there anything else that you wanted to add to the conversation? I know you mentioned that you're part of the consortium, so I imagine you had a chance to listen to Mike Hightower's introductory remarks. Was there anything that you wanted to add from the perspective of the oil and gas sector on the kind of the issues and challenges of the region?

Dustin Brownlow, MA

I think the main thing that I'd like to add is, independently and attached to different organizations over the last five years, **we've been looking at technologies for produced water desalination and getting it to a price point that is competitive with disposal.** Unfortunately, that's what we're competing with. We're competing with the cheapest option, which is a trashcan, unfortunately, in the ground. **I think technologies are moving in a direction that are becoming very quickly cost competitive**. I also think we have quite a few technologies and advanced analytics that are getting to the point that regulators can probably get fairly comfortable around the technology feasibility and doing this in a safe manner.

One thing I've seen is, there's plenty of produced water out there to supply industry for in-field reuse, so I think it's great that the state has taken the steps to pull groundwater sources, where they can, away from industry. Because that's definitely not the best use for that water. And I think industry is starting to get behind that as well.

Mark Sheely, NMWRRI

Okay. All right. Thank you. Thank you so much, Dustin. Was there anybody else who wanted to give any other remarks or some followup points to this discussion of regional challenges and issues?

Aron Balok, PVACD

I do want to comment on the Water Lease Act. That has been a point of contention for some time. Unfortunately, there's a lot of misconceptions about how that is actually applied. What I mean by that is, the idea that water can somehow spring into existence through the water lease act is not correct. All that the Water Lease Act does is allow you to move an existing water right. It is subject to scrutiny from the State Engineer's office before they allow that temporary use. The applicant is then able to use that if it is being protested. There is an opportunity for anybody that might be impacted to protest it. The reason it's set up that way, it's very applicable in our area here. We are on a five-year accounting system, which means that a producer can use more than his three acre foot allocation in a given year, as long as he averages out over a five-year period of that three acre foot use, plus the half acre foot of carriage loss. We get in a situation where a producer may have overused on one of those years. He can lease some water from his neighbor to allow him to finish out that fifth year of accounting. We're in our fifth year right now, so the Water Lease Act is used very heavily here.

If it were just taken away or replaced with one of the alternatives that have been proposed to the legislature, that would allow me as an individual to essentially kill any application to move water through a $25 protest, because then they wouldn't be

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able to use it until after the fact. Well, the crop will be dead by the time we've settled our difference, regardless of whether it was allowed. The way it's set up now allows that water owner to move that water to a different point of diversion, assuming the state engineer will allow that. They will model it and make a decision based on what their model tells them.

I'm speaking specifically to our area because I'm unfamiliar with its use elsewhere. But I think it's safe to say we use it more here than in other parts of the state. If we take away that ability to start using it pretty quickly, then you've killed that application. The counterpoint to that is that there's an avenue to do that, which becomes an emergency application. The problem you'll run into there is, if you take away the Water Lease Act then every application becomes an emergency application. We end up with the same backlog on the emergency application desk, as we do on the water lease desk. The source of the problem can be traced back to the State Engineer's office and their **lack of resources to be able to hear these cases, settle these disputes, and move through these applications quickly**. It's a function of funding. The fact is that the State Engineer is told by the legislature every year that he has plenty of money and he just needs to make do with what he's got. We've got too many vacancies in the Roswell office that handles Southeastern New Mexico, and the State Engineer is powerless to make any changes because he can't just magically spend more money than he's got to spend.

Once again, we trace the root of all our problems back to money, but that's really the primary culprit here. I would advise caution when it comes to any modifications to the Water Lease Act because, to my knowledge, they have not been reversed maybe more than once on their preliminary approval. That's a pretty decent track record, and I would certainly offer that it does more good than it does harm. I don't mean that to throw rocks at anybody. So Martha, please don't be offended.

Martha Graham, NMRWA

No, I'm not offended. What you describe makes a lot of sense in your area. **I think that there are huge implications in terms of the amount of water that will be diverted to cannabis, particularly from drinking water systems**. I also believe that the State Engineer's office has its marching orders to make cannabis production work. Yes, they do model what kinds of impacts there are going to be. **Small drinking water systems do not seem to be on the radar to the extent that I think they should be.**

Aron Balok, PVACD

I will second what you just said and agree whole heartedly and take it one step further in that I'm not nearly as concerned about those who are making applications to move water and/or attempting to do it through a legal avenue. The ones I am extremely concerned about are the ones you just described who are more than likely violating the water co-op policy of using that water for other than domestic purposes. Even more so than that are the domestic wells. I understand the predicament that the State Engineer is in. He is required to issue a permit. He can't deny people a domestic well. Again, this goes back to money. He can limit the amount of water that comes

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from that domestic well, but if he says you can only use a half acre foot or whatever that number is in that area, but doesn't require that the domestic well have a meter, or has nobody that reads those meters, it's really tough to say that we're limiting that use to a half acre foot. What we see down in our area is a lot of these domestic wells are legally put in, a very large landscape of pecan trees is then put in, and those aren't ornamentals. Those are production trees. There's almost no way to regulate that. We're probably better regulated over here than in other areas because the PVACD pays the expense of the water master to keep tabs on what our depletions are. **I can see this not just being a problem here, but elsewhere in the state where we've got to come up with a way to address this domestic well issue.**

I think using co-op water for cannabis is right in that same vein. If you want to grow cannabis, I don't care what you want to grow, but I want you to do it legally. The fact of the matter is, if you own an acre foot of water right, I want you to be able to use that whole acre foot, but I really think it's important that we use the system that we've got and we enforce the system we've got. There are a lot of cracks that can be slipped through right now.

Martha Graham, NMRWA

Aaron, I want to say you're absolutely right. **Enforcement is really one of the fundamental issues here**. The Office of the State Engineer can make any kind of decision that it wants. If it can't enforce that, then we are where we are. But thank you very much for your comments. They're really helpful.

Aron Balok, PVACD

Thank you.

Lynette Guevarra, NMED

I think that's totally the point that we see too, **is the need for increased metering and enforcement around this**. I think that the Office of the State Engineer's office is woefully underfunded for what their mandate is. I think NMED is woefully underfunded for what their mandate is. **We're definitely under-resourced around the issues of enforcement and compliance**. I think both agencies feel that. We sometimes have the legislature pass new acts without necessarily the funding to implement the acts. It's a chronic problem. I think that cannabis coming online is going to bring it to a head and really surface up this issue of needing more enforcement and metering and compliance. I hope that is high on the legislature's agenda, to not only pass these new initiatives, but to pass the funding to go with them to implement them properly.

Aron Balok, PVACD

I'm woefully ill-prepared to unveil this concept, but I've been mulling it over for a long time. I don't really know how to articulate it yet and that's why I haven't tried to do anything with it. The PVACD has enjoyed a lot of success. There was really a lot of foresight that took place by my predecessors here in the valley. They really understood a lot for what they had to work with, and it really impresses me. **One of the things that I think was really successful was that they had the foresight to create this district**. There were some things that forced them to do it the way they did

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so that they could get it done, but that political environment has changed. One of the benefits is that **I answer to a board of directors who are elected by residents of the valley**. We don't have members; we have constituents. You pay your city taxes; we are funded through a local mill levy. So that does a couple things. It allows for a funding source, which goes to the unfunded mandate component. **It also allows for some local governance**. I think that's a real benefit, in that when one producer in the valley has a problem with something that the district is doing, you can bet that they show up at our board meetings and make it known. I really think that the board is tuned into that. They want to hear that feedback, good or bad. It allows us to march in the direction that the citizens want. The concept that, like I said, is probably not ready to be unveiled is **local groundwater districts that have a funding mechanism.**

One of the things that the district does with that resource is we install and own and maintain a meter on every point of diversion that has a water right attached to it. So every acre foot that has a meter, we know whether or not it's being used and keep up with that. We also fund the State Engineer's water master to enforce that, so we address the enforcement component, albeit for a small sector and domestic wells don't fall under that. The second value I see in this here would be **an avenue towards those different kinds of uses**. Right now, if you want to produce cannabis in your backyard and you need a half acre foot of water right, I don't know who you can go talk to, to buy a half acre foot of water right. No one is going to listen to you. As valuable as water rights are, nobody is going to talk to you over a half acre foot or one acre foot. This is maybe a function that those local districts and, hopefully, our district will be able to fill: **serving as that water conservation program that makes available some water rights to those individuals that would otherwise be looking to do it illegally or improperly.**

I don't know how you flesh out all the details of it, but I think there's some value in promoting the concept of **local groundwater management districts that play an active role in how their groundwater is managed**. I think the make or break point on it is going to be that they be seen as working with the State Engineer's office and not be seen as trying to usurp the authority of the State Engineer, because I do believe the State Engineer should have the last word in those kinds of decisions. That's why we hired the man is to make those calls.

Mark Sheely, NMWRRI

Thank you so much, Aron. One of the goals of today's conversation was to try to get some ideas or visions for future water management, or an overall vision of the future of water in this region of New Mexico. Would you say that could potentially be one of those visions: a local groundwater management district?

Aron Balok, PVACD

Absolutely. I'm really fundamentally opposed to solving someone else's problem, because they know their problem better than I do. But one of the places that sparked this line of thought was the Clovis/Portales area where they are facing a declining aquifer that they are mining. They

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know that they're exhausting that resource. They know that their years of use are numbered. It's possible that a groundwater district, **while it couldn't solve the problem, it could certainly soften the landing** as they tried to transition from a system where there was a lot of irrigated agriculture back to a system that relies on dryland farming and that devaluation of property.

I see potential benefits for a district to facilitate that transition, instead of it just being our current scenario where it's a race to the bottom, and there's no alternative to when you finally run out of water.

SE NM Issues / Strategies and Visions for the Future

Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?

Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?

Connie Maxwell, NMWRRI

One of the things that we could talk a little bit more about these ideas of potential strategies for the future. You can have a bunch of different strategies in a vision for the future. That gives us the opportunity to say something like, " we want to turn around the trend of groundwater depletion and take advantage of our aquifer recharge opportunities where we can," like in Aron's district where he has the capacity to recharge. I think this would be a great time for people to throw in both their strategies, and then where do we see ourselves in 15 or 20 years. Or the people that you serve your constituents, what are some of the hopeful visions of the future that we would want to help support?

Lynette Guevarra, NMED

I really loved what Aron just said, promoting this concept of local groundwater management districts statewide and using Pecos valley as a template. That makes a ton of sense to me and. I'm going to channel Mike Hightower for a minute, since he's not on. I think he would like that as well. I'm wondering, how we could collectively try to make that a reality? Maybe do some sort of demonstration of the concepts with Clovis/ Portales. **How can we can tap into the resources we have to help a community set up something like that?**

That was an aha moment for me, hearing that from Aron. Is that concept something that's commonly used in Arizona or other arid states?

Aron Balok, PVACD

There, there are some groundwater districts in Arizona. I'm actually the chairman of the National Groundwater District Managers Association, and I've seen some neat examples of groundwater management, particularly in the Midwest, in Kansas and Nebraska, where they were dealing with this conjunctive management component and facing some pretty dire circumstances. Through augmentation wells, fallowing, and a number of strategies, they were able to meet their surface water obligations and offset the impacts that the groundwater users were having on those surface flows, and have been largely successful.

While, in New Mexico, PVACD is the 600-pound gorilla, as far as districts go, we don't even make a blip on the radar when you go to states like Kansas, that have a district with millions of acres instead of our 110,000 acres. Much larger scale agriculture is taking place in some of those, but that just means their problems get bigger as well. We've learned a bunch and continue to learn a lot from our association with that group. That probably fed into this

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idea of how we can take what's worked here, understanding that the reason it's been so successful here is because of where we're at, and apply it elsewhere. Here, the first step was authorization from the legislature to form the district, appoint the first board of directors, all that stuff that goes into to forming an organization like that. That happened here because we were faced with crisis. There was a sense of urgency and there were several legislative legal attempts to remedy the problems we were having. The man that would go on to become the first chairman of the board, his first attempt to try to remedy what was going on here was to give the State Engineer that authority to say you can't waste water. You then run into the same problem we're discussing now: that's a great idea, but if you don't have any way of enforcing it, what do you do?

So there was a series of events that forced us into this solution. I think having done so, there's a lot of potential. Hydrologically, we know more about our state now than we ever have, and we continue to grow that knowledge base. For those areas where we can identify a groundwater aquifer and its boundaries, it would make sense to draw the lines of those districts based on those aquifers, like we did here. Our district encompasses portions of two counties. That was because we had to define the boundaries of the district and that was done by defining where the aquifer laid.

Connie Maxwell, NMWRRI

I also know that in California with their groundwater law, one of the things they did allowed for a lot of flexibility. If you could bring together whichever group of folks that were concerned about groundwater, could come up with whatever strategies, and the law just said you had to basically stop your declining trend and recharge your aquifer by a certain amount of time. Some of the criticism I've heard is that the capacity might not have been in some of those local districts to be able to figure out a way to do it. **You have local control, but how about a little technical support as well?** I think in some ways, Aaron, a lot of what you've been talking about, the local governance component, is a really important component because there's so much local knowledge about how these systems work. Would you say in terms of a vision for your region, that you would want the aquifer completely refilled in 20 years, or just for the trend of declining to turn around? What would you say is the kind of vision people like to think of for the future for your region?

Aron Balok, PVACD

I really hate using buzzwords, but I'll use one. **I want it to be sustainable**. I don't panic when I see our water levels dip. I will panic if I see our recovery not happen or not happen the way it's happening now. And John Shomaker in Albuquerque once said something that was probably as profound a thing as he's said. He told me, if you guys can keep doing what you've been doing, you have an infinite water supply. I don't know many places that can say that. That hasn't been by accident. It's been a lot of hard work from the get go, but that's what we're trying to do is balance our withdrawals with our inflows.

The only tool that we've had has been to acquire water rights and put them into our water conservation plan. So far that's

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been a completely one-way street. That creates a lot of hesitation on the behalf of the board and on the behalf of potential sellers, because **they don't want to see that farm leave agriculture forever**. The board doesn't want to do that because as soon as we reverse that trend and our aquifer starts inclining in a measurable way, then we know we've gone too far and we're not maximizing the utility of that resource. So the idea of being able to react: we can all look at the weather information and see that this is a low flow year, so **we would pull some of that water from production. Then, when we go into a wet trend, we can put that water back to use; it eliminates that one way street**. One of my ambitions is to be able to take a more active role in the aquifer management rather than relying on **just a reduction of production, and that being permanent.** I think everyone can agree that, in the purest sense, fallowing is the worst solution. I've yet to see a satisfactory economic analysis that really encompasses what the true impact is when you follow an acre of farm land, because that ripple effect is much more than anybody seems to have been able to articulate so far. That's what we want to try and minimize.

Connie Maxwell, NMWRRI

That is really helpful. It is true that the policies at the moment coming out, predominantly throughout the west, are allowing water rights to be sold off of agricultural land for fallowing. I have seen an analysis that shows that there are unintended consequences, lowering of livelihoods and so forth. A group of us are trying to see is if we can take the same kind of programs like the ISC fallowing program in the Lower Rio Grande, but pay for different ecosystem services like aquifer recharge, or utilize flows from arroyos. We can do that in the lower part of the state. But what about in other areas? You can utilize Arroyo flows instead of groundwater, things like that. Are there other experiments that people think are worth trying or other visions for other areas?

Lynette Guevarra, NMED

I agree with that comment. **It feels like stormwater capture is an area where we could improve our understanding and knowledge and utilization in the state**.

Aron Balok, PVACD

I'm a little frustrated with how we do any kind of aquifer storage and recovery in most other parts of the state, because it rightfully is so complicated. And by "complicated," expensive. You quite literally have to clean that water up to a drinking water standard before you can put it in the ground. If you've invested that much in it, then it's a leap of faith to then pump it into the ground and hope it stays there. Again, the exception to that is where we're at over here, because that's how our system operates. We are an aquifer storage and recovery system. When we had those big floods in 2014, the Macho Draw north of town was at capacity. It was literally lapping at the bottom of the bridge where the highway, crosses and none of that water made it to the river. You had this torrent of water a few miles from the river that hit those sinkholes, and had no other route but to go directly into the ground and charge our aquifer.

We've got such a neat system that's capable of that kind of recovery. It really makes it hard to justify the expense of trying to put in a system where you capture that surface water, and try to treat it to a

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point where you can then force it into the ground. The use of that water is hard to justify if you're going to pump it out and onto the ground and grow a crop with it. That dynamic is a little different in other areas, but here **I would love to see some projects that maximize those flood flows**. I think everybody can agree that agriculture isn't the number one user of water in New Mexico; our evaporation rate is. **Any water that we can store undercover where it can't evaporate is water saved** and there's potential there. I don't know of any place, better to do it than here.

Connie Maxwell, NMWRRI

Lynette, I understand there's a program in Southern New Mexico near near Las Cruces, but closer to the border where it's not an injection, it's a passive recharge and the same regulations don't apply. I think part of the issue probably is there isn't a reuse component. Is that correct?

Lynette Guevarra, NMED

There's the Bear Canyon one in Albuquerque. that one is recharged through an, arroyo. I'm aware of that one. I'm not understanding the one that you're mentioning down south.

Connie Maxwell, NMWRRI

It's pretty close to the border and near an airport. John Gwin, the flood commissioner, told me about it. I was wondering about Bear Canyon. Because it's not an injection, is it subject to the same water quality regulations that injection wells are subject to?

Lynette Guevarra, NMED

I was just looking at that permit the other day, because I'm working on the renewal for Rio Rancho's ASR project. I've only been with the groundwater quality bureau for about a year, but I believe that **the reason why we hold the ASR permit to the drinking water quality standards is because in New Mexico, for 85 percent of people, their drinking water comes from some source of groundwater. So it's imperative to protect the groundwater source.** And that's why we put those limits on those ASR projects.

Connie Maxwell, NMWRRI

If you were just doing a spreading project for the purpose of recharging the aquifer, but you weren't trying to then quantify it and pull it out again, that's probably a little bit different, right? I'd be interested in chatting with you a little bit about that subject that Aaron was talking about, because there are ways to do aquifer recharge programs where you probably won't be able to quantify the reuse, but you could still come up with the same effect and wouldn't be subject to the same treatment regulations.

Lynette Guevarra, NMED

That would make sense to me. What I'm speaking to are the large ASR projects that the state engineer's office approves first, and then permit comes to us.

Lynette Guevarra, NMED

I know that there was a lot of discussion at the beginning of of our session about produced water and the potential uses for that into the future. I wanted to loop back and see if anybody wanted to elaborate on visions and strategies for the future in

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regard to produced water.

Aron Balok, PVACD

My opinion on any kind of brackish water use is with the backdrop of how it compares to other sources of water. On the southern end of our district we have a lot of oil and gas activity and it's a no-brainer for me. When you ask the question, why are they not using produced water for their drilling and fracking operations? The answers is pretty simple. It's cheaper. The way you overcome that is two ways. **Either you make it less expensive or you force them through regulation to use a specific supply of water.** I think that's the direction that we're seeing the state of New Mexico lean, that we're going to maybe incrementally, maybe all at once, require the oil field to not use fresh water. You take away that financial component and then it becomes a function of "now we have to do the best with what we've got." **it's going to cost money to clean it up**, but we don't have a choice. That's how we move forward. As far as using brackish water in other areas where you don't have that high utility, it's really hard for a municipality to develop a brackish water treatment facility. **If they're armed with the knowledge that they can purchase some water rights from agriculture and convert those to municipal use**, they're going to try and use their dollars the best they can. I think a good example of that is how they've addressed their water needs in California. Rather than try to do any of the desalinization along the coast, they're using agriculture water.

When I asked that very question, they said it's purely a function of economics. I think the state is moving in a direction where they're going to require the oil and gas to use their produced water. It's in their best interest to do it as inexpensively as they can, but they're going to spend as much money as they have to get it to a point where they can use it.

Dustin Brownlow, MA

I just want to comment on that. I think there's a misconception, particularly in the US around produced water. I've worked on projects internationally for quite some time, and a lot of the advisors that I work with have been for 40 years. **Buying and using groundwater for fracking and completion activity is the most expensive way for producers to operate. Reuse of produced water is by far their cheapest option.** It's close to a quarter of the cost just on the force water side, then it completely wipes out volume for volume cost of that water going to a disposal well.

We hear a lot of talking points here that just aren't influenced by factual information unfortunately here in the US. It's just something we've seen for a long time. If you look at the most economical producers in the Permian, they're the ones with the largest and most all-encompassing recycle programs for water. Water typically accounts for 30 to 40 percent of leaf operating costs. When a producer like EOG can take that down to 10 percent they become a much more efficient and competitive producer in the market space. I do just want to make sure that's at least said from my end. As someone who's a proponent of oil and gas, I do think that they can do things a lot better. The reuse of produced water has almost always been the most effective way to manage produced water. The US is probably one of the worst in the world, as far as oil-producing nations, in the way we manage our produced water resources. If

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you look at any producer that operates in the Permian that also operates in Oman or Northern Africa or Saudi Arabia, these are companies that have million barrel a day recycling facilities in other parts of the world that, at best, have a 20,000 barrel a day recycling facility in the US. It's definitely not due to price. **I think there's just a business management style that doesn't really reward, long-term streamlining of processes**. Unfortunately too, **I think there are probably a lot of local stakeholders that are quite often making substantial amounts of money on their water sources**. That, combined with some poor management strategies, I think has led to this idea that recycling produce water is not economic for the oil and gas sector. That's just not the case, but it's something that has resonated and keeps getting pushed out in the industry. **If New Mexico took the steps to take groundwater away from the oil and gas, in my opinion, they would be making those producers much more profitable and economically viable**. **Very often groundwater resources are the easiest, quickest option for them, but not the most economic.**

Aron Balok, PVACD

That answered the question I had for you there. I was always led to believe that it was a function of the quality of the water that they tend to have as produced water. I know there's some really lousy water that they produced down here with a lot of salt, a lot of sulfur, and things like that. That it made it too expensive to clean it to a point where they could create their frack solutions. But the other component of that is speed. If it's notably faster, maybe that's why the area has been slow to adopt the recycling.

Dustin Brownlow, MA

I think if you see more majors consolidate, you'll see larger recycling projects come online. I've referenced other countries that do a better job. Take a foreign owned oil company. **They own the entire resource from the surface as far down as it goes**. And it's not a stack play where you may have multiple producers on top of each other, pulling oil from different stacks within the play. So, **you don't have near the issue of needing to collaborate with three or four producers to get a project done**. You're one large entity and you don't have to work with other parties to get projects done. These are also long lead time projects, from time of conception to build out and delivery could be two years. When you're looking in the Permian base and you have a lot of producers that, unfortunately, they're hoping to sell to somebody in six months or a year. The idea of outlaying capital for a large project isn't appealing to them or their investors, unfortunately. A lot of this is investor driven issues.

This is a way out there pitch, but **if there were facilities that were built and owned by state agencies or municipal agencies, I think you would see a much larger adoption of reuse facilities** because the capital burden is not being taken on by a company that is hoping to sell everything they own in six months to a year.

That's often, I think, the biggest issue. But again, if you just take a look at the companies with the largest recycling programs, they're also the most profitable out there. I think it's a kind of a business model mindset. **There's also an issue in the oil and gas sector as a whole where there are not a lot of standard operating procedures or**

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requirements to break into the industry. I use this example a lot: if I was a bartender at Chili's in Midland, I could be the CEO of a water company in the Permian in a month, if I wanted to. There's no barrier to entry. There's no requirements or regulations or anything like that, that I'd have to meet.
If I wanted to do that in the mining industry, in New Mexico, that would be impossible because of the regulation, the standard operating procedures. It's just a much more thoughtful industry when it comes to some bits of waste stream. It's harder to break into and that barrier to entry is a lot higher because of liability and risk associated with an inexperienced company being in the mix. Unfortunately the upstream oil and gas sector and in the US just hasn't acted that way.

So you have had historically a lot of inexperienced teams or companies break into the oil and gas sector in the Permian that then caused a lot of operational trouble for that producer because they didn't know what they were doing. They did treat the water poorly and it caused big headaches for that producer. Five, six years ago it was a huge problem, but that's left a taste in the mouth of a lot of folks in the oil and gas industry. Even though things have gotten better and companies have gotten better in the Permian, they still have that taste in their mouth of the unprofessionalism or the poor projects that they entertained in the past. I really think a lot of that is just a function on what upstream oil and gas will accept as a services partner versus what any other kind of large industry in the US will accept.

Aron Balok, PVACD

I've got another question for you. Several years ago, I knew the State Engineer's approach to produced water was, that water is still the property of the state. As long as that producer kept it within their control, they could reuse it as they please, but there was no mechanism for them to sell it to another producer, allowing them to pool their resources and offset the expenses. Again, creating a financial component to it where you were better off to pay to have it pumped it back into the ground and disposed of rather than try and clean it and use it, because once you claimed it and had a marketable product, you had a product you couldn't sell because it wasn't yours, according to the state. Is that still the case?

Dustin Brownlow, MA

That's a good question. Forgive me if I give you the wrong number here, but I think House Bill 546 a few years ago addressed that with a chain of custody provision. I'd have to go back and do a little bit of homework. It's been a while since I've looked into this. I think that's been addressed because there are some larger recycling projects in the Permian that have been built. How much they're being utilized is a different story.

The other issue that we're facing in Texas to a degree is where producers have committed volumes of produced water to third party entity entities called water midstream companies. In Texas, produced water runs with the surface estate. So some producers were giving out contracts to manage water without properly compensating the surface estate owner. It has created questions, maybe not risk or liability specifically, but questions. That probably would be something we would want to look into in New Mexico.

With all the public land that you have, while

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the state may have addressed something on fee acreage and or state acreage, whether or not that exact same law or rule applies to BLM acreage would be a question, because my assumption would be produce water runs with the surface estate in New Mexico as well. Unless there's been a process to separate that.

Aron Balok, PVACD

Something we've got to collectively address is if we're going to penalize the oil and gas industry for not using produced water, but we're hobbling their ability to use produce water, then I see a problem there. Don't take any of my comments as a criticism of the industry, because it's vital to our economy down here. I think everyone in this corner of the state understands what the role it plays. **If we can get them to use that water that we can't use, that's absolutely what we want them to do.** But we can't just keep beating them over the head and make it where they're not going to do business in New Mexico.

Dustin Brownlow, MA

And I've been a while, so I've talked to folks at the State Land Office. **I think one thing that could be helpful would be for the state, maybe working with the Produced Water Research Consortium or an organization like that, to model the cost of reuse.** I'm just going to use some round numbers here that may not be completely representative of current pricing. If you are fracking an oil well with 500,000 barrels of water and it's costing you 50 cents a barrel, then that displaces 500,000 barrels of produced water that can be reused. So you're paying 50 cents for water to frack with, and then you're paying 75 for that same volume to then go to a disposal well. You're at $1.25 or $1.50, and in some cases more. So if you were to pull that groundwater resource from them, a volume that would be going to disposal at 75 cents a barrel can now be recycled for 25 cents and barrel and used in operations and completion.

They would see cost savings on that volume of water. Even if it's the exact price, you're still offsetting that same volume that has to go to disposal, which is a huge saving. As a an example, you just pick southern Eddy county and randomly pull a number like 500 wells to be fracked over two years, and run the numbers on what recycle, reuse, what it would cost for those 500 wells, or what groundwater plus disposal would cost for those 500 wells. It makes a really compelling case very quickly. It doesn't take long to see some savings for a large operator. **One issue that I think a lot of folks have is getting that information into the hands of the management staff that appreciates that information.**

That being said, upper management, presidents, C-suite at these companies, I think just typically aren't seeing these numbers. They're not making their way up the chain of command far enough for a large company to say, "hold on. What are we doing here?"

I think it's important for an entity like the state of New Mexico to leverage its connections and land to maybe **have a call or host a meeting with executives at oil companies, versus just field level asset managers**.

Mark Sheely, NMWRRI

I want to say thank you, Dustin. I know we've overshot our original time bit and I have a

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hard commitment at 11:00 to get to. I have to unfortunately jump off.

Connie Maxwell, NMWRRI

I'd be happy to stay on. It does seem like we've gotten a lot of really great contributions. Are there any other strategies or visions of the future that folks want to discuss?

I think it's been a really terrific conversation. I've learned an enormous amount.

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