Is New Mexico Resilient to the Coming Water Supply Challenges?

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Dagmar Llewellyn is a hydrologist, with an educational background in geosciences and civil engineering, and post-graduate studies in climate dynamics, paleo-climatology, river restoration, GIS, and water law and management. Since 2000, her work has focused on water management and endangered species issues in the Upper Rio Grande Basin. Her work has involved water supply and demand evaluation, groundwater/surface-water interaction, irrigation efficiency, habitat and hydrologic requirements of endangered species, accounting under the Rio Grande Compact, and Reclamation project operations. After 26 years in environmental and water-resource consulting, her interest in working for the federal government was sparked by the passage of the SECURE Water Act, which assigned to the Bureau of Reclamation a west-wide evaluation of the potential hydrologic implications of climate change. Since 2010, she has worked Reclamation on programs authorized under the SECURE Water Act, as well as on Rio Grande water management and endangered species/environmental compliance issues.

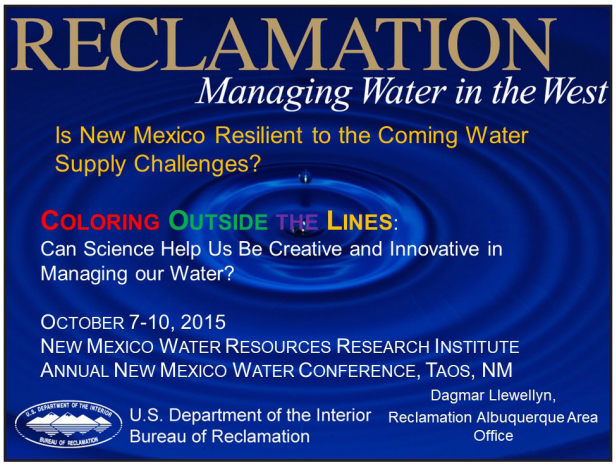

Figure 1. Introduction.

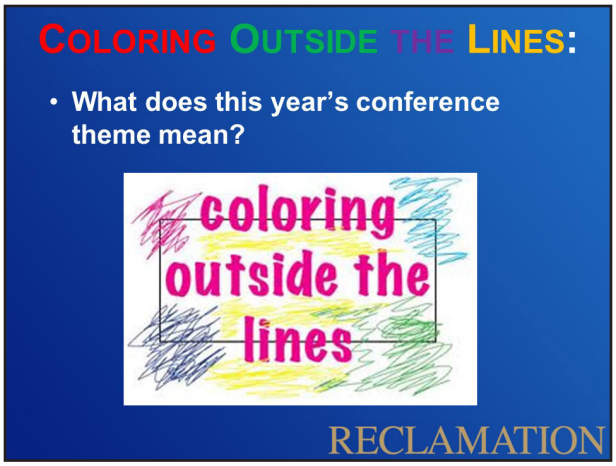

Figure 2. Coloring outside the lines.

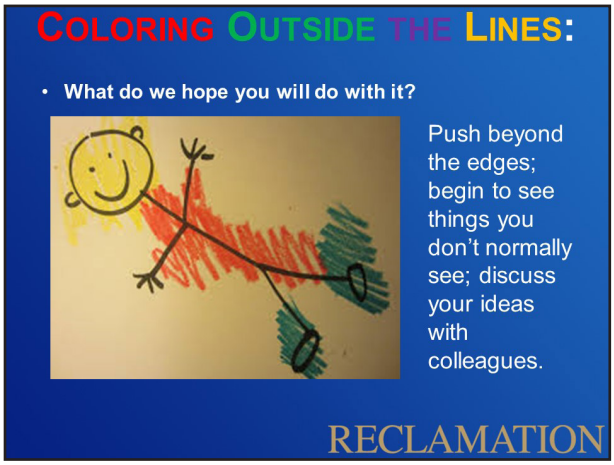

Figure 3. The hopeful outcome of coloring outside the lines.

Figure 4. New Mexico's water management history.

Figure 5. Key Successes.

Figure 6. Reasons to change up past approaches. Disturbances include the cumulative impacts of local human activities over time, as well as global impacts of human activities.

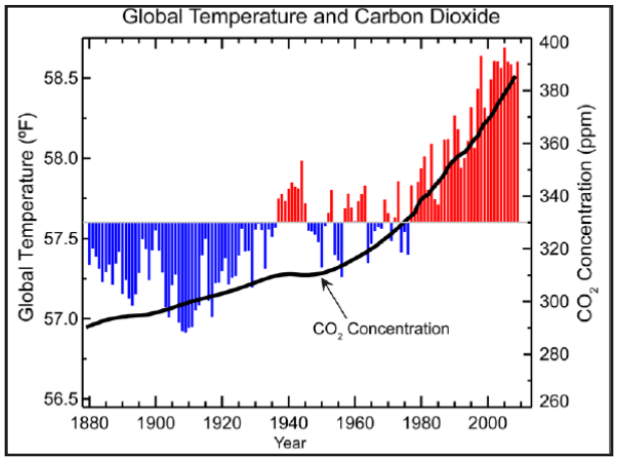

Figure 7. Rio Grande Basin (1971-2011). Average temperature increase by 0.7 degrees fahrenheit per decade. Twice the global average.

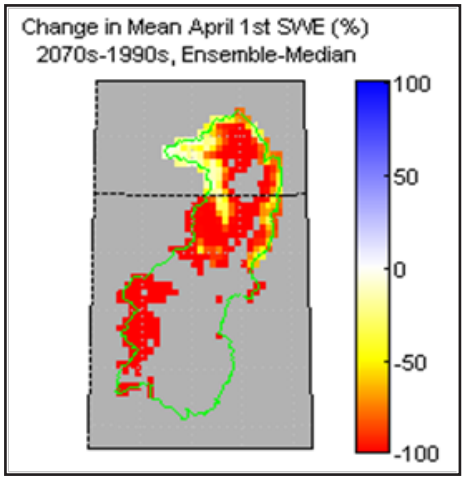

Figure 8. Future climate. Basin distributed snow (2070s). Overall, there will be a slight decline in precipitation and snow, especially in low-elevation areas.

Figure 9. Projected increases in hydrologic variability, meaning more drought and more floods.

Figure 10. Feedbacks and cascading impacts. Drying of soil due to high temperatures, in concert with grazing practices, can lead to dust on our snowpack. Bark beetle infestations (made possible in part by higher temperatures and longer warm seasons) can increase the exposure of our snowpack to sunlight. Sunlight on dusty snow can lead to rapid melting. Loss of snowpack can lead to moisture stress on trees, which can lead to catastrophic fire, debris flows, ash in the river, fish kills, and implications for water diversions.

Figure 11. What are our goals?

Figure 12. Resilience.

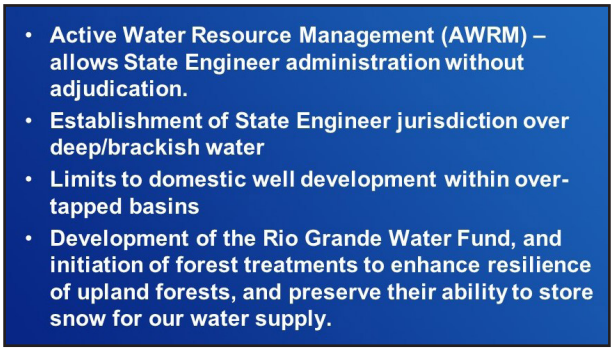

Figure 13. Recent steps to increase flexibility.

Figure 14. Where are we locked down in the old and comfortable?

Figure 15. How can science help us?

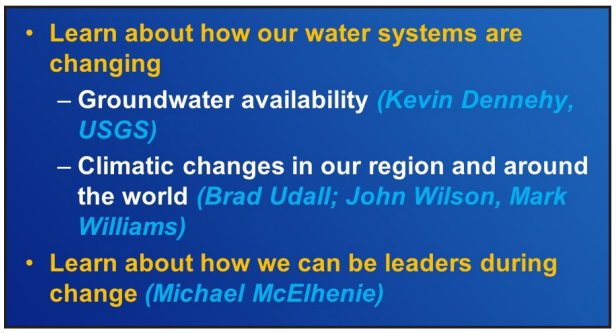

Figure 16. How can we learn about our changing water systems?

Figure 18. How can we stay up to date on water management issues?

Figure 20. Conclusion.

Figure 17. How can this conference help us?

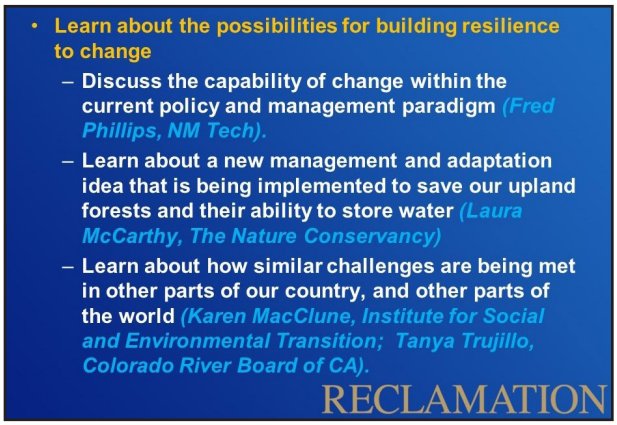

Figure 19. How can we learn about building resilience to change?