

A Comparative Overview of Legal Frameworks and Conflict Resolution Mechanisms in the Nile and Rio Grande Basins

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1. Introduction

“No one can take a single drop of water from Egypt, and whoever wants to try it, let him try.” Taking Egypt’s water will result in “instability that no one can imagine.”¹ With these words, Egyptian President Abdel Fattah al-Sisi recently issued a stark warning regarding Ethiopia’s construction of a dam on the Blue Nile, one of the Nile River’s two main tributaries. This escalating international conflict over water also includes Sudan, where the Blue and White Nile merge. Egypt is in a precarious situation. Roughly 97% of its irrigation and drinking water come from the Nile.² Thus, any changes to water quantity and timing caused by Ethiopia’s dam, especially as exacerbated by climate change, could easily ignite a multi-state crisis. How can this situation inform future management of the Rio Grande Basin in the decades to come? How resilient are existing transboundary compacts between the US and Mexico, and between Colorado, New Mexico, Texas and tribal sovereigns? While those questions are beyond the scope of this report, here I will outline the existing legal frameworks used in each basin and describe how conflicts may be able to be resolved. A limited set of risks is also outlined.

2. Rio Grande Legal Framework

Waters of the Rio Grande are managed, theoretically, in a quasi-hierarchical structure. At the top of the pyramid is the US Constitution as laid out in the commerce, compact and treaty clauses. Below this are 1906³ and 1944⁴ treaties between the US and Mexico, federal legislation

¹ <https://thearabweekly.com/egypt-reiterates-red-line-nile-dam-row-ethiopia>. Accessed 6 August 2021.

² <https://phys.org/news/2019-12-egypt-ethiopia-nile.html>. Accessed 6 August 2021.

³ <https://www.ibwc.gov/Files/1906Conv.pdf>. Accessed 8 August 2021.

⁴ <https://www.ibwc.gov/Files/1944Treaty.pdf>. Accessed 8 August 2021.

from 1928 and 1935 designed to protect Middle Rio Grande Pueblo water rights⁵, federal environmental laws like the Endangered Species Act⁶, and the federally-approved interstate Rio Grande Compact for water sharing.⁷ Finally, at the bottom are water rights and legislation developed under the state constitutions of Colorado, New Mexico⁸ and Texas.

In practice, this pyramid often seems inverted, with States aggressively and regularly asserting their rights against one another,^{9,10,11,12} and local water management districts electing

⁵ Joshua Mann, *A Reservoir Runs through It: A Legislative and Administrative History of the Six Pueblos' Right to Store Prior and Paramount Water at El Vado*, 47 Nat. Resources J. 733 (2007).

<https://digitalrepository.unm.edu/nrj/vol47/iss3/12>. Accessed 8 August 2021.

⁶ Federal environmental laws such as the Endangered Species Act are pertinent because they can require water allotments – e.g., for endangered species – that can trump water rights allocated under state constitutions.

⁷ Act of May 31, 1939, 53 Stat. 785.

https://www.usbr.gov/uc/albuq/water/RioGrande/pdf/Rio_Grande_Compact.pdf. Accessed 8 August 2021.

⁸ New Mexico's water law is found in Article XVI of the state constitution.

<https://nmonesource.com/nmos/c/en/item/5916/index.do#!fragment//BQCwhgziBcwMYgK4DsDWszlQewE4BUBTADwBdoByCgSgBplTCIBFRQ3AT0otokLC4EbDtyp8BQkAGU8pAELcASgFEAMioBqAQQByAYRW1SYAEbRS2ONWpA>. Accessed 8 August 2021.

⁹ In *Texas and New Mexico v. Colorado*, the plaintiffs sued to force Colorado to adhere to the terms of the Compact after Colorado ignored the compact from 1939 to 1966, thereby running up a massive water debt to both New Mexico and Texas. Large flows in the Rio Grande in the mid-1980s filled Elephant Butte Reservoir to capacity, thereby erasing Colorado's debt and resulting in dismissal of the case as moot by the Supreme Court in 1985. 474 U.S. 1017 (1985). https://en.wikipedia.org/wiki/Rio_Grande_Compact. Accessed 8 August 2021.

¹⁰ In *Texas v. New Mexico*, 462 U.S. 554 (1983), Texas sought a decree demanding that New Mexico deliver water in accordance with the Pecos River Compact. While this is unrelated to the RGC, it is another example of states continuing to litigate despite the presence of an interstate water compact.

¹¹ In *Colorado v. New Mexico*, 467 U.S. 310 (1984), Colorado sought to divert water from the Vermejo River under an equitable apportionment theory. A special master recommended that Colorado be permitted the diversion, but New Mexico filed exceptions, and the Supreme Court held that Colorado failed to meet the burden of proof that the diversion should be permitted. While the Vermejo River is not within the Rio Grande basin, the case serves as an example of states suing one another under the equitable apportionment theory in the absence of an interstate compact.

¹² In *Texas v. New Mexico*, 138 S.Ct. 954 (2018), Texas asserted that New Mexico had violated the RGC by siphoning water between Elephant Butte Reservoir and the Texas state line, an action not contemplated by the RGC since New Mexico's duty was to deliver water only to Elephant Butte. The majority of the case is ongoing. In a preliminary question, the Supreme Court held that the federal government was within its rights to join the lawsuit as a co-plaintiff.

to divert water from the Rio Grande in opposition to federal agencies.^{13,14} The federal legislative branch remains in repose, encouraging states to work collaboratively to resolve issues,¹⁵ and actively surrendering federal powers under certain circumstances, such as waiving sovereign immunity regarding federal water rights.¹⁶ Congress has never passed legislation that regulates water based on the Commerce Clause, opting instead only to rubber-stamp compacts mediated by the Department of Interior and agreed to by the States,¹⁷ and to provide federal funding to create water management infrastructure.¹⁸ The executive branch has been similarly pliant over the years, failing to assert federal reserve water rights under the Winters doctrine.¹⁹ While the breadth of the doctrine has expanded and contracted over the years based on subsequent court

¹³ In the fall of 2020, the Middle Rio Grande Conservation District routed water out of the Rio Grande and through its canal infrastructure, arguing it was the most efficient way to get water to Elephant Butte Reservoir to help New Mexico comply with its water delivery requirements under the Rio Grande Compact. The Bureau of Reclamation opposed the action, stating that not only was the efficiency argument questionable, but that diverting the flow had a negative impact on the river ecosystem. <https://www.abqjournal.com/1517200/dry-as-a-bone-ex-2021-to-be-a-critically-low-water-supply-year.html>. Accessed 7 August 2021.

¹⁴ As a result of the water diversion and many other factors, Wild Earth Guardians recently submitted a Notice of Intent to sue the US Fish and Wildlife Service, Bureau of Reclamation, State of New Mexico, and Middle Rio Grande Conservation District for multiple violations of the federal Endangered Species Act, alleging that the defendants' actions were harming the Rio Grande silvery minnow, Southwest willow flycatcher, and yellow-billed cuckoo. See the Notice of Intent here: <https://wildearthguardians.org/press-releases/collision-of-crises-threatens-rio-grande-and-its-communities/>. Accessed 7 August 2021.

¹⁵ An amendment to the Endangered Species Act states "It is further declared to be the policy of Congress that Federal agencies shall cooperate with State and local agencies to resolve water resources issues in concert with conservation of endangered species." 16 U.S.C. § 1531(c)(2).

¹⁶ The McCarran Amendment (43 U.S.C. § 666) waives sovereign immunity in suits related federal water rights and allows others to join the U.S. as a defendant. This has had the effect of forcing the federal government to the table to adjudicate water rights in situations where other claimants might otherwise not be able to access their claimed water rights under state law.

¹⁷ Besides the Rio Grande Compact of 1938, New Mexico alone is a party to seven other interstate stream compacts. https://www.ose.state.nm.us/ISC/isc_compacts.php. Accessed 8 August 2021.

¹⁸ Except for historic acequias, nearly all water infrastructure in New Mexico was funded by the federal government, including Elephant Butte Reservoir, Heron Reservoir, and much canal infrastructure such as that operated by the Middle Rio Grande Conservation District. Susan Kelly, Iris Augusten, Joshua Mann & Lara Katz, *History of the Rio Grande Reservoirs in New Mexico: Legislation and Litigation*, 47 Nat. Resources J. 525 (2007). <https://digitalrepository.unm.edu/nrj/vol47/iss3/5/>. Accessed 8 August 2021.

¹⁹ The Winters doctrine was established by the Supreme Court in *Winters v. United States*, 207 U.S. 564 (1908). The court held that when the federal government created an Indian reservation, the reservation was deemed to have sufficient water rights to accompany it.

decisions,²⁰ it remains the situation that many federal lands do not have adjudicated water rights. Worse, in some cases, senior water rights owned by the federal government have not been protected, allowing junior water rights holders to cause damage to public lands.²¹ Finally, only within the last 50 years has the US Supreme Court (SCOTUS) ruled that the Commerce Clause applied to groundwater^{22,23} and yet, Congress' only major subsequent action contravened the Commerce Clause by precluding water export from the Great Lakes states.²⁴ To date, SCOTUS has not taken up a surface water case where the Commerce Clause could be applied. Further, though SCOTUS has encouraged states to resolve water resources issues through interstate compacts rather than via state-versus-state lawsuits using an equitable apportionment doctrine, there is no clear evidence that the Rio Grande Compact has actually reduced or simplified the number of cases litigated.

²⁰ Todd A. Fisher, *Winters of Our Discontent: Federal Reserved Water Rights in the Western States*, 69 Cornell L. Rev. 1077 (1984). <https://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=4362&context=clr>. Accessed 7 August 2021.

²¹ In *Audubon of Kansas v. Department of Interior*, the plaintiff alleges that Quivira National Wildlife Refuge has suffered from a shortage of water for several decades due to excessive groundwater pumping by irrigators with junior water rights and is suing the Interior Department for its failure to protect its senior (dated 1957) water rights. While this case is not within the Rio Grande basin, it is illustrative of a commonly repeated scenario. Federal political leaders (and sometime career professionals in federal agencies) choose not to protect water rights (or other federal trust resource) because it creates a politically unpalatable standoff between federal agencies and local and commercial interests. The complaint is found here: <https://www.audubonofkansas.org/aok-news.cfm?id=218>. Accessed 6 August 2021.

²² In *Sporhase v. Nebraska*, 458 U.S. 941 (1982), SCOTUS held that 1) groundwater is an article of commerce and therefore subject to congressional regulations, and 2) Nebraska's statute restricting the withdrawal of groundwater if it was to be used in another state violated the commerce clause and was therefore unconstitutional.

²³ Soon after *Sporhase*, the court in *City of El Paso v. Reynolds*, 597 F.Supp. 694 (1984), found New Mexico's statutory embargo on out-of-state water exports to violate the commerce clause. After the state legislature revised its statutes and the state appealed, the court held that it was not facially unconstitutional for the state to limit its groundwater exports to those that are "not contrary to the conservation of water within the state and are not otherwise detrimental to the public welfare of the citizens of New Mexico."

²⁴ The Great Lakes – St. Lawrence River Basin Water Resources Compact, approved by eight states and the US Congress in 2008, generally precludes water from being sold, diverted, or exported outside of the basin. See this article for proposed legislative amendments to strengthen the Compact: <https://www.circleofblue.org/2009/world/congress-michigan-legislature-asked-to-fix-leaks-in-great-lakes-compact/>. Accessed 7 August 2021.

At the international level, two treaties govern water sharing between the United States and Mexico; the 1908 treaty addresses the upper Rio Grande downstream to Fort Quitman, Texas, while the 1944 treaty addresses the lower basin from Fort Quitman to the Gulf of Mexico. These treaties are administered by the bi-national International Boundary and Water Commission established by the Convention of 1889.²⁵ The US component of the IBWC resides within the State Department.

In short, the federal court system is often the arbiter when States, federal agencies and Tribes are unable to resolve their differences, and when members of the public with legal standing believe that an agency is not following its own mandates. Utilization of the federal court system means that conflicts can take years or even decades to be resolved,²⁶ and has resulted in the consternation of the Supreme Court that it repeatedly must play referee between states.²⁷ Congress has not chosen to create legislation at a national level to establish an equitable apportionment of waters under the Commerce Clause, and the Executive branch is loath to be perceived as using a heavy hand to protect federal water rights. Yet for all these failures, half measures and inefficiencies, the federal court system remains the clear arbiter of disputes. As stated by the Brookings Institute, “The extremely complex system of water rights and their wide variation across jurisdictions on the US side [of the border with Mexico] create lengthy and often

²⁵ https://www.ibwc.gov/About_Us/About_Us.html. Accessed 8 August 2021.

²⁶ *Supra* note 9. *Texas v. Colorado* was originally filed in 1967 and dismissed in 1985, a span of 18 years.

²⁷ In *Texas v. New Mexico*, SCOTUS cited four other cases in stating “Time and again we have counselled States engaged in litigation with one another before this Court that their dispute ‘is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of the representatives of the States which are vitally interested than by proceedings in any court however constituted.’” 462 U.S. 554, 575 (1983).

difficult policymaking and enforcement tangles, but they also force water decision-making processes that involve consultation and problem-solving with all stakeholders.²⁸

Rio Grande Major Risks

There are four major identified risks to water security and use on the Rio Grande. First, no overall mechanism is in place to deal with the effects of climate change. While one or more stakeholders may have taken action to address this threat,²⁹ lack of coordination among stakeholders and a lack of an overarching framework, such as federal legislation or an update to the Rio Grande Compact, could result in individual efforts that cancel one another. For example, purchases of senior water rights by the state of New Mexico for benefit of endangered species could be immediately offset by Pueblos choosing to exercise their prior and paramount water right under the Act of 1928.³⁰

Second, the lack of quantification of Middle Rio Grande Pueblo waters under the Act of 1928 means that, at any time, the pueblos could choose to begin withdrawing large amounts of water from the river for agriculture, golf courses, or potentially even export out-of-basin. Such withdrawals could result in significant detrimental effects to junior water rights holders like the City of Albuquerque and the Middle Rio Grande Conservation District, cause New Mexico to be unable to fulfill its obligations to Texas under the Rio Grande Compact, and potentially dry the river enough to jeopardize or cause the extinction of species like the Rio Grande silvery minnow.

²⁸ Vanda Felbab-Brown, *Not dried up: US-Mexico water cooperation*. <https://www.brookings.edu/blog/order-from-chaos/2020/10/26/not-dried-up-us-mexico-water-cooperation/>. Accessed 8 August 2021.

²⁹ The New Mexico legislature passed a bill in 2005 creating the Strategic Water Reserve, which authorizes the New Mexico Interstate Stream Commission to purchase and manage water rights to 1) benefit threatened or endangered species and, 2) help comply with interstate river agreements. This has the potential to help address shortfalls but requires sufficient and timely appropriation of New Mexico taxpayer funds to be effective. https://www.ose.state.nm.us/ISC/isc_SWR.php. Accessed 8 August 2021.

³⁰ Act of Mar. 13, 1928, ch. 291, 45 Stat. 312.

To be clear, the intent here is not to cast aspersions on the right of tribes and pueblos to claim and use, in their entirety, their prior and paramount rights to water. Rather, the intent is to make clear that water rights of tribes and pueblos comprise a significant unknown that fundamentally affects water available to other users in the system.

Third, there is a lack of political will by those with power to make decisions that, while future-proofing the Rio Grande for people and the environment, will result in negative consequences for powerful industry groups, mainly agriculture, that control the majority of existing water rights under New Mexico state law.³¹ In this sense, water in New Mexico has become a political third-rail: politicians are willing to discuss how important the resource is, but usually only in the context of protecting existing users from harm.

Finally, and overlapping with the other three issues, is the byzantine and archaic legal framework by which water is allocated and used. Beneficial use requirements under state water law encourages waste by irrigators,³² federal laws that can trump state water law are sometimes not enforced, and grievances between states take years or decades to resolve, thereby encouraging the disputed activity to continue long enough for some individuals to profit handsomely while driving others to bankruptcy.

³¹ As of 2015, irrigated agriculture accounted for 76% of total water withdrawals, including 77% of surface water and 75% of groundwater. Molly Magnuson, Julie Valdez, Charles Lawler, Matt Nelson & Laura Petronis, *New Mexico Water Use by Categories 2015*, New Mexico Office of the State Engineer, Technical Report 55 (2019). https://www.ose.state.nm.us/WUC/wucTechReports/2015/pdf/2015%20WUR%20final_05142019.pdf. Accessed 8 August 2021.

³² Here I define “waste” as producing an agricultural product in a manner that uses more water than necessary. Flood and sprinkler irrigation in New Mexico is 97% of the total acreage, with more efficient drip irrigation used on only 3% of acreage. *Supra* note 31 at page ii. While the NM water code makes waste illegal, there is no indication that the NM Office of the State Engineer considers using flood or sprinkler irrigation wasteful.

3. Nile Legal Framework

In contrast to the Rio Grande Basin, the Nile Basin³³ lacks a single unifying forum for hearing grievances and resolving conflicts among sovereigns. Instead, a series of treaties have been brokered over the last century, all of which have fallen short of an equitable allocation and management of water between Ethiopia, where the Blue Nile originates, Sudan, and Egypt, where the Nile terminates in the Mediterranean Sea.

The first treaty was concluded in 1929 between Egypt and Great Britain,³⁴ acting on behalf of its colony Sudan and the White Nile colonies of Kenya, Uganda, and Tanganyika (now Tanzania). Ethiopia, unfortunately, was not included in this treaty. The major aspects of the treaty included an annual water allocation to Egypt of 48 billion cubic meters (BCM) and 4 BCM to Sudan out of a total average yield of 84 BCM. The agreement also gave Egypt veto authority on projects that could alter that flow.

In 1959, Egypt elected to build the Aswan High Dam to increase water security. In part because the dam would result in the inundation of some villages in northern Sudan,³⁵ the two countries signed a bilateral treaty that updated the 1929 treaty, agreeing to grant each other a larger share of the river flow, from 48 to 55.5 BCM for Egypt, and from 4 to 18.5 BCM for

³³ This report deals only with the Blue Nile countries of Ethiopia, Sudan and Egypt.

³⁴ Commonly referred to as the Anglo-Egyptian Treaty.

https://www.internationalwaterlaw.org/documents/regionaldocs/Egypt_UK_Nile_Agreement-1929.html.

Accessed 8 August 2021.

³⁵ I.H. Abdalla, *The 1959 Nile Waters Agreement in Sudanese-Egyptian Relations*, 7 Middle Eastern Studies 329 (1971).

Sudan.³⁶ Once again, Ethiopia was not consulted, in spite of the fact that over 80% of the Nile River flow originates in that country.³⁷

Egypt and Ethiopia attempted to rectify this issue in a 1993 accord, agreeing that “use of the Nile waters shall be worked out in detail through discussions by experts from both sides, on the basis of the rules and principles of international law,” and that “each party will refrain from engaging in any activity related to the Nile waters that may cause appreciable harm to the interests of the other party.”³⁸ Real progress never materialized.

The next accord was signed in 1999, including all Nile basin sovereigns except Eritrea. The so-called Nile Basin Initiative³⁹ (NBI) is intended “to achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources.” While cooperation and information sharing continue by signatory nations under the NBI, one of its key goals – a permanent legal and institutional framework via the Cooperative Framework Agreement⁴⁰ – has not been ratified by Egypt or Sudan, though Ethiopia and six other upper basin states⁴¹ have signed it. The basic disagreement hinges on whether waters should be equitably apportioned by all sovereigns, or equitably apportioned based on recognition

³⁶ 1959 agreement between the United Arab Republic [Egypt] and the Republic of Sudan for the full utilization of Nile Waters.

https://www.internationalwaterlaw.org/documents/regionaldocs/UAR_Sudan1959_and_Protocol1960.pdf.

Accessed 8 August 2021.

³⁷ <https://www.brookings.edu/blog/africa-in-focus/2015/04/28/the-limits-of-the-new-nile-agreement/>. Accessed 8 August 2021.

³⁸ https://www.internationalwaterlaw.org/documents/regionaldocs/1993_Ethiopia-Egypt-Framework_Agreement-Nile_Basin.pdf

³⁹ <https://nilebasin.org/index.php/documents-publications/73-nile-basin-initiative-an-overview/file>. Accessed 8 August 2021.

⁴⁰ The Cooperative Framework Agreement.

https://www.internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf. Access 8 August 2021.

⁴¹ Signatories include Burundi, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. In addition, the Ethiopian parliament has ratified it. *Supra* note 37.

of the 1929 and 1959 treaties, which would greatly favor Egypt and Sudan. The adopted language rejected the prior treaties, thus ending Egypt's and Sudan's interest in the framework.

The next major development was Ethiopia's 2011 announcement that it had begun construction of the Great Ethiopian Renaissance Dam (GERD), a move that created a shock wave downriver. Two years later, Ethiopia announced a slight diversion to the flow of the Blue Nile to accommodate GERD construction, which caused Egypt's president to state that though he was not "calling for war," all options were open to Egypt if Ethiopia attempted to take water from Egypt.⁴²

Ethiopia's steady progress on GERD forced Sudan and Egypt to the negotiating table in 2015, resulting in a high-level agreement to "take all appropriate measures to prevent the causing of significant harm in utilizing the Blue/Main Nile," and to cooperate on the first filling and operation of the dam.⁴³ Notably, Egypt did not insist on its previous rights and quantities under the 1929 and 1959 treaties,⁴⁴ but neither did it or Sudan sign on to the NBI's Cooperative Framework Agreement.

Since 2015, Egypt has continued its fiery yet vague rhetoric, insisting that "no one can take a single drop of water from Egypt"⁴⁵ and that "the waters of Egypt are untouchable, and touching them is a red line,"⁴⁶ but not expressly threatening military action. Sudan has remained fairly neutral, generally expressing support for a solution but acting only as mediator in the 2015 agreement and avoiding Egypt's saber-rattling rhetoric, while Ethiopia continues to labor on the

⁴² <https://www.bbc.com/news/world-africa-22850124>. Accessed 8 August 2021.

⁴³ https://www.internationalwaterlaw.org/documents/regionaldocs/Final_Nile_Agreement_23_March_2015.pdf. Accessed 8 August 2021.

⁴⁴ *Supra* note 37.

⁴⁵ *Supra* note 1.

⁴⁶ <https://subscriber.politicopro.com/article/eenews/2021/03/31/in-stark-warning-president-says-nile-water-untouchable-003621>. Accessed 8 August 2021.

GERD and expressing support for an agreement, yet being willing to surrender \$272 million^{47,48} in aid from the US, forego international funding for the GERD, and reject every suggested arrangement for a trilateral agreement. Apparently, each country believes it is taking the optimal approach by avoiding a binding agreement to manage the Nile's waters.

The Three Countries' Approaches

Egypt's Approach

Egypt has, until the 2015 agreement, continued to insist on recognition of the 1929 and 1959 treaties that gave it a massive share of Nile waters. It has recently pressed for an agreement mediated by the US, UN and European Union, instead of continuing the talks mediated by the African Union.⁴⁹ Egypt clearly believes it would gain a greater share of Nile waters by involving these three Western partners than by continuing to work with the African Union, which might push Egypt to ratify the Nile Basin Initiative's Cooperative Framework agreement.

Sudan's Approach

Sudan mediated, rather than joined, the 2015 agreement between Egypt and Ethiopia.⁵⁰ Its rhetoric has been more muted than that of Egypt, though it claimed the 2020 first filling of GERD resulted in water shortages, and threatened to sue the Italian company constructing the dam, as well as the Ethiopian government, if the 2021 second filling of the dam commenced as

⁴⁷ The Trump administration placed a "temporary pause" on funding to Ethiopia due to "concern about Ethiopia's unilateral decision to begin to fill the [GERD] before an agreement and all necessary dam safety measures were in place." <https://www.nytimes.com/2020/09/02/world/us-aid-ethiopia-dam.html>. Accessed 8 August 2021.

⁴⁸ Soon after taking office, the Biden administration "de-linked" the pause in aid to Ethiopia from the dispute with Egypt over GERD. <https://subscriber.politicopro.com/article/eenews/2021/02/19/us-aid-pause-no-longer-linked-to-hydro-dam-dispute-005245>. Accessed 8 August 2021.

⁴⁹ *Ibid.*

⁵⁰ *Supra* note 43.

scheduled in July.⁵¹ Ethiopia announced the second filling was complete in late July;⁵² Sudan has not yet announced legal action. Sudan's balanced approach is apparently couched in the understanding that GERD could reduce flooding that is increasing due to deforestation in the Ethiopian highlands⁵³ and exacerbated by climate change.⁵⁴ Further, Sudan already purchases electricity from Ethiopia, and stands to gain from the opportunity to purchase additional, inexpensive, hydropower created by a fully functioning dam.⁵⁵

Ethiopia's Approach

Ethiopia, left out of the 1929 and 1959 treaties, and a signatory to the 1999 Cooperative Framework Agreement, clearly believes it has nothing to gain and everything to lose by entering into a trilateral agreement with Egypt and Sudan. It has rejected calls by Egypt and Sudan to involve the UN Security Council⁵⁶ as a mediator to negotiations, instead stating that all three countries are in Africa, and so the African Union is the logical mediator of the conflict.⁵⁷ The name Grand Ethiopian Renaissance Dam was selected for a reason – the country anticipates the structure will not only provide electricity for much of the country, it also expects to sell the electricity to neighboring countries, thereby promoting development of the historically impoverished nation. Ethiopia thus recognizes that its negotiating and economic powers grow as

⁵¹ <https://www.aljazeera.com/news/2021/7/6/egypt-angry-ethiopia-resumes-filling-gerd>. Accessed 8 August 2021.

⁵² <https://www.reuters.com/world/africa/second-filling-ethiopias-giant-dam-nearly-complete-state-run-media-2021-07-19/>. Accessed 9 August 2021.

⁵³ Deforestation results in faster runoff, which leads to higher peaks in flood events. https://scholarworks.wmich.edu/cgi/viewcontent.cgi?article=1002&context=africancenter_icad_archive. Accessed 8 August 2021.

⁵⁴ http://www.xinhuanet.com/english/2019-12/28/c_138662188.htm. Accessed 8 August 2021.

⁵⁵ <https://asumetech.com/despite-the-dam-crisis-sudan-intends-to-purchase-1000-megawatts-of-electricity-from-ethiopia/>. Accessed 8 August 2021.

⁵⁶ For its part, the UN Security Council stated that it can do little more than encouraging the three parties to meet. <https://www.aljazeera.com/news/2021/7/6/egypt-angry-ethiopia-resumes-filling-gerd>. Accessed 8 August 2021.

⁵⁷ <https://www.aljazeera.com/program/inside-story/2021/7/4/ethiopias-renaissance-dam-has-diplomacy-failed>. Accessed 8 August 2021.

the dam nears completion and is unlikely to stop construction or sign onto a water sharing agreement before GERD is fully operational.

Options for Resolution

There are at least five entities with varying abilities to resolve differences between the three sovereigns: the International Court of Justice,⁵⁸ the UN Human Rights Council, the COMESA Court of Justice, the African Union, and the UN Security Council. Sudan has threatened lawsuits in the first three bodies,⁵⁹ while the African Union and the UN Security Council have been called upon by various entities to broker an agreement between the three countries.

As described by its website, “the International Court of Justice acts as a world court. The Court’s jurisdiction is twofold: it decides, in accordance with international law, disputes of a legal nature that are submitted to it by States (jurisdiction in contentious cases); and it gives advisory opinions on legal questions at the request of the organs of the United Nations, specialized agencies or one related organization authorized to make such a request (advisory jurisdiction).”⁶⁰ Thus, while the ICJ may be an appropriate body to lay down a ruling on a particular conflict, it is not a mediating body that is appropriate for developing a treaty between the three countries.

The UN Human Rights Council holds regular and emergency sessions to address human rights violations. The real power of this body is limited, since its recommendations go before the UN General Assembly, which can then suspend the rights and privileges of a member if

⁵⁸ <https://www.icj-cij.org/en/jurisdiction>. Accessed 8 August 2021.

⁵⁹ <https://www.aljazeera.com/news/2021/4/23/sudan-threatens-legal-action-if-ethiopia-rejects-nile-dam-talks>. Accessed 9 August 2021.

⁶⁰ *Supra* note 57.

supported by a two-thirds majority vote.⁶¹ Though all three countries are members of the UN, given Ethiopia's persistence in developing the GERD, whatever rights and privileges it might lose are unlikely to result in an immediate change of behavior, especially if GERD becomes fully functional and Ethiopia sees the full benefit of hydropower revenues from other countries and predictable water supplies for its own people.

The third entity to which sovereigns may appeal for a legal judgment is the Common Market for Eastern and Southern Africa Court of Justice, which was established as part of the COMESA treaty.⁶² Ethiopia and Sudan are signatories to the treaty; Egypt is not. The court was established in 1994 and has authority "to adjudicate upon all matters which may be referred to it pursuant to the COMESA treaty."⁶³ Thus, like the ICJ, the COMESA Court appears able to resolve narrow conflicts that arise under the COMESA treaty, but it lacks jurisdiction to render a judgment between Egypt and Ethiopia since the former is not a member of COMESA, and also is not a mediating body that can coax the three parties to the table to develop a binding agreement over water sharing.

All three countries are members of the African Union, an entity that serves as an organizational locus for many specific treaties and activities regarding development and peaceful advancement of societies on the continent. The AU has repeatedly brokered talks between the countries and may be the best situated to bring an agreement to fruition given the recent endorsement by the UN Security Council.⁶⁴

⁶¹ https://en.wikipedia.org/wiki/United_Nations_Human_Rights_Council. Accessed 9 August 2021.

⁶² https://comesacourt.org/wp-content/uploads/2018/10/Comesa_treaty_revised_2009.pdf. Accessed 9 August 2021.

⁶³ <https://comesacourt.org/functions-of-the-court/>. Accessed 9 August 2021.

⁶⁴ <https://www.al-monitor.com/originals/2021/07/can-african-union-revive-nile-dam-talks>. Accessed 9 August 2021.

The UN Security Council is an arm of the United Nations tasked with determining when and where UN peace operations should be deployed. These operations usually entail UN forces used after a ceasefire has been called, and the conflicting parties are committed to a peace process.⁶⁵ Egypt and Sudan had requested that this body broker an agreement between the three nations, apparently believing the UNSC would come closer to supporting their interests than would an agreement brokered by the African Union. However, the UNSC recently rejected the request, with US Ambassador to the UN stating that the African Union “is the most appropriate venue to address this dispute.”⁶⁶

Nile Major Risks

The obvious and greatest risk is that the three countries fail to reach a water sharing agreement, and that one or two declare war on the rest. Given the rhetoric, the most likely scenario is Egypt declaring war on Ethiopia, with Sudan being forced to choose a side. Egypt and Sudan have strengthened their military alliances since 2019 in a series of meetings and joint training exercises.⁶⁷ Ethiopia has responded by announcing an increase in security at the dam, adding that its air force would be actively patrolling the airspace in the vicinity.⁶⁸ Egypt has also signed military cooperation agreements with two countries sharing a border with Ethiopia: Djibouti and Kenya. Djibouti, bordering Ethiopia to the northeast, is strategically important since it has coastline and ports at the mouth of the Red Sea that, in theory, Egypt could use for

⁶⁵ <https://peacekeeping.un.org/en/role-of-security-council>. Accessed 9 August 2021.

⁶⁶ <https://www.reuters.com/world/un-security-council-backs-au-bid-broker-ethiopia-dam-deal-2021-07-08/>. Accessed 9 August 2021.

⁶⁷ <https://www.al-monitor.com/originals/2022/03/egypt-deepens-military-ties-sudan-ethiopia-moves-forward-nile-dam>. Accessed 26 May 2022.

⁶⁸ See the 3:19 video at <https://www.aljazeera.com/news/2021/7/8/explainer-ethiopias-massive-nile-dam>. Accessed 26 May 2022.

bringing troops and supplies to Ethiopia's border. Kenya, Ethiopia's neighbor to the south, is similarly strategic since it could cause Ethiopia to fight battles on multiple fronts.

The second, longer-term and inter-related risk is climate change. Desertification has advanced in Egypt⁶⁹ and Sudan,⁷⁰ making their reliance on the Nile ever greater, and conflicts more common for those who heretofore have depended less on the Nile and more on a predictable rainy season.⁷¹ Farmers and ranchers may therefore be chased toward the Nile by desertification. Egypt must defend its share of the Nile waters both because it provides such a large percentage of the country's overall water supply, and because of its dependence on agriculture. Though Egypt's president has worked to diversify its economy since he came into power in 2014, agriculture has consistently comprised 11% of its GDP since 2010,^{72,73} more than twice that of the US.⁷⁴ Further, the sector still employs more than half of all workers in the southern part of the country.⁷⁵ Thus, Egypt's president cannot be perceived as soft in negotiations with Ethiopia.

In contrast, agriculture in Sudan has declined from 34% to 21% of its GDP since 2010,⁷⁶ potentially indicating a diversifying economy and less economic reliance on Nile waters. While

⁶⁹ <https://www.thenewhumanitarian.org/news/2011/07/11/desertification-threat-local-food-production>. Accessed 9 August 2021.

⁷⁰ <https://www.cnn.com/2016/12/07/africa/sudan-climate-change/index.html>. Accessed 9 August 2021.

⁷¹ <https://www.downtoearth.org.in/news/climate-change/how-desertification-is-silently-fueling-conflicts-66446>. Accessed 9 August 2021.

⁷² https://en.wikipedia.org/wiki/Economy_of_Egypt. Accessed 9 August 2021.

⁷³ <https://www.statista.com/statistics/377309/egypt-gdp-distribution-across-economic-sectors/>. Accessed 9 August 2021.

⁷⁴ <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/>. Accessed 26 May 2022.

⁷⁵ <https://www.usaid.gov/egypt/agriculture-and-food-security>. Accessed 9 August 2021.

⁷⁶ <https://www.statista.com/statistics/727246/share-of-economic-sectors-in-the-gdp-in-sudan/>. Accessed 9 August 2021.

Sudan has expressed support for Ethiopia's right to build and operate the GERD,⁷⁷ it has recently recalled its ambassador to Ethiopia due to a decades-long dispute over agricultural lands located near the shared border.⁷⁸

A failure by the three nations to reach any agreement at all could result in lawsuits or war if Egypt or Sudan believe that Ethiopia damages their respective interests through its management of the dam's waters, or if Ethiopia holds water in the reservoir during a prolonged drought against the demands of Egypt or Sudan. While any water sharing agreement would signal significant progress that currently does not seem likely, one that fails to include futureproofing based on climate change predictions is destined to be an imperfect document subject to continued strife.

4. What Rio Grande Managers Can Learn from Egypt

Given that a decade has passed since construction began on GERD and Egypt has not found a way to reach any type of water sharing agreement with Ethiopia, one might believe Rio Grande managers have nothing to learn from Nile managers. Such an opinion overlooks two realities. First, Ethiopia insists government scientists from Egypt, Sudan and Ethiopia met on a series of occasions and developed a filling schedule for the dam in 2019 that would avoid harm to the two downstream countries.⁷⁹ This was echoed by a US Treasury Department news release saying an accord had been reached regarding the schedule.⁸⁰ According to Ethiopia, it followed

⁷⁷ <https://www.aljazeera.com/news/2021/7/8/un-to-discuss-ethiopias-dam-that-strained-ties-with-egypt-sudan>. Accessed 9 August 2021.

⁷⁸ <https://www.aljazeera.com/news/2021/8/8/sudan-recalls-ambassador-to-ethiopia-amid-frayed-ties>. Accessed 9 August 2021.

⁷⁹ See the 3:19 video at <https://www.aljazeera.com/news/2021/7/8/explainer-ethiopias-massive-nile-dam>. Accessed 26 May 2022.

⁸⁰ <https://home.treasury.gov/news/press-releases/sm891>. Accessed 3 June 2022.

that schedule during the 2020 and 2021 fillings, and there is no indication it plans to deviate from the schedule in 2022 or subsequent years.⁸¹ In other words, the scientists reached agreement on a filling schedule, but the politicians did not adopt it.

Second, the scientific agreement leads to the conclusion that both Egyptian and Ethiopian politicians gain from the lack of an accord. Egypt's president gains stature by being able to talk tough (albeit vaguely) about Ethiopia if it takes "a single drop of water" from Egypt,⁸² and allows Egypt to cast blame solely on Ethiopia for any real or perceived exigency related to the Nile, such as lack of water during droughts or increased salinity in agricultural lands due to changes in water supply. Egypt can also continue to complain to the US and UN about Ethiopia's intransigence even while scientists seem to be in agreement about the filling schedule. Ethiopia obviously gains by filling the dam without any agreement since it allows electricity and associated revenue to be generated at the earliest date, and allows it to lob nationalistic sentiments back toward Egypt about Cairo's unwillingness to negotiate in good faith, both of which help to bolster pride of Ethiopians in the massive construction project that has been mostly funded by the country itself, rather than by USAID, World Bank⁸³ or other strategic allies.

So what *can* Rio Grande managers learn from the Nile situation? I argue lessons can be learned in at least two areas. First are the structural policies adopted by Egypt related to

⁸¹ *Id.* Sources vary significantly in the amount of time needed to fill the dam, with some stating 4-7 and others 5-15 years depending on rainfall, progress on construction, etc.

https://en.wikipedia.org/wiki/Grand_Ethiopian_Renaissance_Dam. Accessed 31 May 2022.

⁸² While Egypt's president has trodden a careful line for years, stating clearly that Ethiopia's taking of water could result in instability while being equally vague regarding what that might entail, President Trump was more direct in 2020, stating publicly that Egypt might "blow up" the dam. <https://www.bbc.com/news/world-africa-54674313>. Accessed 31 May 2022. The irony of this statement is that, if Egypt were to take such an action at this point or in the future, Sudan's and Egypt's dams might be damaged or its cities flooded for months from the massive outflow of the dam.

⁸³ World Bank has mostly ceased funding large dams like GERD because they tend to have significant environmental impacts, displace populations, and often do not provide the promised economic pay-off. <https://www.wilsoncenter.org/article/second-filling-gerd-reservoir>. Accessed 3 June 2022.

expected water scarcity. Second and bigger picture is the precautionary tale of why Egypt, Sudan and Ethiopia have been unable to reach any type of accord for water sharing under principles of “equitable apportionment” and “no significant harm,” and how Rio Grande managers might avoid a similar impasse in the future. These are discussed in turn.

First, Rio Grande managers might learn from Egypt’s application of policies related to agricultural water usage.⁸⁴ This industry employs 30% of its labor force while comprising 11-14% of Egypt’s gross domestic product, yet, similar to New Mexico, agriculture commands a super-majority of water use. In Egypt, agriculture uses roughly 85% of Nile flows reaching the country,⁸⁵ while in New Mexico, the number hovers around 75%.⁸⁶ Egypt has adopted measures that clearly place water conservation as first priority by limiting both food and cash crops, including its most basic staple: rice. The government has developed drought-tolerant rice species⁸⁷ to replace traditional cultivars of this food crop that require massive amounts of flood irrigation, and has placed limits on the land area that can be used to grow this crop.⁸⁸ Limits have also been placed on other water-intensive crops like bananas.⁸⁹

⁸⁴ <https://www.al-monitor.com/originals/2021/02/egypt-fines-farmers-waste-water-gerd-talks.html>. Accessed 3 June 2022.

⁸⁵ <https://www.al-monitor.com/originals/2021/05/egypt-unveils-strategy-adapt-water-shortages>. Accessed 5 June 2022.

⁸⁶ As of 2015, irrigated agriculture accounted for 76% of total water withdrawals, including 77% of surface water and 75% of groundwater. Molly Magnuson, Julie Valdez, Charles Lawler, Matt Nelson & Laura Petronis, *New Mexico Water Use by Categories 2015*, New Mexico Office of the State Engineer, Technical Report 55 (2019). https://www.ose.state.nm.us/WUC/wucTechReports/2015/pdf/2015%20WUR%20final_05142019.pdf. Accessed 8 August 2021.

⁸⁷ <https://www.al-monitor.com/originals/2021/05/egypt-unveils-strategy-adapt-water-shortages>. Accessed 5 June 2022.

⁸⁸ <https://www.al-monitor.com/originals/2022/05/egypt-braces-third-stage-filling-nile-dam>. Accessed 3 June 2022.

⁸⁹ <https://www.al-monitor.com/originals/2021/05/egypt-unveils-strategy-adapt-water-shortages>. Accessed 5 June 2022.

Besides placing limits on crop types and acreage, Egypt has begun developing packages of incentives and fines. Incentives include loans for adopting more efficient irrigation systems and offering tools like soil moisture meters, while fines are levied on those who took the loans but have failed to adopt the technology, as well as those who continue to waste water using flood irrigation.⁹⁰ Early results are promising. The country reduced its acreage of water-intensive rice cultivation from 1.1 million to 750,000 acres between 2019 and 2021, an areal decrease of 32%.⁹¹ It is still unclear how these efforts will rebalance agriculture in the country: the sector is responsible for roughly 20% of Egypt's exports and foreign exchange earnings, and the country currently imports roughly 40% of its food.⁹² The US, by comparison, imports around 15%.⁹³ Egypt has also announced large investments in sewage treatment plants and desalinization plants, both of which can help increase water supplies, albeit at significant upfront cost and with a permanent financial commitment to keep the systems operational. In short, Egypt's approach appears to place water supply as its clear first priority, even at the cost of reshaping the agriculture industry and potentially lessening its food security by increasing imports. Rio Grande managers, especially those in New Mexico, could consider a package of agricultural reforms designed to reduce water usage, with recommendations sent to the legislature and governor for their consideration.

⁹⁰ <https://www.al-monitor.com/originals/2021/02/egypt-fines-farmers-waste-water-gerd-talks.html>. Accessed 3 June 2022.

⁹¹ <https://www.al-monitor.com/originals/2021/05/egypt-unveils-strategy-adapt-water-shortages>. Accessed 5 June 2022. Data were not found regarding the water savings accompanying this acreage decrease.

⁹² <https://www.fao.org/egypt/our-office/egypt-at-a-glance/en/#:~:text=The%20Agriculture%20Sector%20provides%20livelihoods,percent%20of%20the%20labour%20force>. Accessed 5 June 2022.

⁹³ <https://www.fda.gov/food/importing-food-products-united-states/fda-strategy-safety-imported-food>. Accessed 5 June 2022.

The second area Rio Grande managers can look to for “lessons learned” is the long-standing inability of the three Nile countries to reach an agreement on water sharing using the international water management principles of “equitable apportionment” and “no significant harm.”⁹⁴ As background, the US and Mexico used equitable apportionment in their 1906 convention dividing Rio Grande water near El Paso, even highlighting it in the subtitle of the document: “Convention between the United States and Mexico: Equitable Distribution of the Waters of the Rio Grande.” In that agreement, Mexico and the US agreed to a monthly distribution schedule with Mexico receiving roughly 2% of the flow each month, with a total guarantee of 60,000 acre-feet per year. This guarantee applies except in cases of “extraordinary drought or serious accident to the irrigation system,” in which case the volume can be decreased, but is always tied to 2% of the available flow.

Similarly, the 1938 Rio Grande Compact is anchored solely on equitable apportionment of indexed flows at multiple gauging stations. Thus, New Mexico always receives a set percentage of the flow from Colorado regardless of how low the flow. The same goes for New Mexico delivering water to Texas.

The meaning of “equitable apportionment” is laid out in the Nile Basin Cooperative Framework Agreement,⁹⁵ a document that has been accepted by most upstream countries in the Nile Basin but has been rejected by Egypt and Sudan because it would reduce their apportionment from the 1959 bilateral agreement dividing the entirety of the flow between those

⁹⁴ Ryan Stoa. International Water Law Principles and Frameworks: Perspectives from the Nile River Basin. In: NILE RIVER BASIN: ECOHYDROLOGICAL CHALLENGES, CLIMATE CHANGE AND HYDROPOLITICS. Pages 581-596. (Assefa M. Melesse et al. eds., 2014).

⁹⁵ The Cooperative Framework Agreement.

https://www.internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf. Access 8 August 2021.

two downstream countries. Thus, attempting to negotiate an accord between Ethiopia, Sudan and Egypt based solely on equitable apportionment will likely continue to be a non-starter. Instead, Egypt and Sudan prefer the “no significant harm” doctrine, but Ethiopia has rejected this since it could mean that, in a time of extreme drought, Ethiopia might have to continue to allow large flows downstream to provide water to Sudan and Egypt. This could compound Ethiopia’s suffering from famine by foregoing electrical supply for itself, and revenue streams from sales of electricity to other countries, by releasing water from the GERD below the level that turbines could provide power.

The point here for Rio Grande managers is that they need to be prepared for a situation where climate change lengthens an extended drought to decades or centuries, and tribes and pueblos that have not already settled their water rights in an adjudication framework increase demand by ramping up use of their prior and paramount rights. This could result in a situation where neither New Mexico nor Texas is satisfied with their allocations and multiple lawsuits are filed among states, tribes, pueblos and the federal government. Now may be the best time (as opposed to hoping for a future time when water is more abundant, and negotiations are easier) to adopt language more specific than “equitable apportionment,” and instead developing a hierarchy of uses.

5. Potential Solutions for the Rio Grande

While it is beyond the scope of this report to provide detailed analysis of options that policy makers have to future-proof the Rio Grande, a number of options are available – some more realistic than others. These are briefly described below. All options include the assumption that New Mexico will become drier and hotter, and that both groundwater and surface water will continue to become less available.

Continue the Status Quo

Under the status quo, planning, management and use of water would continue as they do today. Following are several examples and implications.

1. **Municipalities:** Municipalities will continue to acquire water rights from farmers.

Municipalities that depend on groundwater will need to invest in deeper wells or other infrastructure to ensure sufficient water for their constituents. Marginal agricultural enterprises with junior water rights will be forced out of business if they do not acquire more reliable rights.

2. **Ecosystems:** Ecological systems depending on spring flooding and reliable instream flows will continue to degrade. The most well-known of these is the cottonwood forest system along the Rio Grande, which requires annual flooding for germination of the forest and overbank flooding for rejuvenation of sediments. The Rio Grande silvery minnow, listed as endangered under the federal Endangered Species Act (ESA), will continue to be managed to lessen the chances of extinction rather than to bring the species back to healthy population levels so that it can be de-listed. Other species, especially those limited to small geographic ranges, will become more likely to be listed under ESA.

3. **Tribes:** Water rights for most tribes and pueblos will continue to be an unknown as the New Mexico Office of the State Engineer (OSE) continues its adjudication process, and lawsuits slowly grind through the system. Many of these historically disadvantaged native communities will continue to be hamstrung for decades into the future because they lack the economic resources to develop their water infrastructure, and generally have not been able to unlock federal funding for these projects except via basin-wide adjudications resulting in settlements approved by Congress. As stated by Daniel McCool in his 2002 book on Indian water rights

settlements, there is a “stark contrast between the federal government’s abject parsimony when funding Indian water development and its gratuitous generosity when funding non-Indian development.”⁹⁶

Modify the Rio Grande Compact

The state of New Mexico could request that the Rio Grande Compact be modified. The underlying premise for this would be that Indian water rights are separate from New Mexico’s apportionment under the Compact, and that Colorado and Texas must reduce their use to allow tribes and pueblos their fair share. As it currently stands, tribes and pueblos are joined in basin-wide adjudications, and all parties negotiate based on an understanding that tribes and pueblos have the most senior rights, but without legal precedent regarding how much water belongs to pueblos (tribes are typically limited to their potentially irrigable acreage and any instream flows needed to maintain fisheries, if it is shown that the tribes depended on fishing as a food source). Thus, if tribes and pueblos maintain demands for their full allocations, upon completion of all adjudications OSE may find that the state is significantly overallocated. This would require OSE to cut off junior irrigators in many years in order for the state to deliver the amount of water to Texas that the RGC requires - a politically-unpalatable solution. The other possibility is for the state to shift the cost burden to taxpayers and begin purchasing rights as it has done to fulfill its obligation under the Pecos River Compact. Thus, re-opening the Compact would seem to have a large potential upside for the state, though it could muddle ongoing adjudications within the state and require years or decades to complete a new compact.

⁹⁶ Daniel McCool, *Native Waters: Contemporary Indian Water Settlements and the Second Treaty Era*. Page 36.

Modify “Beneficial Use” in the New Mexico Constitution or Regulations

Numerous commentators have criticized the doctrine of beneficial use in prior appropriation of water rights as wasteful. In order to maintain a water right, the user must first “perfect” the right by using the full allotment, then continue to show that the entire right is needed to avoid potential forfeiture. This leads two outcomes. First, users continue to use flood irrigation to ensure the entire water right is used, even though a crop might be just as viable using a more efficient means of irrigation. This allows the user to show full use of the water right and avoid investing in other irrigation infrastructure. Second, to protect the water right, the user might simply flood irrigate a field, referring to it as a hay field even if cattle are not grazed, the hay is never cut for bales, and no real economic benefit is generated for the New Mexico economy. Because of its broad purview and skeletal staffing, OSE rarely, if ever, investigates potential waste by individuals, relying instead on the court system. Courts, in turn, seem to point back to the state Constitution and water code, determining that beneficial use has occurred (and waste has not) as long as the water is used for its intended purpose.

A potential alternative is for the state legislature to provide a more specific definition for “beneficial use.” While there are many ways to approach this, one might be to create a hierarchy of beneficial uses (e.g. humans consumption first, environment second, agriculture third, etc.). For each category, the full allotment is available if the water goes to a higher priority use (e.g. water assigned to an irrigator is left in the river to assist with instream flow). Otherwise, the irrigator may only use the amount of water required for a given crop using the most efficient means available. For example, if an acre of alfalfa requires 1 AF of water using flood irrigation, but only 0.5 AF using sprinkler irrigation, the irrigator must decide whether to invest in the

irrigation infrastructure, or irrigate less and hope for sufficient rainfall, or perhaps lease a water right from another owner.

Modification to the definition of beneficial use might be combined with other policies that reduce incentives to waste water. As explained in a recent American Bar Association article, farmers often waste water because government subsidies encourage them to do so, but “reasonable regulations preventing unreasonable water use are not unconstitutional, nor do they qualify as regulatory takings.”⁹⁷

Ramp Up Policy Changes to Agriculture

Agriculture in New Mexico accounted for \$3.9 billion in sales as of 2012 at the farm and ranch level, plus \$2.1 billion in processing, distribution, marketing, financing and supporting services.⁹⁸ This \$6 billion comprised roughly 7% of New Mexico’s gross state product.⁹⁹ This economic engine consumes roughly 76% of New Mexico’s surface and groundwater on an annual basis.¹⁰⁰ As mentioned above, there are likely many ways, including pushing for changes to federal subsidies, to decrease agricultural use of water while maintaining or even increasing revenues.

One approach is to provide support for high value crops such as cannabis. While this has the potential to increase the ratio between agriculture revenue and water use, it does not come without controversy. The 2021 New Mexico Cannabis Regulation Act put in place restrictions on cannabis growers, requiring them to demonstrate a valid water right for their planned

⁹⁷ https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2021-2022/march-april-2022/farmers-are-depleting/. Accessed 15 June 2022.

⁹⁸ <https://pubs.nmsu.edu/circulars/CR675/>. Accessed 15 June 2022.

⁹⁹ <https://pubs.nmsu.edu/circulars/CR675/>. Accessed 15 June 2022.

¹⁰⁰ https://www.ose.state.nm.us/WUC/wucTechReports/2015/pdf/2015%20WUR%20final_05142019.pdf. Accessed 15 June 2022.

operation. This requirement was removed from a 2022 bill by legislators who believed this created a higher bar for cannabis versus other agricultural producers. The bill did not pass, however, leaving the restrictions in place.¹⁰¹ The need for such a requirement was illustrated by data from the OSE Water Rights Division showing that since the 2021 act went into effect, almost 90% of cannabis growers were found not to have valid water rights.¹⁰²

Another option is to follow Egypt's lead and move away from water-intensive crops like alfalfa, cotton, and corn.¹⁰³ These crops are grown on a total of over 300,000 acres in the state.¹⁰⁴

A final option is to incentivize crops grown specifically for direct human consumption, and disincentive crops that serve as feed crops for meat industries. For example, all alfalfa and the majority of corn are grown for consumption by livestock.

Grant Legal Personhood to Water

The term "legal personhood" is used to convey the legal theory that non-humans should have their own rights. Granting legal personhood to anything other than humans has been a mostly unsuccessful battle in US courts. While corporations are considered persons in several legal aspects, assigning legal personhood to land or species has been generally unsuccessful. One example is where a city adopted an ordinance granting Lake Erie some legal rights such that residents could act as sort of surrogate caregivers, allowing them to sue polluters of the lake.

¹⁰¹ <https://nmpoliticalreport.com/2022/02/18/what-the-failed-cannabis-clean-up-bill-means/>. Accessed 15 June 2022.

¹⁰² <https://nmpoliticalreport.com/2022/02/18/what-the-failed-cannabis-clean-up-bill-means/>. Accessed 15 June 2022.

¹⁰³ https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2021-2022/march-april-2022/farmers-are-depleting/. Accessed 15 June 2022.

¹⁰⁴ https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=NEW%20MEXICO. Accessed 15 June 2022.

The ordinance was later struck down in federal court as being unconstitutionally vague.¹⁰⁵ Further, some state legislatures have attempted to take steps to prevent the assignment of personhood to non-humans, fearing it could limit access for mining or other use of natural resources.¹⁰⁶ In contrast, some countries including New Zealand, Bangladesh and Ecuador have passed legislation establishing legal personhood for environmental entities. In New Mexico, legal personhood might be applied to the Rio Grande, the silvery minnow, or perhaps the riparian forest along the Rio Grande. The likelihood of this succeeding as a stand-alone legal theory is not high given the precedent and the current composition of the US Supreme Court. Combining the theory with a workable management strategy, however, could change the outcome.

Develop a Binding Shared Management Strategy

Although legal personhood for a river or other non-human entity is unlikely on its own, it could possibly take root when combined with a shared management strategy where two or more parties unite to resolve conflict. Such is the case for the Whanganui River, where the New Zealand government entered into an agreement with the indigenous Maori after over a century of legal battles.¹⁰⁷ The strategy divides management of the river between three groups: an advisory group, a strategy group, and stakeholder relationship group.¹⁰⁸ The legal personhood aspect was a vital component of establishing the shared management strategy because it mirrored the Maori treatment of the river. The shared management aspect was also important because it allowed for continuation of existing legal and management norms. Developing this type of management

¹⁰⁵ <https://aldf.org/article/federal-judge-strikes-down-lake-erie-bill-of-rights/>. Accessed 16 June 2022.

¹⁰⁶ <https://subscriber.politicopro.com/article/eenews/2022/02/16/bill-would-bar-idahos-lands-and-animals-from-personhood-00009400>. Accessed 13 June 2022.

¹⁰⁷ Atherton Phleger. 2021. Middle Ground: Legal Personhood as a Path to Pueblo Co-management of the Rio Grande. Unpublished manuscript.

¹⁰⁸ *Id.*

strategy on the Rio Grande could take decades given the complex and often conflicting laws and policies at various levels of government, but given that it might take New Mexico 600 years to complete adjudication of the state's waters,¹⁰⁹ perhaps it is an alternative worth considering.

Push for Federalization of Interstate Waters

What some might consider a “nuclear option” is for New Mexico to request assistance from the federal government in managing its water by pushing for federalization of interstate waters. This would include the Rio Grande and its tributaries. While federal involvement is typically anathema to states on many topics, and especially for states like New Mexico that elevate the status of water to treatment in the state constitution, there exists substantial legal and practical bases for federal control of interstate waters.

First, the federal government has invested substantially in water projects across the West, including New Mexico. Federal funds enabled the construction and continued management of several reservoirs in the state, including Heron, El Vado, Elephant Butte, Abiquiu and others.¹¹⁰ Thus, the US Army Corps of Engineers and the Bureau of Reclamation are already present in the state and wield significant influence in how waters are managed for their users.

Second, the Endangered Species Act sometimes mandates instream flows for species like the silvery minnow, while the Clean Water Act requires management of water quality. The ESA has played an outsized role in keeping water in the middle Rio Grande that, in dry years, would

¹⁰⁹ Alletta Belin *et al.* Taking Charge of our Water Destiny: A Water Management Policy Guide for New Mexico in the 21st Century (citing Thomas Turney, “Cracking the Adjudication Nut,” New Mexico Water Law, Continuing Legal Education Seminar, Santa Fe, New Mexico, August 9, 2001.) <https://allaboutwatersheds.org/new-mexico-water-dialogue/library/documents/taking-charge-of-our-water-destiny/view>. Accessed 16 June 2022.

¹¹⁰ <https://uttncenter.unm.edu/resources/research-resources/nm-major-reservoirs-.pdf>. Accessed 16 June 2022.

almost certainly have been diverted for irrigation.¹¹¹ The Clean Water Act includes a goal of keeping water quality at a level that is “fishable and swimmable,” a mandate that helped the Isleta Pueblo require the City of Albuquerque to upgrade its water treatment system at an estimated cost of \$300 million.¹¹² Thus, federal agencies like the US Fish and Wildlife Service and Environmental Protection Agency have significant powers, when used,¹¹³ to manage quality, quantity, timing and distribution of waters of the Rio Grande.

Third, the federal government often represents tribes in legal matters, and especially when it involves water rights. Thus, the Department of Justice as well as the Department of Interior, the latter through the Bureau of Indian Affairs, Secretary’s Indian Water Rights Office, Office of the Solicitor and Bureau of Reclamation, are regularly involved in Rio Grande water issues.

Fourth, the US Supreme Court affirmed many decades ago that the federal government had plenary powers and could regulate interstate commerce under the Commerce Clause.¹¹⁴ The fact that the Rio Grande flows across state lines, water rights are bought and sold, and that water is used in creation of other products produced for interstate commerce strongly suggests that surface water can be managed under federal law, should the federal government ever choose to do so. This question has already been asked and answered with regard to groundwater – a state

¹¹¹ <https://www.wildlife.state.nm.us/download/education/conservation/wildlife-notes/aquatic/Rio-Grande-silvery-minnow.pdf>. Accessed 16 June 2022.

¹¹² <https://www.hcn.org/issues/123/3922>. Accessed 16 June 2022.

¹¹³ The FWS has been sued on at least one occasion for not protecting its own water rights. See <https://www.gbtribune.com/news/local-news/audubon-sues-restore-quivira-water-rights/>. Accessed 16 June 2022.

¹¹⁴ Wickard v. Filburn, 317 US 111 (1942).

cannot legislatively ban the export of groundwater out-of-state because it is a violation of the Commerce Clause.¹¹⁵

Finally, the National Emergencies Act formalizes the emergency powers of the President.¹¹⁶ The act allows the President to declare emergencies under 136 distinct categories, only 13 of which require Congressional action. With regard to the Rio Grande, emergency categories could include public health, trade, land use, and agriculture, to name only a few.¹¹⁷ A presidential declaration or threat that he plans to use the National Emergencies Act to begin managing the Rio Grande could be the catalyst the state needs to fix its broken water management system.

6. Conclusion

Contrary to popular opinion, New Mexico does not have a shortage of water. Instead, what it has is a dysfunctional legal and policy system that, among other shortcomings 1) delays access of tribes and pueblos to their ancestral and federal reserved water rights by way of an underfunded and inefficient adjudication process, 2) allows waste in the form of excessive water being used to irrigate low priority and water-thirsty crops, 3) does not support priority calls when senior water users make them in an unadjudicated basin, which comprises the majority of the state, and 4) lacks a clear hierarchy for use of water, ostensibly depending instead on prior appropriation – which is not enforced – and regulations against waste, which do not take into account inefficient uses as discussed above.

¹¹⁵ See *Sporhase*, *supra* note 22 and *El Paso*, *supra* note 23.

¹¹⁶ 50 USC §§ 1601-1651.

¹¹⁷ https://www.brennancenter.org/sites/default/files/2019-10/AGuideToEmergencyPowersAndTheirUse_2.13.19.pdf. Accessed 16 June 2022.

The Rio Grande and the Nile differ greatly in their situations: the Rio Grande suffers from an anachronistic and inefficient means of allocating water, but does not face an existential crisis. Many solutions are available even with the specter of climate change. Political leadership simply must make it a fiscal priority to plan and execute these solutions. In contrast, the Nile lacks any means of allocating water among Ethiopia, Sudan and Egypt, and the countries seem content – or resigned – to continue with warmongering rhetoric rather than reaching a long-term solution. A hot war with the goal of destroying the dam is unlikely – destruction of the edifice at this point could result in significant flooding and damage to infrastructure in Sudan and Egypt. Skirmishes to take control of the dam, however, are a possibility.

Rio Grande managers can learn from Egypt that “waste” of water can be interpreted as using inefficient means of irrigation, as well as growing water-thirsty crops that are not high priority food crops for humans. Examples applicable to the Rio Grande include alfalfa and corn grown to feed livestock, as well as cotton. Rio Grande managers can also institute packages of agriculture incentives and fines to spark changes in current irrigation strategies.

Nile managers can learn from the Rio Grande experience that, in one sense they are in a good situation: rather than having a multitude of management entities with overlapping and gapping authorities, Nile countries have a clean slate upon which to create holistic, shared management of an entire river basin known as a Cradle of Civilization and existentially important to several hundred million people.

Climate change will continue to force adjustments in water management. It is up to society whether to plan for these eventualities with some pain in the near-term, or remain in a reactionary, emergency response mode, with potentially greater pain in the long-term. Societies have responded magnificently to existential challenges before, and hopefully will do so again.