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Drought in the Colorado River Basin: A Policy Proposal

The Colorado River Basin (Basin) flows through 7 states in the Southwestern United States (Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, and California) and forms 17 miles of the California-Mexico border. The river is over 1,400 miles long and begins in the Rocky Mountain National Park, where its headwaters are fed by the lakes and marshes in La Poudre Pass (Carlson, 1989). Further down river, over 70 tributaries greatly increase the size and flow of the river. The major tributaries include; the Gila, the Green, the Gunnison, and the San Juan Rivers. Winter snowpack and late summer monsoons also provide flow increases to the river.

The importance of water allocations from the Colorado River are seen in the multiple purposes that they serve. Approximately 40 million people, as well as extensive agriculture, within the Colorado River Basin draw on the water from both the river and its tributaries. Within the area there are 29 native tribes, many of which see the river as sacred and deeply entwined within their culture and spirituality (Smith, 2020). Additionally, in this area 5.5 million acres of land are irrigated, there are seven wildlife refuges, eleven national parks, and four national recreation areas (USBR, 2012). Hydropower within the Basin provides upwards of 4,2000 megawatts of electricity to this region. (USBR, 2012). Furthermore, the Colorado River Basin provides international importance as it forms the U.S-Mexico border along Southern California.

Equitable and sustainable allocation of water resources is becoming increasingly important as water resources decline and population, agriculture, and energy needs increase dramatically. The water scarce Colorado River Basin is being overallocated and needs new policy initiatives that include all the perspectives present in the Basin. Inclusion of these perspectives will help to better allow for smooth communication, understanding, and certainty between parties that will ultimately lead to the betterment of water management in the area.

With records dating back to 1890, the basin has been experiencing an increasing occurrence of droughts. The early 1900s and 1950s experienced considerable drought and the past decade has seen the most persistent drought (NOAA, 2021). Since 2000 and through to 2015, every part of the Southwestern United States has experienced higher than average temperatures (National Drought Mitigation Center, 2021). Since 2000, at least 20% of the

Southwest has experienced drought during any given year. Between 2002 and 2005 and 2012 to 2015, over 90% of the region was in a recognized drought (NOAA, 2021). The upper basin of the river has experienced an increase of two degrees fahrenheit over the last century (NOAA NCIA, 2021). The Colorado River flow, "...has declined by nearly twenty percent in the last 15 years…" (Blankenbuehler, 2018).

History of Policy and Allocations

In this section the ideas of the hard path and soft path of water resource management will be used. The hard path is the building of large centralized infrastructure. In the context of water resource management, the hard path consists of infrastructure development, including, dams, aqueducts, pipelines, and more. The soft path is the creation of social change and policy initiatives. In the context of water resource management, the soft path refers to treaties, policies, and grassroots initiatives. Below is a brief description of the history of policy and allocations that have occured in the Colorado River Basin.

The 1877 Desert Lands Act was passed to encourage and incentivize the development of arid and semiarid lands in the Western US. Settlement of this land for development kicked off after it was passed and in 1901 the first diversion came to fruition, flooding what is now known as the Imperial Valley (Congressional Research Service, 2020). This initial major diversion led to settlement of people in the Southern California Desert. Eventually in 1941 the All-American Canal replaced this diversion route, the new canal moved from flowing through Mexico to staying within U.S. soil. Annually the All-American canal continues to flood the Imperial Valley with over 3.1 acre-feet (Blankenbuehler, 2018).

The early 1900's brought a few changes to funding, water rights, and continuation of the hard path of water management. In 1902 the Reclamation Act was passed to set aside federal funding for irrigation projects in 16 western states as well as funding for the U.S. Reclamation Service (which is not the Bureau of Reclamation) (Summit, 2013). Eight years later the Winters Decision gave certain tribes the right to use water for primary reservation use. This set a precedent for following Native water rights. Finally, by 1909 the hard path of water management continued to be seen through the building of the Laguna Dam which was the first federal dam on the Colorado River (Summit, 2013).

By the 1920's and on, water management began to take a different direction as an emphasis on allocating resources began to set in. In 1922 the Colorado River Water Compact was established to set allocations to the lower and upper basins based on an annual flow of 18 MAF (Congressional Research Service, 2020). This was later determined to be a record high flow level. The compact led to tension between California and Arizona regarding each other's water use. Seven years later the Boulder Canyon Project Act ratified the 1922 compact. However, it authorized construction of the Hoover Dam, using the hard path to continue water management efforts. This dam appropriated the lower basin's 7.5 MAF to three states (4.4 MAF to California, 2.8 to Arizona, 300,000 acre-feet to Nevada) (Congressional Research Service, 2020). In the later 1900's more soft path approaches were taken to water allocation. The 1944 Mexico Water Treaty was established to allocate and manage surface waters, specifically boundary waters from both the Colorado river, Tijuana rivers, and Rio Grande river (Sanchez, 2006). It also allocated Mexico water in the event of significant drought (Sanchez, 2006). Finally, four years later the Upper Basin Compact focused on giving percentage allocations to Colorado, Utah, New Mexico, and Wyoming. This also allocated 50,000 acre-feet annually to Arizona (Congressional Research Service, 2020). Data from 1906 through 2018 displays an average annual flow of 14.8MAF. During the past two decades, this flow has averaged 12.4 MAF. Current total allocations equate to 16.5 MAF, 7.5 to the lower and upper basins and another 1.5 to Mexico.

Allocations: Problems & Indicators

As previously stated, droughts are occurring more frequently and severely. The natural system as a whole is changing and that heavily affects the way in which people in the Basin use the water supply. The water supply has been in a decline for the last 15 years (Blankenbuehler, 2018) and has historically been overallocated. This and other societal factors have been leading to issues with allocations. Allocations have historically been un-equitable as certain groups are being left out of discussions and or allocations entirely. An example of this is the 2007 Colorado River Interim Guidelines. These guidelines were created to improve the management of the water source as well as ensure more reliability to downstream users and provide increased storage and delivery options (Bureau of Reclamation, 2020). However, these guidelines were created without Tribal consultation, leaving out 29 groups from around the whole basin from the discussion. Furthermore, there have been many disagreements between states within the Basin

around conservation efforts. In fact, Arizona has spent so much time trying to figure out how to conserve water within their state, that they have held up negotiations for the entire Basin (Blankenbuehler, 2018).

Two main indicators of water allocation issues are water availability and water use. Before water even has the chance to be allocated, it first must be present in the Basin, this indicator of water availability can be seen by the following indicators. As an, "exceptional drought" takes place within the upper region of the Basin and over 60% of the lower Basin is within an extreme drought (Bowlin, 2021) water levels in reservoirs in the Basin reach new lows in 2020. The second largest reservoir in the Basin, Lake Powell, reached depths in January of 2020 that spurred drought contingency plans throughout Colorado, Wyoming, Utah, and New Mexico (Bowlin, 2021). Lake Mead, a reservoir in Nevada, has also declined in water supply, reaching only 40% capacity in 2021 (Bowlin, 2021).

Water use is a good indicator of the issues of water allocation because water use varies from state to state within the Basin. Three states provide good examples of this, firstly Utah demonstrates that a growth mindset will further strain the resource. Currently Utah is not drawing their full allocation, they are only using about one MAF of their 1.725 MAF allocations (UDNR, 2021). Yet, Utah is planning to eventually start using their full allocation in order to grow their already rising population. In addition to supporting a larger population they want to use parts of their allocation for recreation, creating an abundance of green golf courses. Colorado farmers are taking an uncompromising stance and refusing any deals that will require them to take less water in the future. Finally, California's Imperial Irrigation District receives over 3 million acre-feet of water a year, 70% of that allocation is used for agriculture (Blankenbuehler, 2018). These three states demonstrate that the use of water within the basin is increasing as the impacts from drought continue and population grows. The actions of these states are also good indicators of the issues around allocation as through these three examples it can be seen that allocation issues are prevalent and diverse throughout the Colorado River Basin.

Policy Proposal

The policy proposals for beginning to solve these issues of allocation are threefold. In order to make more informed decisions regarding allocations, standards for the engagement of tribal nations in allocation decisions must be set and allocations to tribal nations must be quantified and upheld to their full amount. Additionally, new policy models that incorporate the

structure used in the minute 318 agreement may prove to be beneficial in the success of this engagement.

The current guidelines governing the allocation of the Colorado River that were approved in 2007 failed to consult the tribal nations involved. The United States has a long and complex history in colonization of the region and the continued disengagement and disenfranchisement of these groups adds unnecessary layers of conflict in relation to water negotiations. While current environmental laws and regulations require tribal consultation for development projects, this standard is lacking in resource allocation decisions. Creating a set process for tribal engagement in these decisions can maximize efficiency and contribute to building and improving upon existing relationships between federal and tribal governments. These standards for engagement need to be developed by tribal governments with federal consultation and consideration.

Within the basin, 22 tribes have quantified and resolved their allocation rights, accounting for 2.5 MAF annually. With 13 tribal nations in the basin continuing to have unquantified water rights, decisions for allocations to these nations are unnecessarily difficult. Quantifying these rights will create a better perspective for determining the actual amount of water that can be allocated to other users.

To make the engagement of Tribal Nations, local perspectives, and overall traditional ecological knowledge (TEK) succeed in allocation decisions, further structure and planning needs to take place within water management policy. Modeling new policies off of successful ones will contribute to the success of tribal engagement in water allocations. Not only should they be modeled off of successful policy initiatives, but they should be modeled after policy that is flexible and allows groups to have a platform to build negotiations and relationships off of. For example, the aforementioned policy proposals would be modeled off of the Minute 318 agreement. In 2010 the Baja Peninsula earthquake destroyed vital irrigation throughout the region in Mexico thus spurring action plans including the Minute 318 agreement that allowed Mexico to defer their water transfers without losing their water rights. This agreement was a good example of successful water management policy because it established groundwork for flexible and humanitarian focused water management. This is a more realistic framework for policy as conditions are constantly changing and it is being found that humans are more intertwined with natural systems than was previously acknowledged. Thus if new water management policies were modeled after Minute 318, the humanitarian approach would better

allow for the engagement of tribal nations, local perspectives, and aid to the success of those groups inputs. A humanitarian approach utilizes a people first approach and recognizes the base level need for water for survival. This flexibility will prove useful in water agreements and policy because it also allows for tribal nations to integrate their TEK into western policy with greater ease.

Conclusion

Changes in water availability and use will continue to affect the users within the Basin with extensive and long lasting effects. Historical allocation methods have proven to be ineffective and present day agreements have made little progress (seeing as in 2007 the Colorado River Basin Interim Guidelines left out Native tribes). This policy proposal suggests incorporating Native tribes, TEK, and local perspectives to create more certainty around water demand and legislation. This will be achieved by modeling new policy against progressive methods and considerations.

The authors of this paper would like to acknowledge that the allocations of the Colorado River for over the past century have deeply impacted the economy and industry of the region. For this river, no solution is an easy solution. These changes argue for correcting the years of over allocation that has spurred the massive development of unsustainable industries in the region will take large amounts of time and effort from all parties.

References

Blankenbueheler, P. (2018, December 20). *How best to share the disappearing Colorado River*. High Country News. Retrieved April, 2021, from https://www.hcn.org/articles/water-how-best-to-share-the-drought-plagued-colorado-river

Bowlin, N. (2021, February 24). *Will the climate crisis tap out the Colorado River?* High Country News. Retrieved April, 2021, from https://www.hcn.org/issues/53.3/south-colorado-river-will-the-climate-crisis-tap-out-the-colorado-river

Brougher, C. (2011, June 8). *Indian Reserved Water Rights Under the Winters Doctrine: An Overview*. Congressional Research Service. Retrieved April, 2021, from http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32198.pdf

Bureau of Reclamation. (2012, December). Colorado River Basin Water Supply and Demand Study Executive Summary. u.s. Department of the Interior. https://www.usbr.gov/watersmart/bsp/docs/finalreport/ColoradoRiver/CRBS_Executive_Summary_FINAL.pdf

Bureau of Reclamation. (2020, December). Review of the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead. U.S. Department of the Interior. Retrieved May, 2021, from

https://www.usbr.gov/ColoradoRiverBasin/documents/7.D.Review_FinalReport_12-18-2020.pdf

Congressional Research Service. (2020). Management of the Colorado River: Water Allocations, Drought, and the Federal Role. https://crsreports.congress.gov/product/pdf/R/R45546

National Drought Mitigation Center. 2021. Maps and data. Accessed March 2021. https://droughtmonitor.unl.edu/Data/DataTables.aspx

NOAA (National Oceanic and Atmospheric Administration). 2021. Climate at a glance. www.ncdc.noaa.gov/cag

NOAA National Centers for Environmental Information. May 2021. Climate at a Glance: Regional Time Series, Upper Colorado River Basin. https://www.ncdc.noaa.gov/cag/

Sánchez, A. (2006, February 17). *1944 Water Treaty Between Mexico and the United States: Present Situation and Future Potential*. Scielo. Retrieved April, 2021, from http://www.scielo.org.mx/pdf/fn/v18n36/v18n36a5.pdf

Smith, A. (2020, March 10). *'This system cannot be sustained'*. High Country News. Retrieved April, 2021, from https://www.hcn.org/issues/52.4/indigenous-affairs-colorado-river-this-system-cannot-be-sustained

Summit, A. (2013). Contested Waters: An Environmental History of the Colorado River. University Press of Colorado. https://books.google.com/books?hl=en&lr=&id=ZMu9AwAAQBAJ&oi=fnd&pg=PT7&dq=Colorado+River+allocation+history&ots=Q_NHiSIOgj&sig=pnnO0allsb4OXqIr2wPD8VQsVvQ#v=onepage&q&f=false

U.S. Department of the Interior Bureau of Reclamation. (2012, December). RECLAMATION Managing Water in the West. *Colorado River Basin Water Supply and Demand Study Executive Summary*, 34. Bureau of Reclamation. Retrieved April, 2021, from https://www.usbr.gov/watersmart/bsp/docs/finalreport/ColoradoRiver/CRBS_Executive_Summary_FINAL.pdf