COMMUNITY-BASED CONSERVATION IN WATER-SCARCE AREAS

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INTRODUCTION

Water scarcity poses an existential threat to people and nature. Climate variability coupled with changes in water demand are fueling the increasing prevalence and severity of water scarcity. Over 70% of irrigated areas in the world experience at least periodic water shortages[1] (Figure 1) and nearly one half of the global population—roughly 3.6 billion people—live in areas that suffer water scarcity at least one month each year.[2]

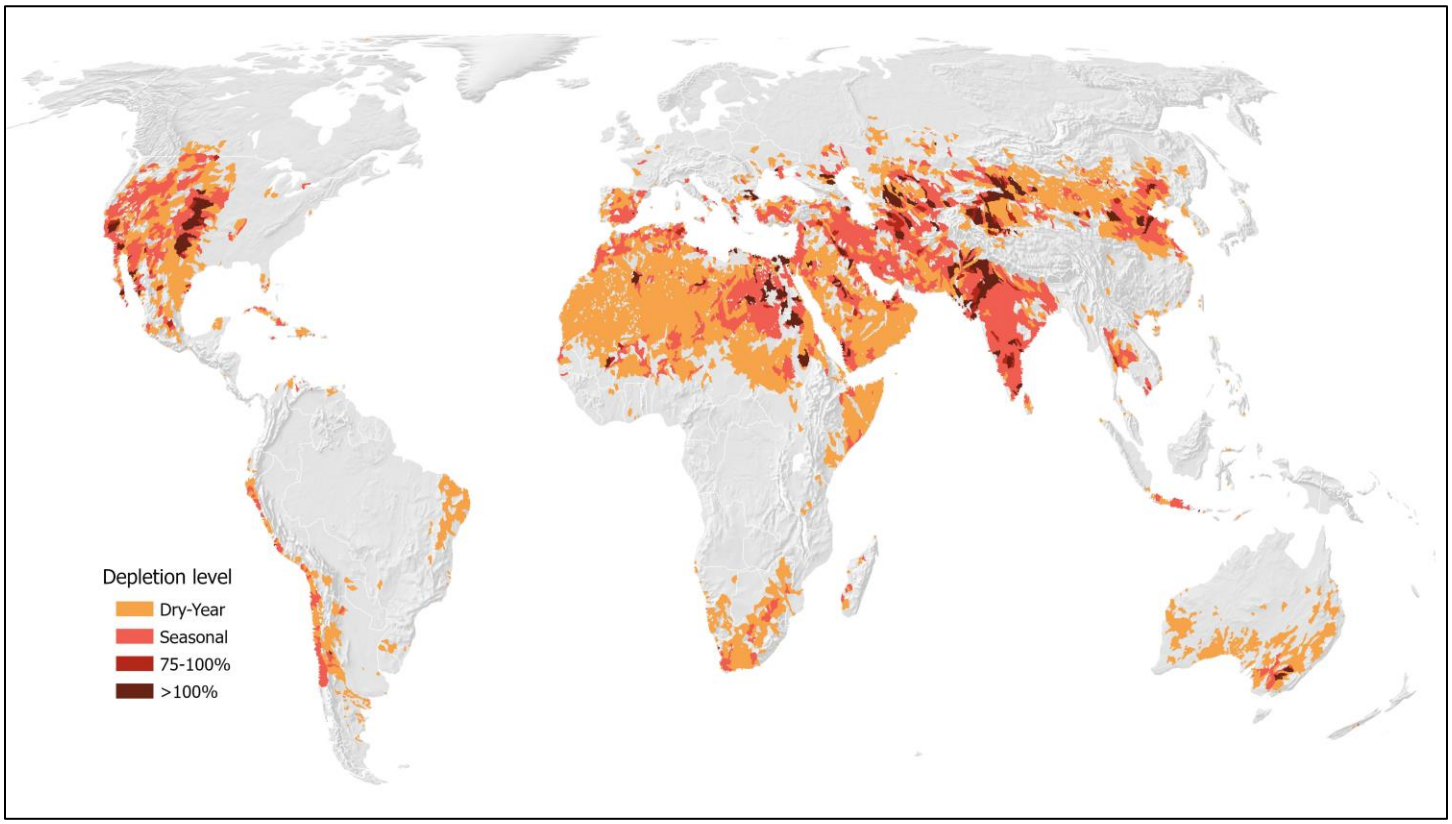


Figure 1: Map of water depletion in global watersheds. Water depletion is defined as the fraction of renewable fresh surface and groundwater available in a watershed consumptively used by human activities on annual, seasonal, and inter-annual time scales, for 15,091 watersheds delineated in WaterGAP3. Reproduced from Brauman et al. 2016.[3]

These pressures necessitate new approaches to water management that ensure water is available when and where it is needed most. Around the world, communities are seeking new ways to bring freshwater systems into balance. In many places, this requires addressing long-standing inequitable water allocations and creating the flexibility to manage water in real time to accommodate climate variability. In other places, the work is just beginning to focus on managing water resources for the future.

Most water resource planning processes identify current and future demands, the availability of supplies, potential projects or strategies to meet needs, and often financing, with a 20-30-year time horizon. Unfortunately, these processes often fail to include the needs of and impacts to nature, and they neglect local community needs and involvement. Around the world, colonization and dispossession of land and water access have adversely affected Indigenous peoples and local communities (IPLC).[4] Governments, private companies, and multi-lateral institutions have a long history of directing water away from communities for large-scale agriculture, cities, energy, and manufacturing in the name of development, termed “water grabbing.” Two ways by which this has happened include privatizing water rights that were previously held collectively and centralizing customary water rights under the state, so that communities must get a permit for water access.[5] These processes have excluded Indigenous peoples from decision-making and dispossessed local ownership and management. Ongoing and future processes are at risk of further exacerbating these inequities. It is essential that communities are involved in water planning—from the local level to the country level—so that all water needs are considered.

To help address this problem, The Nature Conservancy (TNC) embarked on a global program focused on freshwater community-based conservation (fCBC). This work engages with IPLC to support the conservation and sustainable management of freshwater resources for both nature and the communities that depend on it. To date, TNC has engaged in over 50 fCBC projects around the world.

This paper looks specifically at five case studies where TNC is working alongside IPLC to transform how communities and governments address water scarcity through advocating for IPLC water rights, involvement in decision-making around water, and/or integrating traditional knowledge and cultural needs into water resource management. The intended audience is internal practitioners working on water scarcity projects and leaders who are funding and directing this work. This paper builds on foundational work at TNC including the Voice, Choice, Action Framework (VCA Framework); Practitioners Guide to Applying TNC's VCA Framework for Freshwater Resources; and the Freshwater Community-Based Conservation Project Inventory. The objective of this report is to share insights from case studies working with communities on water scarcity. Key questions we attempted to answer were:

- What makes water scarcity a particularly unique and difficult problem to address?
- What challenges did communities and practitioners face when working to secure water for people and nature?
- What are the entry points for communities to manage their own water resources?

We start the report by exploring some of the unique attributes of water scarcity. We then dive into the five case studies: India, United States, Peru, and two in Australia. Finally, we conclude with an analysis of the lessons learned across the case studies and key considerations for practitioners.

UNIQUE ATTRIBUTES OF WATER SCARCITY

World-leading freshwater expert Sandra Postel's quote, "water is the basis of life – and it is finite" underscores water's value and scarcity.[6] Freshwater availability is a key driver for aquatic ecosystem health, human livelihoods, and economic development. Yet freshwater ecosystems are under increasing pressure by water scarcity and so are the people who rely on these resources for their livelihoods.

Historically, ecosystems like intermittent rivers and ephemeral wetlands and their species adapted to periodic variability of freshwater. For example, dryland ecosystems are uniquely adapted to aridity and climate variability, and the plants and animals living there have evolved to extract water more efficiently or to survive periods without water.[7] However, today, human demands on freshwater – nearly six times greater than they were 100 years ago[8] – compete with freshwater ecosystems. For instance, over 40% of global irrigation water use occurs at the expense of environmental flow requirements,[9] and groundwater pumping is expected to cause environmental flow limits in 42-79 percent of watersheds by 2050.[10] Exceeding ecological thresholds has a cascading effect and usually precipitates species die off and forest fires. Unfortunately, conservation of freshwater ecosystems, especially in water-scarce regions, has not gained the attention or traction that land and marine crises have received.[11]

As human demands for water increase and competition for water intensifies, different challenges of water scarcity emerge. While there are multiple definitions of water scarcity, many focus on the gap where freshwater demand exceeds available supply, recognizing water scarcity as a relative concept. For instance, the Pacific Institute defines water scarcity as the lack of volumetric abundance of water, calculated as a ratio of human water consumption to available water supply in a given area.[12] The Food and Agriculture Organization of the United Nations defines it as "a gap between available supply and expressed demand of fresh water in a specified domain, under prevailing institutional arrangements (including both resource 'pricing' and retail charging arrangements) and infrastructural conditions."[13] Water scarcity is dynamic and varies in time,[14] partly due to local climatic and hydrological conditions, but perhaps more as a function of prevailing economic policy, planning, and management. Thus, **definitions of water scarcity have focused on an imbalance between supply and demand of water**.

The World Economic Forum has ranked water scarcity one of the key risks to economic growth for 10 consecutive years.[15] Water is critical for agricultural production and industry for economic growth. As water demand escalates, externalities such as marginalization of vulnerable local communities including Indigenous peoples have been exacerbated. Nearly half the global population is already living in potential water-scarce areas at least one month per year and this could increase to 4.8–5.7 billion by 2050.[16] Since access to water and sanitation are recognized as basic human rights by the United Nations,[17] the link between water scarcity challenges, human rights, and global development is inextricable.

Water scarcity defined as an excess of water demand over available supply[18] reveals different types of scarcity based on the competition between users and timing of demands.[19] For example, some areas face water scarcity due to competition between urban and rural water users, but only seasonally. Others may experience scarcity caused by competition between farmers, as a chronic condition. Diagnosing types of water scarcity is helpful when thinking about strategies to address water scarcity because different strategies can be more appropriate than others based on the specific types of scarcity. Once we understand the type of water scarcity, it's also important to focus on the drivers of water scarcity. Theoretically we can group the major drivers into three categories:

1. Scarcity due to physical water shortage (i.e., volumetric availability of water with acceptable quality).
2. Scarcity due to lack of adequate infrastructure irrespective of water resource availability.
3. Scarcity in access to water services due to institutional or organizational failures (including water rights and water allocation) to ensure reliable and equitable water supply.

Linking strategies to the types and drivers of water scarcity is an important step and requires an understanding of governance, data, finance, and needs to be transparent about private, public, and environmental benefits. Water scarcity thus poses a complex, systemic challenge for conservation and equitable water resource distribution. Given the focus on human consumptive use in its definition, decisions must be made around how to allocate water among many competing demands, including ecosystem water needs.

Traditionally, conservation organizations focus on more powerful stakeholders in water-scarce regions which disproportionally neglects local community perspectives. However, these powerful actors may also operate in ways that perpetuate environmental and resource injustices when trying to solve water scarcity challenges. IPLC that are directly dependent on local freshwater ecosystems are often the most affected in scenarios with water scarcity challenges and governance failures. They often feel the effects of water insecurity before more powerful actors, in a similar way to freshwater ecosystems. For example, communities may experience declining water levels in rivers or aquifers long before industrial or large-scale agricultural users because their wells are not as deep, or their water infrastructure is not as sophisticated. With complex tenurial rights and historical injustices meted out to the IPLC, the most vulnerable resource-dependent communities are driven to the margins while powerful players ensure access to the already scarce water resources.

Working within such a resource-constrained context, conservation organizations need to find multi-pronged, transdisciplinary pathways to ensure that conservation does not alienate and marginalize IPLC further, but instead empowers them to become stewards of freshwater ecosystems. In particular, there is a need to elevate the importance of holistically taking ecological water needs into account when developing conservation strategy, which is underscored by the competition between ecosystems, IPLC, landholders, and businesses. Conventional, top-down driven 'fortress conservation' approaches—which forcibly exclude local communities' access to water to restore ecological needs—are no longer a justifiable option. Furthermore, water scarcity may lead to more direct conflicts among water users and require negotiation and complex trade-offs beyond the conventional scope of conservation actions.

Partnering with IPLC is critical for designing and implementing multi-benefit solutions on the ground to ensure equity and justice. IPLC have traditionally been the stewards of their lands and waters. There is evidence that IPLC-managed lands and waters are highly effective in maintaining biodiversity and ecosystem integrity.[20] Fully engaging and involving IPLC in conservation ensures sustainability of strategies and increases the likelihood of favorable conservation and human well-being outcomes within a more resilient social-ecological system. A set of other fundamental principles are also central to such multi-pronged, holistic approaches, including Free, Prior, and Informed Consent (FPIC); Justice, Equity, Diversity, and Inclusion (JEDI); and other human rights considerations (see Glossary). Yet more work is needed to increase integration and implementation of these principles into conservation strategies, especially in water-scarce regions.

This report highlights areas where ecosystems and IPLC are threatened by water scarcity due to multiple pressures including: food production, economic growth, entitlement rights and allocations, and institutional failures to acknowledge multiple needs for water. The following case studies explore the water scarcity and IPLC context in five locations: the Devnadi River Basin in India, the Colorado River Basin in the United States, the Murray-Darling Basin in Australia and Northern Australia, and finally Cusco, Peru (see Figure 2). Table 1 illustrates how the three drivers of water scarcity are reflected in these five case studies. Each of the case studies starts with the water scarcity and IPLC context, followed by more detailed information on current projects and how TNC is involved. The authors of the case studies intentionally include information about both the opportunities and challenges faced in community-based water scarcity work, both externally and internally at TNC. We summarize the common themes in the Lessons Learned section at the end of the report.

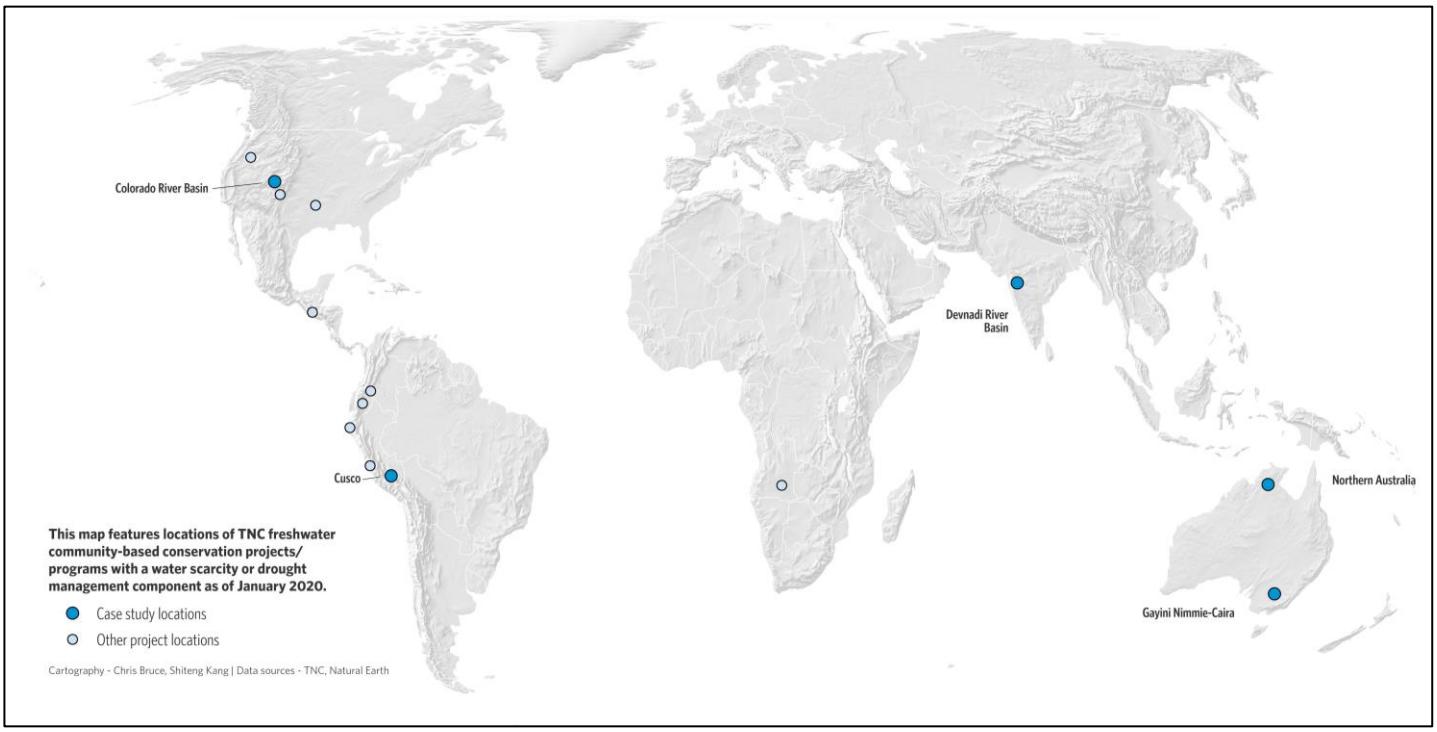


Figure 2: Map of TNC fCBC projects that have a water scarcity component. In dark blue: case studies featured in this report. In light blue: other fCBC projects identified as of January 2020. © TNC

Table 1: Drivers of water scarcity across case studies.

	Physical water shortage for IPLC and ecosystems	Inadequate infrastructure (for IPLC)	Institutional Failure
Devnadi River Basin, India	✓	✓	✓
Colorado River Basin, USA	✓	✓	✓
Gayini Nimmie-Caira, Australia	✓		✓
Northern Australia, Australia	✓		✓
Cusco, Peru	✓	✓	✓

INDIA: THE DEVNADI RIVER BASIN*

Creating Resilient Groundwater Futures Through Community-Based Conservation

Shuchi Vora

Introduction

India supported the UN Declaration on the Rights of Indigenous Peoples on the condition that all its citizens be considered Indigenous. This is on the grounds that all Indians are expected to have a deep relationship with nature, including cultural and religious significance, as members of an ancient civilization. The country supports 17% of the world's population with 4% of the world's freshwater resources. Water has been allocated for domestic, agricultural, and industrial uses, and while a hierarchy for allocation exists (domestic water use is a priority), water is an over-allocated resource and ecosystems are not a priority.

An emphasis on water resource conservation is important because conservation laws have historically focused on terrestrial conservation in India—the most common practice has been to designate forests as Protected Areas and relocate communities who have traditionally lived in those forests. Freshwater conservation laws (largely focused on iconic rivers and wetlands) have been passed only recently (such as the National Wetlands Programme and the National River Conservation Plans), and their implementation needs more attention from state and non-state actors.

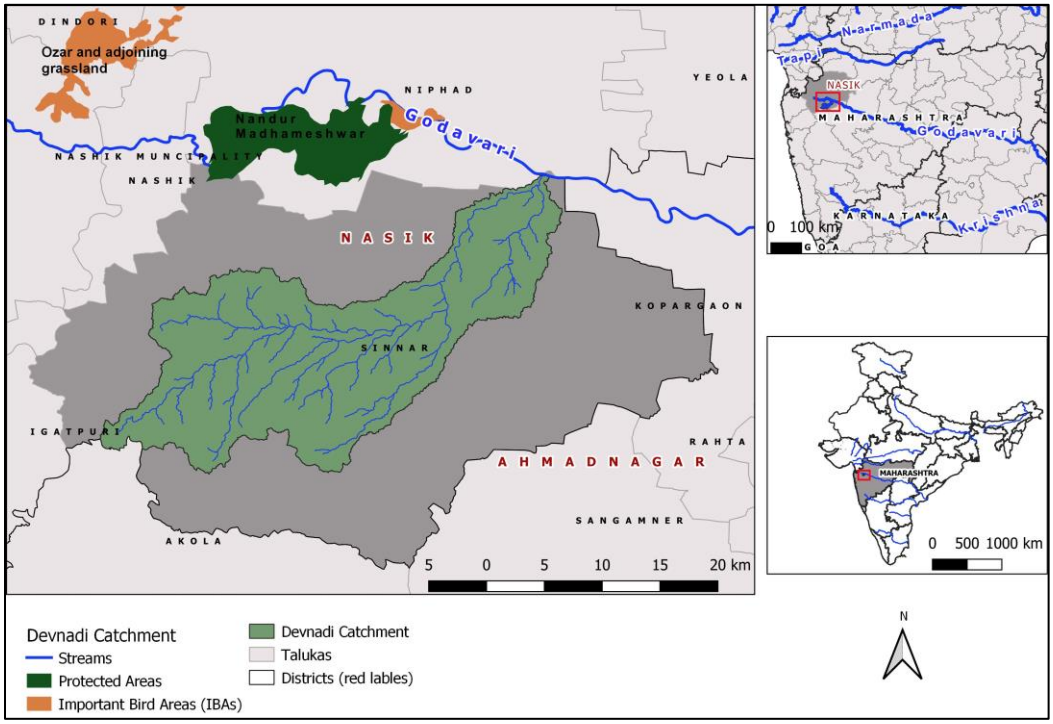


Figure 3: Devnadi River Basin and project area in Maharashtra. ©TNC

This case study presents an example of groundwater use by local communities including Adivasis, lower caste, and other at-risk communities in the Devnadi River Basin (see Figure 3), which supports small-scale agriculture and experiences drought every year.

Indigenous Peoples and Local Communities Context

TNC defines IPLC as "the communities that possess a profound relationship with their natural landscapes and depend on them for their cultural, religious, health and economic needs." In India, many of these communities are marginalised and resource-dependent, often at the lowest rungs of caste, race, ethnicity, and/or class.

The Adivasi, considered the earliest inhabitants of India, are dependent on groundwater to meet their domestic and agricultural water needs, and they are just one of many marginalized communities in India who are highly natural

* This case study was written when TNC had an active project in the Devnadi River Basin. In September 2020, TNC ended its involvement in the project due to funding challenges and shifting prioritization. The partners continue the work, and the lessons offered are still incredibly helpful to consider.

resource-dependent for subsistence livelihoods. The marginalization of the Adivasi communities refers to their displacement from their original lands by colonizers, their high dependence on natural resources for their livelihoods in landscapes that are at-risk for commercial interests, and their very low socioeconomic status, which can result in prejudice and violence from mainstream Indians. Adivasi communities are traditionally forest-dwelling communities. They practice subsistence agriculture and rely on non-timber forest produce (NTFP)—such as fruits, herbs, and roots—for food or medicinal purposes.

The marginalization of Adivasi communities is different from the marginalization of other local communities. Other marginalised communities include pastoralist communities who have been historically nomadic and have often had to settle in one location with the post-colonial development paradigm practiced in India; resource-dependent smallholder agriculturalists with less than 5 acres of land; and communities marginalised based on caste, religion, and ethnicity. All of these may intersect with one another as well, making marginalised identities all the more complex in the country.

The work in this case study was done with both the Adivasi community and other marginalized communities in the area. While these communities are at the margins, many of their mental models, or how they understand the world and their opportunities, are often focused on economic growth in agriculture at the expense of the resources they directly depend on.[21] For this case study, community-based conservation is directed towards these marginalised, resource-dependent communities, and the strategies employed to change their mental models are discussed in the sections below.

Political and Scarcity Context

India's forestry and wildlife protection laws have focused on Protected Areas that fortified conservation landscapes and excluded communities from them since the British colonial period.[22] The Indian Forest Department is also a remnant of the colonial laws; it was established in 1865 when the first Forest Act was enacted by the colonial rulers. The state, thus, remains the owner of forests in India even in the post-colonial period, and excludes Adivasi and other marginalised communities from the forests, even in the subsequent Forest Acts of 1927 and 1980.

This started to shift when the Joint Forest Management Committees came into existence in 1988 through the National Forest Policy. These committees gave management rights to communities jointly with the State Forest Departments in exchange for revenue from the NTFP. In 2006, the Forest Rights Act came into force, aimed at giving land and resource rights to traditional forest-dwelling communities through legal claims. This law gives the right to management, conservation, and resource use to the Adivasi communities. Implementation and compliance of this law have run into many issues. Many of these forest areas also fall within villages that are governed by the Panchayats (Extension to Scheduled Areas) Act. Panchayats is the name for the traditional local governance system in place pre-colonization. This Act gives the communities control over their resources, and Free, Prior, and Informed Consent (FPIC) needs to be obtained through the Village Local Self Government Resolution (Gram Sabha), which means that only if the village agrees to any interventions can they be carried out in that area.

For non-Adivasi local communities, the Panchayats Act gives the right to local self-governance. The villages in India own commons titled as Village Forests or Grazing Lands. The management of these lands is under the Village Committee (Panchayat) and again, FPIC needs to be obtained through a Gram Sabha Resolution.

India's tenurial regime has been carried forward from the British taxation system that supported the caste *status quo* in the country. Landless community members typically use non-revenue land (wastelands, as India classifies them) and common lands for farming. They get water from community shallow-dug wells for farming. If they aren't able to farm, they earn income as agricultural labourers or pastoralists. They use common shallow-dug wells or springs for their domestic water needs. Community-owned shallow wells and government-owned hand pumps remain the predominant means to access water for the poorest communities in the country.

Groundwater Use and Groundwater-Dependent Ecosystems (GDEs)

India is the largest groundwater user in the world with 80% of the withdrawals for agriculture.[23] Further, the average landholding in agriculture is 1.4 ha (compared to 167 ha in the U.S.).[24] The bulk of India's agriculture is done by small, marginalised farming communities. Since the 1970s and '80s, the Indian government has systematically prioritized

agricultural production over natural resources conservation,[25] with a vision to achieve food sufficiency. As a result, food sufficiency has been achieved in the country and because the agriculture policy continues to prioritize output over resource management, this has led to ecosystem degradation, biodiversity loss, and groundwater depletion. Groundwater measures to control use have been introduced across several states since the 1990s, but groundwater continues to be largely unregulated, with the landholder owning the rights to extract groundwater below their land.[26]

Groundwater is also critical to the survival of many iconic landscapes that are groundwater-dependent ecosystems (GDEs). Many of them have high levels of endemicity (such as seasonal herbs in the Kaas Plateau in Maharashtra); others provide critical ecosystems services (such as improving water quality and quantity in the forests of Central Indian Highlands Landscape); while others have cultural significance, such as springs and phreatophytes in Indian landscapes. However, the actors (government, communities, philanthropies, and civil society) do not intuitively make the connection that agriculture is dependent on nature. Groundwater recharge, and groundwater supply in particular, is critical to the survival of agricultural livelihoods and the ecosystem services that people derive from nature.

The Devnadi River is a spring-fed river and its source-water spring, along with the vegetation around its source, is a GDE. The Devnadi originates from the Aundhepatta hills of the Sahyadri mountains. The river basin is 560 km^2 (56,000 ha) in area and lies in the Nashik district in Maharashtra. The 70-kilometer-long Devnadi River forms the source of the Godavari River, an important river that flows 1,465 kilometers across four states in peninsular India. The Devnadi River Basin supports 150,000 people who mainly pursue agrarian livelihoods. The farms in the area produce onions, grapes, wheat, soybean, varieties of millet, oilseeds, and lentils.

Drought Risk to GDEs and Marginalised Communities

Droughts have always been a part of the natural regime in South Asia, and yet the frequency and intensity of drought is expected to increase with climate change and increased variability in the South Asian monsoon.[27] The last decade saw more than four droughts in a third of the country, and there has been a 57% increase in land area affected by drought.[28] Much of the drought-prone area within the country lies in dryland regions, where about 44% of India's food grain supplies are produced. Further, as water demand in India is expected to become twice the available water supply (from non-renewable groundwater and reduced precipitation), water stress in India will be further exacerbated. About 1 billion people are directly dependent on groundwater for their drinking water and livelihood security.[29] Groundwater has been depleted at an alarming rate, and neither monitoring science nor management have matched the pace of depletion.

The Nature Conservancy's Work

Conservation of GDEs in India is possible when communities can adapt effectively to the pressures of water scarcity and droughts and reduce their depletion of the groundwater that normally supports those ecosystems. TNC-India proposed to focus on actions that contribute to restoring ecosystem services and conserving ecosystems for the well-being of both people and nature in the country.

TNC's goal is to both reduce demand on groundwater and protect the surface expression of the ecosystem itself. This nature-based solution for effective climate adaptation aims to ensure resilient groundwater supplies so that both people and nature can thrive. Adaptation is effective in the long-term when both vulnerable communities and ecosystems are resilient to external shocks like droughts. Ecosystems as well as communities require context-specific solutions. Therefore, to truly achieve scale, the proposed solutions were process-based and not prescriptive; flexible and not rigid with high up-front, unrecoverable costs; systemic in nature and able to embrace the uncertainties associated with climate change.

The team proposed key pathways to do this:

1. Direct engagement with communities to conserve GDEs.
2. Science-based decision-support systems and tools for reducing depletion, improving management of agricultural lands, and conserving GDEs.
3. Partnerships with government, corporations, and NGOs who work on agricultural water security to inform policy and on-the-ground work.

4. Enabling conditions in policy for conservation of GDEs.

Community-Based Conservation in the Devnadi

In the Devnadi River Basin, TNC-India proposed to work with unconventional allies, such as organizations that work on agricultural water security, community mobilization, sanitation, health, and more. In addition to a specific issue focus, each of these organizations also has a disciplinary focus as well. Such allies included:

- The Indian Institute of Technology Bombay, a premier engineering institute, is keen to develop technological alternatives for rural distress.
- Arid Communities and Technologies is an NGO that works in arid and semi-arid areas on participatory groundwater mapping for agriculture.
- Yuva Mitra is a local NGO in Sinnar that works on agricultural water security and institution strengthening.
- Vanam Ecologics is an organization that has carried out ecological assessments.

TNC convened these partners and provided thought leadership with a transdisciplinary focus to community-based conservation in the Devnadi River Basin.

Planning

This project was initiated in late 2018. From 2018-19, we spent time scoping out the geography and bringing interested partners on board. In June 2019, a systems-thinking approach was adopted to arrive at the interventions required for communities in the region. Community representatives as well as TNC-India's partners were all part of the workshop. The team found that in the Devnadi basin, both communities as well as experts visualised "resilience" as a sum of the following parts:

- Natural capital or nature-based solutions.
- Social capital or local trust networks.
- Information capital or access to better, more-user friendly data and technology for decision-making.
- Financial/economic capital or assured incomes and incentives for conservation.

The first phase of implementation was almost parallel to the planning process as a trust-building measure between TNC-India and the partners as well as the communities. At that point, since ecological data on the basin did not exist, 10 villages were selected for capacity building based solely on socioeconomic vulnerability. The collaborative spirit of this workshop and the continuous reinforcement of systems thinking that TNC consciously seeded within the activities of this project also led to a unique multi-stakeholder spatial action mapping exercise as a part of the planning phase. A multi-criterion ranking based on ecological data, socioeconomic vulnerability, hydrogeology, water demand, and cropping patterns was completed by TNC and the partners. The ranking was proposed to lead to the selection of five pilot villages, which may or may not overlap with the original 10 villages, where all future interventions would be piloted and engagement with these villages deepened. These new villages were to be selected based on a composite index that includes the original socioeconomic vulnerability ranking, priority habitats, agriculture water demand, and aquifer mapping data.

Implementation

TNC's Devnadi team completed the planning phase in March 2020 and was able to make good progress until the program was closed in September 2020.

Tenurial rights are an important aspect to consider during planning and implementation of strategies for community-based conservation. The complicated land tenure history of the country has led to many families within communities without access to resource rights, though technically, the provisions of village and community-owned lands in laws ensure legal rights to resources for all. Because ecosystems are common pool resources, collective action is necessary for conservation. Project implementation, therefore, proposed to focus on strengthening village institutions and collective action to conserve these commons while establishing rules and norms for equitable access for all members of the community.

Based on the planning, TNC and the partners proposed to implement, refine, and adapt the first set of tools to enhance resilience of the Devnadi River Basin and its people:

- **Capacity building of Bhujal Jankars (groundwater knowledge-keepers) and village leaders.** "Bhujal Jankar" is a Hindi phrase for the people who have traditional knowledge of water. Eleven Bhujal Jankars were trained on groundwater science. Their existing knowledge on rocks, vegetation, groundwater wells, and geological formations was complemented and strengthened with modules on groundwater science. We proposed to integrate ecosystem knowledge in the modules so that the systems-thinking approach for groundwater, agriculture, and ecosystems would be transferred to communities for empowered decision-making.

- **Drought resilience planning** to help communities site nature-based solutions in areas of most need and sustainably manage their ecosystems, while prioritising community water use and ensuring water security collectively at the village level. Nature-based solutions include a combination of protection and restoration strategies for lands that are recharge areas and in-farm regenerative agricultural practices that reduce water demands for farmers. Ten water security plans were prepared in 10 villages where Bhujal Jankars were already trained. As the knowledge of these local hydrogeologists and their village leaders is strengthened, the community level institutions will be empowered to prepare drought resilience plans that include ecosystem restoration and conservation, demand management, and improved drinking water and sanitation as means to adapt to droughts in the area. These plans will become blueprints for villages across the Nashik District to replicate and incorporate place-based solutions to water scarcity. TNC proposed to replicate, strengthen, and scale-up the process of creating these drought resilience plans rather than the solutions prescribed within them. The differences in communities, their contexts, and the ways they interact with nature have led to this intentional focus on strengthening processes instead of prescribing solutions.

Monitoring, Evaluation, and Achieving Scale

We proposed a process to create a joint monitoring and evaluation framework. Evaluation and adaptive management were continuous actions during the project. We had regular check-in calls and meetings with the partners. The interactions with the community and their feedback were captured through the interactions of our partners in the field. We proposed to strengthen this process through peer-reviewed evaluation, knowledge exchanges with other organizations working on groundwater and ecosystems, and rolling out a monitoring and evaluation plan in the future.

Though TNC is no longer involved, in the next five years partners will design incentive-based conservation mechanisms, farmer-friendly early warning systems, and citizen science tools for ecosystems. These tools are important for achieving scale and transformative change beyond the Devnadi project, as they can be used in other geographies within or outside India by governments, partners, businesses, philanthropies, and NGOs. Transformational systems change requires place-based solutions that are unique to the geography and its context; however, the processes and mental models needed for arriving at these solutions help achieve scale.

Opportunities and Challenges

India is a new geography for TNC, and this project was its first freshwater project. It was therefore important to build trust and credibility at the outset. This exercise also helped TNC to establish its thought leadership and convene partners to explore synergies in a non-confrontational, collaborative manner. The approach did not just help TNC create a strong planning process, it reinforced the need for transdisciplinary work. While TNC's role in the project concluded in 2020, the work is ongoing through the partnerships that were built.

Opportunities and Early Successes

The systems-thinking workshop helped TNC, its partners, and community representatives arrive at a collective vision to ensure resilient groundwater futures of the Devnadi basin. The mental models of partners before this workshop were confined to their respective disciplines. The biases and disciplinary boundaries were bridged through the systems-thinking workshop, and the project is now co-owned by everyone involved in the process. This spirit of co-owning and co-producing knowledge was also passed on to the communities in the implementation of the project.

We used systems thinking as a collaborative and enabling means to manage power dynamics within the group. The partners with technical expertise in agriculture and economics had a relatively bigger voice, while people espousing the rights of the ecosystem and marginalised members of the community, including women, had lesser say at the start of the workshop. However, using systems thinking, the bigger picture and links between all the parts of the whole were suddenly visible to all partners. This changed the dynamics as all partners began acknowledging their mental models in process and recognised the importance of collaboration for systems change in the Devnadi basin.

Challenges

Like all transformational change processes, changing mindsets from a growth-oriented outlook to a balance-oriented outlook will be a long and arduous terrain. We have had to overcome impatience for solutions without a clear understanding of the systemic and complex nature of the problem among the partners as well as the communities. A lot of community engagement processes are qualitative processes, and we need to put some thought towards how we will monitor our effectiveness using non-quantitative indicators, such as community perception. None of this is captured in the current Shared Conservation Agenda (SCA) metrics and therefore, we explored frameworks that suited our needs.

We continuously reinforced systems thinking within the mental models of our partners, but this work was difficult to quantify and thereby exhibit the value TNC adds to this entire transdisciplinary approach. The inability to capture reinforcement as an activity has implications on fundraising as well.

Conclusion

In a world full of complex problems, transformational change requires reaching out to organizations that don't necessarily work on conservation as partners. We must find common ground with these organizations that may work on community rights, agriculture, water security, health and hygiene, or other development agendas. A popular approach in freshwater conservation in water-scarce areas has been that of making the environment one more stakeholder in the process of allocations through entitlement rights (e.g., Murray-Darling in Australia or Colorado River Basin in the U.S.). However, using systems thinking as a tool has the potential to make conservation a common vision for all stakeholders and thereby improve chances of transformational change in water-scarce areas. For this, we must strengthen capacities on systems-thinking practices and tools within TNC for the organization to be able to effectively balance conservation and human development goals in geographies with water scarcity.

UNITED STATES: THE COLORADO RIVER BASIN

Addressing Indigenous Rights and Water Scarcity

Celene Hawkins

Introduction

The Colorado River Basin (see Figure 4) is one of America's most iconic landscapes, home to the Grand Canyon. It is an ecosystem of enormous biodiversity, and it is home to many cultures, communities, and economic interests. The vitality of both people and nature in the Basin is dependent on the reliability and resilience of the Colorado River. The Colorado River Basin spans seven U.S. states (Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California) and two countries (the United States and Mexico). In the United States, the Colorado River provides critical water supply to some of the nation's fastest growing cities, including Albuquerque, Denver, Las Vegas, Phoenix, Los Angeles, and San Diego. The United States' portion of the Basin supports more than 20% of the nation's gross domestic product (GDP). Demographers project that the number of people relying on the Colorado River will grow from 40 million to 50 million by 2060.

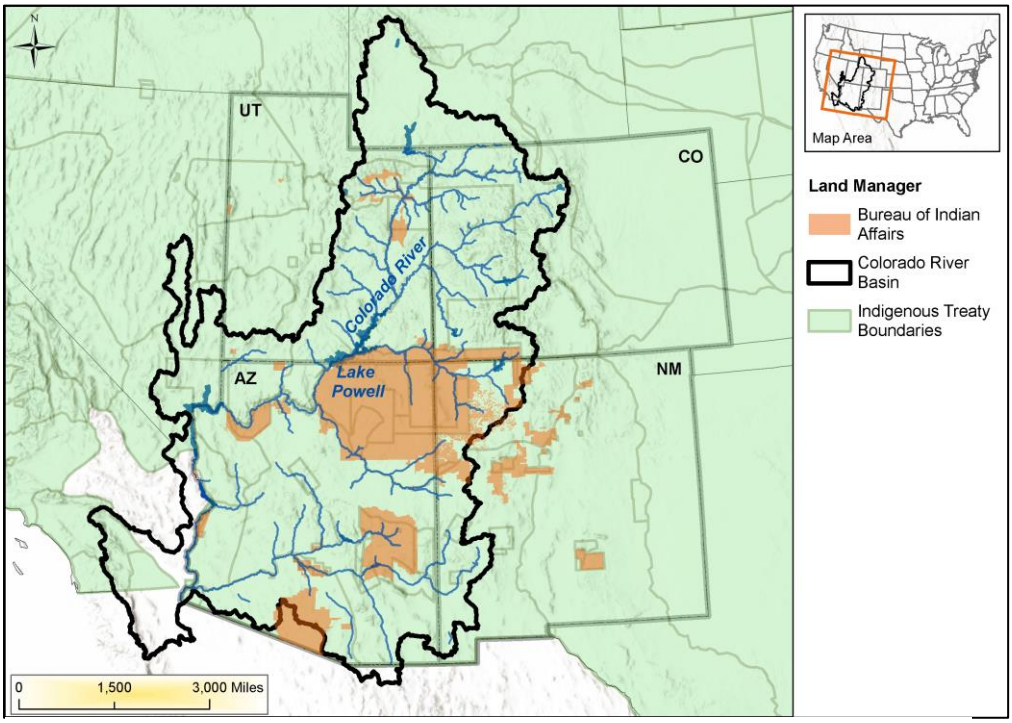


Figure 4: Map of the Colorado River Basin. ©TNC

With so many people depending on its water for both agricultural and domestic needs, the Colorado River is considered one of the most controlled, controversial, and litigated rivers in the world. Its expensive and sophisticated water infrastructure system includes 29 major dams and hundreds of miles of canals, and serves thirsty cities, irrigates more than 5 million acres (20,234 km^2), and generates more than 12 billion kilowatt-hours of hydroelectricity each year. The Colorado River is so intensively managed—with reservoirs capable of holding four times the river's annual flow—that each drop of water that is diverted or stored is used an average of 17 times in a single year. This extensive infrastructure system and the alteration of natural flow regimes have drastically altered river function throughout the Colorado River Basin. The river mainstem, many major tributaries, and associated riparian corridors are in a degraded condition, and in many cases, trending downward. Of the Basin's 30 endemic fishes, four are extinct, 12 are federally listed as endangered, and four are federally listed as threatened.

The Colorado River Basin is already facing a water scarcity crisis, and the pain experienced so far pales in comparison to what may be in store. The Basin has experienced severe drought since late 1999, and water use already exceeds supply on the river by about 1.5 million-acre feet (AF) (1.85 billion m^3) each year, with reservoirs making up the difference. This gap between the Basin's supply and demand is likely to reach about 3.2 million AF (3.9 billion m^3) per year by 2060.[30] In addition, anthropogenic climate change is intensifying drought and decreasing runoff and water supplies across North America, with declines of 30-50% expected by mid-century on the Colorado River. The ecologic function of the river and its tributaries—which is already compromised by the current infrastructure and water use—will be at increased risk with climate change, and especially if the effects of climate change become a water scarcity crisis that begins to shift law and policy to try to meet the needs of people in the Basin at the further expense of the ecologic function of the river.

Indigenous Peoples and Local Communities Context

The Indigenous peoples of the Colorado River Basin have relationships with the rivers and lands in the Basin that span thousands of years. Colonization of lands and waters in the Colorado River Basin by non-Indigenous peoples drastically altered the ability of Indigenous peoples to continue to inhabit, use, and care for the rivers and lands. Genocide, forcible removal from ancestral lands, treaties, and a host of federal law and policies intended to undermine Tribal control of resources and to assimilate Indigenous peoples deprived them of access to the lands, water, food, and other natural resources of the Colorado River Basin that had sustained Indigenous people and culture. In addition, the building of the extensive water infrastructure system in the Colorado River Basin further degraded these natural resource systems and largely neglected the water needs of Indigenous peoples, who were forced into non-Indigenous farming and ranching efforts and life on arid reservations.

In the early-mid 20th century, when major compacts (legal agreements) and the power structures for water in the Colorado River Basin were developed, Tribal water rights were largely ignored. The Tribal Nations remaining in the Colorado River Basin were still losing access to land, water, and other resources through both land allotments and other assimilation policies that sought to end Tribal governments and break up communally-held reservation properties, and they had no representation in the compact negotiations. However, a 1908 U.S. Supreme Court decision established the implied reservation of federal, senior-priority Tribal water rights, so the state and federal compact negotiators knew that Tribal Nations had claims to water in the Basin. The limited discussion of Tribal interests in the compact negotiations resulted in a "wild Indian article" that states: "Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian Tribes." Convinced that the potential Tribal claims on the Colorado River were "negligible," the compact negotiators moved ahead with plans to develop and divide the water resources of the Basin.

Starting in the 1960s—and especially after the U.S. Supreme Court confirmed that Tribal Nations were entitled to substantial, senior-priority water rights in the Colorado River Basin—Tribal Nations began litigating and settling their water rights claims. Twenty-two of the 29 Tribal Nations in the Basin have quantified water rights in at least some of the states in which their reservations are located. Currently, Tribal Nations control about 2.8 million acre feet per year (3.5 billion m^3, which is approximately 20% of the water in the Basin), and that amount is expected to rise as the 12 Tribal Nations with remaining unresolved claims in some Colorado River Basin states quantify their water rights. Significant portions of these Tribal water rights are currently undeveloped but will likely displace current water use when they are developed. Many Tribal Nations are now in the early stages of developing their water to support Indigenous communities—and, in some cases, to provide the first safe treated drinking water systems to their people—as well as their economic development, the environment, and Tribal agricultural production.

Despite the success of establishing Tribal rights to such a significant portion of the Basin's water supply, Tribal Nations have not yet been successful in securing either formal "seats at the table" in major Colorado River Basin policy negotiations or in ensuring that new policies and programs in the Basin protect their water rights or allow for voluntary Tribal participation. Tribal Nations have also become increasingly concerned that, as the state and federal negotiators in the Basin assess risks and begin to create programs to address water scarcity, many of the analyses will only look at the current levels of Tribal water development and not at Tribal Nations putting all of their undeveloped water rights to use nor the 12 Tribal Nations with unresolved water rights claims. As recently as 2019, because of the unwillingness of state and federal negotiators to take a hard look at the role of Tribal water in both the water scarcity risk and solutions to the Basin, programs designed to reduce water scarcity risk have excluded the Tribal Nations from participating with significant portions of their Colorado River Basin water rights.

Legal, Policy, and Political Considerations

The Colorado River is governed by a complex set of laws and rules known as the "Law of the River." These laws and rules include state water law, interstate compacts, federal statutes, U.S. Supreme Court case law, and the international treaty between the United States and Mexico. In the United States, there are complicated relationships between states in the Basin—the river is divided into an Upper Basin, where the Upper Colorado River Commission (UCRC) and its Upper Basin states dominate legal and policy decisions; and a Lower Basin, where the Secretary of Interior serves as the Water Master, but where there are equally complicated relationships between Lower Basin states.

Historically, in the United States, federal agencies, the UCRC, and the seven basin states have dominated Colorado River law and policy negotiations. However, as the water scarcity crisis in the Colorado River Basin has begun to force hard decisions in the Basin (including the recent negotiation of drought contingency plans), other entities in the Basin—including municipal water suppliers, major agricultural interests, and non-governmental organizations—have played an increasingly important role in the governance of the Basin, and in finding innovative and collaborative solutions to avoid a water scarcity crisis in the Basin.

The Nature Conservancy's Work

The Conservancy's Colorado River Program works across all seven Basin states in the United States and in Mexico, and at a Basin scale. We focus on three strategies: we work to balance water needs between people and nature, we improve water infrastructure and other operations for environmental flows, and we advance our Tribal Water Initiative (new to the 2021 strategic plan). The Conservancy is one of the most influential conservation NGOs working on Colorado River issues, and we work in close partnership with other conservation NGOs and key stakeholders in this work.

Identifying IPLC Engagement on the Colorado River

In our work across the Colorado River Basin, the Conservancy has always engaged Tribal Nations in our work. The type, duration, and depth of engagement have varied, and included both project-based work and policy work. In 2016, the Colorado business unit hired a freshwater conservation practitioner who had previously worked for a Tribal Nation and whose prior work had included a years-long engagement with the Ten Tribes Partnership, a multi-Tribal coalition working on Basin-wide law and policy issues. Soon after, the Ten Tribes Partnership and some of its member Tribes began to express interest in exploring a deeper relationship and opportunities to collaborate with the Conservancy, and specifically with the whole Colorado River Program. Both the Colorado Chapter and the Colorado River Program responded positively to the Tribal outreach and began to evaluate the potential role of Tribal Nations and Tribal water in our work, and in the Conservancy's larger body of IPLC work.

At about the same time, other conservation NGOs, academic and policy institutions, and philanthropic funders of Colorado River Basin work were also beginning to explore opportunities for relationship-building and collaboration with Tribal Nations in the Colorado River Basin. This interest by multiple other funders and partner organizations significantly complicated the internal TNC process of considering whether and how to fit Tribal engagement and Tribal collaboration into our work due to concerns that it would negatively impact other work. At the same time, the convergence of interest on engaging Tribal Nations on water issues in the Colorado River Basin resulted in the development of the Water and Tribes Initiative (co-led by the Lincoln Institute of Land Policy and Daryl Vigil, the Temporary Executive Director of the Ten Tribes Partnership and Water Administrator for the Jicarilla Apache Nation), which is emerging as an important and diverse Basin-wide policy forum for discussing the role of Tribal water in the Colorado River Basin.

It is important to acknowledge that, even early in the process, it was clear that Tribal Nations were interested in discussing both projects and policy work that the Conservancy was already pursuing under its own business planning work. For example, Tribal Nations were already discussing and exploring water marketing work (an area of strong interest to TNC's Colorado River Program and many TNC state chapters in the Basin). The convergence of some significant Tribal and Conservancy policy interests (such as the potential sharing or marketing of Tribal water to resolve looming water scarcity problems) became more apparent after the publication of the Ten Tribes Partnership Water Study .

Opportunities and Challenges

Internal TNC Work—State Chapter Engagement

Because Tribal engagement in the Colorado River Basin raises both risks and opportunities within the states in which the Tribal Nations are located, it has been important to discuss both individual and Basin-wide Tribal engagement with each of the state chapters in the Basin. Although the level of interest in Tribal engagement varies between the states, there has been positive support from state chapters for exploring opportunities for Tribal engagement and collaboration.

As we continue to explore relationships and opportunities throughout the Basin, we have faced some questions about the alignment between state strategic or business plans and Tribal collaboration opportunities. In some cases, we have identified opportunities to work with Tribal Nations that were not in areas where state chapters have been prioritizing work or resources. In other cases, state chapters have expressed concern about how Tribal collaboration might intersect negatively with other priority Conservancy work, either by competing for funding resources or by raising political risks with state agencies that are critical to the success of other Conservancy work. In these states, the Colorado River Program has coordinated on fundraising work and is supporting a state chapter in assessing both the risks and opportunities of Tribal work. However, in other states, the alignment between Tribal collaboration and state chapter priorities has been clearer, and state chapters have taken on large pieces of work on emerging Tribal projects, including significant fundraising efforts (Colorado) and project implementation (New Mexico).

Internal TNC Work—Colorado River Program Business Plan

As we scoped the opportunity to co-create work with Tribal Nations in the Colorado River Basin, many questions surfaced about the alignment between Tribal work and the Colorado River Program's business plan (and especially about how the Tribal work could feed into measurable outcomes and grant deliverables for that program). These questions highlighted the challenge of simultaneously engaging with Tribal Nations in a manner that supports the voice, choice, and action of Tribal Nations, and also fitting Tribal freshwater work into the Conservancy's planning processes, which are usually linear, time-bound, and focused on where the Conservancy can take relatively near-term action to achieve conservation objectives.

In 2020, the Colorado River Program completed a business planning process that included the first set of recommendations from the Program's Tribal Water Initiative about how to integrate Tribal freshwater work into the program's business plan. The Tribal Water Initiative is now a stand-alone strategy that includes relationship-building, internal TNC training, equity, and project and policy incubation work that is implemented under separate Colorado River Program and state business unit strategies.

Internal TNC Work—Compliance with FPIC and other Applicable International Human Rights Requirements

We have also encountered some questions about whether Tribal engagement strategies on the Colorado River are robust enough and consistent with applicable international human rights requirements, such as Free, Prior, and Informed Consent (FPIC). For example, some of the Global Water Program's surveys about fCBC work have posed questions about how we are engaging members of Indigenous communities where we work, and we suspect that FPIC guidance will encourage or require direct engagement with Indigenous community members and consideration that Tribal Nations we are working with may have dual systems of government (e.g., an elected government and a traditional government). However, in the United States, federally-recognized Tribal Nations are sovereign governments, and our approach to date has been to work with water resources staff, attorneys, and elected Tribal leaders to co-create collaborative work and to emphasize Tribal priorities in this work. We suspect that any initiative to reach out directly to members of Tribal communities about our work would be seen as an affront to the elected Tribal leaders and to the systems that these sovereign governments have in place to discuss water and other projects with community members, and we have not convened Tribal spiritual leaders to discuss our work. At the same time, we recognize that there are discussions occurring in the Basin—such as the recent negotiations where the state of Arizona needed Tribal Nations to agree to cut back use of Colorado River water—where the protections around FPIC might be relevant and necessary in water scarcity work in the Basin, and we recognize that community outreach and engagement of non-governmental Indigenous peoples is often an important aspect of IPLC work.

External Challenges in Identifying and Advancing the Work

There have been challenges in moving the Tribal Water Initiative from the exploration phase to more structured implementation phase. There are a few reasons that this is challenging:

- **Relationship building**. We continue to learn that relationship building with Tribal Nations takes time, resources, and effort; that it is difficult to tie that work with specific projects or outcomes; and that it is often unclear where there could be opportunities for collaboration when the relationship-building effort begins.
- **Reconciliation**. We continue to learn that the long legacy of non-Indigenous people depriving Indigenous peoples of water and other resources is present in our work. One influential partner has shared with us that the

absence of any reconciliation process about past resource deprivation can make it hard to think about what's possible in the future. We have also heard that acknowledgement of the Conservancy's role in that legacy of resource deprivation and the global IPLC team's approach to Tribal engagement helps to overcome some of the fears about the Conservancy taking more resources away from Tribal Nations.

- **Tribal capacity**. As we engage with Tribal Nations, we see that the capacity of Tribal leaders, staff, and employees to engage with the Conservancy can be limited. In some cases, discussions about collaboration opportunities where there seems to be strong interest from both a Tribal Nation and the Conservancy have lost momentum as other pressing matters have engaged Tribal capacity. This challenge has been particularly apparent in 2020 as Tribal partners faced difficult challenges protecting their communities from the COVID-19 pandemic.
- **Increasingly crowded field.** Other NGOs and stakeholders in the Basin are also engaging with Tribal Nations in the Colorado River Basin. Although the Water and Tribes Initiative has emerged as the leading policy and discussion forum for many of the other NGOs and philanthropic funders, it has been challenging to understand how other NGOs or philanthropic funders in the Basin plan to advance work with Tribal Nations in the Basin.

Fundraising Challenges

Although some traditional funders of the Conservancy's Colorado River Basin work have been supportive of efforts to explore Tribal projects (and although we are now seeing more funding opportunities that have special criteria or specific requirements around Indigenous peoples work), we have encountered three different fundraising challenges with Tribal work:

- It can be challenging to identify measurable outcomes to deliver to Conservancy funders when we are at the early stages of work exploring opportunities with Tribal Nations. To date, we have been cautious about what we promise to funders and we have tried to communicate with Tribal partners about private funding deliverables as far in advance as possible.
- We have encountered an interesting fundraising hurdle where some TNC donors have hinted at a reluctance to fund water conservation work with Tribal Nations who are considered to be self-sufficient and economically prosperous. This was the case even after providing those donors with cultural competency training that explained both the historical and cultural context of the Tribal Nation's economic prosperity and the potential large scale of water conservation work under exploration with the Tribal Nation.
- We have found that the price of some collaborative project opportunities with Tribal Nations in the Colorado River Basin is beyond the immediate fundraising capacity of the Conservancy's business units who are assisting with fundraising. For example, one Tribal partner in the Basin is interested in leasing out nearly 20,000 AF (24 million m^3) of water per year over the next 10 years for both compact security and environmental purposes, but it is unlikely that we can identify a public or public/private funding package to lease that much water in the next few years.

Large-Scale Opportunities with Explicit Conservation Benefits

Some of the opportunities that we are currently scoping with Tribal Nations in the Colorado River Basin are larger in scale and are more inclusive of conservation goals than projects with non-Indigenous partners in the Basin. For example, the 20,000 AF of water per year mentioned above that one Tribal partner can make available for compact security and environmental flows in 2021 is roughly the size of an entire recent conservation pilot program produced with multiple transactions. This project also seeks to combine multiple goals, including water scarcity, compact security, environmental benefits, and economic benefits to our Tribal Nation partner by replacing revenue from water leasing to coal-fired power plants. This project is one of the only current compact security projects in the Upper Colorado River Basin that is exploring embedding specific environmental flow co-benefits.

Some of the policy issues that the Tribal Nations are raising—and especially the issue of the role of undeveloped Tribal water in the future of the Colorado River Basin—involve enough water to significantly change the water scarcity

problem in the Basin (for better or for worse). The ability to explore water scarcity solutions that include Tribal water may allow us to identify durable conservation solutions for the Basin.

Traditional Ecological Knowledge and Connection to the Colorado River Basin

The opportunity to engage with Tribal Nations in the Colorado River Basin about water and natural resource management provides the Conservancy with an opportunity to learn about Indigenous perspectives on the stewardship of resources in the Basin. From what we have learned so far, Indigenous cultural and spiritual connections to the lands and water in the Basin provide a powerful narrative about the current degraded state of the river and both concerns and hopes for the future of this shared river.

Increasing TNC's Understanding of Tribal Nations and Water Scarcity in the Basin

Engaging Tribal Nations in the Colorado River Basin is helping the Conservancy understand the role of Tribal Nations in both increasing water scarcity in the Basin (i.e., if they developed the full amounts of Tribal water secured through litigation or settlement) and helping to mitigate water scarcity risk (i.e., by taking water management opportunities, including agreeing not to develop their full amounts of Tribal water, on a voluntary and compensated basis). Tribal engagement and an attention to both the role and history of Tribal water in the Basin has also allowed the Conservancy to better understand the water development needs of Tribal Nations and the looming environmental justice concerns if laws and policies in the Basin continue to deprive Tribal Nations of the ability to use or derive critical economic benefit from their water resources. It has also allowed the Conservancy to understand links between climate change mitigation interests and Tribal water interests in the Basin, such as how the closure of coal-fired power plants is intimately linked with Tribal economic development and water use in the Basin.

Tool Development for IPLC Engagement

Currently, we are using Memorandums of Understanding (MOUs) and project plans to co-create work with Tribal Nations in the Colorado River Basin. With one Tribal Nation, the combination of an MOU, a project plan, and a strict confidentiality agreement resulted in the Conservancy leading an effort to develop a decision-support tool for Tribal staff and leadership. That decision-support tool (which had significant buy-in from a diverse group of Tribal staff who had co-created the project) provided a comparison of ecological benefits between multiple possible water conservation opportunities that is helping the Tribal Nation make decisions about whether to use a large portion of its water rights on one river to achieve both water rights protection and ecological outcomes.

Conclusion

Engaging Tribal Nations in the Colorado River Basin is changing TNC's approach to water scarcity work. The Conservancy's initial engagement with Tribal Nations in the Colorado River Basin is showing promising opportunities for both project and policy work to address water scarcity and environmental needs in the Basin. Our Tribal engagement work has also required us to begin considering some of the important equity and human rights questions for Indigenous peoples in our Colorado River Basin work.

As we approach a major law and policy negotiation in the Basin, the political dynamics are beginning to recognize the important role of Tribal water in the future of the Basin. The current business planning process in the Colorado River Basin has identified a significant overlap in our work on sustainable water use and some of the questions that Tribal Nations are raising about the role of undeveloped Tribal water in the Basin. We recognize that decisions about the development and conservation of Tribal water will have a large impact on human water security, the health of the Colorado River and its tributaries, and environmental justice. Because of our Tribal work, the Conservancy is now better equipped to understand the implications of undeveloped Tribal water and to co-create policy work with Tribal partners as it considers how to influence the future of water use in the Basin.

AUSTRALIA: GAYINI NIMMIE-CAIRA CASE STUDY[31]

Conservation for Water and Indigenous Rights

Rene Woods, James Fitzsimons, David Hinchley

Introduction

The Murray-Darling Basin is a large (over 1 million km² or 1/7th of the Australian continent) and productive river basin (see Figure 5). The rivers of the southern Murray-Darling Basin are now highly regulated, and much of their flows are diverted for irrigated agriculture. This has led to a decline in the health of the unique floodplain-dependent wetlands and woodlands and associated species that rely on seasonal overbank flood events. The National Water Initiative (NWI), formed in 2004 by the Council of Australian Governments, separated public water licenses from land and converted them to tradeable private property rights.[32] The water entitlements generated allocations of water that varied depending on the seasonal rainfall patterns and storage capacities[33] and, as a result, a vibrant water market has emerged in the Southern Connected River Murray system.[34] As part of the NWI, water can be returned to rivers by the government purchasing entitlements and allocations back from willing sellers, to improve the health of rivers and wetlands.[35] Attempts to achieve water justice for the environment have been largely through water purchased for the purpose of dedicated environmental flows.[36]

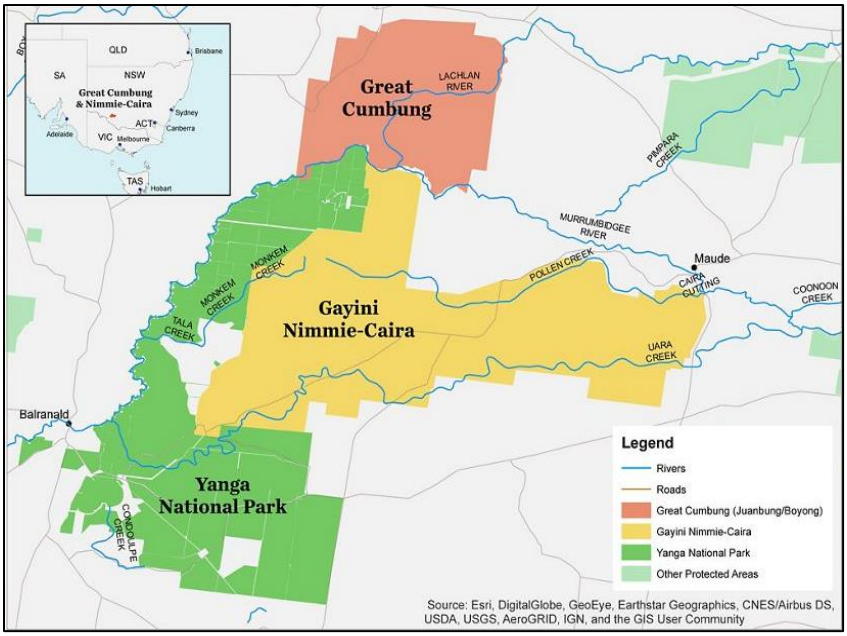


Figure 5: Map of Gayini (formerly Nimmie-Caira) and the Great Cumbung in relation to Yanga National Park. © TNC

The Murray-Darling Basin is also a highly significant region for Indigenous peoples and the cultural health of much of this country relies on flows and flooding. There are concerns that the transfer of rights—and thus wealth—from the Crown (the states) to the private sector has disadvantaged First Nations' ability to maintain ownership of water[37]. Thus there has been an emergence of collaborative partnerships between environmental water managers and First Nations community organizations in the Murray–Darling Basin to water 'Country.'[38] [39] Country refers to the communities, lands, and waters of the First Nations, and to water Country is to reestablish water (rights, access, etc.) for the landscape and the communities.

Indigenous Peoples and Local Communities Context

The Murray-Darling Basin is a highly significant region for Indigenous peoples. For the Nari Nari people, the Indigenous traditional custodians, the highly fertile Lowbidgee floodplain was like a 'supermarket' or 'shopping centre' where food was plentiful and trade connections occurred with Muthi Muthi people to the west and Wiradjuri to the east. The Lowbidgee is the largest remaining area of wetlands within the southern Murray-Darling Basin and contains rich tangible evidence—over 1,200 sites from middens, earth mounds, burial sites, and scar trees—and stories of 50,000 years of occupation. Water was of critical importance as a provider of food, for culture, and for the health of the Country. Earth mounds would stick out in the landscape and allow elders to navigate for food and shelter. The Lowbidgee system, like so much of the Murray-Darling Basin, was a 'boom and bust' system where big floods would fill the wetlands and floodways. These wetlands would hold water and fish and keep game species such as kangaroos healthy for months, and with good hunting and land management practice the Nari Nari people ensured the food could last through the drier parts of the year.

Historical, Political, and Legal Context

European colonization in the mid-1840s saw dispossession of First Nations people, and land in the Lowbidgee was sold or handed out as large parcels of freehold (private) land. First Nations people never had the opportunity or resources to purchase this land in the past and were not even considered Australian citizens when land and water was handed out or sold. Following World War II, the Lowbidgee was further subdivided into smaller lots as 'soldier settlements.'[40] Stock grazing was the predominant land use.[41]

The first large-scale clearing of lignum vegetation for farming on the Lowbidgee floodplain occurred in the late 1960s when 400 hectares were cleared for irrigated agriculture. While only isolated areas were cleared for cropping through the late 1970s,[42] during the 1980s and 1990s the Lowbidgee floodplain was rapidly developed for irrigated agriculture.[43] In the 1960s–1980s, the Lowbidgee area was affected by the development of confinement systems that prevented water from flowing out from the distributary creeks into the swamps[44]—it is estimated that the flows reaching the Lower Murrumbidgee wetland were reduced by at least 60% because of the upstream diversions introduced during this period. After 1980, channels, levee banks, and regulators were installed to promote irrigation, constricting water to floodways and special habitat areas. Over 2,000 km of levees and 394 km of channels were constructed on the mostly southern parts of the Lowbidgee.[45] The reduction in flows and irrigation development on the Lowbidgee resulted in the loss of 76% of the floodplain habitat, loss of floodplain vegetation, loss of waterbirds, fish, frogs, and aquatic invertebrates.[46] Nonetheless, the Lowbidgee floodplain is considered a wetland of national and international significance, containing what is one of the largest lignum wetland complexes in the country and large colonial-nesting waterbird rookeries, areas of river red gum and black box floodplain forests as well as native grasslands.[47]

Post-European colonization, access to the Lowbidgee area by First Nations people was limited. In the late 1980s and early 1990s, after years spent working on and around the Lower Lachlan and Lowbidgee areas and trust being built, Nari Nari and other First Nations people were allowed access to visit from most landholders in the area. In the late 1990s and early 2000s, the Hay Aboriginal Land Council and then Nari Nari Tribal Council developed positive working relationships with landholders to undertake protection and two-way learning of recording culture and heritage on farms in the Hay area.

The change in landscape and limited access since colonization has led to displacement of a number of Nari Nari people and loss of their connection to Country. The change in land use on the Lowbidgee and upstream has disrupted natural water flows and changed the way water had moved in the past.

Rights

One of the major instruments for addressing land justice for Indigenous peoples in Australia is the Native Title Act 1993, Australian (Commonwealth) legislation that recognizes there were legal systems in place at the time of European occupation; that Indigenous peoples' rights to land survived colonization; and that a form of native title could exist in situations in which it had not been extinguished.[48] The Native Title Act confirmed Crown (government) ownership of water, but included rights for Traditional Owners over waters located within Traditional estate boundaries and for customary use of resources for sustenance (hunting, gathering, and fishing), and a right to protect sites or areas of cultural significance that include waters has been recognized as a native title right.[49] Dispossession of land in the Murray-Darling Basin means that most land (and water) does not meet this definition under the Native Title Act.

However, the government also recognized that Native Title was not the only mechanism to achieve land and water justice, as it did not address instances where rights were deemed extinguished, such as through dispossession and conversion of land to freehold (private) ownership.[50] Other mechanisms sought to compensate for this, such as the establishment of the Indigenous Land and Sea Corporation (ILSC), which assists Indigenous First Nations people to realize economic, social, cultural, and environmental benefits that the ownership and management of land, water, and water-related rights can bring through the acquisition and management of rights and interests in land, saltwater, and freshwater Country.[51]

The Nature Conservancy's Work

In 2013, the New South Wales (NSW) and Australian governments purchased the land and water rights of 11 separate farms that made up Nimmie-Caira and put the land out to tender for consortia to bid to lease the land for conservation of ecological and cultural values and compatible economic development activities.[52] The Nimmie-Caira Project was a $180 million water-saving project for NSW, and particularly significant for the Murrumbidgee region where the Lowbidgee floodplain is located.[53] From a NSW Government perspective, the project balanced environmental and First Nations cultural heritage protection with commercial use, and by doing so created an asset for the local community and the Murray-Darling Basin. The five major components to this project included:

1. **Land and water purchases**: The project purchased 19 properties on the Nimmie-Caira floodplain, together with their share of the Lowbidgee Supplementary Water Entitlement (381,000 shares).
2. **Water savings**: Water entitlement purchased from landholders was transferred to the Commonwealth to help 'bridge the gap' to meeting sustainable diversion limits as part of the Murray-Darling Basin Plan.
3. **Environmental Watering Plan:** Documents the demand for environmental water within and beyond the project area.
4. **Long-Term Land Management and Water Management Plan**: Outlines how the area will be managed into the future with some land managed for First Nations cultural heritage and environmental values and other land managed for commercial use.
5. **Reconfiguration of the water delivery infrastructure**: Enhances the delivery of environmental water to lands identified as having high ecological value.

The protection and enhancement of First Nations Cultural Heritage values in the agreement between the NSW and Australian governments[54] brought a new dimension to the process, with weight being added for a consortium that could undertake this role with both cultural authority, knowledge, and protection of Aboriginal sites across Gayini Nimmie-Caira, in addition to biodiversity conservation expertise.

In 2013, soon after the purchase of the land and water at Nimmie-Caira, discussions began between the Murray-Darling Wetlands Working Group (MDWWG), Nari Nari Tribal Council (NNTC), the University of New South Wales (UNSW), and other groups around what a consortium to bid for the property would look like and the vision for the property. In the years following, there were a number of potential partners that were consulted, but an agreement could not be reached on a shared vision of land ownership to First Nations people.

In 2017, a consortium was formed with TNC as lead applicant to the formal bidding process and NNTC, UNSW, and MDWWG as partners. There was strong alignment within the consortium for the types of activities proposed, and a shared vision for the property to build a self-sustaining model to protect, manage, and enhance the environmental and cultural assets of the Gayini Nimmie-Caira. NNTC considered it crucial to develop its own profile for the property and named it 'Gayini' (meaning water). The model was to place First Nations owners at the centre of planning, delivery, and evaluation, supported by a strong network of partners with diverse management expertise to underpin effective long-term management.

Each partner brought different and complementary expertise:

- The Nature Conservancy with experience in conservation planning, management, and innovative financing, particularly in partnership with Indigenous communities.
- The Nari Nari Tribal Council, representing the Traditional Owners with experience in managing large properties for cultural significance, biodiversity, and sustainable production.
- The Murray-Darling Wetlands Working Group, with experience in environmental watering.
- The University of New South Wales with experience in floodplain ecology and monitoring, particularly in the Lowbidgee.

In 2018, The Nature Conservancy-led consortium was judged the successful bidder and awarded a 15-year lease (with the option to extend by two further 15 year-extensions, up to 45 years) with the option to 'call to purchase' the property outright after 1 year if certain conditions were met. The call option conditions included that the organization must meet

clear financial audits and long-term land management experience and quality management systems must be in place prior to purchase. The consortium was able to successfully take advantage of this opportunity, as described below.

The vision for the property is to see nature at Gayini Nimmie-Caira thrive, and the Traditional peoples of Gayini Nimmie-Caira heal its lands and waters. In return, Gayini Nimmie-Caira heals its people, so they can enjoy culturally, socially, and economically sustainable and fulfilling lives. Gayini Nimmie-Caira represents a once-in-a-generation opportunity to create economic independence for the Traditional Owners of Gayini Nimmie-Caira. The goal of the consortium is for Gayini Nimmie-Caira to be an exemplar of an Indigenous-led, culture-based enterprise that sustains healthy country, responsible agriculture, education, research, and independent Indigenous livelihoods.

Approach to Water Scarcity Work

To ensure that multiple objectives—such as biodiversity, cultural heritage, and water delivery—were met, a series of legal and management constraints and protections were developed. This included a Land and Water Management Plan (LWMP) and environmental water easements to allow environmental water delivery across much of the property.[55] These restrictions and protections aligned well with the ambition of the consortium for the property. The overarching Land and Water Management objectives for the Gayini Nimmie-Caira are to:

- Protect, maintain, and enhance environmental values of the Gayini Nimmie-Caira.
- Protect, maintain, and enhance Aboriginal Cultural Heritage values of the Gayini Nimmie-Caira.
- Create economic value from the property within the constraints of the environmental and Aboriginal Cultural Heritage outcomes.

The Gayini Nimmie-Caira LWMP sets out objectives for the property and the NSW Government requirements for the management of the property. The LWMP divided the property up into seven units—core conservation areas, lignum areas, river red gum areas, black box woodlands, native grassland and shrubland, rehabilitation areas, and cultivation lands (e.g., old irrigation bays)—each with their own outcomes, indicators, and targets, and each of these areas having restrictions on the types of activities allowed. The LWMP has been designed to operate within the principles of adaptive management and shall be reviewed and adapted to meet changing conditions into the future. It is expected that the management of Gayini Nimmie-Caira will be modified if and as necessary to achieve the desired objectives in response to the MERI (Monitoring, Evaluation, Reporting and Improvement) plan.[56]

The consortium proposed the adoption of a Healthy Country Planning process to build upon the LWMP. The Healthy Country Planning process (an adaptation of the Open Standards for the Practice of Conservation for an Australian Indigenous context)[57] will maintain the aspirational goals that guided the development of this LWMP and the management of Gayini Nimmie-Caira into the future. It is proposed that the Healthy Country Planning process be used to ensure that all delivery partners and key stakeholders can see how the LWMP is clearly linked to activities and actions by having a clear theory of change articulated for all significant activities.

The targets in the LWMP were focused mainly on environmental assets, while the Healthy Country Plan focused more on cultural values in the core conservation areas. This included culturally important species such as black swans. This will allow for more shared benefits in watering at Gayini Nimmie-Caira, until Nari Nari receive their own water entitlements. The Healthy Country Plan has opened up discussion for further watering at Gayini, not just the current core conservation areas, and will inform watering plans for Gayini Nimmie-Caira and working with the government water authorities.

Implementation

A key component of the Gayini Nimmie-Caira project was to enable improved environmental flows to reach Yanga National Park, as well as improving the ecological health of the wetlands on the Lowbidgee floodplain at Nimmie-Caira itself. The extensive channel system and series of regulators on Gayini Nimmie-Caira was considered an efficient means of doing this. In addition to the original water recovery of 173 gigalitre (GL) arising from the Commonwealth purchase in 2013, a reconfiguration of the existing Nimmie-Caira water delivery system and landscape commenced in 2017 to more effectively and more efficiently supply water to the ecological assets of the area.

That work includes three separate but interconnected elements[58]:

1. Watering the Nimmie-Caira floodplain for environmental benefits within the acquired land.
2. Reinstating connectivity to parts of the Nimmie Caira and Uara creek floodplain system, (the Lowbidgee), that has been isolated by local irrigation development and reduced occurrence of overbank flow events.
3. Watering parts of the Redbank South area within Yanga National Park, south of the Murrumbidgee River.

The aim was to return the watering of the Nimmie-Caira system back to the lowest lying elements of the landscape. The watering regime which is being implemented focuses on supporting the existing wetland complexes and reinstating the primary flow paths through the Nimmie and North and South Caira floodplains. It involved a conversion of the existing floodway-wetland-channel operations developed to support irrigation into a low maintenance, low operational requirement, fill and spill arrangement. The infrastructure reconfiguration[59]:

- Limits the use of the irrigation supply channel system, relying instead on the natural creeks and floodways where possible. Watering strategies will need to ensure that use of these natural delivery systems to supply water to associated wetlands does not result in overwatering of natural channels and floodways. This minimises ongoing maintenance and operational costs associated with the project.

- Adapts existing embankments across the existing floodways to focus distribution of water to areas where environmental values are located and where floodplain rehabilitation is most effective. To enable this, the installation of 23 regulators allowed for better waterway management while over 650 cuts were made to existing banks to allow water to spill onto the floodplain.

Early Successes and Challenges

In December 2019, the land titles at Gayini Nimmie-Caira were formally purchased by the Nari Nari Tribal Council, with TNC raising the funds to make the transfer of ownership possible, through support of the Wyss Campaign for Nature, the Indigenous Land and Sea Corporation, and John B. Fairfax AO (a private philanthropist). As mentioned previously, NNTC considered it crucial to develop its own profile for the property and named it 'Gayini' (meaning water). This reflected the focus of water on the property and particularly the core conservation areas where the main environmental water is delivered under the LWMP.

As of 2012, First Nations peoples held less than 0.01% of Australia's water diversions and recent government efforts to improve First Nations water access is considered to have had negligible effect on increasing First Nations-held water allocations.[60] In future years at Gayini, NNTC hopes to see shared benefits of Aboriginal Environmental Outcomes (see Figure 6) and dual watering across not just the core conservation areas and areas identified by NSW and Federal governments, but other key cultural areas in need of watering in good water years. Aboriginal Environmental Outcomes will occur at Gayini with shared watering with environment agencies—these will include watering focusing on black swan and Australian painted snipe and lignum shrub regeneration. Once NNTC can own their own water to deliver to the Country and to cultural values across Gayini, this would then become a cultural flow to Country.

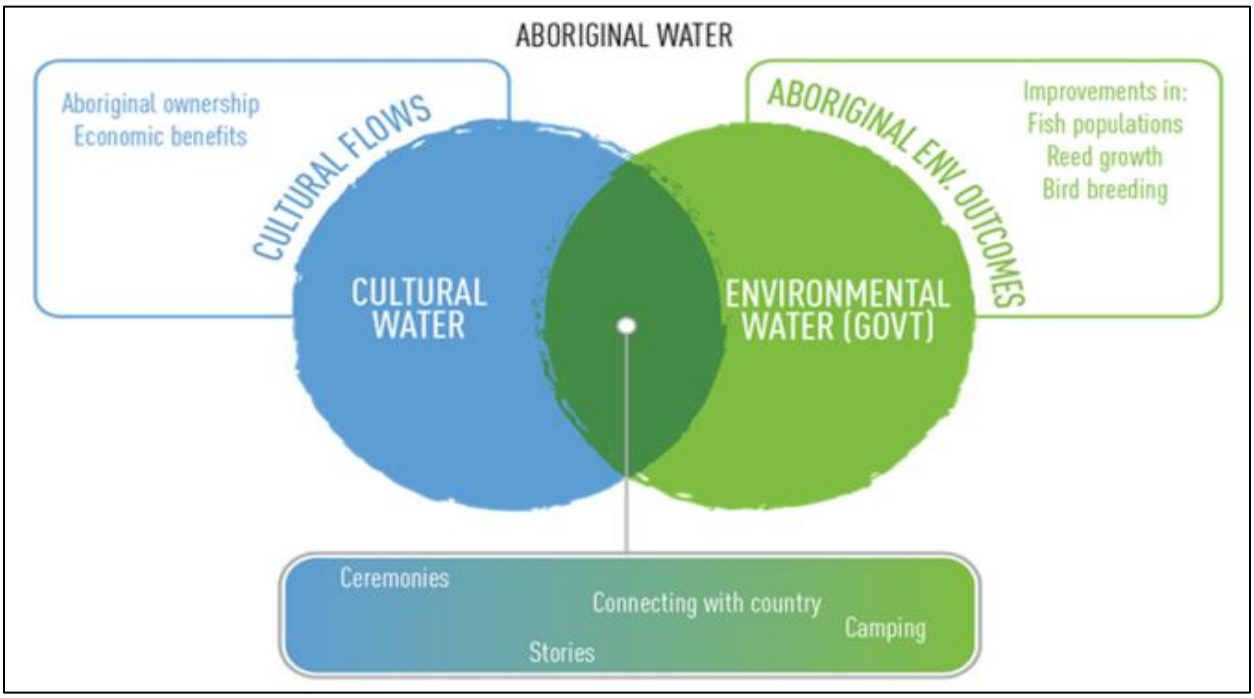


Figure 6. The relationship between outcomes for Aboriginal people from cultural water and environmental water. (Source: MLDRIN 2015)

Land justice has been secured with the acquisition of the 88,000 ha, now transferred to NNTC. This is a significant area for southeastern Australia and a huge parcel of land owned outright by First Nations people within the Murray-Darling Basin area. As water rights were purchased by the Australian Government for use as environmental flows in the 2013 deal, there are no water rights attached to the lands. Nonetheless, in conjunction with Commonwealth Environmental Water Office and the NSW Department of Planning, Industry and Environment, NNTC will prioritize watering across Gayini for shared benefits and Aboriginal Environmental Outcomes. The next stage is to secure water for NNTC in their name for economic and cultural use.

The concept of *terra nullius* (a principle sometimes used in international law to justify claims that territory may be acquired by a state's occupation of it) provided no recognition of rights for Traditional Owners under colonial/state/Australian law post-European settlement. Ironically, the reason the farmers collectively were interested in selling their farms to the government in the early 2000s was the decreasing flow events from water extraction upstream on the Murrumbidgee—a situation symptomatic of over-allocation of water for agriculture in the Murray-Darling Basin.

With the significant changes made in ownership, consolidation of property boundaries, purpose of management and alteration of infrastructure over the past few years, we are hopeful of a more natural flow regime across Gayini. Although changes to hydrology from upstream infrastructure and extraction and the increasing influence of human-induced climate change will hinder a return to flows of 6,500 years ago, a more natural flow of water will hopefully see a reconnecting of Nari Nari earth mounds, where Nari Nari peoples lived over long periods of time, that are near those old flood ways.

Had the winning consortium not been successful in its bid for the long-term management of Gayini (and another consortium was successful), achieving land and water justice for Nari Nari would have been harder and slower if it was achievable at all. For Traditional Owners to have been so close to securing back their Country and not successful as part of the consortium process would have been deeply upsetting. The Nature Conservancy-led consortium worked through a number of scenarios before the bidding process for the property was known, and NNTC was confident that the consortium was molded into the right fit for government, but also allowing First Nations people to take the lead in ownership and management.

Conclusion

Gayini Nimmie-Caira provides a good example of how water justice, to some extent, can be achieved where recent past injustice has occurred. But can this model be replicated in other parts of the Murray-Darling Basin and other parts of Australia? The original drivers of the land and water purchase deal remain—a shortage of dedicated water for maintaining natural aquatic and floodplain ecosystems—due to past over-allocation of water for agriculture. While purchase of water by government for environmental purposes has been capped and slowed recently due to politics, it remains the most economical option for restoring flows.[61] More water for the environment rather than irrigation is also seen by the majority of First Nations people as good for Country.[62] While water rights and land are disaggregated in the Murray-Darling Basin, buying water rights could devalue land (particularly in drier areas) and thus land and water purchases when done together lead to better environmental and economic outcomes. A consortium-type arrangement that puts First Nations groups at the centre of decision-making and ownership of land and water may make such purchases by governments easier, but time will tell. Nonetheless, First Nations people have the drive to own and manage Country for their nation groups and communities, and diversified skills and expertise in key areas, as was present in the Gayini model, could assist Indigenous communities in accessing land and water.

Beyond this case, the Murray Lower Darling Rivers Indigenous Nations (MLDRIN), a not-for-profit company, acts as an advocacy body for Indigenous water rights in the Murray-Darling Basin. MLDRIN has pushed hard over the years to improve the voice of First Nations people in water management, building the capacity of Nation groups to be heard and sitting at the table in water management discussion.[63] This, however, is still a work in progress with much more needed —water ownership is still low and, in most cases, the only water available for use on cultural values is environmental water.

The example of Gayini Nimmie-Caira adds to other examples of improved recognition of rights to and access to water for First Nations people in the Murray-Darling Basin, and other parts of Australia, and are important steps on the road to water justice in this region.[64] However, many First Nations groups still lack access to land or water and more systematic consideration needs to be given to ensuring land and water justice are improved.

PERÚ: CUSCO

Community Action to Protect Water Resources

Aldo Cardenas Panduro and Alberto Limo

Introduction

Peru is home to approximately 71% of the more than 700 tropical glaciers of the South American Andes, the majority of which are in the Santa River watershed in Ancash.[65] These glaciers currently contain reserves of fresh water for ecosystems, human consumption, and industry such as agriculture, hydroelectricity, industry, mining, and agro-industrial projects—activities that play an important role in socioeconomic development for local communities. Glaciers are excellent indicators of the evolution of the climate, and the retreat of the South American Andes glaciers is of growing concern worldwide. Glacial retreat puts both the communities and ecosystems that depend on them at risk, particularly given seasonal variability in precipitation.

This case study focuses on Cusco and the surrounding local communities (see Figure 7). Cusco is a city of 428,000 located in the Urubamba and Vilcanota mountain ranges, home to the Ausangate, Quellcaya, and Verónica glaciers. The dominant natural regions surrounding Cusco are *puna* (montane grasslands and shrublands in high central Andes Mountains at 3,200-3,400 meters above sea level); the grasslands of the high central Andes; the snowcapped, high Andes; the Upper Amazon; and the tropical forest of the Pacific. The Cusco region is characterized by its great diversity of ecological zones. In the lower part there are tree ferns, reeds, alders, and ornamental plants; in the intermediate zone, forests formed by several arboreal, coniferous, and broadleaf species are typical; and in the upper part, the Quechua and Puna area, the *ichu*, *queñua*, *waqo*, *achupalla de monte*, and *raqui-raqui*, among others, predominate. Among the birds, an abundance of partridges, swallows, *gallinazo*, condor, and eagle stand out. In the rivers and lagoons, the Andean goose or *huallpa* and a variety of ducks are present. The Andes are home to 123 fish species, many of which are endemic to their high-altitude rivers and lakes, fed by glaciers. Climate change, glacier retreat, population growth, pollution, excessive water usage, and invasive species threaten this at-risk landscape and its endemic species.

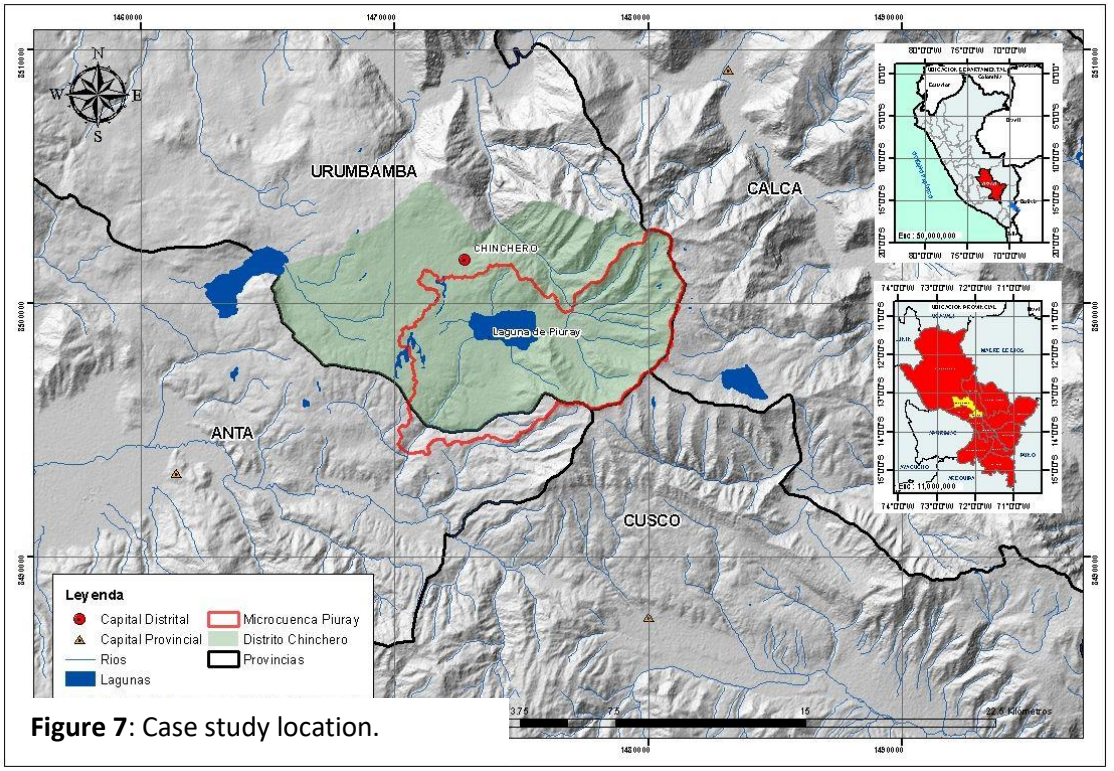


Figure 7: Case study location.

Indigenous Peoples and Local Communities & Water Rights

The watersheds around Cusco are home to many Quechua communities that live on communal lands and rely on spring water. Communities in the Peruvian Andes keep records of their freshwater resources (lakes, streams, wetlands, springs, etc.) and have localized norms for managing the water.[66] Customarily, community water rights are tied to land and managed collectively. Over time, through communal assemblies, families have been granted parts of the communal land and the water necessary to farm for subsistence and their livelihoods. The customary rights over water are built through working to maintain water management structures, where the community member earns his/her right based on their

contribution and less so by the water right granted through a license by the local Water Authority. For example, if someone needs water for agriculture, they make this request known at the communal assembly and then work alongside other community members to develop an irrigation line to their plots as well as other plots in need. Some of the communities are still using Inca or Nazca water management systems for accessing water.

In 2009, Peru passed the Water Resources Law that established water as a public good, formalizing water access through permits and licenses. The law requires communities to formalize their freshwater rights through an application to the local water administrator. The application requires maps, village descriptions, land titles, technical water studies, and clear budgets for management needs. While the intent of the law was to better protect customary water rights, in practice it established a significant barrier to getting formal recognition while increasing insecurity of their existing customary systems. If customary water rights are not formalized with local government, they can more easily be grabbed by those with competing interests such as mining companies. Case studies have already demonstrated water grabbing in other watersheds, including mining companies using the lack of formalized water rights as a reason to skip prior consultation with communities.[67]

Water Scarcity and Political Context

The Piuray Ccorimarca watershed, including Piuray Lake, supplies around 43% of the water demand of the city of Cusco. This system supplies the northern part of the city and the historic center, which is where most of the commercial business activities of the tourism industry take place. The remaining water supply for Cusco comes from the Vilcanota watershed (46%) and from the Kor, Salcantay, and Jaquira watersheds (11%) through 642 springs and nine filter galleries (underground structures built to recharge an aquifer). Both the Vilcanota and Piuray Ccorimarca watersheds are supplied by glacial melt and lateral runoff from precipitation, the former being most important in the dry season.[68]

The water resources in Cusco projected to the year 2050 indicate a deficit of 45.03 million m^3 to satisfy the water demand for people and nature. A limiting aspect is that the storage capacity and water availability of the Piuray Lake is not yet known; more scientific research is needed. However, the Local Water Authority has authorized Cusco Water Supply Company—EPS SEDACUSCO (hereinafter SEDACUSCO)— to extract 330 liters per second of water.

Poor water management has resulted in decreased water flows and poor water quality. The decrease in quantity of water is observed through the loss of springs and/or the decrease in their flows. The watershed degradation is caused by overgrazing, burning, changes in precipitation and temperature, and disorderly urban growth with abundant impervious asphalt that prevents soil water infiltration and increases runoff. As a result, less water recharges the aquifers that feed the springs. These problems are exacerbated by climate change, which has been manifesting itself in the accelerated reduction of glaciers, and by the growing demand for water for human consumption and activities such as agriculture and industry.[69]

Additionally, Cusco city and local communities Valle Chosica, Pongobamba, Ccoricancha, and Simatauca all face water quality issues caused by the discharge of wastewater along the rivers, with over 150 sewage discharge points.

Political Context

The management of water resources in Peru, as well as the inherent conflicts, are complex. Although Peru has detailed regulatory processes, it suffers from inefficient and ineffective water management. The National Water Authority (ANA), a part of the Ministry of Agriculture and Irrigation (MINAGRI), is the governing body of the National Policy on Water Resources. It oversees the National System of Water Resources Management and water rights. ANA centralizes water resource management in coordination with the Regional Administrative Water Authorities and Local Water Authorities. Separately, for more than five years, the Ministry of the Environment (MINAM) and the National Agency of Sanitation Services (SUNASS) have been promoting Remuneration Mechanisms for Ecosystem Water Services (MERESEH). This is the regulatory framework for utilities to collect resources from water tariffs to develop conservation actions for ecosystem services.

While the government manages major water systems, particularly those supplying cities, communities continue to manage water through customary law. As described earlier, this is partially because of the high burden for formalization,

and because customary law allows communities to continue to manage water in a way that is consistent with their culture and livelihoods.

Local Advocacy Efforts

Cusco's municipal utility SEDACUSCO is one of the main players in the Piuray Ccorimarca micro-watershed. In the 1990s, the gravity-fed system from Piuray to Cusco was no longer functional, and SEDACUSCO built a pump to supply water to the city. Within the same timeframe, precipitation was low, and the lake level dropped. The local communities surrounding Piuray were negatively impacted by the reduction in lake levels and began organizing with the help of a local nonprofit, Centro Bartolome de las Casa. They started a dialogue with SEDACUSCO about over-pumping, and after over 10 years of community advocacy, they reached a negotiation and preliminary agreement that included a 4.8% tariff on water in Cusco, gathered by SEDACUSCO. The purpose of the tariff is to protect, conserve, or restore the environmental services of the Piuray Ccorimarca Microwatershed and to ensure the quality and quantity of the water resources provided by the Piuray Lake. The communities benefited through municipality-implemented water and sanitation projects.

Some of the local communities want more direct benefits from the water tariff, apart from the reforestation and infiltration ditches to improve water quality and flow. Community disapproval has increased since the original agreement as SEDACUSCO has built additional large pipelines to extract water from the lake. There are many challenges to maintaining good relations between SEDACUSCO and the communities, including staff turn-over, new actors with divergent interests (governmental and private), and growing demand for water.

The Nature Conservancy's Work

The combination of declining supply due to reduced glaciers, increasing demand, over-allocation of available water, and declining water quality all highlight the need for strategies to secure water supplies for local people and ecosystems. To identify strategies, TNC—together with local partner, Centro Bartolome de las Casa— work alongside communities to develop necessary conservation and development activities. A significant portion of the work to date has been youth training programs focused on restoration. These trainings are carried out in the communal premises of the Piuray-Ccorimarca micro-basin management committee, which groups together the 11 communities of Piuray. Table 2 offers an overview of the activities TNC is pursing in partnership with Centro Bartolome de las Casa and communities. These activities focus on the value of ecosystems and nature-based solutions for water regulation and healthy ecosystems while improving the living conditions of local populations.[70]

Local Community	Inhabitants	Actions
Ccorccor	200	Reforestation and infiltration ditches
Ccoricancha	316	Reforestation and infiltration ditches
Huitapucyo	91	Reforestation and protection of *manantes* (flows)
Ocutuan	73	Recovery of terraces, infiltration ditches and afforestation
Pongobamba	452	Protection of *manantes*, recovery of terraces and reforestation
Pucamarca	262	Reforestation, infiltration ditches, build terraces
Simataucca	293	Infiltration ditches and afforestation
Taucca	137	Forestation and infiltration ditches
Valle de Chosica	421	Enabling landscape tourism circuit, infiltration ditches, afforestation, rehabilitated forest nursery, protection of the half-moon lagoon

Table 2: Conservation activities taking place in the Piuray communities.

Additional efforts that TNC and Centro Bartolome de las Casa are considering in partnership with communities include:

- Empowerment of local communities to participate in and influence watershed planning, particularly increasing their say over how water across their communal lands is managed and used for Cusco.
- Strengthening the formal recognition and respect for communities' traditional uses and customs of worshiping water, as the source of life for their domestic and economic activities.
- Development of watershed restoration actions through the improvement of grassland and scrub cover in the watershed headwaters, reduction in grazing and regular fires, and involvement of local communities with traditional knowledge about natural infrastructure opportunities to increase infiltration. Build water tariff policies that support this work.
- Development of storage infrastructure at the headwaters of the watershed and infrastructure for drinking and wastewater treatment in each of the districts and population centers, in collaboration with communities.

TNC is simultaneously developing a relationship with SEDACUSCO to better understand all parties and contribute to a better relationship between SEDACUSCO, Centro Bartolome de las Casa, and the communities. TNC is working with these partners to develop an improved agreement and a method for the tariff funds to flow to the communities for restoration of the surrounding environment. Also, Centro Bartolome de las Casa is trying to articulate this process with the Cusco Regional Council for Climate Change (CORECC) and updating the Climate Change Regional Strategy.

Opportunities and Challenges

With COVID-19 the project has slowed down significantly, with staff unable to visit communities. While relationships are improving, there is still more work to do to: 1) find additional partners and funding, including private funds that are not tied to the public process; 2) find a way for the tariff money to support the direct needs of communities; and 3) continue to implement restoration work that has ecological benefits.

Opportunities

A major opportunity is the creation of a water fund for Cusco, which could increase funding for community-based conservation through corporates partnerships. The water fund would create independent financial mechanisms for compensation for ecosystem services, in addition to the existing tariff. The project has the following three goals:

- Build the capacity of local communities and officials.
- Create and strengthen long-term governance and financial mechanisms (such as a Watershed Council).
- Implement natural infrastructure projects and hydrological monitoring.

Successes to date include the implementation of nature-based solutions, strengthened community capacity and hydrological monitoring system, and recovery of ancestral knowledge on water management. This project seeks to contribute to the Convention on Biological Diversity, which promotes nature-based solutions through the sustainable management of mountain wetlands, the restoration of forests and grasslands, as well as the restoration of grasslands with native species with deep roots. The intent is to continue to improve water regulation, reduce erosion, and strengthen water storage capacity.

Challenges

The most significant challenge to the project is differing interests across actors and within the communities themselves. Communities are sometimes divided in their interests, often because of external agents—such as companies, NGOs, and even the local government—seek to work only with one or two communities. For example, SEDACUSCO recently only worked with two communities, Cuper Alto and Tauca, to develop its water consolidation plan. They did not consider that these communities are unique and seek specific benefits, which may be different than the goals of other communities. This creates divisions among communities. Additionally, SEDACUSCO deals only with a community manager, so as not to generate greater expectations in the entire community. However, community managers do not always represent the diversity of voices, needs and interests of all community members. This generates discomfort in every community and lends itself to misunderstandings and lack of transparency.

Conclusion

Working with communities requires transparency and accountability. We must continue to develop good relationships with local communities for carrying out actions in the field, including contracts with the communities, to serve as a reference in the implementation of SEDACUSCO resources.

The creation of a Cusco water fund to continue to support the work in communities is a long process that involves a participatory and inclusive management model, the mobilization of resources from private companies, good will of the public sector, particularly SEDACUSCO, and good coordination with the communities. The proposal for hydrological monitoring will not only include technical aspects but also promote local knowledge and participation. The partnership with communities in the Piuray watershed is making it possible to generate projects that will benefit both people and nature.

NORTHERN AUSTRALIA CASE STUDY

Supporting Human Well-Being in the Outback

James Fitzsimons and David Hinchley

Introduction

Northern Australia is home to the world's largest remaining intact tropical savannas left on Earth, interspersed with free-flowing rivers and World Heritage-listed wetlands and floodplains. The diverse habitats within this vast area are home to hundreds of unique and threatened plant and animal species.

These landscapes have been managed for more than 60,000 years by Indigenous Australians, primarily through fire, enough to have significantly crafted the ecological process responsible for maintaining northern Australia's biodiversity. But removal of the fire management practices of Indigenous communities in the years since European settlement has changed land uses (now dominated by dryland grazing industry, mining and tourism). Subsequent waves of invasive plant and animal species—such as cattle, horses, donkeys, buffalo, pigs, cane toads and cats—have fundamentally changed the biota of northern Australia. Compounding threats from increased pressure for agricultural intensification and increased demand for mineral and gas extraction add to the urgency to halt and reverse a dramatic decline in small mammals and other species in the last 200 years and restore healthy habitats for all species.

The outback is also home to one of the world's oldest living cultures—that of Indigenous Australians. Indigenous communities are gaining increasing recognition of rights and return of various forms of ownership and/or rights to more than 60% of northern Australia. Together with the government-supported Indigenous Ranger and Indigenous Protected Area[71] programs, this has provided a foundation for Indigenous land management across much of northern Australia over the last 10 years.

Indigenous ranger groups are demonstrating that they effectively manage their Country for social, environmental and cultural outcomes if provided the right opportunities and support. Many groups are now leading in the management of their country, using cutting edge scientific knowledge interwoven with intricate traditional knowledge and cultural practices. Much of the Indigenous estate is managed for conservation through Indigenous Protected Areas and Indigenous ranger programs, together with support from non-government organizations and increasing capacity of Indigenous landowners to earn income from conservation management, for example through carbon markets.

However, Indigenous communities continue to face significant challenges even once their rights to land ownership and control are re-established. These include economic disadvantages, lack of funding and resources, pressures from inappropriate development and threats such as climate change and introduced pests and diseases.

Indigenous Peoples and Local Communities Context

Indigenous communities face the impacts of declining or damaged water resources on cultural sites, practices and stories (e.g., through loss of wetlands, water-holes, changed flow regimes, loss of access rights in grazing leases, loss of capacity to visit sites and maintain cultural practices). Water scarcity also directly impacts food and medicine resources, including fish, river vegetation and good quality water. Current and future opportunities for culturally and environmentally appropriate development options are at risk if water is allocated to large-scale industry prior to Indigenous communities being able to obtain rights due to policy failures and economic constraints.

One of the major instruments for addressing land justice for Indigenous people in Australia is the Native Title Act 1993, Australian (Commonwealth) legislation that recognizes: the legal systems that were in place at the time of European occupation; that Indigenous peoples' rights to land survived colonization; and that a form of native title could exist in situations in which the title had not been extinguished.[72] The Native Title Act confirmed Crown (government) ownership of water, but included rights for Traditional Owners over waters located within Traditional estate boundaries and for customary use of resources for sustenance (hunting, gathering and fishing), while a right to protect sites or areas of cultural significance that include waters has been recognized as a native title right.[73]

However, Indigenous peoples still have limited rights to use water on their lands for commercial and productive purposes. Native Title rights to water have been interpreted narrowly by the courts to mean primarily traditional and cultural uses and are usually accounted for as in-stream cultural and conservation values in water catchments, distinguishing them from the consumptive rights held by other users.[74]

Water Scarcity and Political Context

Northern Australia is a tropical savanna woodland landscape with a distinct wet season from approximately January-May and a prolonged dry season from June-December. Water is abundant in the wet season, with large areas of annual flooding on huge coastal floodplain in some areas. While major rivers flow all year, there are many smaller seasonal streams that do not, and water is generally scarce during the dry season. For this reason, groundwater is important in many areas.

Most rivers across the tropical savannas are unrestricted apart from smaller weirs and community storages. There have been several failed or partly successful attempts to develop larger-scale irrigation dams. However, increasing government and industry attention is being given to more intensive large-scale agriculture as part of a "northern development" agenda. Water allocation legislation and policies are determined by the three state/territory governments that encompass the northern savannas (Queensland, Northern Territory and Western Australia). These vary across jurisdictions but generally focus on allocations for domestic (town) uses, industry and recreation, with some consideration of environmental flows.

Water reform discussions in the period of 2006-2013 recognised that water allocation policies and practices generally excluded Aboriginal peoples, with limited recognition of or provision for culturally important uses of water by Indigenous communities and even more limited allowance for potential future economic development uses by disadvantaged Indigenous communities. Reform attempts have been patchy and allocation processes are still lacking. Thus, water scarcity issues relate to both seasonal scarcities that influence the capacity of water resources to support livelihoods (and with high variability from year to year) and allocation scarcity driven by poor policy and legislation.

The Nature Conservancy's Work

TNC's response to these issues has been to focus on several key aspects of Indigenous land and water management capacity with the aim of supporting enduring and resilient conservation and human well-being outcomes. Water values are inextricably linked to cultural and other socioeconomic values in Indigenous communities, and their ability to exercise rights associated with these values depends on re-establishing management capacity that is led and driven by Indigenous organisations and communities within contemporary governance systems and economic realities. Key components of our Indigenous lands strategy in northern Australia are our community-based planning and capacity-building initiatives that aim to support Indigenous communities to better plan, lead and sustain the future management of their lands and waters for integrated outcomes.

Community-Based Conservation Through Healthy Country Plans (HCP)

Healthy Country Planning (HCP) is an Indigenous, community-driven planning method used to develop management plans for looking after natural and cultural values, including community well-being, livelihoods, language, knowledge, land and sea associated stories, totem species, species of conservation significance, resources, sacred sites, practices, tools and technologies. These plans enable Indigenous people to manage their land in a way that respects their community aspirations and that can work in partnership with government, NGOs and businesses. HCPs are also a critical step in helping Indigenous groups plan for and declare new Indigenous Protected Areas that play a vital role in Australia's National Reserve System for conservation of biodiversity, including significant rivers and wetlands. Through HCP, TNC facilitated the acquisition of the 180,000-hectare Fish River Station to be managed by Indigenous people.[75]

TNC supports HCPs in northern Australia. All HCPs across northern Australia identify freshwater resources as key targets for conservation and culture. Our recent analysis of HCPs for Indigenous lands in Australia showed that aquatic ecosystems are the most common targets for protection and management, being a priority in 32 out of the 35 plans analyzed. For Indigenous communities, water is highly culturally important. There are many cultural sites, practices and

stories that align with water resources. And future development opportunities rest heavily on future access to water resources—land and water-based development options such as grazing, bush foods and ecotourism. This alignment is highlighted in our review of HCPs, with 87% of individual HCPs sharing the same five targets (Aquatic Ecosystems, Cultural and Heritage Places, Cultural Practice and Traditional Knowledge, Important Native Animals and Bush Meats, Important Native Plants and Bush Medicine).

Economic Development—Planning & Support

Community-based HCP and fire management planning also underpin the rapid scale-up of an Indigenous savanna-burning carbon industry that is providing critical income from conservation management to help sustain Indigenous land management activities[76], as well as directly contributing to restoration and protection of critical freshwater resources such as wetlands and riparian areas, together with associated water use and cultural values.[77] However, in addition to factors affecting the capacity of individual communities to manage their land and water resources, there are a range of broader economic development, policy and governance issues that continue to pose major challenges, including the ability of communities to tackle policy failures related to water rights and allocation.

Economic development of northern Australia since European settlement has been dominated by large-scale grazing and resource extraction industries, with several notable failures to develop large-scale agricultural industries based on irrigation from the highly seasonal water resources[78]. A 2015 Australian government white paper[79] on developing northern Australia again prioritized infrastructure development to support these industries as the predominant form of economic development. Numerous policy failures relating to how First Nations peoples can participate in and derive benefits from economic development that cares for their lands and waters have been identified. Failures to develop fair and effective water allocation mechanisms to support the aspirations of Indigenous communities are bound-up amongst many other policy failures.

As a result of ongoing policy failures, Indigenous communities are increasingly faced with making decisions about potential developments without enough information or enough time to make informed decisions. Native Title Representative Bodies (NTRBs), which represent the interests of Native Title holders for a Native Title determination area, often have limited capacity to assess and evaluate impacts of proposed developments. The critical principles required for appropriate development of Indigenous lands of “Free, Prior and Informed Consent (FPIC)” are undermined as a result, leading to heightened risks of negative environmental, social and cultural impact.

In response to these issues, TNC’s northern Australia program has drawn on TNC’s global experience with spatial “Development by Design” (DbD) planning to develop a community-based DbD process designed to assist Indigenous communities in assessing the potential impacts of economic development options and having more say in decisions about development.[80] The process is founded on reference to the vision and values articulated by the community in its HCP and spatially assesses impacts of future development options on these values. This is done using maps and other tools to overlay where developments are proposed, or where development opportunities exist, with detailed layers of natural and cultural values. This enables groups to clearly see, and demonstrate to other stakeholders, where developments might co-exist with or have an impact on their natural and cultural values.

While not able to fully deal with broader policy failures relating to negative impacts of economic development on Indigenous communities, the community-based DbD process is one mechanism to highlight impacts such as damage to water resources on community well-being during the development assessment and decision-making processes. By making these impacts explicit, experience to date shows that this information can be used by NTRBs to influence economic development decisions.

Early Successes and Challenges

TNC’s program has supported rapid scale-up of Indigenous land management across northern Australia and the HCPs guide the Indigenous ranger program conservation management activities. There is a large increase in Indigenous Protected Areas that now form a major part of the Australia’s National Reserve System. These attract government and other funding that enables Indigenous ranger groups to manage threats to water resources (e.g., feral animals, weeds and inappropriate fire regimes that damage riparian and wetland habitats). The rapid scale-up of early dry-season fire

management regimes can provide increased protection for riparian and wetland ecosystems. Moving forward, community-based DbD projects are emerging as an important tool for Indigenous communities to be able to better identify impacts of potential development threats and opportunities for freshwater. They also empower Indigenous communities to make decisions about future uses of their lands.

In order to continue having an impact, TNC intends to continue scaling-up HCP and community-based DbD along with continuing to build Indigenous groups' capacity to attract funding support, design good governance and develop sustainable and diversified income streams for future management. Moving forward, more explicit attention to policy reform on water allocation is needed to complement community-level empowerment already being supported through HCP, DbD and other capacity-building and adaptive management work. More explicit attention to research and understanding of surface and groundwater interactions will be needed in many areas, especially in relation to potential impacts of mining, irrigated agriculture and other resource developments on groundwater resources.

Conclusion

TNC is directly addressing sustainability by helping Indigenous communities gain more control and capacity to manage their historic lands in the way they want to care for their people and Country. A key assumption of our work is that Indigenous land management driven by strong connection to homelands, community values and decision-making will lead to better outcomes for both people and nature. Our strategies aim to support these outcomes and strengthen Indigenous land management at the scale needed to make a difference for conservation and human well-being across northern Australia. To do this we use science to develop innovative approaches to conservation and sustainable financing, and support Indigenous groups to monitor, report, communicate and continually improve management of their Country (adaptive management).

LESSONS LEARNED FROM CASE STUDIES

The case studies explored here demonstrate the diversity of community-based water scarcity work through different ecological, political, geographic, and human contexts. The water scarcity challenges faced in each place are unique:

- In Colorado, there is an acute and immediate inequity in water access and recognition of water rights.
- In India, groundwater-dependent communities and ecosystems are rushing towards an irreversible depletion of groundwater.
- In both Australia cases, Indigenous communities are empowered to manage their own water resources as industrial agriculture threatens cultural significance and ecological water needs.
- In Peru, climate-induced glacier retreat is steadily leading to increased water variability and communities are actively pursuing rights to water.

In all five cases, water is over-allocated across multiple uses including but not limited to agriculture, industry, municipal, and domestic. These cases offer insights into three scales of water scarcity concerns: local groundwater (India), watershed (Peru), and entire basins (United States and Australia). Importantly, the case studies offer lessons on the opportunities within community-based conservation and the challenges.

Opportunities

Partnership: Improving TNC Capacity

Community-based conservation requires an understanding of and respect for IPLC's reality of water scarcity, including **who** has access to water, **when**, **how**, and **for what purposes** including cultural needs. This level of understanding and respect can only be achieved through partnership with IPLC. Some of the elements critical to building a strong partnership and evident in the case studies include:

- **Staff cultural competency.** This affects staff's ability to learn and understand communities' needs and worldviews, particularly in water-scarce situations where limited access to water can be the difference between life and death. The Colorado River Basin team is actively pursuing staff training as a part of their Tribal Water Initiative, and the India team did a version of this by using a systems approach to uncover biases and mental models during their initial workshops.
- **Building trust and rapport.** Balancing human and ecological needs take time, understanding, and trust. Building trust takes patience, willingness to learn and change, and humility. In places where TNC is new or has a strained relationship with IPLC, partnerships with local organizations that are already working alongside communities can be effective—as was the case in Peru, India, and Australia—and/or through a trusted individual, as was the case in the Colorado River Basin.
- **Investing the time and resources.** In Peru, negotiations between communities and local government took over a decade to be effective. The success of Gayini took over 5 years of targeted work, and longer to develop the enabling conditions. TNC needs to dedicate significant time and resources to community-based conservation, on par with what TNC dedicates to projects focused on policy or corporations. The Colorado River Program's commitment to the Tribal Water Initiative in their strategic plan helps solidify time and resources for the work.
- **Co-designing projects.** TNC cannot build community programs without the communities. Community-based conservation must be designed and led by the communities themselves. Both the India and Peru case studies demonstrate how essential local context was in deciding which nature-based solutions to pursue and where. In Australia, only the Nari Nari can determine which areas to protect for their cultural significance and how to manage them. The Colorado River Basin case study explicitly discusses the tension between TNC's ambitious conservation goals and community needs. For community-based conservation to be effective, community needs must be understood, respected, and met. This is backed up by not just the case studies in this paper but also numerous peer reviewed articles.[81]

- **Engaging IPLC to catalyze long-term stewardship.** As more IPLC voices are included in the decision-making and planning processes, this increased diversity of knowledge and understanding leads to stronger conservation outcomes about the dynamics of water use. In Gayini, the Nari Nari are the key knowledge holders who understand how to manage the property for cultural significance, biodiversity, and sustainable production. As the project unfolds, both TNC and the government will have a lot to learn from how the Nari Nari return the disjointed water and landscape to one that is interconnected and culturally and ecologically resilient. IPLC representation in addressing water scarcity is critical to designing solutions that meet the needs of people and nature, as was seen in the Healthy Country Planning (HCP) approach in northern Australia. This is true from a "do no harm" approach and from an approach of bringing more diverse ideas and multi-benefit solutions forward that can advance shared people and nature goals.

Policy and Water Rights: Elevating IPLC Voices

At the start of the paper, we listed three drivers contributing to water scarcity:

1. Scarcity due to physical water shortage (i.e., volumetric availability of water with acceptable quality).
2. Scarcity due to lack of adequate infrastructure irrespective of water resource availability.
3. Scarcity in access to water services due to institutional or organizational failures (including water rights and water allocation) to ensure reliable and equitable water supply.

While local interventions are essential to addressing water scarcity and the resilience of local communities and ecosystems, these drivers and the case studies also indicate a clear need to address policy, including water rights. Historically, policies have contributed to over-use, depletion, and inequality in water access. The case studies offer insights into community water rights or lack thereof and the potential for TNC to influence improved policy outcomes.

- In India, water rights are tied to the land, which is owned by the state. Several laws have formalized community land management rights though challenges remain, including overlapping rights between Adivasis and other groups and landless households without means to gain formal recognition. In the Devnadi River Basin, water rights' connection with land, limited infrastructure, and the use of shallow wells make local, community-based interventions particularly impactful. Local interventions make a difference in the sustainability of groundwater use. As the country continues to expand water supply infrastructure, as demands for water increases, and as climate change exacerbates drought, community representation in policy development will be essential to safeguard against continued marginalization of IPLC as well as to protect water for nature and people.

In Gayini Nimmie-Caira water rights are separated from land. In the Colorado River Basin water is heavily dammed and managed disconnecting it from its natural flow. Disconnected water is more common in water-scarce landscapes with significant infrastructure (e.g., canals, pipes, etc.) for delivering water to different users in different areas. Separating water rights from the greater ecological context is a factor enabling the development of water markets, where water rights can be bought and sold. When there are water markets, it is not sufficient for IPLC to own land; they must compete with other water buyers, including private companies, with significant capacity and financial resources to access a limited resource. As a result, communities can be priced out of having access to water. Furthermore, the separation of water from its natural channels and waterbodies leads to the disruption of ecosystem processes, losses in hydrologic connectivity, and destruction of native habitats. Thus, both IPLC and freshwater ecosystems suffer from heavy-handed water management schemes.

- In Australia, the Native Title Act recognized Indigenous peoples' land rights while confirming government ownership of water. The Nimmie-Caira lease offered the right to manage the land for 15 years but not the water rights, which are still held by the Australian Government for use as environmental flows. The Nari Nari Tribal Council are using the landscape to reconnect water and the land by limiting the use of irrigation supply channels and focusing on natural creeks and floodways to reinstate connectivity to the lowest parts of the floodplain. While the government is prioritizing water in Gayini for cultural and environmental outcomes, an injustice remains with the lack of Indigenous water ownership. There is a forced disconnect between water and land

when many Indigenous communities see the systems as whole rather than separate. Also, in future leasing there is a risk of the Nari Nari getting priced out of the market. From the case study: "As of 2012, First Nations peoples held less than 0.01% of Australia's water diversions and recent government efforts to improve First Nations water access is considered to have had negligible effect on increasing First Nations-held water allocations."[82] So, while the Gayini case study offered a success story for using existing policy and opportunities, there is still work to do to create policies that empower Indigenous ownership and management of Country in its entirety.

- In the Colorado River Basin, a complex set of rules and laws dictate water management and use across the Basin's many interested parties. Water is highly managed through dams, canals, etc. Legal precedent entitles Tribal Nations to substantial, senior-priority water rights in the Colorado River Basin, and 22 of the 29 Tribal Nations in the Basin have quantified their water rights claims. Despite their recognized rights, Tribal Nations have yet to gain access to the platforms where decisions are made. As a result, these platforms (and the analyses they conduct) do not consider how the Nations may develop their water rights, tend to propose solutions that fail to recognize and respect the treaty and other rights of the Indigenous Peoples, and miss the opportunities to work with Tribal Nations to mobilize/leverage Tribal water to address the Basin's socio-economic and environmental challenges. Per the case study: "As recently as 2019, because of the unwillingness of state and federal negotiators to take a hard look at the role of Tribal water in both the water scarcity risk and solutions to the Basin, programs designed to reduce water scarcity risk have excluded the Tribal Nations from participating with significant portions of their Colorado River Basin water rights." This case clearly indicates that while water rights are an important part of IPLC empowerment, there are other factors—commodification of water, exclusion in multi-stakeholder platforms, narrowly scoped research—that continue to disenfranchise IPLC.

- In Peru, the 2009 Water Resources Law disenfranchised communities that don't have the capacity to submit onerous proposals for formal water rights recognition. Whereas communal practices integrate water and land, particularly in management and use, the 2009 law separates them. While intended to protect the use of water for all, the law has forced many communities to fight for their water rights. In the Piuray watershed above Cusco, this meant over a decade of negotiations between communities and the local water utility. Though an agreement was signed, communities must continue to demand their rights and traditional practices be respected, especially as water demand and insecurity increases.

Based on the local, regional, and national context, there are different strategies and opportunities for empowering IPLC within the existing policies and water rights. In some water-scarce places, land ownership is necessary for water use, management, and allocation for environmental and cultural outcomes. But land ownership is not sufficient if it is not associated with adequate water supplies to meet domestic and livelihood needs. In all cases, IPLC engagement is necessary for policy implementation and decision-making that has the potential to impact community water access. This includes everything from decisions on irrigation infrastructure to dams. Key components of supporting IPLC in this work are outlined in the VCA framework: (1) understanding existing laws and policies related to rights; (2) building IPLC capacity and leadership; and (3) strengthening local multi-stakeholder platforms.

The first, understanding existing laws and policies, has significant implications for the strategies IPLC may pursue. In cases where there are limited rights to water or enabling conditions for IPLC ownership and management of water, policy reform may be necessary. Policy reforms that recognize community and ecosystem water needs can establish norms for sustainably managing water and elevating community voices. Systematic, large-scale change requires policy that is adaptable or responsive to local context. With the anticipated increase in water stress due to climate change, policy solutions are a key component to systematic solutions. If communities are not at the table when these large-scale, long-term solutions—like drought resilience planning—are built, they risk being left out for generations, which perpetuates centuries of injustice. The laws and policies that involve IPLC and establish their rights to water help bring the community-based conservation work to scale and can also help to achieve conservation outcomes. There are several concrete ways that TNC can engage on policy to support IPLC as demonstrated in the case studies:

- **Use our power and privilege**. TNC can use its experience, influence, and relationships to demand and elevate IPLC voices in decision-making processes. Particularly in places where we've worked for decades, like the Colorado River Basin, TNC should be an ally in getting IPLC represented at multi-stakeholder platforms.
- **Offer our capacity**. TNC has diverse capacity—including, but not limited to, legal expertise; engagement in local, national, and international policy fora; conservation planning; management and innovative financing; and GIS—that can play in important role in elevating IPLC voices. These skills were integral in the Gayini case study where their success was attributed to the deep partnership and skill sharing across TNC, the Nari Nari Tribal Council, universities, and Murray-Darling Wetlands Working Group.
- **Help to fundraise**. TNC also has fundraising capacity. Policy work takes significant resources, particularly people's time. We can help fundraise for projects and staff important to IPLC policy work and make direct introductions to funders.

Local Knowledge: Strengthening Conservation Goals

Working with communities—following the guidance of the Voice, Choice, Action Framework and Human Rights Guide—is essential to achieving TNC's Shared Conservation Agenda (SCA) freshwater and human well-being goals and metrics, including freshwater ecosystems with improved management as well as people with increased security of rights to resources. Decades of research and the case studies here demonstrate that working with IPLC and learning from their local knowledge and different ways of knowing provides us much greater likelihood of innovative, transformational work that can help us achieve the SCA's goals.

- The Devnadi River Basin case study explicitly highlighted communities' extensive local knowledge where a group of groundwater knowledge keepers designed community drought resilience plans using a combination of local knowledge and hydrology. Continued partnership through monitoring and evaluation will build upon local knowledge and empower the local knowledge keepers to adaptively manage their human well-being and conservation goals over time. Better awareness of groundwater-dependent ecosystems will help communities conserve these ecosystems for their own benefit as well as nature. Documented success from drought resilience plans can help elevate local knowledge to a policy level, strengthening the water security of communities and bringing community-based conservation to scale.

- In northern Australia, Healthy Country Planning and TNC's theory of change put Indigenous knowledge at the center of the project. TNC staff used its fundraising and innovative financing skills to support Indigenous leadership, investment, and management of their freshwater resources for economic, cultural, and ecological purposes. This case study demonstrates not only conservation wins but also justice for historical and current injustices aimed against Indigenous peoples.

- Australia's Gayini Nimmie-Caira project establishes a long-term stewardship model (15 years), a timeframe that allows for robust evaluation of conservation wins. The project protects important wetlands that support a diversity of species—including the threatened southern bell frog, Australian bittern, and Australian painted snipe—and critical breeding and feeding habitat for freshwater birds such as the straw-necked ibis, royal spoonbill, little pied cormorant, and Australian pelican. The project is transitioning traditional agriculture to low-impact grazing, which will provide income for the Nari Nari people and serve as a new nature and culture business model. Future sustainable land-use opportunities include carbon farming, education (two-way learning bridging Indigenous and non-Indigenous cultures) and ecotourism.

In many case studies, monitoring and measurement of conservation outcomes is still ongoing. But partnerships between different Indigenous groups and TNC expands our impact and builds in long-term sustainability—with local people managing their own resources rather than those resources being managed by an international non-profit or even national non-profit. Each of the case studies was designed to achieve conservation and human well-being outcomes, balancing the needs of both rather than viewing them as opposed. For community-based conservation to succeed in the long-term, finding the intersection between community needs and ecological or biodiversity outcomes is key.

Community-Based Conservation: Building Climate Change Resilience

Climate change is a major threat to people in water-scarce areas, with the potential to destroy livelihoods and food production, create conflict, and force climate migration. Community-based conservation has the potential to increase community and ecological resilience to the impacts of climate change.

Traditional Ecological Knowledge (TEK), which is highlighted in the Australia and Colorado cases, has implications not only for managing scarce water resources, but also improving local capacity to adapt and maintain resilience to climate change. Resilience increases with extensive knowledge of the local system, adaptive management as the ecology changes, cultural rules around care for nature, and flexible decision-making.[83] Elevating community voices in decision-making around water, as in the Colorado River Basin case, or returning landscapes to traditional communities, as in Australia's Gayini Nimmie-Caira, allows these communities to manage water using TEK, which can then increase their resilience to climate change. Another form of this resilience is presented in the India case study, where collaboratively increasing knowledge of groundwater management and conservation is helping communities to build social networks that will help them to cope with drought and to build the resilience of the ecological system on which they depend.[84]

With an increasing global emphasis on generating solutions to the impacts of climate change, a recognition of fCBC as a model for building community resilience and ecosystem adaptation can help to raise the profile of this work.

Challenges

Addressing water scarcity is difficult because the challenge is both enormously complex and operates at multiple spatial scales from entire basins to local communities. There are strong economic and political drivers at the highest levels, nationally and internationally, and locally across communities, agriculture producers, municipalities, industry, and other water users. Powerful economic interests, such as industrial agriculture and corporations, hold the greatest political power and use most of the water. In three of the five case studies, economic and political drivers challenged community management of and rights to fresh water. In Cusco, municipal water demands competed with the needs of upstream, local communities. In the Colorado River Basin, demands across states, industry and major cities overshadow Tribal water rights and interests. In both the Gayini Nimmie-Caira and northern Australia cases, water regulations have historically disadvantaged Indigenous communities.

These cases highlight that within the complex political and economic context, IPLC often have less power and effective authority in discussions about how to allocate water and address water stress. In Australia and the Colorado River Basin in particular, communities face water scarcity as a result of both physical water shortage and limited access to water services due to governmental failures to ensure water supply not only for sustainable economic development but also cultural use and ecological need.

When nature *is* taken into consideration, it is pitted against other interests including those of communities. When we do not fully understand IPLC dynamics and priorities, we may advocate for solutions that further disempower these communities. Both the India and Colorado River Basin case studies discussed internal challenges related to advocating for community needs. In India, the team had to translate qualitative processes into strict quantitative metrics within short timeframes that did not do justice to the time necessary to build community rapport and influence change. In Colorado, teams and individuals that previously saw IPLC goals as potentially harmful to their conservation work now recognize the benefits.

TNC's work with IPLC on water scarcity is a component of the organization's broader grappling with historical and current conservation practices that contribute to inequity and injustice. These case studies provide examples of how we can engage with Indigenous peoples and other marginalized communities to ensure that we are not perpetuating environmental injustice in our work but rather co-creating shared visions that benefit both IPLC and nature.

CONCLUSION

The case studies, research, and IPLC experiences indicate that focusing only on ecological and biodiversity outcomes is especially problematic in the water scarcity space. Water scarcity and stress are deeply complex and systemic problems that require relationship and coalition building to find the big, transformational, and durable solutions that make SCA-scale wins possible. TNC, with its planning and systems-thinking expertise, has a lot to offer in this space in partnership with IPLC. All five case studies offer insights into the water scarcity challenges that IPLC face around the world, institutional and legal shortcomings around engaging IPLC in water management decisions, and the potential for conservation and justice gains when IPLC are empowered to make decisions and manage water. Empowering communities at both the local level to manage water and at the policy level can lead to systems change and resiliency in the face of water scarcity. Checking-in with the case study leads at regular intervals could help us to establish additional key lessons, and their conservation wins could help give credibility for freshwater community-based conservation over time.

GLOSSARY

Community-based conservation (CBC): Conservation that strengthens the voice, choice, and action of Indigenous peoples and local communities to shape and manage land and water in ways that improves peoples' lives and drives biodiversity outcomes. Freshwater CBC projects emphasize freshwater resources and their management (more below).

Free, Prior, and Informed Consent (FPIC)[85]: An international legal standard that assesses whether interactions and decision-making affecting IPLCs reflects best practices for protecting the Indigenous right to self-determination. [From Human Rights Guide]

- **Free** means consent that is given free of coercion, intimidation, or manipulation.
- **Prior** means that consent should be sought not just in advance of any authorization or commencement of activities, but at the earliest stages of project development, before key decisions are made.
- **Informed** means that the IPLC has been given access to all relevant information about the purpose of the project, its size, scope and lifespan, likely participants, and impact assessments. The process must allow time to dig into underlying issues and follow up.
- **Consent** refers to an authoritative and legitimate collective decision made by the IPLC, using its own customary decision-making processes.

Freshwater community-based conservation (fCBC): TNC defines fCBC projects to include two components: (1) a strong connection to freshwater biodiversity, through focusing on the protection and/or conservation of freshwater species and/or ecosystems and the services they provide; (2) a focus on Indigenous peoples and local communities (IPLC) as users and beneficiaries of the freshwater resources. Freshwater conservation goals are pursued by fCBC strategies that emphasize the role of IPLC in decision-making about natural resources. fCBC programs are often strongly linked to other non-fCBC strategies (e.g., hydropower by design, sustainable agriculture), but because communities are often distributed along water bodies throughout river basins of interest, the community can often be an important entry point for system change. fCBC includes a spectrum of approaches that range from the formalized devolution of rights to communities, to practices that emphasize the co-management of resources. fCBC strategies involve many actors, including community members, government officials, and non-profit organizations, with decisions and feedback often occurring across multiple scales.

Freshwater species: Species and/or natural communities that are dependent on freshwater ecosystems (rivers, lakes, wetlands, springs, aquifers, etc.) for all or part of their life history stages. This can include riparian and floodplain species and habitats that depend on freshwater ecosystems for processes such as seed dispersal, but does not include all species that simply use the water in a freshwater ecosystem.

Indigenous peoples and local communities (IPLC): Consistent with the definition adopted by TNC's IPLC team. A "community" usually refers to a well-defined group that self-identifies as a people and/or that has a shared identity, culture, and/or values. Communities contain multiple diverse actors and interests that interact through institutions and change through time. The term "Indigenous and local communities" is used to refer to communities that possess a close and profound relationship with their natural landscapes (territory, area, or habitat) which they depend on for cultural, religious, health, and economic needs. This includes the original inhabitants of a place and/or migrants who have settled in a place who have the aforementioned relationship with the natural landscape. Note that IPLC are usually original inhabitants of a place and thus consider themselves distinct from other sectors of the societies now prevailing in the territories, which they [Indigenous peoples] originally occupied prior to colonization. Indigenous peoples have collective rights recognized under international law.

Justice, Equity, Diversity, and Inclusion (JEDI): From the J.E.D.I Collaborative:

- **Justice**—Dismantling barriers to resources and opportunities in society so that all individuals and communities can live a full and dignified life.
- **Equity**—Allocating resources to ensure everyone has access to the same opportunities. Equity recognizes that advantages and barriers—the 'isms'—exist.
- **Diversity**—All the differences between us based on which we experience advantages or encounter barriers to opportunities. Diversity isn't just about racial differences.

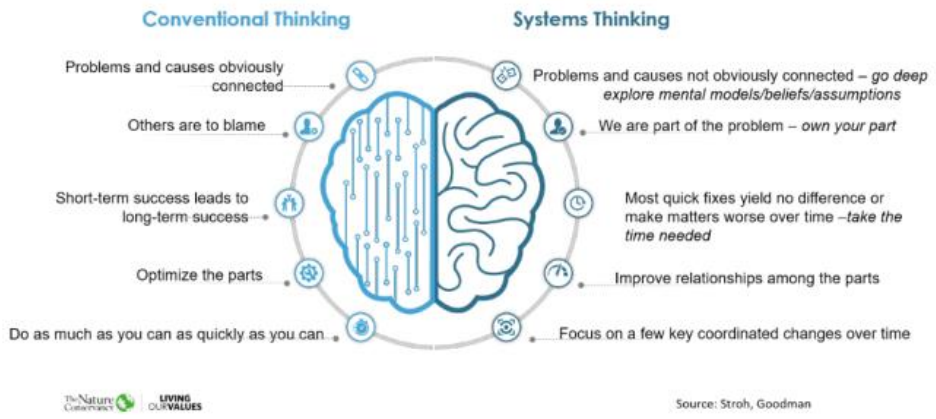
- **Inclusion**—Fostering a sense of belonging by centering, valuing, and amplifying the voices, perspectives, and styles of those who experience more barriers based on their identities.

Mental models: the assumptions, beliefs, and values that people hold about the systems and people around them.

Nature-Based Solutions: the sustainable management and use of nature for tackling challenges such as climate change, water and food security, biodiversity protection, human health, and disaster risk management [TNC].

Rights: Property rights can be defined as the legitimate (that is, recognized) right to use or control resources and to have those rights protected through a variety of statutory and customary systems. Because of their fluid nature, freshwater resources are less likely to be "owned" like land or buildings. Rather, it is important to look at who holds different (and often overlapping) "bundles of rights," including use rights (access and withdrawal) and control rights (management, exclusion, and alienation or transfer). [From Freshwater Practitioner Guide]

Systems thinking: A different way of processing information as summarized in this table from the Living Our Values Insight Report:



Voice, Choice, Action Framework: Short for *Strong Voices, Active Choices: TNC's Practitioner Framework for Strengthening Outcomes for People and Nature*, describes TNC's approach to partnering with Indigenous Peoples and local communities on shared conservation and sustainable development goals. Version 2.0 expected in 2022.

Water scarcity: Definition drawn from Wight et al. (2021)[86] with permission. Water scarcity can be defined as an excess of water demand over available supply.[87] Within this definition are several important components. Freshwater supply or availability depends on precipitation over land which divides into either runoff or evapotranspiration. [88] Water availability fluctuates over space and time, and exacerbations in hydrologic variability due to climate change challenge water management and policy. [89] [90] There are also different types of water demands and uses. Consumptive use (evaporation or transpiration) can be economically beneficial (e.g. intended for a cooling plant or irrigation) or non-beneficial (e.g. evaporation from a lake).[91] Water consumption can either be recoverable (e.g. return flows from sewage systems) or non-recoverable (e.g. flows to the sea).[92] Economic policies and technological changes respectively, influence the demand and supply curves of water. Economic policies (e.g. trade policies, subsidies) drive changes in water use which affect water productivity [93] and comparative advantage.[94] Studies demonstrate that agriculture is the largest water consumer[95] [96] and that globally, the area equipped for irrigation has expanded fivefold over the 20th century. [97] Urban water demand is projected to increase 80% by 2050 and competition between cities and agricultural users could affect hundreds of millions of people. [98] Competition between hydropower and agricultural users [99] and industrial water users [100] also occurs. Water demands for the environment should be considered as well, as environmental flow requirements and management play an important role for freshwater conservation. [101] However, over 40% of global irrigation water use occurs at the expense of environmental flow requirements [102], and groundwater pumping has resulted in environmental flow limits being reached in a substantial number of watersheds.[103]

ENDNOTES

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[4] Indigenous People and Local Communities: those possessing a close and profound relationship with their natural land and/or aquatic territory, area or habitat, as they depend on these habitats for cultural, religious, health, and/or economic needs. This includes the original inhabitants of a place and/or migrants who have settled in a place who have this relationship with the natural landscape. From TNC's 2015 IPLC Strategy.
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