

AN ABSTRACT OF THE THESIS OF

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In transboundary river basins, political borders oftentimes trace shared rivers across a basin. A border between territories can be seen as a space that is separated; however, it is actually one with the potential to unite populations and environments. A river basin is generally defined by its topography and hydrology. New paradigms in river basin management point towards expanding this definition to include culture, values and placed-based knowledge (Jackson 2011; Jackson et al. 2015). By including these aspects, we can have more informed and comprehensive planning that addresses the needs of river basin residents (Wolf 2008; Jackson 2011).

This research explores and addresses how incorporating culture and values is being implemented and included in river basin management plans (Wolf 2008; Cosens 2012; Jackson and Palmer 2012) through a case study of the Sixaola River Basin— an international transboundary river basin located in Central America that is shared between Costa Rica, Panamá and five indigenous communities: the Bribrí, Naso, Cabecar, Brunca and Ngöbe. This case study exemplifies how these practices are being applied to water resources management at international, national and local levels. Through collaborative participatory research, videography, photography and storytelling, I explore lessons learned in the Sixaola River Basin

and take note of how this approach can be used in other international transboundary river basin management plans worldwide (Jackson et al. 2015). Findings in this work include: 1) the importance of integrating culture and values in river basin management, 2) the effectiveness of co-managed research, and 3) the value of increasing communication and information exchange of river basin residents.

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Navigating Cultural Currents: The Sixaola River Basin Story.

by
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I understand that my thesis will become part of the permanent collection Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Dacotah-Victoria Splichalova, Author

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FORWARD

Riding on an old yellow school bus high above in the jade colored mountain jungles of Costa Rica and Panamá, it's about 100' degrees Fahrenheit, and I'm sticking to and slipping on the seat. Looking out the window, I see the expansive valley below of what I am told is the great Parque de Amistad, "Park of Friendship." The river between the hills is a winding snake. Large banana trees line its bank — bananas are everywhere.

All of sudden, I feel a tap on my arm. I turn and look forward. Surprised, I see man staring directly at me. He asks, "*Eres la mujer del agua?*" I respond, "what?" Again, not moving his gaze from my eyes, he asks, "*Eres la mujer del agua?*"

Are you the water woman?

I respond, "Yes."

He says, "*Good, because I need to tell you my water story...*"

The man, I will call him Andres, recounts that he has heard of a *siqua*, 'outsider,' traveling around, asking people across the communities' about their rivers: What is their river name, what their river means to them, what changes they may have seen over time, and, also, what their thoughts on this might be?

Walking down the narrow dirt road, Andres takes us to a river, one that he now calls a small creek. He says it is known by a different name now, one that does not represent the great river it once was. He tells the story how this river was diverted by an aqueduct system, about 5 years back, that has never gotten off the ground.

He explains a conflict over whose responsibility the water is or is not and spoke of his God here. What's left of this river drains into a larger one — first the Yorkín then the Telire to

the Sixaola, before eventually winding its way down the valley to the Caribbean Sea. Andres says environmental and human damages caused downstream are killing it.

He then says,

“Our rivers here are sacred and are the most important thing for our communities. They provide and sustain our lives. Simply, if the river disappears—so, do *We*.”



Figure 1. Suretka, Bribri Territory, Talamanca, Costa Rica

NAVIGATING CULTURAL CURRENTS: THE SIXAOLA RIVER BASIN STORY.

CHAPTER 1 - INTRODUCTION

A river begins and ends somewhere —spanning across a specific geography, time and space. Its ephemeral banks expanding and contracting to the pulse of the Earth's rhythms are blanketed on either side by a plethora of biodiversity. The river enlivens all of life that is woven together—plant, animal and human. Its residents, too, feed the river.

The richness of a river's creation does not reside solely in its waters alone. The interconnectedness of its multiple channels— the distance a river travels across a landscape and how it interactions with residents is where its story begins (Wolf 2008).

The geography of a river system, from its birthplace to its outlet, makes up a river basin. A river both shapes and is shaped by the surrounding landscape— the climate and population that influences the holistic story of a river basin and its changing waters. Unique peoples, environments and natural resources within each river basin form distinct conditions that are sometimes favorable and other times competitive for sustaining and maintaining a shared river basin system (Giordano and Wolf 2001). No two basins are alike. As each river basin is dependent upon the combinations of these factors, it can be said that each basin has a unique story to tell.

River basin interdependencies are made more complex when crossing international political boundaries. A political boundary, a border, is an imaginary line separating two territories. These imaginary lines often trace rivers (Wolf 2008). The border between territories can be seen not as a space that is separated but rather one that unites the populations and environments on either side.

Generally when a river basin is defined it's defined by its physical makeup, i.e., topography and hydrology. New paradigms in river basin management point toward expanding this definition to include the culture, values and integrated placed-based knowledge of river systems across a basin (Jackson 2011; Jackson et al. 2015). These water resources management practices foster the potential to support a more-informed, calculated and comprehensive planning process when addressing the water needs of river basin residents (Wolf, 2008; Jackson, 2011).

A novel consideration is to explore and address how the incorporation of culture and values held for water resources within river basins is being implemented and incorporated in river basin management plans worldwide (Wolf, 2008; Cosens, 2012; Jackson & Palmer 2012)—what lessons are being learned and taking note of how this approach is realized in other water resources river basin management plans (Jackson et al., 2015). Visiting one of these river basins would be useful in learning how the practices are readily applied to water resources management at any spatial scale: international, national and local (Wolf, 2008). Exploring opportunities to bring river basin managers and practitioners directly to our river basins, specialists that impart this knowledge first hand, and spark the conversation of how culture and values are or are not considered within our own water resources planning can prove useful. This opportunity fosters creating a dynamic information exchange platform to ignite conversation on river basin management as the world continues to face increasing challenges with an increasing limitation of available water resources (Wolf 2008). With certain types of globally shared learning experience opportunities, basin communities are empowered to explore what can be done to ensure that each basin is 'getting it right' for basin residents—both environmental and human, and guaranteeing the water resources are well managed.

How then might the consideration of incorporating this emerging paradigm of culture and values of water be realized in river basin management plans (Wolf, 2000; Jackson, 2011; Cosens, 2012; Jackson & Palmer, 2012)? Ideally, academic research and water resource researchers can support and facilitate making these connections between basin managers and basin residents. Both the actions and responsibilities for researchers here include: 1) cultivating an information exchange platform across the basin through implementing both existing and pioneering communication and knowledge exchange tools that are culturally conducive, meaning that considerations regarding the ability of the resultant data to be readily digestible by the community groups for which the data is generated takes precedent; and 2) implementing support efforts for river basin residents and basin managers to share their experiences and receive the experiences of other water resources planning and coordination stories outside their respective river basins (Garrett, 2011). In this work, the inclusion of culture and values on water resources in river basin management plans is coupled with the researcher as an amplifier, which are considered two parts of the same whole when realizing the multiscalar critical information exchange potential for water resources management across river basins worldwide (Jackson, 2011).

Incorporating cultural water resource values in river basin management plans while dually addressing the facilitative role researchers play in these efforts allows critical lessons to be learned from ‘well-managed’ watersheds and river basins. In order to not repeat deficient river basin management planning it is necessary to gain insight into the difficulties faced by well-managed river basins, i.e., where these basins groups went wrong in their planning and coordination in the past and what was changed in response, if anything, as a remedy. According

to UN-Water (2008, 2009, 2016), in the United States, Canada and Australia there are ‘good’ examples of well-managed river basins within the context of incorporating culture and values into planning efforts. Historically, a counter to well managed basins are riparians that are less developed and maintain a lower capacity; examples include riparians across Central America for reasons of limiting resources (both financial and human capital), tense and disparate political conditions, and lacking organizational structures in place to foster the coordination of a river basin’s water resources (IUCN 2010, 2012).

Well-managed river basins or not, within the context of the current state of the world’s water resources, individual and collective needs for water promote both the potential for collaboration and the potential for conflict in international transboundary river basins; wherein is defined as two or more countries that share a river basin (Wolf, 2008). The transboundary river basin management of water resources can be complicated. Discussing these complexities, Wolf (2002) states that transboundary river basins demand, “a more-complete appreciation of the political, cultural, and social aspects of water, and that the tendency is for regional politics to regularly exacerbate the already difficult task of understanding and managing complex natural systems” (p. 1). Navigating shared water systems at the local, national and international level has been the focus of increased attention over the past decade through the emerging lens of water security (Cook & Bakker, 2012; Lautze & Manthritilake, 2012).

According to (Petersen-Perlman et al., 2012, p. 1), water security is defined broadly as “the availability of freshwater in the right quantity and quality, and location, at the right times, for the people and environment dependent upon this resource to live. Factors such as climate change, environmental degradation, or the reallocation of water resources from one location to

another, especially in the context of transboundary river basin management, only enhance the need to address water security. In international transboundary basins, forming joint and collaborative efforts to enhance water security across a shared basin is made more challenging by the multiple and differing political structures, political will and competing priorities among multiple riparians toward allocating resources for the water security of a basin. An added layer to the political challenges faced by transboundary basins in coordinating water security is the particular geographic landscape of the basin. Physical barriers, such as hard to reach mountainous regions, can lessen communication and data collection potential for river basin managers. Working across these complex political and geographic landscapes when aiming to address water security, it is easy to imagine how much more difficult incorporating culture and values into water resources management for river basin can be for all involved riparians and river basin residents.

It is most useful to present an example of an international transboundary river basin that is facing the gamut of these purported challenges and barriers towards enhancing water security across shared waters head-on. The *Sixaola River Basin Story* is a compelling study in geographic research of water resources management within the context of an international transboundary river basin system in Central America—including Costa Rica, Panamá and the five indigenous communities residing across both geopolitical identities. With its concerted collaborative management efforts, The Sixaola River Basin positions itself as an evident outlier among both its Central American counterparts and other international transboundary river basins situated across more developed riparians. Current collaborative international transboundary initiatives being carried out within the Sixaola River Basin embody the concept of uniting people and the

environment and incorporating the values and cultures of water resources and natural resources into planning the development and enhancement of water security across the shared basin.

This research presents an emerging paradigm in water resources research of harnessing an awareness and understanding of how culture and water resources values are incorporated into planning processes across an international transboundary basin, and how the incorporation of culture and values help form the underbelly of current collaborative and cooperative water resources management actions within a multi-stakeholder river basin group working towards enhancing water security. Thus, this research brings to light *The Sixaola River Basin Story*. Implications and outcomes of this research stretch far beyond the Sixaola River Basin. This work introduces a working model for supporting enhanced understandings, communications and the coordination of initiatives towards incorporating the culture and values of shared water resources management plans into international transboundary basins worldwide.

1.1 Conceptual Framework

For this research, my conceptual framework is expressed as the culture and values held for water resources across international transboundary river basins, coupled with the responsibility of a water resources researcher to act as an amplifier and facilitator—or bridge—for the gathering and incorporation of this knowledge into river basin planning that jointly crafts the best dissemination methods and channels of data for river basin managers and residents.

Exploring shared water resources through the collective stories of the Sixaola River Basin residents, we are walked through the role that diverse human societies and cultures play in valuing, managing, preserving and using water. Further, we learn how the presentation and

understandings of the shared valuation of water resources can lead to collaborative and cooperative efforts and ‘working models’ of well-managed water resources in the context of international transboundary river basins.

Expounding upon the unique conditions necessary to seed collaborations and cooperative efforts towards enhancing water security within an international transboundary river basin context with *The Sixaola River Basin Story*, I present my conceptual framework: culture and water resources values, and the designated role of the water resources researcher working ‘co-cooperatively’ in academic research with basin residents as the facilitator plays in eliciting this knowledge within the context of international transboundary water resources management, water security and collaborative governance (Jackson & Palmer, 2012). Next, careful examinations are made of the historically underused research methodologies of ethnography, community participatory action and storytelling can be used in concert with one another in water resources research (Garrett, 2011; Coombes, Johnson, & Howitt, 2014). I also incorporate the use of videography and photography tools to support the conceptual framework within this research project. In this project, the role of the water resources researcher is examined to enhance understandings of how this conceptual framework can and should be replicated and expanded upon in future water resources research. In support of this claim, I will present examples as to how the selected methodologies and research tools in this thesis project are beginning to be more widely implemented across multiple international basins globally including The Murray-Darling Basin in Australia (Jackson et al., 2008, 2015; Jackson, 2011; Palmer, 2011, 2011; Jackson & Palmer, 2012; Jackson & Barber, 2013; Palmer, Riedy, & Mitchell, 2016) the Mekong Basin in Southeast Asia (Watson, 2012), and the Nile Basin in Africa (Barnes, 2017).

The goal of this study is to show how using the methodologies selected for this study—particularly storytelling and my conceptual framework of culture and values of water resources—combined with the water resources researcher serving as a facilitator, can help craft more holistic data in multi-stakeholder, collaborative management practices and approaches within international transboundary basins. Furthermore, this inclusive framework and collective methodology also offers valuable insights into the consequences and limitations of past water resource management, a historically top-down and siloed approach, in sustaining the viability of human communities and their environments within an international river basin when culture and values are not taken into consideration.

1.2 Research Problem

This study aims to address the following research problem: Water resources management in international transboundary basin areas is impacted by the different governance structures and their influence/control on the quantity, timing and location of water distributed across the shared basin and, thus, warrants investigation as to how water governance structures impact water security across a transboundary basin. Oftentimes within water governance structures, culture, values and integrated place-based knowledge of a river basin are not taken into consideration with respect to water security. This omission fosters the potential for governance structures to overlook basin residents' critical inputs towards the sustainable planning and management of water resources across an international transboundary basin.

1.3 Research Question

It is with these provided understandings in mind—i.e., the importance of culture, values and integrated place-based knowledge of water resources across a river basin with respect to enhancing water security across an international transboundary basin, coupled with the role of the water resources researcher as an amplifier for facilitating and accessing vital data into river basin management planning—that I have shaped the core question of this project: How does a river basin tell its own story?

1.4 Justification

Establishing a comprehensive methodology for transboundary river basins and for water resources researchers to answer how a river basin tells its own story stimulates critical revelations on collective place-based values that are often veiled by water managers, policy makers, international organizations, state governments, indigenous governments and basin residents (Jackson et al., 2008, 2015; Jackson, 2011, 2011; Jackson & Palmer, 2012). Recent cases around the world where rivers and their basins are telling their own stories include New Zealand and India. In March 2017, New Zealand sanctioned the first “living river” on planet Earth by declaring the north island’s Whanganui River as a living entity with its own rights, in support of the Maori’s belief systems and governmental structures of NZ. After 160 years of persistence in the courts of New Zealand, the Maori people succeeded in their efforts to grant the Whanganui river the rights of legal personhood. Long considered a sacred ancestor, the river’s deeper identity was reclaimed and restored. Te Awa Tupua, as the Maori people know it, is the third largest river on the north island of New Zealand and was reinstated to her ancient status as a beloved member of the Universe’s community. Only in the last several centuries of western

colonization had she been consigned to the status of a thing, something to be used, owned and managed (Te Awa Tupua (Whanganui River Claims Settlement) Bill; Pearlman, 2017).

Immediately following New Zealand, Northern India granted legal personhood and voices to the sacred Ganges – Ganga Ma (Mother River), and Yamuna Rivers, two vast and powerful rivers of life flowing from the Himalayas. Long considered spiritual goddesses by the Hindu people who have traditionally depended on them for their physical and spiritual well-being, the two rivers have been given a voice in the court of human law. As persons, they may speak to protect themselves against the overwhelming industrial assaults and desecration that threatened their very survival as carriers of life (The Guardian, 2017; Hindustan Times 2017).

Ideally, understanding how a river basin tells its own story creates a richer context about the variances of people, values, culture and places within the entire geographic expanse of a basin; however, it can also bring to light the collective nuances shared by river basin residents when aiming to create collective, sustainable and beneficial water resources management decisions and plans that support the livelihoods, environments and futures of stakeholders.

In the following sections, I provide a description of the Sixaola River Basin field site, followed by a literature review of international transboundary water management, water security, and collaborative governance. I provide an explanation of the methodologies and research processes selected for this study coupled with explanations on how the particular geographic and water resources research methodologies elicited data-rich results. Further, I explore why it is vital that the methodologies used in this research project should be more readily considered in current geographic research aimed at international transboundary water resources management and water resources research, in general. I explain the co-managed spirit of this research and

highlight critical considerations made on the format of data generated by the selected methodologies, and how the methodologies, when employed together, are culturally conducive to the river basin communities, residents and managers— ensuring that research data are in a form readily digestible for basin residents. With this in mind, the research then presents the role of the water resources researcher as a facilitator of knowledge, and critical considerations are necessary when implementing the methodologies in this project across other international rivers basins.

Concluding this work, I address my research question—How does a river basin tell its own story? —through a summarization of the data yielded in the context of the *Sixaola River Basin Story* and a validation of the comprehensive methodology established in carrying out this research. In doing so, I provide robust recommendations and conceivable strategies for water resources researchers endeavoring to implement these research practices in other international transboundary river basins. I explain why the culture and values of water resources, and the culture of knowledge sharing in the communities themselves, should to be taken into consideration when selecting methodologies that will result in relevant, understandable and practical data for research participants with whom we (researchers) collaborate in this work. I then offer an analysis derived from the data in this project for the current working group—the Binational Commission of Sixaola River Basin of Costa Rica-Panamá— where I provide the group with several suggestions for enhancing water security across the shared basin waters, and include how this research offers implications for international transboundary basins outside the Sixaola River Basin.



Figure 2. The Community of Shirroles, Talamanca, Costa Rica

1.5 Field Site

In Central America, there are 23 international transboundary basins that represent approximately 36.9% of the territory. Due to limited capacity, both in terms of financial and human resources, and also in maligned political agendas across the region, in most of these basins there are no joint agreements for their management (Delli Priscoli, 2016). The Sixaola River Basin is an international transboundary basin that covers 2,890 km, of which 81% is located in Costa Rica and 19% in Panamá. Between Panamá and Costa Rica the basin stretches nearly 500 km from coast to coast—where from the mouth of the Sixaola River in the Caribbean Sea to Boruca Point on the Pacific Ocean it runs through extraordinarily diverse microclimates and natural ecosystems (UNEP, 2013). In addition to its incredible biodiversity, the

transboundary zone of the Sixaola Basin has other important wealth both in the human capital and culture of the people who live there. These populations include five indigenous communities: The Bribri, Cabecar, Brunca, Ngöbe, and the Naso. Also living within the Sixaola River Basin are mestizo, African descendants and migrant populations from various parts of the world (IUCN, 2013).



Figure 3. The Sixaola River Basin, Costa Rica-Panama

The Sixaola River Basin can be divided into three sections: Talamanca, Sixaola and Bocas del Toro. Talamanca consists of an alluvial valley formed by several different rivers, namely the Coen, Uren, Lari, and Telire. They originate in the Talamanca mountain range, whose highest peaks reach over 3,000 meters, and merge with one another until they reach the Sixaola River. The Sixaola River Basin is comprised of a narrow river valley that opens up to a broad coastal plain. The confluence between the Yorqín River and the Sixaola River can be considered the borderline between the two sections of the watershed. While most of the Sixaola

watershed is contained within the Province of Limon in Costa Rica, the Sixaola River Basin is equally shared by the provinces of Changuinola and Bocas del Toro in Panamá, and the province of Limon in Costa Rica.

Historically, transboundary relations between Costa Rica and Panamá have been characterized by friendship and cooperation. The Sixaola River between Panamá and Costa Rica is considered by the people as a “living space” where hundreds of people travel from one side to the other, to live, trade and communicate with one another every day (Binational Commission of the Sixaola River Basin). The transboundary of the Sixaola River is considered one of the most peaceful and conducive to cross-border cooperation in the Mesoamerican region (IUCN 2013). However, historically, the Sixaola River has suffered from water quality, quantity and distribution problems as a result of severe deforestation practices and increased industry in the basin, leading to bank erosion and siltation, flooding, and runoff into the tributaries of the Sixaola River (IUCN, 2013).



Figure 4. Tributaries of the Sixaola River Basin, Costa Rica-Panama

Within this international transboundary Basin, the Sixaola River system changes its course routinely. This not only creates problems relating to the border, since the river establishes the border between Costa Rica and Panamá for approximately 100 miles, but many farms are also bounded by river, which means that producers gain and lose territory as the river changes its course. Furthermore, this area is highly flood-prone. Flooding occurs almost annually between December and January (IUCN, 2013) and again beginning in August (Researcher's field notes 09/2016). The construction of a highway on the Costa Rican side, which has no drainage system, worsened flood conditions for communities located primarily on the Panamánian side (IUCN, 2013). In response to the increased damages caused by floods, dikes were built out of iron, dirt and stones in Panamá to contain the flood. These structures, on both sides of the river, only cause more damage when flooding occurs (GWP, 2010). Pollution, in general, has detrimentally affected this transboundary river basin system due to historic mining in the region, unmanaged waste disposal, and other pernicious factors such as warming waters due to climate change only further environmental hazards and degradation (IUCN, 2013). All of these factors have led to health problems for the residents and the environment that are dependent upon the Sixaola River Basin system as their primary freshwater resource.

1.5.1 Introducing the Binational Commission of the Sixaola River Basin, Costa Rica-Panamá

In 2009, with the support of the Global Environmental Facility (GEF) and the Inter-American Development Bank, the National Environmental Authority of Panamá and the Ministry of Environmental, Energy and Telecommunications of Costa Rica began executing the first binational with Panamá project called "Integrated Management of Ecosystems in the

Binational Watershed of the Sixaola River.” The aim of this project was to contribute to sustainable use and conservation of biodiversity and the water and soil resources, to promote and integrated management of the Binational Sixaola River Basin. According to IUCN (2013), this relationship of friendship and cooperation has also enabled joint management of La Amistad International Park, an important part of La Amistad Biosphere, designated as a UNESCO World Heritage Site due to the importance of conservation of this area. This experience has established an important precedent for developing future natural resource management and conservation projects in the Sixaola Basin between the two countries and the five indigenous communities, as it contributes to the wider global conversation with regards conservation efforts, coupled with communities historic and ancestral land rights. This Binational Commission has furthered and facilitated convergence and joint-work in the Sixaola River Basin, as was the case for the building of a temporary bridge over the Sixaola River by the two Ministries of Public Works with financing from both countries, that now provides better and safer conditions for the many who take the international route across the ‘river’ border everyday (IUCN, 2013).

Addressing these concerns requires comprehensive collaborative efforts that support the active and constructive participation of different international, national, and local governmental institutions, civil society, and the private sector of both nations and the indigenous governments, to achieve enhanced levels of sustainable water management, water security and human development for the Sixaola River Basin.

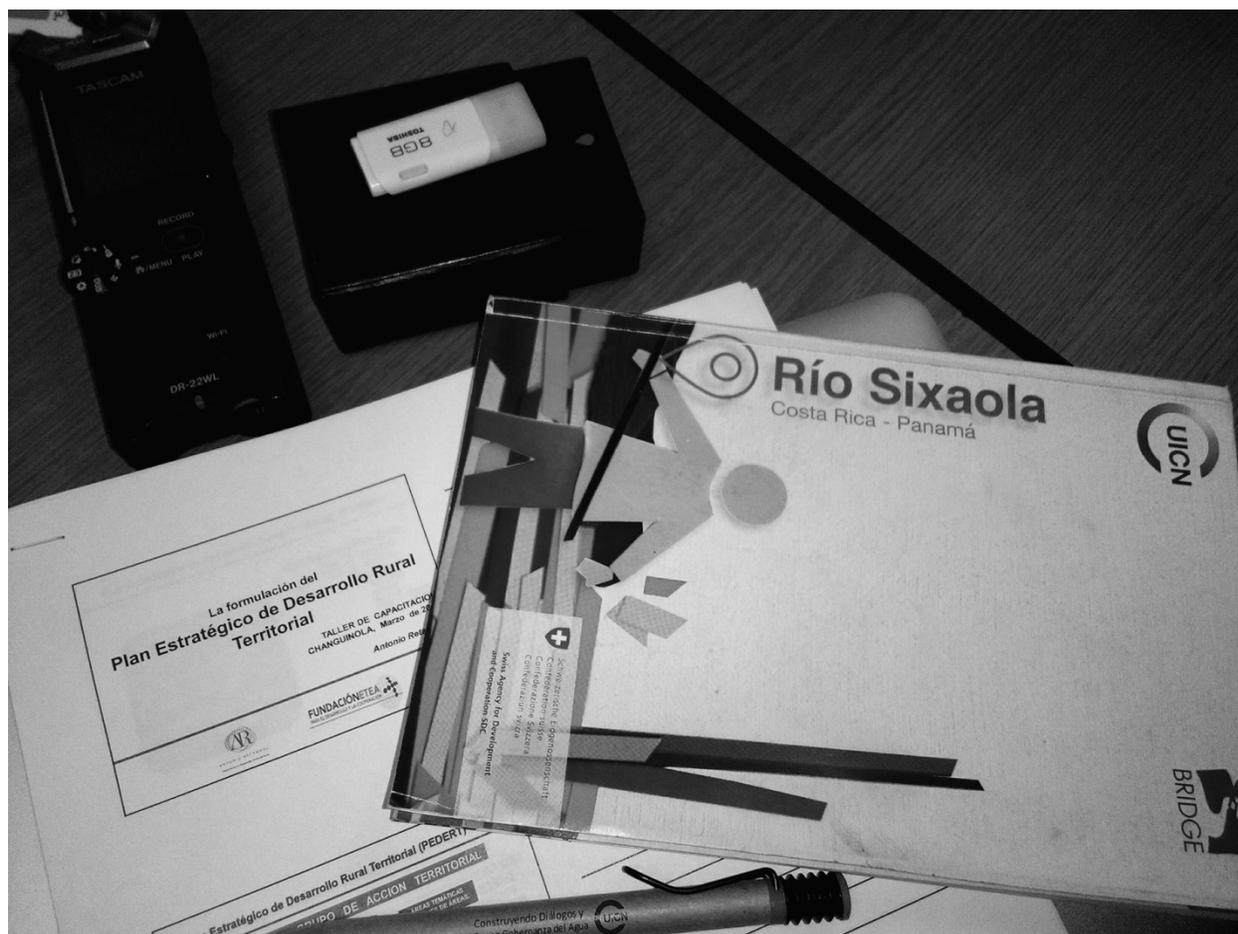


Figure 5. Binational Commission meeting, Changuinola, Panama. March 2015

The Binational Agreement of Costa Rica and Panamá was initially signed in 1992 by the presidents and foreign ministers of the two countries. The main objective of this transboundary agreement is to “Contribute to the development of the social, economic, commercial, environmental and political improvement and enhancement of the Sixaola Basin, in turn, deepening the cooperation and integration of water resource management between the two countries” (Binational Commission). The Binational Commission of the Sixaola Basin incorporates operational mechanisms such as sectorial technical commissions and technical executing units for coordinated binational initiatives among different sectors and stakeholders,

including natural resources, health, agriculture, energy, migratory affairs, tourism and human development. The Binational Commission's highest decision-making entity is the Permanent Binational Commission, coordinated by the heads of Costa Rica's Ministry of National Planning and Economic Policy, and Panamá's Ministry of Economy and Finance. Binational Commission members also include the governors of the Panamánian border provinces, mayors of Costa Rican border municipalities and representatives of the main institutions in both countries (IUCN, 2013). In 2013, executive secretariats were established to follow up on agreements of the Permanent Binational Commission and coordinate all actions therein. A binational action plan was developed in 'a participatory form' by the governments of the two countries, aimed at addressing the primary social, production and environmental needs of the Sixaola River Basin that were identified by the local actors (basin residents) themselves at that time (IUCN, 2013).

When speaking about the Binational Commission of the Sixaola River Basin of Costa Rica and Panamá in 2013, IUCN released the statement, "Around this transboundary of the Sixaola River that separates us, there is a border that unites us." Water has no political borders or boundaries (Wolf, 2004). Presently in international transboundary basin management, there is a growing awareness of the need for integrated, adaptive and collaborative approaches that simultaneously take into account a whole range of exchanges and that engage stakeholders in the entire management process (Cortner & Moote, 1994; Pahl-Wostl, 2002, 2007). Effective transboundary basin management requires collective action and the resolution of conflicts (Pahl-Wostl, 2007). Recent analyses emphasize that effective governance based on principles of equity, efficiency and diverse knowledge integration are as important for dealing with water resource management problems as technological solutions (GWP-TEC, 2000, 2004). Cultural

and social values are advocated as crucial to understanding barriers to the adoption of technologies and water resources management strategies and might also foster exchanges of experience between countries (GWP-TEC, 2000, 2004).



Figure 6. Binational Commission meeting, Puerto Viejo, Costa Rica. February 2015

The objectives and bylaws of the Binational Commission of the Sixaola River Basin assert for the commission to uphold an awareness and sensitivity towards the basin's dynamic and rich culture and values across communities. Further, the bylaws describe that within the Binational Commission's collaborative efforts, the commission will not, by any means, culturally appropriate community members within commission practices, processes, or actions—citing

indigenous communities of the Sixaola River Basin when it comes to electing how and who will participate in this working group (Binational Commission). The Sixaola River Basin Commission for its members demonstrate a diplomatic relationship, or model, where by whatever means available and conceivable, the commission believes it should be demonstrated and communicated to other international transboundary river basins communities when it comes to the planning and coordination of water and natural resources across multiple political boundaries.

CHAPTER 2 – LITERATURE REVIEW

2.1 International Transboundary River Basin Management

No matter the region or river basin, water secures the fabric of society (Watson, 2015; Wolf, 2004). Water is essential for life, for livelihoods that produce food and for all other life as well (Peterson-Perlman et al., 2015). Water additionally secures economies, aiding as an input toward varied production and service activities with a region that present widely diverse water requirements (Sadoff, 2002; Wolf, 2004). Considerations that some water must remain in the environment to provide environmental services can be taken into account when managing water resources at any scale (UN-Water, 2008, 2009). Thus, the need to mitigate impacts that population growth, development of industry, agricultural demands, economic demands and climate change impose on water resources is a reality for international transboundary water basin management (Peterson-Perlman et al., 2015; Cook and Bakker, 2012).

There are currently 309 international transboundary basins in the world (TFDD). Some 600 basins have agreements over shared waters among basin and sub-basin entities, where the others currently do not (TFDD). When transboundary rivers enter and exit from one riparian country to the next, there may or may not be political structures in place dedicated to the management of these waters. Recognizing that decisions can be made unilaterally— and that conflicts over livelihood and environmental sustainability may arise due to risks associated with inadequate water governance policies and practices—can bring into question how to effectively manage and govern water resources across a shared basin. Unilateral decisions made by transboundary riparian states have resulted in adverse impacts, such as flooding; community displacement; threats to livelihoods; environmental degradation; and economic and political

turmoil across basins (Vinogradov & Langford, 2001; Fischhendler, Dinar, & Katz, 2011; Giordano & Wolf, 2001; Comair et al., 2013; Kliot, Shmueli, & Shamir, 2001; Biswas, 2011; Kaufman et al., 1997; Hensengerth, 2009; Kiker, 2008; Biba, 2012).

According to Sadoff and Grey (2013), transboundary river basins contribute “another layer of complexity” in the construction and “balance” of shared water institutions, water governance and water infrastructure. In the academic literature (Beach et al., 2000; Giordano & Wolf, 2001; Wolf et al., 1999; Wolf, 2007; Wolf, 2008) transboundary water resources are discussed as both having the potential to cause conflict and create the opportunity to explore real, shared interests among riparian states and find common ground.

With degraded water quality becoming more of a concern in the latter half of the 20th century, there has been a growing emphasis on the creation of joint institutions to restore and protect transboundary freshwater and marine ecosystems (Sadoff & Grey, 2013). Cooperative efforts are increasingly focused on sharing benefits, rather than only water itself (Giordano & Wolf, 2003). Where water allocation is generally perceived as a zero-sum game, cooperative transboundary water management provides opportunities to increase the scope and scale of benefits from international rivers, presenting benefits that may then be shared by mutual agreement (Giordano & Wolf, 2003; Sadoff & Grey, 2002, 2005, & 2007). The shared benefits, or “basket of benefits” (Giordano & Wolf, 2003) of cooperative transboundary water management are many and may include: flood management and mitigation, improvement to water quality, or infrastructure development for irrigation and power. These benefits can provide vital incentives to establish and sustain transboundary water governance institutions and organizations (Sadoff & Grey, 2005).

Sadoff and Grey (2013) determined that significant evolving practices in transboundary water governance have included: innovations in environmental and social impact analyses (particularly of local project-affected populations and environments); in stream flow management; environmental set-asides; demand management; re-engineering and re-operations; enhancement of natural water storage and regulation; and lastly, benefit sharing with affected populations and transboundary neighbors. Water institutions that promote equity, efficiency, participatory decision-making, inclusion, sustainability and accountability are more likely to achieve and sustain a higher degree of water security than those that do not include these considerations (Sadoff & Grey, 2013). We then may pose the question: what might ‘functioning’ cooperation and collaboration over shared water resources look like in an international transboundary water management context? Agreements between riparian states suggest that multi-stakeholder participation, may lessen water security concerns (Peterson-Perlman et al., 2012).

2.2 Water Security

Much of the existing literature on water security in international transboundary river basins emphasizes the importance of interstate cooperation (Peterson-Perlman et al., 2015). In the policy literature, for example, cooperative water resources management is the means to achieve water security, according to UNESCO (2008). It is also argued that institutions that govern shared waters should consider ‘effective transboundary water management’ (Cosgrove, 2002, p. 75). In the UN Report (2008) “Transboundary Water: Sharing Benefits, Sharing Responsibilities” (2008), effective transboundary water management is defined as, “it starts at

the national level, where coordination and cooperation between different ministries and water related institutions is needed, as are sufficient financing and political commitment” (p. 15) Some common obstacles are conflicting mandates, disjointed authority and limited capacity of national institutions, citing “The lack of strong political will to develop and implement the laws and agreements are needed” as further hindrance towards establishing effective transboundary cooperation (UN, 2008, p.1). Similarly, a report published by the Royal Academy of Engineering (2010, p. 6) on global water security points out how ‘international treaties’ are the yardstick for ensuring water security between states sharing waters. The report argues the importance of establishing mechanisms for “international coordination’ that could guide national and binational responses (Lankford, 2013). In the academic literature on water resources management, Tarlock and Wouters (2010) purport that the concept of “hydro-commons” is useful to address global water security from a legal perspective. This idea of “hydro-commons” disassociates water scarcity from interstate competition and instead encourages the peaceful management of shared waters using legal principles, such as equitable and reasonable utilization (UN Watercourse Convention). Petersen-Perlman et al. (2012) frame water security as a negative concern for basin states, citing factors that lead to competition of water resources such as upstream versus downstream users, water rights, and the social and political history of basin states, and thus argue the importance of fostering cooperation and collaboration. The UN asserts that riparian states that, “institutional and human capacities are crucial and recommend that riparian states should have a broad competence and skills that bridge disciplines (UN 2013, 6).” And continuing this discourse on effective transboundary water management in relation to water security, “the capacities of managers, especially at the national and local levels, should be strengthened not

only to raise understanding of the complexities of managing shared water resources, but also to derive the benefits made possible through cooperation” (UN, 2013, 6). Further, the existing literature treats water security as both something to achieve or avoid in transboundary river basins, and the need for collaboration and cooperation is associated with this concept (Peterson-Perlman et al., 2012).

2.3 Collaborative Governance

In place of several sectors of society working on a common issue individually, an emerging level of integrated political and social engagement has taken form in the newer paradigm of collaborative governance (Ansel & Gash, 2007; Cosgrove & Rijsberman, 2000). According to the literature on collaborative governance, implementing collaborative management requires attention to the process(es) of governance used to carry it out. In this context, “governance is the process of resolving trade-offs and of providing a vision and direction for sustainability, management is the operationalization of this vision...” (Boyle et al., 2001, p. 122). By definition, governance will involve trade-offs and, thus, may not lead to the perfect scientific result for the ecological system (Cosens, 2012). Though collaborative and cooperative management is a step in the right direction, without integrating social and cultural components can make the same mistake as traditional management by optimizing for a subset of the system, i.e., the ecosystem (Cosens, 2012).

Coupled with collaborative management, an appropriate form of governance may address the entire social-ecological system (Cosens, 2012). The Columbia River Basin, an international transboundary basin shared between the United States, Canada, First Nations and Native

Americans, has an internationally respected water resources management agreement (Cosens, 2012). The Treaty of the Columbia River Basin (The Treaty), implemented first in 1964, did not consider the needs of fish, what a “healthy river looks like”, treaty fishing rights of the local indigenous populations, values of ancestral communities, or cultural resources that are now fully protected under modern laws (Cosens, 2012). The U.S. and Canada negotiated the Treaty to last at least 60 years, i.e., 2024 (Cosens, 2012). The Treaty as it now stands allows parties to terminate it, but they must provide a ten-year notice of their intent to do so. That ten-year window opened September 2014.

Despite the international acclaim of the Treaty, Native Tribes (U.S.) and First Nations (Canada) were not consulted during the initial negotiation of the Treaty; as a result, according to the tribes, the Treaty fails to include tribes or tribal values and interests (Cosens, 2012). The tribes’ participation in “The Columbia River Treaty 2014/2024 Review” was viewed as critical for protecting tribal values, rights and interests, including improving ecosystem functions and ensuring favorable conditions for other tribal resources across the basin (Cosens, 2012). In fall 2010, the Columbia Basin tribes began participating in the Treaty Review process. The tribes expanded the agreement of the U.S. to regard ecosystem function as “an equal” partner with flood control and power production during the Treaty Review and include measures to restore and preserve tribal resources, values and culture. The tribes also sought representation on the U.S. negotiating team if changes to the Columbia River Treaty are discussed with First People’s and Canada.

In the Columbia River Basin, efforts are underway that attempt to predict changes and understand whether the predicted changes warrant Treaty modification. In addition, many view

the Treaty review as an opportunity to connect domestic and local efforts on ecosystem restoration to international operations under the Treaty, and to bring greater transparency and avenues for public input to implementation decisions. To remedy past faults of the Treaty, e.g., flooding and restricting traditional fish passageways, a shift in governance mechanisms working from a top-down approach to a more adaptive and collaborative bottom-up approach, inclusive of culture and basin communities, is being sought (Cosens, 2012).

For Ansel and Gash (2007) collaborative governance is defined as a “governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets” (p. 544). This definition stresses six important criteria: (1) The forum is initiated by public agencies or institutions; (2) participants in the forum include non-state actors; (3) participants engage directly in decision making and are not merely “consulted” by public agencies; (4) the forum is formally organized and meets collectively; (5) the forum aims to make decisions by consensus (even if consensus is not achieved in practice); and (6) the focus of collaboration is on public policy or public management. This is a more restrictive definition than is sometimes found in the literature, as it discusses nothing on actualized agreements in place as a result of collaborative governance.

Water scholars, policymakers and other stakeholders over the last decade generally agree that improving water governance is a key solution to building water security and water resource management (Rogers, 2002; Hoekstra, 2006; GWP, 2000; UN Millennium Assembly, 2000; Hague Ministerial Declaration, 2000). The World Water Vision 2000 Report, for example,

pointed the blame at bad institutions, poor governance, insufficient incentives and poor allocations of resources as root causes of the problem (Cosgrove & Rijsberman, 2000) when it comes to riparian states not collaborating over shared waters. Elaborating on barriers to collaboration, the UN Water report (2008) asserts that:

Existing agreements are sometimes not sufficiently effective to promote integrated water resources management due to problems at the at the national and local levels such as inadequate water, the management structures and weak capacity in countries to implement the agreements, as well as shortcomings in the agreements themselves (for example, inadequate integration of aspects such as the environment, the lack of enforcement mechanisms, limited-sectorial scope and non-inclusion of important riparian States and stakeholders). (UN Water, 2008, p. 7)

Rogers (2002) states that over time, successful patterns of collective action, like individual actions, become learned behavior on the part of their participants and crystallize into social habits, cultures and institutions, and, often becoming over time easier and more efficient to enact. Awareness of the positive, cumulative results of successful collective action gives credibility to and encourages further social activity and arrangements. Such awareness of the benefits of social cooperation can become a form of social capital, which can be expressed in functional belief within a project and can lead to greater trust and willingness to accept authority. Focusing for a moment on individual stakeholder's belief in a project or a water management institution, it could be seen that international transboundary water basin management participatory processes can play a key role in enhanced institutional change (Pahl-Wostl 2007). Included is the ability to design management plans and policies (and mobilize social resources in

support of them) that are socially accepted, have their collective goal shared across the basin, support the sustainable development and use of water resources and make their implementation effective by the different actors and various stakeholders involved in the process. When people act together, two questions arise: Whether their collective action achieves the outcomes that are sought; and if so, whether the benefits of that success are shared among participants in such a way that they renew their contributions and the collective action can be repeated or continue (Cosgrove & Rijsberman, 2000).

In the case of the Sixaola River Basin, The Binational Commission, a collaborative working group, was created as an intermediary step to unite everyone in the basin until an international integrated management system, featuring transboundary multi-level governance is in place between the co-riparian states of Panamá and Costa Rica in Central America (The Binational Commission). When examining what collaborative governance can look like within an international transboundary basin, The Binational Commission of the Sixaola River Basin can serve as a chief example in Central America and beyond on how to include diverse perspectives, values and initiatives from multiple stakeholders across an international transboundary basin when working towards the enhancement of water security for these riparian states.



Figure 7. The Ngöbe-Buglé Community, Comarca, Panama. (2015)

CHAPTER 3 – MOTIVATION

3.1 Geographies of Transboundary River Basin Management: Ethnography

In the context of the Sixaola River Basin and in international transboundary water resources management, ethnography, a research methodology, could be considered as an effective tool to reveal the undercurrents of what influences basin residents to collaborate and cooperate over their shared waters resources, and to explain how a river basin tells its own story. Ethnography, more generally, is defined as the process of discovering how people live “in their own words,” that is, as told from the “inside” rather than from an observer’s perspective (Hall, 2010). Much of the data gathered in ethnographies appears in the form of stories told by members of a community. Researchers then use a range of methods, from narratives, and clustering by themes, to analyze them (Palmer, 2007). Palmer’s (2011) study in Timor-Leste, focusing on the relations between water management practices and customary systems of the people in Bacau City, asserts that the ethnographic research employed richly brought to life the critical role that narratives of customary institutions play in better understanding to what extent place-based, deeply-regarded customs may influence Timorese organizations and the collaboration principles embedded into their water resources management. These narratives also demonstrated how these customary systems could be more readily incorporated into the dominant water resources management paradigm.

Ethnographers frequently work to discern how meaning systems orientate the action and inaction of the social world (Herbert, 2000). Ethnography differs from surveys and interview methods conducted on their own, because it examines what people do, why they do what they do and what they say. As such, it often enables an insightful examination of any discrepancies

between thoughts and deeds (Eyles, 1988). Furthermore, a qualitative methodology such as surveys have the potential to be conducted with no local familiarity of place; and for this reason, they can be considered useless in this context as they can only impose an intellectual order on the group and do not enable a steady unearthing of the layers of meaning attached to actual daily life (Eyles, 1998). Ethnography, on the other hand, allows for progressive familiarity with the groups within the research region. It necessarily involves developing an understanding of how meaning systems are operationalized by group members.

In the case of the Sixaola River Basin, and beyond, humans create their social and place-based worlds through processes that are symbolically determined and thus made meaningful. By exploring these meaningful processes, residents can reproduce and challenge prevailing dominant structures in the everyday of their place-bound actions (Herbert, 2000). Jackson (2011, 2012, 2015) uses ethnography when working with indigenous community members across the Murray-Darling Basin to gain a deeper understanding of “cultural flows”; elucidating an emerging concept in water resources that “water entitlements that are legally and beneficially owned by the Indigenous Nations and are of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations (Jackson 2011).” The methodology of ethnography selected in Palmer’s studies yield critical data supporting the importance of considering cultural flows in the dominant water resources management paradigm in Australia. Because ethnography provides particular insight into these processes and meanings, it can most vibrantly explain the unique and complex relationships between structure, agency and geographic context of people and the environment within the Sixaola River Basin.

Considering the Sixaola River Basin communities' collaborations and cooperative efforts towards enhancing water security across the basin, ethnography provides the capability to expose the web of everyday life and to reveal the underlying processes and meanings, which enable actions to be reproduced and sometimes challenged (Hammersley & Atkinson, 1983).

Ethnography is generally recognized to rest upon participant observation, a methodology whereby the researcher spends considerable time observing and interacting with a social group (Bernard, 2012). These observations and interactions enable the ethnographer to understand how the group develops a collection of relations and cultural constructions that weave it together (Bernard, 2012). As Ley (1988, p. 121) asserts, such research "is concerned to make sense of the actions and intentions of people as knowledgeable agents; indeed, more properly it attempts to make sense of their making sense of the events and opportunities confronting them in everyday life."

Ethnography uncovers what groups across the Sixaola River Basin may potentially take for granted and thereby reveals the knowledge and meaning structures that provide the blueprint for social action (Herbert, 2000). Close observations of Sixaola River Basin residents' daily activities separate ethnography from other qualitative methods, such as carrying out interviews alone. Applying ethnography in this context provides unmatched insight through the close analysis of everyday activities and symbolic constructions of residents. Subtle behavioral variations observed among Sixaola River Basin residents reveals a deep and complex cultural knowledge regarding the symbolism of place and the values attributed to their water resources that cannot be unearthed without enduring familiarity with the groups (Herbert, 2000). Ley (1988, p. 126) states: "The geographer's charge to interpret the complex relations of people and

place requires a methodology of engagement not detachment, of informal dialogue as well as formal documentation.”

Although ethnography proves itself to be a powerful research tool in geography by capturing the rich essence of people and place, there remains a missing piece of the pie when aiming to discover the heart of the *Sixaola River Basin Story*. Although the stories of the basin residents come through in ethnography, it should be noted that these stories are based on the researcher’s, i.e., outsider’s, initial questions and are not necessarily questions that the residents of the Sixaola River Basin need answered for themselves to enhance their understanding of collective transboundary water resource management efforts. In the context of transboundary water resource management, community based participatory action research is an emerging geographic methodology aiming to incorporate this type of rich data by engaging river basin residents in the research process to tell their own basin story (Palmer, 2012).

Crafting the research process to actively include the Sixaola River Basin residents in collaboratively generating and answering questions the residents deem important proves key when answering, “How does a river basin tell its own story?” In qualitative research in general, and specifically pertaining to this research project, listening to stories through ethnographic methods can be enhanced through resident-driven methodology. Community-based participatory action research models have been developed in geography, in part, to communicate geography research to audiences beyond the academy, and most importantly, to communicate meaningful data to the community members themselves (Coombes, 2014). This is relevant to this particular research project due in part to how water resources researchers (Jackson & Moggridge, 2015) are finding that the cultural and social connections residents hold with their water resources in

developing countries, e.g., the Sixaola River Basin, but also these cultural values are held by the native residents in more developed countries, such as Australia, Canada, United States, China and Finland. Their results show that the contributions of residents' knowledge may score the underbelly when shaping holistic multilevel governances of these shared water resources (Jackson and Moggridge 2015).

3.2 Geographies of Transboundary River Basin Management: Community-Based Participatory Action Research

A core principle of community-based participatory research is that the research be adapted to “the culture and context of the participants” (Kelly et al., 2001, p. 348). Thus, the “culture and context” of the collaborating communities can be considered paramount in shaping the direction, form and design of the research project. While community-based participatory action research holds significant promise as both a way to learn and interpret as a researcher, Christensen (2012) claims that “it is equally if not more promising as a collaborative method”; that is, to co-author stories with research collaborators or to facilitate opportunities for research collaborators to tell their own stories, in their own words (Ball & Janyst, 2008). Moreover, it is through collaborative, participatory efforts that the visible potential of how a river basin tells its own story may be realized. This approach also places a greater emphasis on the research process in addition to its outcomes—presenting positive and empowering local participation in research, and one that relates more meaningfully to the local context of the Sixaola River Basin.

Supporters of community-based participatory action research claim to involve all partners at all stages of the research process, recognizing the strengths that each brings (Tobias et al., 2013). As Nicholls (2010, p. 22) observes, a successful collaboration requires multilayered

reflexivity, which “involves the self, interpersonal and the collective.” Community-based participatory action research anticipates that research will commence with a subject area of importance to the community, ideally one brought to the researcher’s attention by the community. This ideal necessitates an extensive time commitment for establishing trust among participants who may be separated by considerable physical or cultural distance across the river basin (Richie et al., 2013).

Experience with community-based participatory action research suggests, according to Coombes (2014), that a collaborative ideal can be sustained throughout the experimental stages and processes of research, but becomes more difficult to involve all participants in the analysis and representation. There are risks to be cognizant of while facilitating community-based participatory action research, specifically when it comes participant selection and engagement throughout the process, from beginning to end (Coombes et. al., 2014), including the *post hoc* analysis and dissemination of research results (Christensen, 2012). Firstly, if the trust between the researcher and basin residents is not strongly established, gaining deep and wide-ranging understanding concerning key participants’ contributions may be missed, and thus, not included in the river basin’s story. Remaining aware of the way(s) in which the local participants engage in this research, does not undermine residents as their own free agents as individual contributors to the project. As Heikkilä and Fondahl (2012, p. 72) observe, “the whole idea of the ‘community’” as a single collaborator needs to be revisited. This premise is meant to suggest that it is the researcher’s responsibility to enter this project with collaborative partners honoring and accounting for the variances that reside within the community. Trust and time with residents of the Sixaola River Basin is essential— a process referred to as “gaining entry” in qualitative

methods, and aids in deliberation and discernment when reviewing the data by understanding who is present, who is not, and accounting for multi-variability across the community while not presupposing that the residents report equally as a unitary community collaborator.

In the water resources research literature, Jackson (2011) implements participatory action methods when working to resolve potential knowledge gaps regarding indigenous water resources management as they relate to the design and implementation of the Basin Plan across the Murray-Darling Basin in Southwest Australia. Jackson states:

The research team drew on Indigenous input and expertise at key points in the study.

Indigenous representatives expressed a general desire for involvement in the preliminary study, viewing it as an opportunity to contribute to the Basin Plan, although it was realized that the scope and time frames set by the Basin Plan schedule were unrealistic for a comprehensive study. Anxiety over future reductions in access to water and the difficulty of integrating Indigenous knowledge into water-planning processes were seen as critically important and cause for concern. (Jackson, 2011, p. 164)

Secondly, despite methodologies where the research interest and questions are co-created and co-facilitated by the researcher and the basin residents together, the actual modes of dissemination can be taken for granted by the researcher and collaborators as they may collectively turn to standard methods of research communication, such as journal articles, white papers and policy reports. In this same vein, Coombes et al. (2014) asserts that geography research that historically took the once-radical step of “giving voice” actually has the ability to patronize, undermine and silence those whose voices are quite capable of self-expression (p. 846).

Conversely in this project, the Sixaola River Basin residents play an active role in shaping the research development process, insofar as the representational formats of storytelling, videography and photography selected to disseminate the data collected. Christensen (2012) asserts that there are ways research projects such as this thesis project can aim to present the data and results so that it makes an impression on people in a more immediate, engaging way. Indeed, one critical outcome of this research with the Sixaola River Basin is its ability to inspire potential changes in the way basin residents, the environment and water resources are perceived, and the way basin residents' individual experiences are understood, both by themselves and by the greater basin communities. A central goal of this community-based participatory action research is "to create an interested public around an important social issue" (Johnston & Pratt 2010, p. 133). Transcending water resources research for only research sake, in an attempt at research driven by and for communities, "time and trust are undeniably interlinked elements, and rest at the center of the efforts put forth by the researcher to cultivate deeper understanding of place by syncretizing varying viewpoints" (Heikkilä & Fondahl, 2012, p. 78).

To ensure that the data collected in this research project on the collaborative and cooperative efforts over shared waters in the Sixaola River Basin is powerfully communicated to basin residents at large, while also, at the request of residents, endeavoring to communicate their river basin story to other international transboundary working groups, the water resources methodological tools of community-based participatory action research coupled with ethnographic methods have been employed in this study.

Most importantly, this research aims to discover optimal ways to meaningfully communicate findings to the Sixaola River Basin residents whose firsthand experiences with

their transboundary river basin management so eloquently informed this project. Aspiring to understand the complexities of basin residents, actions and place-based realities in water resources research— and in the context of this project on how a river basin tells its own story, water resources researchers and participant basin resident collaborators have begun to incorporate methodologies of storytelling (Garret, 2010), explicated through storytelling, videography and photography, to holistically represent the varying values and perspectives of the residents and communicate research findings in tangible, digestible ways.

3.3 Geographies of Transboundary River Basin Management: Storytelling, Videography and Photography

3.3.1 *Storytelling*

“At its heart, research is storytelling” (Christensen, 2012). Stories express something irreducibly particular and personal yet they can be received as expressions of broader social and political context; and their telling can move, affect and unify collective understanding.

Traditionally, geographers have aimed to shed light on the perspectives, actions and events of people and the environment within a particular region of the globe. As Coombes describes, “To imagine across and to maneuver across cultural connections, geographers increasingly turn to storytelling” (p. 849). These stories, sometimes collaborative and sometimes ethnographic, can encompass a diverse range of reportage, fiction and metaphor for intercultural knowing and understanding (Cameron, 2012; Christensen, 2012; Tsalach, 2013). As asserted, the aim of this project is to conduct research across the Sixaola River Basin and deliver the how and why of this

river basin's story—these cultured and valued connections, understandings and perspectives — back to the residents in order to more fully inform daily interactions among one another in relation to the enhancement of their water security planning and transboundary basin water resources management.

Interest in story and storytelling is recognized across a broad spectrum of geographical approaches (Cameron, 2012). Drawing on theories relating to networks and actors, geographers and water resources researchers working within cultural, historical, economic and environmental traditions, have begun to take an interest in 'story' (e.g., Bridge, 2001; Gibson-Graham, 2002, 2006, 2008; Hoskins, 2010; Jackson, 2010; Jackson, 2012; Jackson, 2015; Kosek, 2006; Lorimer, 2003; Moggridge, 2010; Pratt, 2009; Price, 2010; Watson, 2012; Veilleux; 2015). Fundamental understanding of story and the relationships between vary widely, and the formal definitions and engagements of story are limited. As Cameron (2012) asserts, recent geographic approaches differ, and with this, “rarely the understanding of story and storytelling are mobilized in each of these approaches is made explicit) ... what they share, most broadly, is a longstanding concern with the ways in which personal experience and expression interweave with the social, structural, or ideological (p. 577).”

In support of the power of storytelling in geographic research, in the context of environmental history in particular, and in the case of water resources in this project, Cronon argued “crafting a story, makes us care” (p. 1374). Seemingly, this caring can encourage shifts in human-environment relations; a premise that is, according to Cameron (2012), something Cronin was not willing to let go of. Stories in geographic work, Cronon argued, are “our best and most compelling tool for searching out meaning in a conflicted and contradictory world” (p.1374).

Differing from Cronon's assertion, where story is embedded primarily in the context of morals and emotionality many geographers today are "more concerned with how stories might change the world in a structural and systemic sense" (Cameron, 2012, p. 579). Their understanding of precisely how stories might affect such change has also become more refined and apparent, although similarly to Cronon, contemporary scholars remain susceptible to the criticism "that the role played by stories in social change is asserted rather than demonstrated" (Cameron, 2012, p. 579).

The importance of personal storytelling for scholars (e.g., Domosh, 1997; Jackson, 2015; Moggridge, 2015; Moss, 2001; Valentine, 1998) rests not only in its ability to challenge larger discourse but also in its ability to build oppositional politics among marginalized groups. For Gibson-Graham (2008), a longstanding interest emerges in the transformative capacity of stories, in part, from this tradition, but in recent years has been more informed by a method of storytelling described as a practice that involves "writing about, engaging with, performing, and taking seriously their alternatives in seeing the world as an act of conscious, political and creative reproduction" (p. 580, referenced in Cameron 2012). Essentially, this kind of project attempts to create a clearer, practical and theoretical vocabulary for how stories transform and recreate the world.

Gibson-Graham (2006, 2008) has developed an emphasis on stories as productive and participatory that calls into being alternative spheres of reality regarding the relationships between residents and their environments. This type of storytelling therefore orients itself towards the emergent, the "not-yet-here," and participates in the manifestation of newly

discovered realities. It is within this approach that this research project is carried out— with a focus on story, human-environmental-social transformations and affirmations:

The point is to get at how worlds are made and unmade, in order to participate in the processes, in order to foster some forms of life and not others . . . The point is not just to read the webs of knowledge production; the point is to reconfigure what counts as knowledge . . . The point is, in short, to make a difference – however modestly, however partially, however much without either story or scientific guarantees (Haraway, 1994, p. 62).

3.3.2 Videography and Photography

Incorporating videography and photography within co-managed geographic research opens windows and doors that may not have been apparent previously. Participatory video (PV) (Garrett, 2010) and photography, or community media (Kendon, 2003; White, 2003) allows participants on a project to articulate in their own words what it is they wish to have conveyed and ideally take control of the production process from the researcher. Johansson et al. (1999, p. 36) comments that they “cannot imagine a more effective method to quickly comprehend the often complex perceptions and discourses of local people than to produce, watch, discuss and analyze PV material together with them” (cited in Kendon, 2003, p. 143). PV gives research participants the opportunity to voice their own thoughts and opinions, which ideally concludes with all parties seeing the film as an “ongoing process of creating community” (Sandercock & Attili, 2010, p. 37).

Making a film, especially with PV methods, required a level of intimate participation with Sixaola River Basin residents because “documentary filmmaking is by nature collaborative. Quite simply, it is impossible to make a film about other people on your own” (Barbash & Taylor, 1997, p. 74). Even if researchers do not end up producing anything from the recorded footage, simply working on it together and sharing it allows the researcher to use it, as Schwartz (1992, p. 15) did to “talk with research participants who taught her ‘how to interpret the images of their lives’”. Through to the editing process (Laurier et al., 2009) one can come to a much better understanding of what it is that the project participants value by creating mediated work together (Laurier) while enhancing ethnographic and community based-participatory methodologies.

These potential collaborations with research participants who provide so much can be “an imaginative act which should bring us into touch with the lives of strangers” (Thomas, 1997, p. 143). Videography and photography can help to bridge gaps between participants and researchers by undermining notions of academic authority. Watson (2012) crafted a participatory documentary film, “A River Loved: A film about the Columbia River and the people invested in its future,” to gauge if this type of facilitative tool could enhance dialogue among the stakeholder parties within the Columbia River Basin. The results of the study showed that the film did promote dialogue across stakeholders, enhanced understanding and empathy amongst the parties and encouraged stakeholders to take new scenarios under consideration when collaborating over shared waters (Watson, 2012). Watson further found that film when used in water resources research is a tool that, based on the aforementioned premises, can facilitate cooperation towards enhanced water resource management planning. Watson encourages film to be considered as a

“handy tool” for complex and multi-stakeholder arenas, such as transboundary basins. Lastly, in the context of how a river basin can tell its own story, Watson asserts that film allows for “stakeholders’ voices to be heard” and that using film as a research tool has the ability to “transform” these complex transboundary river basin scenarios by “sharing understanding for the holistic system” in place, thus fostering further potential for collaboration over shared waters (Watson, 2012, p. 5).

Similarly, when it comes to water resources research tools that promote the capacity of sharing the voices of research participants, enhancing understanding amongst stakeholders, and aspiring to communicate a more holistic story of a river basin through the lens of the residents themselves to inform river basin management planning initiatives, researchers are using photography as a valuable methodology to achieve these aims. In the “Portraits of Rivers of Change” project, Veilleux, a geographic researcher and photographer focusing on global water resources research, uses the camera to document the voices of local communities of both the Mekong (Laos) and the Nile (Ethiopia) international transboundary river basins. Concerned with the communities’ voices that “may be drowned out by national governments’ priorities and objectives within their water resources management decisions, this project emerged as result of Veilleux’s scientific research carried out within these international transboundary basins (Veilleux, 2015, Web). Veilleux asserts that her photographic methods can support telling a fuller story of the impacts that national development projects within the Mekong and Nile transboundary basins and others can have on the communities and water resources they depend on to live. On her website when discussing the changing rivers of Ethiopia and Laos, Veilleux states, “Portraits from Rivers of Change serves as a visual memory of people living in traditional

communities, their identities as river people, and as an appeal to preserve the knowledge and culture of these fast disappearing communities” (Veilleux, 2015, Web).

In the case of Veilleux’s river basin research, rather than simply distancing the research from participants, they are often particularly intrigued by the equipment—especially if participants see the researcher filming themselves or if the researcher hands them equipment. This allows one to “break the ice” quickly as conversations ensue about the nature of the technology, recording format and possible distribution channels for collaborative work (Garret, 2010). Similarly, in the Sixaola River Basin multiple professional cameras were carried and distributed to basin residents to capture the images they felt held meaning for them in relation to telling their river basin story. At times, the camera is actually witnessed as less intrusive than a paper and pencil since the researcher can use the flip out screen to maintain eye contact while listening, talking, instantaneously playing back footage and the shared experience of watching recorded footage in real-time (Pink, 2007, p. 78).

There are a number of reasons why working in this manner could benefit water resources research. But of vital importance in terms of ethnographic and community-based participatory action research work, and in particular in the context of the Sixaola River Basin residents, is the concept of agency: The acknowledgement of and willingness to share authorship gives agency to a project’s basin residents. Taken to its logical conclusion, by handing over control of this project the researcher(s) “exposes the wiring” of the method (Pearson & Shanks, 2001) and begins to “destabilize hierarchical power relations”, shifting from making a film about people to filming with people (Kindon, 2003, p. 142).

Ethnographic methodology across the discipline of geography has been generally criticized for its “non-transparency.” (Garrett 2010, p. 11). Garrett (2010) posits that “critics highlight the difficulties of recovering what the researcher saw and experienced undermining the ability of fellow scholars to form an independent judgment of the quality of the analysis.” (p. 11).’ Using video recording can help overcome this critique because ““video... has the potential for the data on which analysis is based to be made available and readily examined”” (Hindmarsh et al., 2019, p. 7), lending more transparency to ethnographic and community-based participatory action research work. It is also worth noting that, in the context of geographic research, ““that there can be no blueprint for how to do fieldwork””. (Coombes, 2010).’ It is context-dependent, and for this reason, we have to solidly construct our theories and frameworks for how to do fieldwork in the field’ (Josephides, 1997, p. 32, referenced in Pink, 2007, p. 4). And as Garret (2010) states:

Carrying a video camera and photo camera allows for this flexibility as participants guide the researchers to what they think is important, setting the agenda spontaneously as the researcher moves, creating a space of tactic where experience, cultural memory and everyday life can be the events most worth recording... the moments of inspiration, intrigue and indiscretion reside within the small spaces of experience captured by the diaphragm of the camera lens, in the researcher’s hands or in theirs, in the researcher’s stories or theirs. (Garret, 2010, p. 11)

With the use of videography in geographic research comes the potential for sharing the researcher’s work with participants who may have interest in recordings for their own personal archives. It lends itself to enhancing ethnographic methods by bringing a multidimensionality

with viewing opportunities through the process and increases the transparency of the research to participants. Secondly, a result of videography in this geographic research is the collaborative creation of an information exchange platform for Sixaola River Basin residents to communicate across the basin and beyond—disseminating their story to other international transboundary basin groups and overcoming limited geographic locations and language perimeters. Lastly, the product of this videographic geography can be readily used as media and/or promotional materials for Sixaola River Basin residents to collectively explain and represent themselves in their own context and on their own terms.

Explored here, storytelling combined with videography and photography in geographic research, coupled with ethnographic and community-based participatory action research methodologies builds an interwoven, dynamic and comprehensive framework for providing a more holistic representation of the Sixaola River Basin residents' perspectives, engagements and actions. These combined research methods suit the collaborative nature of this co-facilitated and co-created research process with the residents of the Sixaola River Basin.

Placing the camera into the hands of basin residents' peaks curiosity (Garret, 2010). "This curiosity can act as a bridge, dismantling the power forces that historically persist between the researcher and research participants" (Garret, 2010). This framework importantly grants residents agency to direct the research by creating meaningful research questions and imagery specific to their transboundary water resources management and water security across the Sixaola River Basin.

Further, the opportunity for Sixaola River Basin residents to tell their stories in their own voice—through their lenses and not the lens of the researcher alone, provides the opportunity for

a more accurate representation through self-representation and facilitates a transformative effect for both the participants and the receivers of these river basin narratives.



Figure 8. The Sixaola River, Sixaola-Guabito, the border of Costa Rica-Panama

CHAPTER 4 – RESEARCH METHODS: WATER VALUES, STORYTELLING, AND THE RESEARCHER

To account for the selection and content presented in the *Sixaola River Basin Story*, it is important to reference my own experience as a researcher in the Sixaola River Basin, Costa Rica-Panamá. For this master's thesis project, I spent five and a half months of 2015-2016 traveling across the dynamic geographies and landscapes of this Central American basin. The fieldwork timespan encompassed two trips to the Sixaola River Basin during the annual flooding seasons (December-March) and in the beginning of the flood season (August-September). This long period of field work was intended to be exploratory, where I would strive to become familiar with the communities, I refer to in this project as basin “residents,” which describes both the people and the environments in which they reside—all of whom rely on the water resources of the Sixaola River Basin system. These basin residents are located where the rivers are born at the headwaters in the upper river basin and span through the middle and lower river basin to the outlet in the Caribbean Sea.

Pre-research of the field site had indicated that there were five indigenous communities residing at the upper-middle river basin: Bríbrí (Talamanca & Keköldi, IUCN, 2016) and Cabecar occupying territories legally constituted as indigenous reserves. In the middle-lower basin are three indigenous ethnic groups: Bríbrí, Naso and the Ngöbe-Buglé, occupying territories “comarcas,” not officially declared indigenous cantons. The indigenous residents are ranchers, farmers, fishers, artisans and dwellers along the banks of the tributaries of the Sixaola River Basin System. In land use practices and interactions with nature, i.e., farming, the literature (UPEACE 2014; IUCN 2016) notes that upper-middle basin indigenous community members take a “traditional farming” approach with a limited or non-existent application of agrochemicals

compared to the middle-lower cultivators with practices that developed alongside United Fruit Company cultivators, i.e., Chiquita, whose historic application of agrochemicals are attributed to quantities of effluent and runoff into the river systems of the Sixaola River Basin.

Distinct differences of the cultural practices and community values attributed to water caught my attention, particularly as a researcher looking at water security in the context of an international transboundary river basin. Beginning to listen and spend time with basin residents during my fieldwork, I soon realized how powerful these cultural stories and values held for water were for them. Every person that spoke to me had a water “story.” From an outside researcher’s perspective— or *Sicua*, as myself and others entering from outside these territories are known— the devotion that local community members hold for these water stories, and how the stories about their river and water systems in and across the Sixaola River Basin both inform and shape their interaction and engagement with basin waters, surprised me in the depth to which the residents live them out in their day-to-day lives.

Noticeably, upstream there is a better quality of water than downstream (Researcher’s notes, 03/2016). It is drinkable, i.e., potable. When nearing the outlet to the sea, the story of the water changes. There, the water is polluted from agrochemicals, solid waste disposal and plastic remnants from large-to-small scale banana plantations that line the riverbanks of the Sixaola.

4.1 Research Interviews

My initial interviews laid the foundation to pursue what I realized was a plausible gap in knowledge about what drives the actions of the multi-level stakeholders involved in the Binational Commission of the Sixaola Basin. This gap encompassed what some officials asserted as happening in the Sixaola River Basin, and that is, “Over there, there are limited problems with

water the in the Sixaola River basin because there is a lot of water, and due to the fact that there is a lot of water, it's easy for the local communities to collaborate— there's nothing to fight over” (Interview, San Jose, Costa Rica 02/2016).

Spending time with Sixaola River Basin residents and the Binational Commission of the Sixaola River Basin members traveling across all sides of the basin, across political borders of Costa Rica and Panamá, across indigenous territories in the basin and employing my research methodologies (i.e., ethnography and community-based participatory action research), I sought to uncover what questions the community members (basin residents) of the Sixaola River Basin had in mind: The questions they believed needed answering in relation to their water resources and the sustainable development of their transboundary river basin.

In order to identify what information and data basin residents' need, I applied a “cultural litmus test” to each of the employed methodologies in this work. This litmus test considered how basin residents communicate and share knowledge with one another, how basin residents receive information and how, and to what extent, the data from these methodologies will foster residents' ability to share the information. Therefore, an element that emerged from within the data that could not be refuted is the importance of the vibrant stories that imparted the cultural values and the significance of water itself in the lives of residents in the Sixaola River Basin.

Four main objectives emerged from the comprehensive methodological approach undertaken in this research:

1. Sixaola River Basin residents requested the creation of a data set that could promote the opportunity to incorporate voices into the conversation on water resources of those who have historically not been present nor included — be it geographical location, landscape

or possible apparent and/or historically veiled power structures in place as barriers to residents' inclusion.

2. Sixaola River Basin residents requested to learn the stories from residents located on the opposite sides of the basin, of whom the landscape and geography potentially make it difficult to exchange information with one another. The narratives desired were specific to the cultural values of water, and water resources management practices that each community engage in reference to water security. Essentially what causes/ promotes residents to interact with and engage their water resources in the Sixaola River Basin as they do?
3. Sixaola River Basin residents requested from data presented in this thesis to promulgate an international platform for information sharing in order to communicate their collective river basin story to communities located in river basins outside of the Sixaola River Basin. The aim being to enhance knowledge exchanges pertaining to what the residents are getting right when it comes to their water resource management, as well as the counter, what more can the residents of the Sixaola River Basin be doing in their practices to enhance water security within this international transboundary basin?
4. Dissemination modes by which to present this data and findings is of paramount concern and consideration in this co-managed research. Forward planning as to how this research must be presented in formats that are culturally relevant and thus accessible to the residents was discussed with resident and myself (the researcher). We collectively determined that Storytelling, Videography, Photography, were the most accessible modes to communicate the data to the greater river basin residents, and were thus employed to ensure that these objectives were met.

Following the four initial interviews, thirty-four interviews additional interviews (N=38) were conducted. I interviewed Sixaola River Basin residents across all landscapes of Costa Rica, Panamá and the indigenous territories. These co-managed research interviews were based on open-ended questioning methodology, with a few basic prompting questions that the Sixaola River Basin residents indicated were important to them:

1. What is the name of your river(s) or water resources in your life that you identify with?
2. What is the significance of this water resource to you in your life?
3. Describe would you like to know or learn about... in relation to your water resources?
4. Describe any changes if any, that you have seen with regards to your water resources, past, present, future time?

5. What questions would you like or believe need asking with regards to water resources in the Sixaola Basin?
6. Would you like to ask me (the researcher) anything?



Figure 9. Margarita, Talamanca, Costa Rica. Middle Basin. Photo: J. Tanner (2016)

All interviews for this project were carried out in the Spanish language, with the exception of a basin resident translator for a certain native language words needing interpretation. All interviews on-record (N=38) were audio-recorded. The duration of each interview conducted is between 15 minutes and 1.5 hours in length. No research participants were recorded on video, per sensitivity to cultural norms, coupled with IRB guidelines and restrictions. However, providing technical training to research participants by the researcher (myself), research participants did take on the task to video and photograph what they each felt

was important for them in the context of their water resources, to incorporate these research data in their *Sixaola River Basin Story*.

Three off-the-record group meetings/convening were held throughout my fieldwork in the Sixaola River Basin with community elders and leaders, wherein off-record means that there was no note-taking, audio-recording or filming documentation by the researcher (myself) or basin residents. Held as an offering to acclimate me (*Sicua*) to the cultural history, norms, and practices of the community, each of these meeting lasted approximately three hours in length.

Knowledge elicited from these meetings was rich. I did not ask questions. The purpose was for community members to share, and for myself as the researcher to learn how best the community members share and exchange information, thus giving faith to my conceptual framework. Mostly oral exchanges were shared, however there were a few instances where stories were drawn on an old green chalk board, while each leader took a turn explaining processes and cycles within each narrative. It was from these meetings that the project's methodologies were selected to be culturally appropriate for basin residents in relation to residents imparting their knowledge and experiences of their water resources across the Sixaola River Basin, and led to the story and stories shared in this project.

4.2 Video and Photography

A core assertion within this project is that stories do not simply represent – they affect. For this reason, the storytelling tools of videography and photography were strategically selected for this project, as they were deemed culturally conducive by basin residents per the form of data that would result: images of place, and the accompanying narratives (voice) of basin residents. Based on the capacities of videography and photography to potentially transcend likely socio-

cultural barriers across basin residents, by actually placing the responsibility and command of these research tools in their hands, offered a greater capacity towards basin residents own self-representation, in place of myself, the researcher, selecting what may or may not be of relevance to basin residents. This approach both expanded and ignited the involvement and engagement of basin residents in this research work, and dually with each other across the basin.

In this project, basin residents were taught by myself, the researcher, how to operate a professional photo and video camera. Technical equipment used were a Canon 60-D pro-camera for photography only, and a Sony a6000 for photography and video. To capture images sought, residents had access to various lenses, and a tripod to stabilize shots, e.g. using a tripod is residents had interest in filming their river(s) or sea over a long period of time, or to monitor traffic and movements across the river systems. Residents learned the equipment fast, and were engaged immediately. Generally, the camera(s) peaked curiosity in basin residents, and noticeably acted as a mediator and a facilitator of sorts on its own merits, taking on a role of a third party in this research by: 1) The utilization of the cameras granted basin residents agency – residents controlled the data outputs (images) and 2) In this project, the cameras helped enhance trust between the researcher and basin residents, fostering more sound co-management and collaboration to support basin residents in telling their river basin story.



Figure 10. The Sixaola River Bridge, Sixaola-Guabito, Costa Rica-Panama

Basin residents and myself captured more than 6,000 photos and approximately 39.5 hours of video footage were documented throughout a 5.5-month period. The data was backed up on (2) terra-bite external hard drives as to prevent data loss. The photo images that appear in this thesis were selected as they accompany the Sixaola River Basin stories told by the spread of residents, from the headwaters of the basin to the outlet in the Sea Caribbean Sea. I, the researcher, appear in some of these images, as basin residents felt it important to document the process of this co-managed work.

Further in this co-managed research, a 4.5-minute film was produced, “SIXAOLA.” The data selection for this film was based on Sixaola River Basin residents’ objective #4, to share and

promote their current collaborative efforts to a greater audience – worldwide. Therefore, when analyzing the data (video *and* interview audio recordings), the researcher, myself, looked for key words in the video and audio voice recordings of: unity, collaboration, cooperation, organizing, values of water. Using these key word codes, audio narratives were narrowed to 4.2 hours. This is an intensive iterative process between myself, the researcher, and basin residents. Ultimately, myself, the researcher, underwent an intensive process of pulling only the key words/phrases, while remaining mindful throughout this data analysis process of the basin residents' objective #1 in this co-managed research: to hear from voices that had not previously been in the conversation, and to aim to include these voices. Selecting and the audio took a total length of 37 working hours. Once the audio was selected, which totaled 4.5 minutes, the audio was editing for sound cleanliness: pops, cracks, volume and background noise. This process took 8 working hours. Once the audio was cleaned, I then analyzed the video data. To select the video data for this film, I searched for images captured by river basin residents' and myself, the researcher, that best represented and accompanied the resident speaking and the subject matter which they discussed (e.g. river, specific geographic location, activities). Following the first pass of video data, the video data was narrowed to 2 hours, taking a total of 21 working hours. A second pass narrowed the video data to 15 minutes, taking a total of 8 working hours. To compile audio and video data, Adobe Premiere Pro was utilized for final edits, which comprised an additional 16 working hours. The final edits to produce this 4.5-minute film that basin residents could use to more readily communicate the *Sixaola River Basin Story* took a total of 90 working hours to edit the audio and video from start to finish.

Dissemination of this film is a key aim of this work. The film was presented by myself, the researcher, at the Conference of Latin American Geographers (CLAG) on 05, January 2017 in New Orleans, LA. on a panel focused on Water Security in Latin America. The film is housed on www.Vimeo.com with 300 views and has been widely distributed by the Binational Commission of the Sixaola River Basin. As the researcher and facilitator of this co-managed data, I have asserted efforts to disseminate this film by giving university and community talks, through my website, www.WaterPax.org, and by harnessing modern technology and social media channels such as What's App and Facebook, ensuring that Sixaola River Basin residents have open access to this media.

Lastly, something important to note within this project, and for other researchers in co-managed research or otherwise who wish to implement tools of film or photography, is that considerations need to be taken per the cultural norms of the communities with whom we collaborate (the research participants). Some residents within the Sixaola River Basin hold the strong belief that the camera “takes one’s soul” and they do not wish to appear on camera; however recorded voices are acceptable. Images of place are approved, but no eyes and faces. This is especially true across indigenous communities in this particular basin. When aiming to support and facilitate residents in capturing images that are important to them and to communicate their stories, this is where photography and videography may support one another. In this project, when basin residents and the researcher, myself, were capturing images through photography and basin resident images were not permitted, the use of the video camera to only record voices and places was readily able to support the wholesome documentation of river basin residents’ stories.



Figure 11. Private "Finca" (Farm), Ngöbe-Buglé, Comarca, Panama

CHAPTER 5 – THE SIXAOLA RIVER BASIN STORY

Introducing the *Sixaola River Basin Story*, where river basin residents' stories communicate through their voices and perspectives brings to light how this particular co-managed research approach — bringing together the Sixaola River Basin residents' stories of their culture and values held for their water resources readily enhances understandings of the requisite interwoven social fabric that lends itself to form the current comprehensive collaborative approaches for water resources management in the Sixaola River Basin in the first place - The Binational Commission of the Sixaola River Basin.

Each narrative is geographically site-based, spanning from where the rivers of the basin are born at the headwaters, snaking their way across extraordinary terrains, with the final story ending in the basin's outlet at the edge of the Caribbean Sea. Each narrative encompasses a collection of poignant and moving accounts of the basin's water resources from river basin residents' lived experiences in the Sixaola River Basin. As a collection of data, themes of unity, spirituality, and stewardship of water resources in the Sixaola River Basin emerged across all of the stories/interviews, it is based on these finding that I assert how the deep values, culture and interests of Sixaola River Basin residents form the necessary conditions for the Binational Commission of the Sixaola River Basin to emerge and endeavor to collaborate and coordinate in the first place. From the perspective of the Binational Commission of the Sixaola River Basin, “there is a lot we can show and provide other international transboundary river basin communities with regards to our organizational structure, practices, knowledge and shared learnings.”

On the global scale, The Sixaola River Basin is one of the only basins in Central America that has an active working agreement between two countries that could be described as “functioning,” which differentiates the Sixaola River Basin. For basin residents, this is something that is incredibly important. Fundamentally, the way in which the Binational Commission of the Sixaola River Basin has structured and organized itself, stands out, through a strong historical relationship among neighbors of the Sixaola River Basin, two countries of Costa Rica and Panamá, and the five indigenous communities. Overall, the data extracted from river basin residents’ stories in this project show that Sixaola River Basin residents think about themselves and explain themselves as a basin (an integral working and living system), not as political divisions or borders, or separate from one another or their resources, “... human links with the river are strongest in developing countries and communities, where livelihoods respond to the annual cycle of flows; cultural, religious and recreational ties to the river have deep meaning” (King & Brown, 2010, p. 128).

For members of the Binational Commission of the Sixaola River Basin:

Our work is the vision to continue learning in support of the struggle faced when aiming to secure the health of basin residents and the environment. The Binational Commission aims to motivate and encourage basin residents to become conscientious of what each can do to support the health and well-being of the basin. Since the commission began, the Sixaola River Basin is managing resources in an enhanced way, from the time when there was not the level of coordination that there is today. Among them, the rich resource, people - the basin residents, and the water resources, which is essential. (Interview, 03/2016)

The heart of this entire research project—“The Sixaola Basin Story”—is shared as a means to ignite discussion for current and future water resource management paradigms and managers to consider incorporating culture and values into practice and projects while aiming to produce data within co-managed research that is conceivably digestible in a culturally sound context by the research participants themselves: The river basin residents. All of the aforementioned research objectives within this co-research project in-turn serve a purpose in answering the research question of this project: How does a river basin tell its own story? Each objective is implemented in this commanding narrative, *The Sixaola River Basin Story*: “Thank you for the opportunity to share with you. Following your read, and in working to fulfill and meet the objectives of this co-managed research, the concluding hope is that you too, will share your water story with us...” (Interview 08/2016).

5.1 Headwaters

To arrive at the top of the Sixaola River Basin, the “Cordillera de Talamanca”, is no easy feat. According to residents, people who don’t live there—called *sicua* in Bríbrí—don’t typically even make the attempt.



Figure 12. Headwaters of The Coen River, Alto Coen, Talamanca

The headwaters, where the rivers are born, boost themselves with a series of 100 foot *cascadas* (waterfalls) and throngs of playfully packed electric blue morpho butterflies (*Morpho achilles*), each the size of your face, that bounce like a silk ribbon off the mist, as they dance in upward-spirals towards the jade jungle canopy and blazing sun.



Figure 13. Bribri Territory, Talamanca

These mighty flows are nestled at 3,700 m, or approximately 12,000ft— similar in height to Mt. Hood in Oregon’s (USA) Cascade Volcanic Arc. The only option to cross this river system is to traverse it not once but nine times, zigging and zagging through the hurried waters from one side to the other.



Figure 14. The Headwaters of the Coen River, Alto Coen, Bribri Territory, Talamanca

Every step is taken with calculation and care. Climbing and jumping the smooth rounded boulders using both hands—sometimes with a baby on your back and carrying 30 kilos of goods from the township below, high above your head — this is the only way to get “there.” And it is in this place where the *Sixaola River Basin Story*, beings...

5.1.1 Alto Coen

I want to welcome you into our house that we built. It is our great traditional house. This is the house where our community gathers and holds ceremonies. It gives me great pleasure to share with you that our rivers each have great stories to tell.



Figure 15. Sacred Meeting House, Bribri Territory

In our indigenous culture, these rivers of ours, all have life. Every river has a shape, and each shape a unique dialectic of every inhabitant residing along the banks. Every person learns from the river. This is the language and lens of how each live their lives. The river shapes the residents who live here, and across the basin, and it is not the other way around. We don't change the shape of it, we listen to it, and it constantly changes us. In listening, we learn to adapt to these changes.

For us, the rivers symbolize very large snakes, and this is why these rivers are rounded. They each serpentine down our mountains and hills. They say that the race and origin of all of where these snakes were born is called the big house of Kamuk, which is positioned high up at

the top of the basin, where these four most important rivers to our culture are born. In our language, these rivers are called: Coen Uren, Aradi, Telire. These rivers are the four rivers that Sibü, our God, left to us. For each river, the people are called the same who are born in the river's place. Hence, the people of Uren, are called Uren'awaH — the people of the Uren River. Those born of my home river in mountain plains area of Aradi, are called Aradi'awaH. Those born in the part of the COEN, are called COEN'awaH. And it is the same for the TELIRE'awaH.

In our culture, Sibü created the rivers as male and female. When we look across our lands, this basin, the Telire, the Coen, and Uren rivers, are women. The male river is the Rio LARI. Lari is the sharpest, and is the cockiest. What I mean by this, is that by no fault of Lari own, the umbilical cord was cut off from our culture and spiritually. This is evidently observed in the people LARI'awah are the people who most preserved culture because they were the purpose of our great Sibü, people of Alta Uren, the Rio Uren preserve the culture, the people of Bajo Coen because they lost their language, lost their customs, why? That they began to think evil. And they did not keep the spirituality of its rivers.



Figure 16. Tributaries of The Coen River, Bribri Territory

That river was our greatest, but became salted when the United Fruit Company arrived in the basin. When they came, they seized our terrain in the middle and lower basin, and with it, the spirit of our great spirituality. These are the days that the great Shamans called the spirit of water. It was then when the floods began to arrive more fiercely, in order to sink all of those who could eliminate our way of life, the way we have always lived — in rhythm with the rivers, the land, and nature.

Man, who does not follow in these ways, does not listen to the messages that nature sends him. He has forgotten or has never learned. This is unfortunate and can cause harm and lasting damages that may be unrecoverable. Contrasting, I receive an abundance from nature, which

brings me messages in the rain, in the starry night, through the connections and in the footsteps of the stars – and I read this language. It's the language of the spirit, and it is the spirit that tells me what messages I need to make mention of to my communities, whether that it is a message of life or a message of death or a message of preparation for either a good thing or a bad thing. I carry these messages to my brothers and sisters.

I'm a spiritual doctor of my culture. I have three scopes of responsibility within my culture. I carry out task of maintaining our culture's strong roots, communicating the basis of such studies of culture and values with our communities, and providing reminders to all of what each can offer the world of humanity within our culture: love your fellow man, love the earth, love our older brothers that are the animals, the rain, the sun, the water, and mother Earth.

The humanity across the world, I feel in my heart, has lost the spiritual values held within the elements. They are not present. Especially in the element of water, the fabric of life. We can see examples everywhere in cities and in more developed areas that do not value water. Simply, practices of throwing away trash in the streets, that eventually makes it way into the streams, people carry out these actions without thinking how this trash will affect the waters they drink. It's unfortunate how not having a connection and an understanding of the value of their water affects the lives of fish and animals that have always lives in their streams. Imagine that if the animals are affected, and this where the water that they drink daily, comes from? We don't let this happen here.

In our area, the fish are alive and thriving. And even the sun today is still shining overhead. This nature has not ceased to be no more, due to our ancestors living in marriage with all the elements, and all spirits. And they lived well.

Today, we hear stories of companies and businesses all over the world that want to commoditize water. Or put their name on, patent it. But water is God. Water is for humanity. And we should not place our generations that are needing to take care of our waters in competition over something that God gave to all of us to share. We do this well in our rivers here, we share.

Water, time, the changing environment, the sun, the rain, the air, we recognize here that the spirit of the waters flows underground. These wells, they all are our brothers. We are part of them, and they are part of us. This was and is our cultural currents; it is a conscious era. And we still live this way.

It's difficult when noticing of others that instead of holding these kinds of cultural values for their waters and for the elements, they elect to live within a materialistic age. It is an age where their God is money, and they do not think about the spirits that are apart of them. I can say that this might be the most important message that I can share: I believe that revaluing our culture's connection to the value of water is something that many communities outside of our basin could revisit and consider for all of our futures.

5.1.2 Yorkín

Something important we recognize, with regards to protecting our basin is that if we do not work to protect this side of the streams and rivers, the other side is going to be hurt. The idea then is that all sides of the river are united, and recognize that we all take care of our basin, to ensure that the river will not die.



Figure 17. The Yorkin River, a main transportation and export hub of the Sixaola River Basin

Since the day I was born, I am here in Yorkín. I am the president of the Binational River Basin Group of indigenous community leaders. We are a group of women. For two and a half years since 2013, we have engaged in a watershed and basin committee with the objective to protect our rivers and our *basin*. Here, we have four communities across the Sixaola Basin: Darkin, Waba, Yorkín and Shuab. These are the four communities of the Yorkín River in the Sixaola River Basin. Our current working group emerged in response to impending damage to our natural resources— water especially. Damages to these resources is a situation that we would very much like to escape and prevent altogether if possible here in Yorkín and across the basin.

We have witnessed people that come into the basin without permission, and cut the trees down across our lands. This affects the system as whole, causing erosion in the streams, hurting the fish populations, and so on. We would like to create policy and protective measures to prevent these types of activities from happening in our basin.



Figure 18. Transportation on the Yorkin River, Middle Basin, The Sixaola River Basin

Within our working group, there is a committee of indigenous residents that works specifically to protect our water. If we do not protect it, then we die. If we protect our waters, we protect our culture, and all that is of the nature of God, and that is of the creation of our God, *Sibu*. From our culture, it is understood that we must protect and care for our waters, because God left us this land. He left everything for us, and this is why we are joined as we are — of one

culture. We unite to protect our rivers. The basin has several streams and rivers. In our part of the basin, we have large rivers that are the Yorkín and the Skui and the Brai. We are working hard right now as ever, in our efforts towards protecting all of these.

Currently, we want to learn how we can assist the residents of the basin. We want to improve the quality of life for all, both the people and the environment. We do this by helping the river. We're asking, "How can we prevent deforestation?" We would like to educate people not to cut the trees down, as this negatively effects the river systems by enhancing flooding events for lower-basin residents. By providing informative workshops, we are exploring how to motivate basin residents to consider the decisions they make to benefit themselves and their livelihoods, in parallel with efforts to support the health of the environment and the basin.

A fundamental goal of our basin committee is to safeguard the waters so that they are not contaminated. Occasionally, as human beings, we sometimes use chemicals, and we do not realize to what extent this practice is polluting the water. We do not realize that what we allow to enter our streams, will also harm the water we use and the fish in the streams, our food, it harms them too. We don't want to arrive at a place in time where we realize that we have not done enough for our waters. Therefore, we are putting strong efforts within our committee by creating awareness of what we cherish.



Figure 19. Yorkin, Bribri Territory, Middle Basin, The Sixaola River Basin

We are lucky here in our basin, as the two countries are united, and our indigenous communities are united, also. However, at times, we have threats from people who are not indigenous and who come from outside the basin. The residents that I speak of, are those who are tending livestock, especially next to the river systems in the lower basin nearer to Panamá, and unfortunately do so without having developed conscientious practices, and worse, the policies that are in place, further allow these practices to continue. Nearer to Costa Rica, this problem is lesser in this region of the basin, due to the fact that our communities here have a right to the land, which is of the Bribri territories.

Certainly, I can tell you the story, as it is known not just here, but all over the world, that the natural caretakers of nature are indigenous residents. We were gifted this land—no one else. It is our responsibility to see that it is well kept. We know how to handle our own affairs as we always have, ever since our ancestors walked out of these rivers. They taught us that we can use everything we have in the forest, in the water, everything — everything, but because we are a part of this everything, we are aware that we must measure every decision with a ruler. If someone comes in, and does not do this, we will all cease to live.

Two years ago, our group went with IUCN to Guatemala and met the binational basin shared between Guatemala and Mexico, where they were beginning to make efforts towards protecting their rivers. This exchange was to encourage myself and our group members to exchange experiences and to return to talk with people in the community about what we learned. Throughout these two years, our basin group has been liaising regularly to discuss the needs of our basin. In the case of the shared river basin in Guatemala, unfortunately, their group did not put forth strong efforts to collaborate across their basin. The result, is that they are now saying if they had started to coordinate immediately, their rivers and issues they face with regards to water security could be lesser today.

Our basin group and efforts, are another story. Our group began to do the necessary work immediately. We talked to agricultural producers across the basin to ensure that they carry out their farming practices without chemicals. Simply, if a farmer chooses to cultivate organic crops, they will not pollute. This is a key reason why our group gathers together, regularly — we are fighting the battle. Sometimes it's more visible than others, but we do this in order to see what can be done for and with the residents of the greater Sixaola River Basin community.

We believe that if residents are well-informed, a greater consciousness will enhance people's practices. In turn, the quality of our waters is improved and the quality of life for residents across the entire geographies of the Sixaola River Basin become a reality. For this reason, we are fighting, so that everyone can have a healthier future by way of upholding a greater awareness of the importance of protecting our natural resources in the basin.

The other thing is that we are threatened with hydroelectric. They (the governments) want to join the Rio Yorkín with Rio Brai to a hydroelectric power venue, and we do not want that because that will end the only large river we have. It is our responsibility to see how we can protect this river; we are bound to it. I do not know what else I can say about this except, for us as Bríbrís, our appreciation for nature runs deep. For us, if others touch nature that we are connected to, for example our rivers or the trees, it hurts us, we feel it. It is as if we cut a foot off or a hand. This has been the real struggle as indigenous to think that if we do not work as hard as we can, if we do not fight, others will come and cut our feet off...

Our experience as indigenous residents, we can certainly share this experience with residents outside our community. We would like opportunity. We can tell our stories that explain these deeply-seeded connections, because we care about nature as indigenous, and because it hurts us when we do something to nature — the water, forest, birds, fish, all of this. For us, every part of nature, it is paradise, and we defend it because God said, "I leave Paradise to you and if you do not take care of it, then there are the consequences." Examples of these consequences that are happening today can be readily seen... climate change, and all that.... Well, we still have it.



Figure 20. The Changuinola Dam, The Changuinola River located outside of The Sixaola River Basin

What we know is good for us as indigenous is that water is life. We cannot live without water and it is considered sacred because if it's over, you cannot get more. The only hope is that you try to return to rebuild as it was. And that costs many years and all the while, many people suffer. For us, the water is a living thing. Thus, it is not necessary to meddle with water.

When the rivers are full of water, it's possible that you can see something that does not matter. It's a feature on the landscape. But in our culture, it's a living thing, giving instruction. Something that is not dead, but rather, *she* is alive. But what happens in many other cultures and in human belief, is that we do not believe in that. Here in Yorkín, God cleanses us with water and

so *is* our culture cleansed — we are clean water. More specifically in our culture we are clean like chocolate and water! We believe that *cacao* (chocolate) is the wife of *Sibu* because she meets and delivers what God says; she provides what grows and nourishes all of our bodies and spirits. But other indigenous, other communities across the world, have their own experience of water, and they can share with us, that is our hope. And they can say what if all of what I am saying is true or not?

For us, we are continuously learning more while we are in the fight for healthy waters in the basin, this is what most motivates me to protect them, the knowledge we gain throughout this process, and also to make people aware of these learnings. Sometimes, people who are not indigenous do not understand us. They think that we get upset over environmental issues for fun. But it is not that, that is not the truth. Rather, the indigenous are always looking forward to the future. And others, not. With this, sometimes there are consequences experiences for the people that do not see the future ahead. If something will happen one may not know, but we as indigenous, we know.

My grandmother told us all of these things—you are the ones who care for everything, and it is you who will be what will suffer if you do not. But not now, and I leave everything for you to guide them along, the rivers, but if you are not guided, you will suffer with the rivers, the environment, and everyone else. So, taking care of our rivers, and taking care of our basin, that is what we do.

5.1.2 Telire women and her streams

On the subject of water, being in an indigenous area of the Telire River and its channels, we are very friendly towards nature. For us, the rivers and streams are incredibly important. Like

children, adults all care for them, this nurturing relationship is how we keep our rivers. For all of us here, we have learned well from our elders who taught us to care in this nurturing manner, because rivers are part of us.

We share them with fish, and all the other animals that are sustained by water, like us. We take care of them as best we can, and teach our children to do the same. However, we have noticed that there is less water than there was in past generations. Simply, the population has grown much larger than before. In the location where we have historically collected water, we now need to travel further upstream, as many more people are now residing there. An example of this growth is that our buckets that we gather for our daily use, are not as full now. And from this shift, it is also taking longer to collect our water.

But despite the observed populations changing, we always hold close the care of our rivers. We remain mindful to ensure that the rivers are not poisoned. We safeguard that each river that is normally fished, recognizing that we must let the streams be alive as they are, allowing the animals to thrive. With this allowance, the animals eat the fish, the allowance of the fish to eat the flies, we are keeping a balance, and do not hurt the rivers. If we take too much out of this alive system, we fully understand that we injure ourselves in the process. Disrupting these life circles not an option.

Water feeds all life.

Our waters, the Jamen, Tucuriri, Bele, are the three largest streams we have from the Telire. These channels fill up very big when full. They are abundant in many species and quantity of fish, shrimp, and are wonderfully beautiful. We eat fish to consume, especially during Easter, but no fish are sold. This is one of the reasons why their populations remain strong today.

Telire is a feminine river system, one that nourishes and provides our community with life. Our ancestors walked of her streams. We live, raise work closely along her winding banks.

We are a women-run grower and distributor collective of produce. We are 75 producers strong and growing. Out of the 75, most are organic but some are conventional and making the shift towards not using chemicals on their crops.

The idea within our cooperative is to sell all kinds of fruits, not just bananas. Historically, bananas are new for our farmers. We have grown cassava, cacao, oranges, yams, mangoes, and many other crops in one plot, all organic.

Each fruit we sell here can open up doors for us to sell our goods in national or international markets. The banana, too. But that's the vision; we are starting to develop our banana markets more strongly and for a year now they have been growing alongside our other crops.

We have received support from the Mixed Social Welfare Institute (IMAS acronym in Spanish) with banana and with the Ministry of Labor for various jobs such as weight or internal work to be carried over and that. Then the Ministry of Labor has supported us in this and we are mostly women than men in this organization. Because at the beginning our organization was mainly ran and staffed with women, but then with the new law came into order that we needed to have the participation of men within our organization.

An issue we are presented with in relation to our changing waters of the Telire and the values we hold towards them concerns what is organic and not — this is mainly with banana cultivation.



Figure 21. Telire, Woman-Run Producer's Collective, Middle Basin, The Sixaola River Basin. Photo: J. Tanner (2016)

Today, bananas are the largest good produced across our growers, and I believe this also holds true in the entire basin. An interesting fact is that our region, and this river basin, is a prime exporters of bananas in the world to Europe.

I am proud to say that we are very friendly with nature in our farming practices. We work with what is sensible for the environment, hence we are more organic than conventional farmers, because we believe that in our farms we must sell, what we would eat.

We have all learned that bananas are not difficult to grow in our regions of Talamanca and these lower valleys. They grow incredibly well in our near-coastal climate. However, the choice as to how to grow the banana is a difficult one for many growers.

As indigenous, we grow organic.

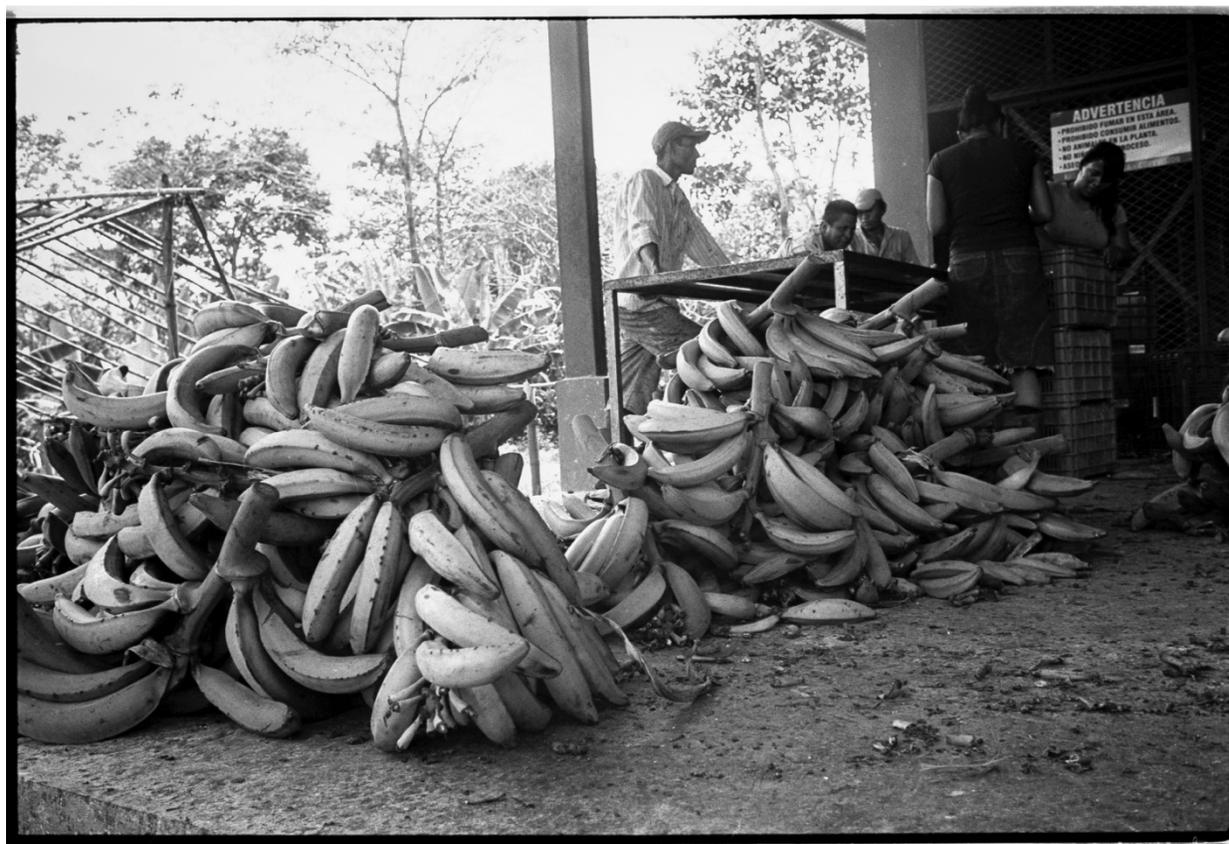


Figure 22. Telire, Woman-Run Producer's Collective, Middle Basin, The Sixaola River Basin. Photo: J. Tanner (2016)

The bananas that are grown with the other fruit crops, are grown for our own consumption, and therefore, are organic. But the bananas that are grown to be sold to national

and international markets, some of our farmers use conventional methods of agricultural, which are the same methods as larger growers, wherein chemicals are applied. We do not support this approach. It all comes down to education.

At the markets, when a farmer is attempting to sell their organically grown banana, without the use of plastic bags to cover them, they are bitten by bugs, burned by the sun, and browned a little. The farmer sees a conventional banana next to theirs, one that is golden-yellow without blemishes, and it is difficult for the farmer to believe that their bananas, browned, and bug bitten, will sell beside the yellow bananas.

So, they use conventional methods, and with the selection of monoculture, as means to compete with larger growers.

Across our collective we are trying our best to educate our farmers about the benefits of crop diversification, and the lessening, or rather ceasing of chemical application on their crops. In these efforts, we highlight that when the land is sterilized in the way that it is needed for the banana, other types of fruits cannot be grown there. The likelihood that their entire crop could be wiped out by disease increases. This is a present concern, and is something that has been witnessed in our basin. We have heard that the die-off of crops is not unique to our region, and in Central America, but is happening in communities all of the world with the banana.

To avoid placing our livelihoods at stake and to avoid injury to the environment, in our beliefs and culture, we work more with earth, because that is what gives us life.

We live in the basin so we care for us to work with chemical is something that allowed us to us Indians because it is something that will damage gusanito from the smallest to the largest.



Figure 23. Telire, Banana Distribution, Middle Basin. Photo: J. Tanner (2016)

Bananas are brought in by individual farmers to the collective. They are counted, weighed, and sent to shipping and trade facility in Puerto Viejo, Costa Rica, a coastal town well known for coastal commerce, including import/export of goods, and tourism.

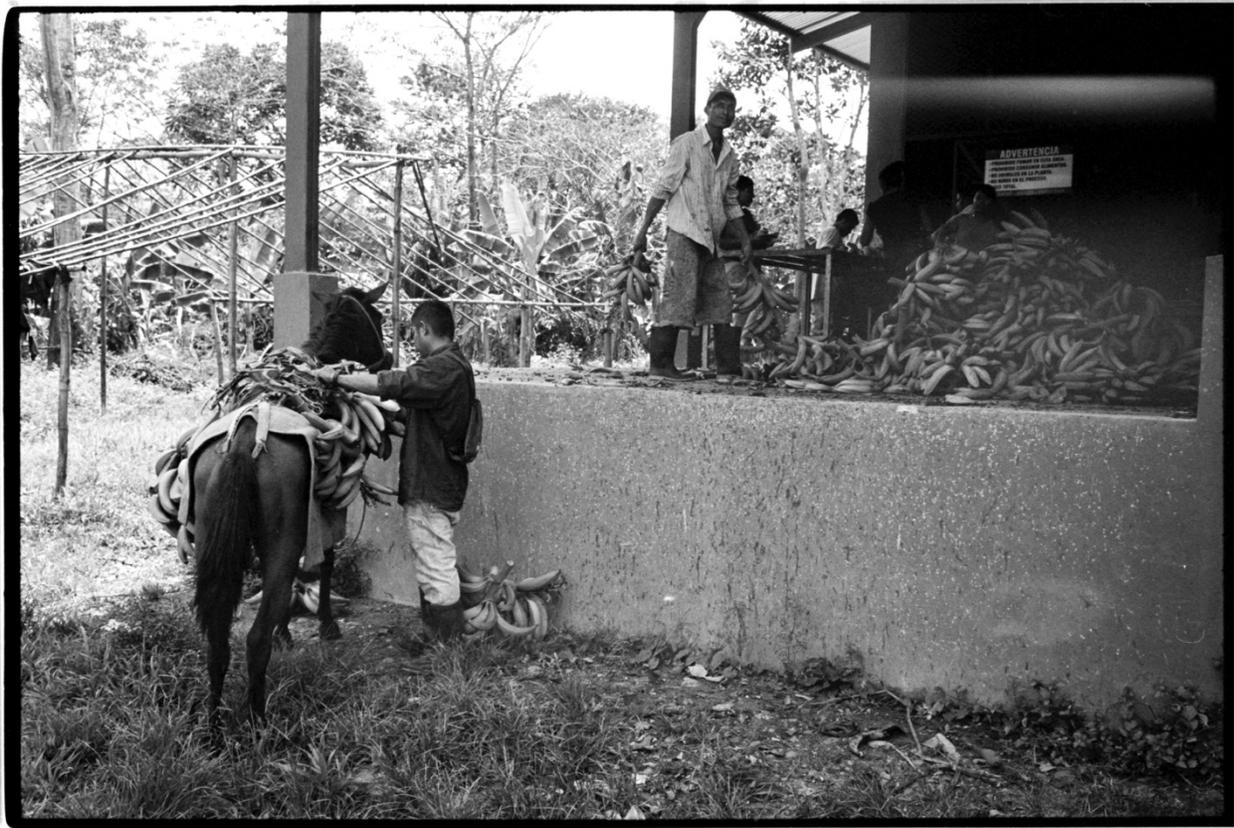


Figure 24. Telire, Banana Distribution, Middle Basin. Photo: J. Tanner (2016)

Our problem here is infrastructure; the road is in bad condition. The rivers, when they are full, take all of the roads with them. And with it, our capacity to sell. We cannot sell our produce in bad weather, as it rains a lot here in rainy weather like sun, there are times when there is a fairly severe drought, but thank God also raining at once.

Here, we suffer both at once, the extreme rains, and then near drought conditions. There's not a single summer time, but many. We try our best to listen to the rivers, and to adapt. Simply, in Talamanca, we do not know the weather here.

It is our vision, and within our cultural beliefs that we care for our rivers, our streams, and will do what we can to protect them for our future generations in the basin. It is our sole

responsibility, if not us, then who? The government(s)? No. It starts and ends with us, with our actions, our community and our families — we affect and are the affected.

God gifted us this land, and we as caretakers always try to do our best by it. At times it's difficult, but we choose to do better than what we hear other growers, producers, and communities have done elsewhere.

If we hurt the rivers, we hurt ourselves.

5.2 Middle Basin

From an aerial view, if you could have looked down on Central America 100 years ago, surprisingly, there were no bananas. Bananas did not exist here. From this, a story of geopolitics in the Sixaola River Basin emerges. The United Fruit Company changed their name to Chiquita, and their presence remains across the basin. The famous oval blue and yellow label can be seen on the sides of shipping trucks crossing the bridge, overtop the border—the transboundary Sixaola River between Costa Rica and Panamá.

Lining the lower valley roads are thousands of square feet of processing plants with the famous signage at the front gates. “Chiquita” is the very last noticeable thing seen at the port, sending thousands of tons of banana directly to Europe. Supporting the economies of trade of the indigenous community territories, and of Costa Rica and Panamá, the banana has become a part of the local residents' story, influencing their lives and livelihoods.



Figure 25. Banana Fields, Middle Basin, The Sixaola River Basin

But what helps can also hurt. The emergence story of the banana is a robust politick that has persisted alongside the cultural values of the Sixaola River Basin residents. Residents existed long before the banana in this region. How residents identify culturally and spiritually with their waters, with their land and with their trees has held strong over time. But to say that the banana has had no influence on river basin culture and basin residents would be naïve.

5.2.1 Valle de la Estrella

Covering the entire territory of Talamanca and Valle de la Estrella, I just started working in the Sixaola River Basin. The area that I covered goes from Bríbrí to Sixaola. My first indication that there may be a problem here was when I was working to plant tree coverings in

order to provide shade along the banks of the Sixaola River. I began finding out there were great concerns about chemical usage and the exploitation of banana as a monoculture. I have learned that there have been various actions towards improving protections and producing a healthier river system here in the mid-lower basin for citizens. Actions have been taken to mitigate and lessen the extent of climate-induced change over the years.



Figure 26. Commercial Banana Crops, Middle Basin, The Sixaola River Basin

Actions are being taken to support the residents here, such as reforestation, crop diversification and introducing grain commodities to provide food security. At this time, we are touring the Shirroles indigenous community to learn about their practices and how we might incorporate them into our management planning of the basin's natural resources.



Figure 27. Banana flowering, Middle Basin, The Sixaola River Basin

Here I also started in the Sixaola River. We continued with the Telire, renamed but still the binational territory covering both Panamá and Costa Rica. This river system has embraced multicultural populations since its inception. Many are indigenous to this place, and are also Nicaraguan migrants and indigenous Panamánians working in Costa Rican territory.

There are situations that are worrisome for our ministries from both countries tasked with protection of the river: Over the years there has been a great increase in the use of agrochemicals. The greatest export demand is banana and a learned practice is that this requires the use of *bolsas* (plastic bags) for protection from insect damage and the burning sun.



Figure 28. Plastic bags used in banana farming, Middle Basin, The Sixaola River Basin

Here, insecticides are used to maintain the crops. Bananas fall to the ground, full of these chemical. There are also very frequent and excessive rains in this region. With these events, the river grows and causes all of these plastic bags and quantities of agrochemicals applied to the

bananas to be swept away by the currents and pollute the waters of the Sixaola River, and well, everything ends at the mouth of the Sea.

This has been a pressing concern for the institutions and basin residents that have been training villagers on the use of these products. There are other alternatives, including times when it is not necessary for these bags to come impregnated with insecticide. However, promoting the use of these bags without chemicals has been a problem. The idea is to lessen the need for these products and to gradually replace them with lower toxicity products and alternating with organic inputs to increase soil fertility after overharvesting— the greatest impact on pollution would be if we add these agricultural practices to an overall decreased use of agrochemicals,.

Maybe it's from ignorance that people use recommended chemicals without knowing much about them. It is easier to tell people what to use than what not to use. And what do I tell small farmers if only agrochemicals used by big, agribusiness farms are available, for example? Should they use them, too?

Within my training, I am an environmental ecologist. I believe very much in symbiosis, protection and that sort of thing, but I'm also an agronomist. So, I try to get good returns with the least possible impact. I'm not an extremist. But I think you have to do something when you see something is wrong.

This is important, because this valley is a lung for the area and across the country, and the for the Sixaola River Basin, and it is in need of a good rescue right now. From what I can see, I think they many here are using chemicals without controls. I question if the governmental agencies that regulate these practices, if they have begun to think about any of this? I can answer this question, no. They have not considered the critical need for rescuing this area. I was

surprised that they (agencies) will deliver chemicals to community members that do not understand these chemicals, what the effects are. If the political will in the eyes of the government is to be more organic, and to be environmentally conscious because of global warming, for example, but they will continue to apply chemicals... it makes no sense. It makes me shamed and gives me grief that they still are delivering chemicals in this way. It benefits one, and damages all.

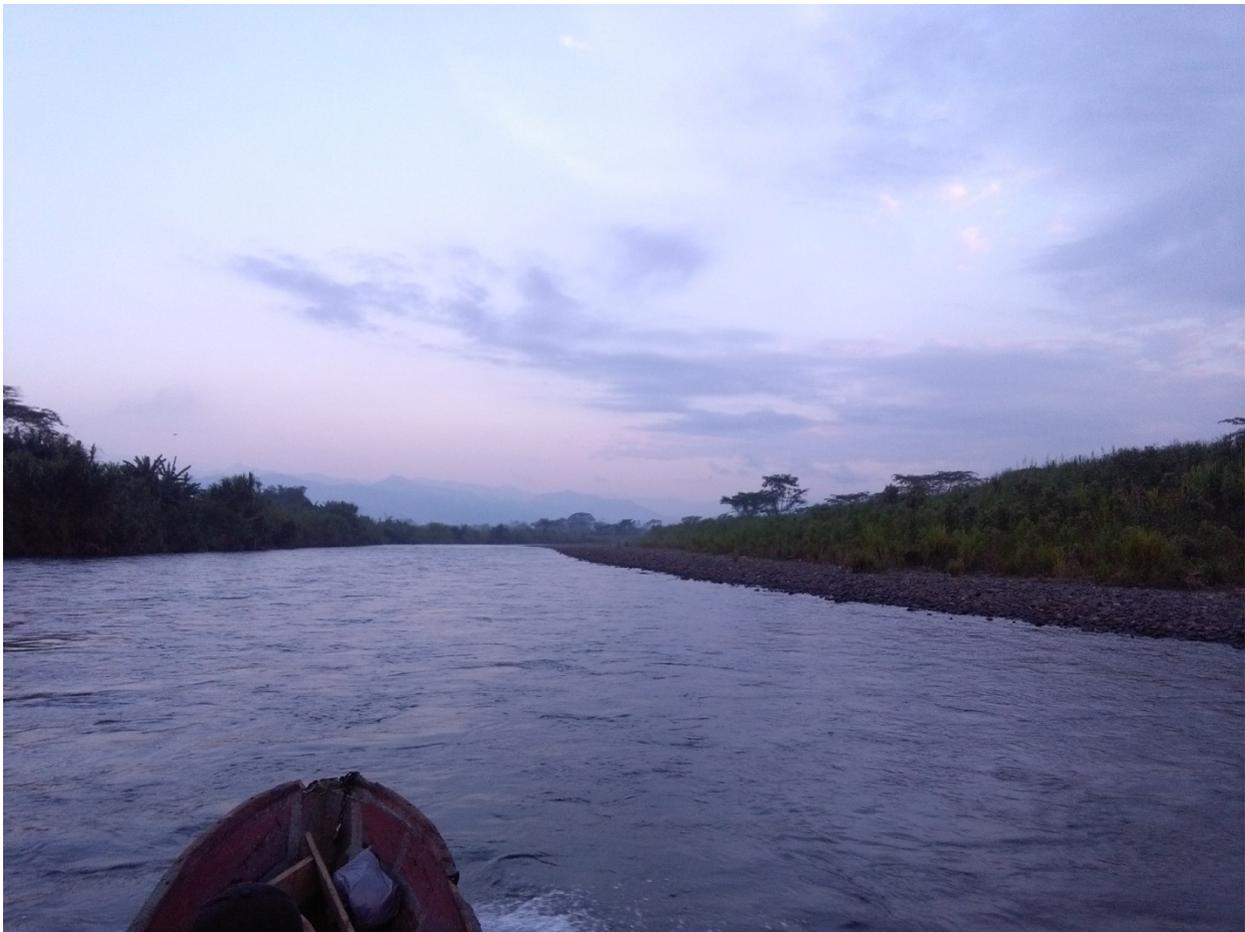


Figure 29. Tributary of the Telire River, Middle Basin, The Sixaola River Basin

The people whose land and territory this originally was, and some are still here, Bríbrí, its tragic to see the poor state of some of the land and the waters. When they share with me how the

rivers should be, how they were, but how they look now following so much destruction when Chiquita came in and took up residence here, and continue still with their practices on neighboring lands – it's heartbreaking.

Understandably, all of this that I am making an account of sounds ugly. But there are at least indicators that within working groups and other governments around the world, that are giving value to indigenous people, listening to them, and learning from their inputs of what we might change within our human-environmental interactions. I welcome these initiatives here, and everywhere. The knowledge exchanges between myself and the communities across the basin on the soils, the water and the growth cycles, are rich. We are able to share and compare practices, and find ways for community members to not use chemical if possible, as they don't want to.

These disjointed actions at the governmental level that I discuss, I believe only inspire and ignite the current local initiatives taking place by basin residents. I hear from the community members that I am working with on their farms, that there are working groups talking about these important issues: water resources, chemicals, flooding, water security and others, and are making efforts to get people involved. I am new to the Sixaola River Basin, but I would be interested in learning what projects these groups are tackling, and maybe, I could help in some way? I don't know... I look forward to learning more about the Sixaola River and these lands surrounding it.

5.2.2 Margarita

Water is one of the fundamental elements of life. I have met almost all rivers' headwaters: the Telire, the Cohen, the Yorkín, the other, the other the other... They are beautiful, little fountains from everywhere, the most beautiful waterfalls. At any moment, we crossed

between Talamanca and Buenos Aires, for many special reasons with each excursion. I walked in almost all Telire headers. They are magnificent.

But down below, here in the middle basin and valleys, it's another story. Recovery would be a good word to describe the state that we find ourselves and are waters in. Across the valleys, we drank contaminated water for many years. First, because we have polluted the rivers immensely, mainly with the banana transnationals. Moreover, here we operate on wells. We learned that wells and banana don't mix. My property sits higher in elevation; thus, I gave what good water I had to the community. But all around our community well were plantations where any number of chemicals were irrigated with DDT to organophosphates. As the lands here are all alluvial, it's no wonder that they then all became penetrated with these substances. Our community here in Margarita for example, has the aqueduct in the same well which made the company (United Fruit Company). If you were to have visited Margarita, you would realize that there was a cellar of agrochemicals located directly next to our main water source. But not today. It has been gone for many years. I took it upon myself to fight from the outset of these findings, and report many of these things to every agency possible. What I noticed, I reported. I went to the Ministry of Health and met with the Minister of Health. We had a group here that formed and it is was called, *the Civic Committee*, which has made history across the basin. Within this committee, were a group of fact, but not in law. It's important for me to state that I belong to the committees of fact and not of law. We came together on our own accord, volunteering our time and efforts to do right by the residents of the basin.



Figure 30. Organic Farming, Margarita, Talamanca, Costa Rica, The Sixaola River Basin. Photo: J. Tanner (2016)

When talking about good water or bad water, and how much is in the river system, and *water security*, the water here is plentiful. We have no shortage of water. Mother Earth blesses us in this way. But the water that we consume here is contaminated, because in my opinion, we are disorganized people, we are dependent on people that are removed from what our lived experiences are in our basin, and with this, politically we are poorly educated people. We are a product of a system that has taught us to not be interested in history.

'A people without history is like a tree without roots,' it was the great apostle Martí that once said that.

We learn all that we can from our rich indigenous communities and neighbors of the basin. We are lucky that we can have something to compare how we are by way of acculturations, and how we ought to be, with respect to our connection to Mother Earth, stewardship of the environment, and our waters.



Figure 31. Organic Farmer, Margarita, Talamanca, Costa Rica, The Sixaola River Basin. Photo: J. Tanner (2016)

I am a farmer. What I learned of my farming practices, I learned from my parents. I produce what I eat, and give away my surplus to neighbors and to the school. I tell the river, the river comes out does its job, does nothing, meets a natural process because we gave her the opportunity. We gave her the trees, providing stability for her banks, habitats for the fish and macroinvertebrates, and critical breeding grounds for the native birds. We leave her (the river) to

her natural processes, and she goes wherever she chooses. But that process, I would say, for some people of faith, the river is a blessing, because what it does is it brings organic matter, new fertilizer, it is beautiful, lovely for all the land. It is within this process, that the river fulfills its role, and we humans are the ones where we break that role, wherein we should not be disturbing, and destroying the natural barriers of the river.



Figure 32. Organic Farming, Margarita, Costa Rica, The Sixaola River Basin. Photo: J. Tanner (2016)

For me to be able to discuss the value of water resources in my corner of the Sixaola River Basin, it is fundamental that the history of this region is shared. The story of Talamanca is very cruel, and is one that most do not like to talk about. When the government of the last century wanted to make the railway to the Atlantic, they created an agreement that was carried

out by a man named Minor Keith. That man was a bad man. Keith was dissatisfied with the agreement and said that he needed land too. Then the government without analyzing the situation, said we will give all of the eligible land to plant bananas. At the time, it didn't matter that this was indigenous lands. Valle de Talamanca and Valle de Sixaola went to Minor Keith, and the Valle de La Estrella remained "unclaimed" for a period. These lands were delivered to Mr. Minor Keith and, given without having done an analysis of who lived there for thousands of years, who were our rich indigenous populations of the basin. Minor Keith then turned around and sold it to the United Fruit Company.

United Fruit Company came in, and started cutting down trees to make room for banana production, and in the process, damaging our vital resources of the Sixaola River Basin and the Valle de Talamanca. The indigenous who resided there, they were thrown up to the mountain tops with our other indigenous communities residing there – they were driven out from their ancestral lands, as they had no defense. They came, United Fruit Company, and brought bad people, people who went around migrating across our basin – they were murderers in Nicaragua, in Honduras, and elsewhere. They (the banana company) were murderers and what they did was, they changed their name to have a new face for themselves. Soon after, the local groups would take opposition to these murderers, and they came, they beat the managers with a machete. A saying from that time in our basin went: a payment without dead was a bad payment. People got paid to kill others. There were many murderers, throughout the Caribbean islands, everywhere.

It is a cruel history here of the *banana*. Years passed, and it is now different, because the cycles of life have already started to regenerate themselves, from the valleys to the Alta Talamanca's indigenous territories and communities. The land domain of the big banana

companies is already considerably lesser. Most of the lands here are in the hands of small farmers, not because the State gave the land back, but because the land recovered. That began to change, up there and here, in roughly the late 1970s when the indigenous territories and reserve below here were created. Seizures of land began, land grabs, in the region began in 1976 and 1979, and that is when the final fight that took place at the church of Limon. The peasants got into the church and they/we forced the State to negotiate. Monsignor Coto had lived during that time, and this business and, he said: 'I will fix the problem and tell the story'.

Monsignor Coto sat with the government and started to negotiate the land, these dealings were able to be completed in 1976. All of these lands were recovered, the indigenous groups won the fight. Now, that's the inside story. It has been very difficult here, but the importance of all that is Talamanca and all of this rich basin that it is our home, it rests upon the blessings of these lush and fertile lands and our precious rivers that feed them. I and many of the community members here think like our basin's indigenous, we're not separate from these resources. That said, in the end, even with our beliefs and our fighting, we weren't able to prevent long term damages.

If you do a study on Margarita in the last 20 years, people out there, most people die from cancer. They died of bone cancer, died of stomach cancer, people have been dying of cancer everywhere and that's not by chance. Air pollution, water pollution, which when we consider it, are the same here. We are understanding that we have plenty of water in the Sixaola River Basin, but contradictorily the quality of water, we are not water secure. It is contaminated water that we consume here. This is counter to how I was taught to keep the land, how many of us were taught

to take care of the rivers. If it weren't for the companies, I would be telling you a different story than this...

To understand how our water works here in the middle basin and across the basin, it is important to understand how these profound past historical currents that we have experienced and how these experiences share our valuation for these resources that we hold so dear, especially our rivers. We didn't ask to become ill, we didn't ask for lands to be taken away, we fought enough. We did what we could. But for today, I understand that to change a system, it is not a fast process. But I hope with our continued efforts across the basin, we can continue healing, together.

5.2.3 Paradiso

There is no greater thing than the Sixaola River. It acts as a border, but for a farmer like myself that lives on the river banks, I do not see it like that. If the river is always changing, which it does, one always has to be united with everyone here.



Figure 33. Paradiso, The Sixaola River (Nearside - Costa Rica, Far side – Panama). Photo: J. Tanner

Yes, I could say, “that side is the border of Panamá and this side is Costa Rica,” but that doesn’t do any good, the separation. I want to know what I am doing here on my land on the Sixaola, how that affects people all along this river system — not what only affects Costa Rica or Panamá.

I was in River San Juan before the Sixaola River. I was born in Heredia in San Jose, but raised in Nicaragua. I had my family farm at the banks of San Juan River, at the border of Nicaragua and Costa Rica. When there was the war, unrest and conflicts of the Sandinistas, I had to leave. I arrived here in Paradiso.



Figure 34. Farmer, Paradiso, The Sixaola River, Costa Rica. Photo: J. Tanner (2016)

I love it here on the river, my home, because, how could you not like it? Just look at it! I grew up alone on these banks. I had no papa and no mama. I grew up with my grandmother who was 80 years old. From seven years of age, I had to become a man, and to begin work on the farm. In all this time, six decades, I have never worked for anyone. I have only worked on my land, and for myself. I had to learn how to farm. Sixaola, she taught and still teaches me when I need to plant my crops.

This is banana.



Figure 35. Banana Farmer, Paradise, The Sixaola River, Costa Rica. Photo: J. Tanner (2016)

Banana arrived as a cure for my family. It's the main crop here. Banana planting began in Talamanca about 70 years ago or so. The banana is the source of income for me, I have other crops, too, but none near as profitable. Chiquita came to the basin years ago. They only worked bananas and plantains. We saw, and learned from them.

There's a story behind this, one that I am not very proud of.

At first, when I started out farming, I had poor practices. I was pouring poison on my crops, insecticides to keep out the bugs and more to fertilize the soils. I was killing all the nature. I have learned since. Right now, I'm trying to preserve nature. It's taking me a little bit of time to

get used to, especially without nematicide, cultivating without poison and without anything to preserve some land, and but time will tell to see if the crop is better.

The Ministry of Agriculture are giving educational talks and training for small farm farmers. In the time that I was growing up I had no one to guide me, I saw what the big farms were doing, and did the same. But these specialists said to me, “look you're doing it wrong.”

I worked as I wanted, but not now. I am more aware of the needs of the environment, and going along with this, taking care of this river. I am grateful to have learned now, and not when it's too late. At least we have people who are giving us knowledge, bringing all the farmers on all sides of the river and the valley, showing us different approaches— how to be better. That's where we're going, together. Our future.

This river is a source of life, she gives life to one and all. Waters like these are not found anywhere. We call her “El Rey,” because she takes whatever she wants in her path. She doesn't care what side of the river you're on, she consumes everyone's farms. She makes us all surrender. She unites us. This water is forceful and alive. Just look at her. Feel her currents. She is brilliant.

Some people in the area drink tap water that comes from wells in the ground. Others drink from tanks that are delivered by the governments. But I say its better take this water in, just as it is. I have never not bathed in it, drank from it, and used it for my crops. It's a precious source for me. I cherish this river.

To support the river banks, and to improve soil health, which is incredibly difficult with the constant floods experienced here, I am reforesting my land with many different trees. One is

melina, it's a fast growth tree, another is called espavel (wild cashew), and plenty of avocado trees, they grow incredibly well in our climate.



Figure 36. Cacao Farm, Paradiso, The Sixaola River, Costa Rica. Photo: J. Tanner

I also plant tree for timber. These are the cocobolo, used for shade and for their wood. But it will take 25 to 30 years to harvest. In the meantime, they serve a great purpose, providing shade for the bananas. And at night, the dew from the leaves leaves will keep the soil moist. From all the rains that we have had this season. It smells strongly of the natural fertilizers I am now using.

I am interested in doing more planting. However, I do not write. And in order to obtain payment for environmental services, it requires me to submit written requests. I have been told,

that if I learn to write, then I might be able to be placed into these programs, so that I may carry out more of this work.

Look over there, across the river. That is ‘Panamá.’ But when the river changes, just like the tail of the iguana, where we are standing right, is this land, now Panamá? With every flood, which are many, I have to lose just enough land to keep myself afloat. The fact is, what does not hold from the floods — *this river kills*.



Figure 37. Standing on the bank of The Sixaola River, Costa Rica. Photo: J. Tanner (2016)

I have sown sotacaballo, a strong tree species to protect the river. Its roots give strength to the banks, and help clean the river. For almost 40 years, the Sixaola River has had many changes.

Through this time, changes in depth have been noted, and it dries very quickly. At any time, it rains, the river rises too. *Quickly*.

For most of my life, I have watched the Sixaola. For me, it is sad to think of the destruction and carelessness that has happened over the years. What has flowed from these banks, along the entire river systems, and especially throughout the middle to the lower basin, is tragic - how all of this eventually finds its way to fill the sea.

That is pure banana sea - the chemicals, the excess nutrients from the peels, the plastic bags used, all that sea is lost. Earthquakes are another story. Historically, that is just another igniter for the flooding to begin. The first floods generally arrive in August. Almost every year I have to think about what I will do, and how I will plan. But I feel this river, with whatever I do — she laughs at me.

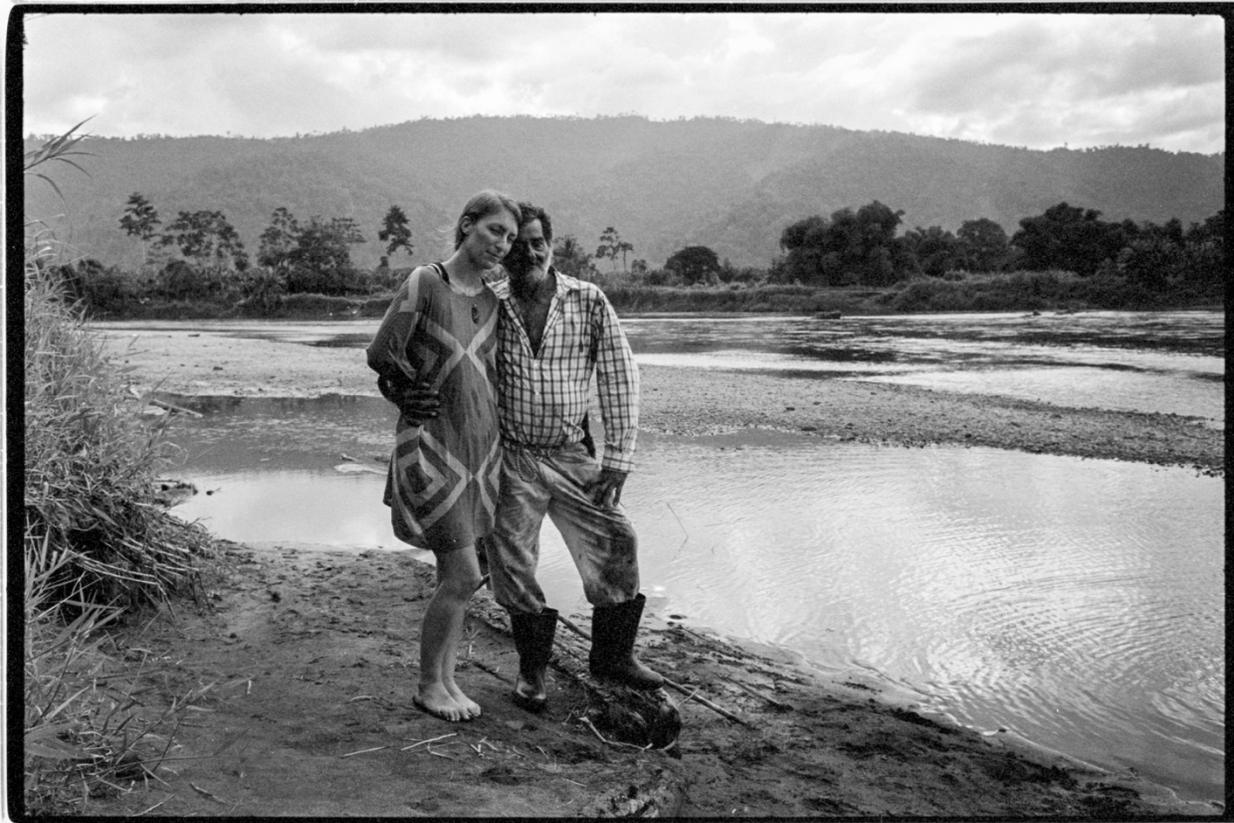


Figure 38. Farmer (Research Collaborator) and Researcher, Paradise, Costa Rica, The Sixaola River. Photo: J Tanner (2016)

This year already, there have been three full flood events. It's September. You can see over there; she ate part of my crops. Recovery, it is slow. But I think efforts of the tree plantings could help lessen the damages to my crops that I have experienced in past years.

With everything this river takes, all of us who live here know she is what sustains us, and gives us life. So, we learn to live with her, The Sixaola River – and with one another.



Figure 39. Private Banana and Plantain Farm, Paradiso, Costa Rica, The Sixaola River. Photo: J. Tanner (2016)

5.3 Lower Basin

The Sixaola River Basin is not a fully closed thing, but is much more open than spoken of in terms of geopolitical references. For more than a basin, you give that limit the influence, but this basin goes far beyond that limit you can ever give it. No political line can divide this region, they certainly do on a map, but that is not how communities see themselves and function in their day to day. They see the ephemeral river border as a historic bridge of peaceful interactions and relations. You do however, have to cross an actual bridge to make your way to the basin's outlet at the Caribbean Sea.



Figure 40. The Sixaola River Bridge, Sixaola-Guabito, Costa Rica-Panama, The Sixaola River Basin

The Sixaola River in addition to being a river that separates us, is a river that connects us to both sides. For many years we have had trouble crossing the river once before there was the bridge and when the bridge began, 100 years ago, the bridge is today and then a bridge type that has been built as a temporary bridge that was made to hold for 2 or 3 years, and now comes another bridge to be made from the month of June 2016, any bridge will be something better of what we have.



Figure 41. The Sixaola River Bridge, Sixaola-Guabito, Costa Rica-Panama, The Sixaola River Basin

But the bridge has always been the union between the peoples, both in terms of Costa Rica and on the side of Panamá. And actually, indigenous communities have used the river even for transport, to change sides for trade, but not where bridge(s) are currently. The communities are located just above the river. They directly cross the bridge, as if there were no limit. They have used it this way historically. There are even communities who have moved sides based on where their river moves, we for example have Bríbrís on the side of Panamá that did not exist here prior, they do not originate from here, because they have changed sides. Many Ngöbes and Naso living Costa Rica, originated from the side of Panamá. This is why I feel it important to say that it is both a separation, as much as a union of all sides of the Sixaola River Basin.



Figure 42. The Sixaola River, Costa Rica-Panama, The Sixaola River Basin

On the other hand, there have been problems with the river over the years, there have been growing pains, you record floods that have affected both countries, on both sides and that has influenced a little this issue of the commission to develop binational because sometimes you have to take measures that are equally for both (all) sides. Starting with the issue of risk, which is the subject of flooding and continuing the theme of improving agriculture, to make it more sustainable, on both sides, because both sides influence the river. So, we have to work on something that is equal on both sides, because if no one were damaging the river and other not. But we have to treat both sides work in the same way. In the part of agriculture, health part also

feels the same, if it affects one side a health issue, it's going to affect the other side. The Sixaola River Basin is our partnership, and our contract that we sign, is the rivers themselves.

Maintaining the health and well-being of our rivers, this is a direct reflection on our commitment to the residents of the Sixaola River Basin.

5.3.2 The Outlet: Almirante

For me, the sea is life. This understanding also holds true with our rivers. Each are alive, and carry life with them as they reach the sea. Our rivers, are born up high in the sacred and protected lands of the Sixaola River Basin.



Figure 43. Outlet of the Sixaola River Basin, The Port of Almirante, Panama

As users of the sea, fisherwomen like me, we understand that everything that enters the sea comes from the rivers. On this basis, our participation with others is joined by a shared vision of providing influence towards sustainably developing the basin region as a whole. Here, we are specifically users and family of the sea. When we are fishing we try to be as sustainable across the aquatic valleys and in the area of San San, our protected wetlands, and in the rivers of Changuinola and the Sixaola.

When the weather allows for us, all of this region carries out its fishing work. Fishing is how we support our livelihoods. Although we are fisherwomen and fishermen, and live with and by the sea, we are very interested in the conservation of the entire Sixaola River Basin.



Figure 44. Outlet of the Sixaola River Basin, The Port of Almirante, Panama

Naturally, if the basin rivers are contaminated, we see ourselves readily affected here in the Sea.

In recent years there have been a lot of changes witnessed in the ecosystems in the basin, beginning at the confluence and outwards into the seas. Fishing has lessened greatly for us. The climate has changed, making the rivers grow in size considerably. We have seen how all of these

shifts have affected the fish. Sadly, these changes have also been accompanied by the pollution of agricultural production of the banana and plantain across the region.

Without care, some larger producers in the basin, and more recently observed, some smaller producers who have followed suit in their footsteps, to use agrochemicals. This practice has contributed to run-off into our rivers and stream systems in the mid-to-lower basin, and for many years, it has unfortunately reached the sea. The result is dyer here.



Figure 45. Port of Almirante, Almirante, Panama, Export Hub to Europe, The Sixaola River Basin

When I was child, the reef here was beautiful. But today, they are bleached, and white like bone. They are dead. Without healthy and vital reefs to provide critical habitat for fish and other aquatic and marine species, the fish populations decrease. Essentially, our livelihoods are at stake.

Accompanying this, Sanponsac wetlands here have also been affected. Negative terrestrial impacts have been witnessed along the banks of the rivers, and across the wetlands. There are many species of trees that have been dying off. This worries us considerably, and promotes our belief that there is much respect for conservation work to be done and carried out here. As a basin, it is my belief that we must provide each other with encouragement to investigate these issues. We need to seek support, and perhaps within the basin group of the binational commission, and of this strong partnership Tico-Panamánian, I can foresee that we are walking into something positive for the region.

Usually what we are involved in this, are people within a civil society, but in Costa Rica organized group. On the side of Costa Rica, it could be seen as if there was a little more people interested and involved – volunteers and more involved personnel within government or institutions. I think there should be more of this, the local authorities should be involved here, the governor represents the district or districts, and together with the institutions that have to do with NANA or ARAP, but who engage not only to go once and when listening if not to take actions to respect. The binational commission for me is very relevant and incredibly important because it is an initiative that civil society is to develop the border area, and it is the civil society that comes together to makes collective decisions for the health of the basin and its residents. We as civil society are doing evaluations and can make diagnoses. But in this, we need the authorities to carry out the executions of some of the corrective measures that need to be taken.

We are a rich region. The Sixaola River Basin is a basin rich in biodiversity in the human hand, the population, and ancient rich cultures. It is in holding a high regard and respect for these elements that I think we have to handle our work in water resources planning and management

with kid gloves, and develop the basin carefully, so that it is sustainable. Factors that we consider within this are the changes occurring in the basin, and our need to mitigate any negative impacts that these changes may have on our water resources and natural resources.

I can most certainly cite one of these changes immediately, it has changed because the population has increased. The Increase the population use more water care less because there are more people, there are more users and if we do not have adequate water supplies, with regards to water security, good water, and enough of it, then the concern is that people will not use these resources responsibly.

Harmonious development is key for our transboundary river basin. For me, I view this development work is truly exercised by preserving the ecosystem throughout – the residents (people and the environment), this all has to do with the true ecosystem, correct? The interconnectivity of all living things. And if one element is out of balance or damaged, the rest of the systems feels it. This is how we think here, and this philosophy, values and culture is embedded into our work on the binational commission. We operate and come together on initiatives collectively through a lens of a working ecosystem, as a bio-region, and as a basin.

I feel that this commission should be strengthened by involving more participants in the conversation. We are doing well, but with more voices, the will for us to continue to work to cultivate the ideas and innovations to towards developing the basin, managing our resources, and within this, our waters, we can accomplish this in the region, and gain more insights to also ensure that we protect the environment. We wish to fully develop as the unique bioregion that we are in our basin, both steadily, and in friendly way where impacts of development are not likely to damage the area ecologically and culturally.

And in thinking like this, form a grounded approach for all who reside in basin anywhere in the world, transboundary or not, should consider the basin as an ecosystem an ecosystem by seeing people navigating the activities undertaken by basin residents be it economic or cultural, because this should be a very harmonious way to protect our main resource, the main resource of the planet – water. Water depends on all the residents living in the lands around the basin. They affect one another. If managed well, the agriculture and livestock production in this basin that line the river banks, the seas then, the resources within it can also be managed well.

We must see this resource of our waters as a whole. The whole population must have a relationship with our waters, and we must handle it as such. I would like to leave a message to anyone else who has not yet to be involved in current efforts across the basin. Get involved. There is room for everyone to want to work in the binational commission of the Sixaola River Basin. A multisectoral group, people are coming from many professional sectors of different branches. They are merchants, tourism professionals – all that handle the tourism, and across all the political identities (countries), and many more areas, sectors, and communities are present within the binational commission.

The cultural part of our work in our basin, we could do a good job and keep our watershed well, but it is a great responsibility for all the residents of the basin. We want to hear from the greater communities of the basin, we want their contributions. After all, they are the reason why we are coming together in the first place. We realize that there are areas across the basin who are hard for us to reach – they knowledge their concerns, and their interests. We also know that in some places in the basin there are environmental errors committed by ignorance because many times humans do incorrect things and they do not know they are doing things that

are harmful to the environment and ultimately to themselves and all the residents felt at different magnitudes and levels.

As Bocatorians (residents of the Panamánian province of Bocas del Toro), we believe in holding a high regard for everything that is the environment. This respect for the environment has been informed by our roots of an incredibly rich culture of our indigenous inhabitants, residents that know to handle and care for it well. Understanding these connections and respect for the environment, we believe that we need to live and to participate in a geographic space that does not belong to either of the two countries of Costa Rica and Panamá, and importantly support these native populations that are a part of all of our identity, informing our current and future actions because we are all a part of each other lives — we are a basin. The Sixaola River Basin.

5.4 Our River Basin

The Sixaola River Basin is a very important basin for many reasons, some already mentioned, is water, is life and destruction, but that destruction that occurs serves to regenerate itself in both nature, and in society in the way of people's thinking regarding a resource, and here, it is the water. The waters of the Sixaola River Basin can bring us good things, bad things, and can bring us new revelations about ourselves by way of how we interact with our waters. Ultimately, it depends on how each resident uses this valuable resource in their daily life. So, for me, personally, the channels of the Sixaola River Basin are unique and not like many other shared rivers basins in the world.



Figure 46. Tributaries of the Telire River, Bribri Territory, The Sixaola River Basin

It is river system that is born of a Binational Park, a heritage of humanity. We must take care of all of this river basin. It's birthplace rests in the mountains, and that is guaranteed for life because the two countries, joined with the indigenous territories and decided upon the La Amistad International Park, which is where the many different rivers of the Sixaola River Basin are born, that eventually become the Sixaola River. The headwaters reside in this International Park and the park is reserved for life by all the basin residents.



Figure 47. The Headwaters of the Coen River, Alto Coen, Bribri Territory, Talamanca, The Sixaola River Basin

We are confident that in the future, the Rio (rivers) will remain full of life here, and but this does not mean that we will not have problems – not without erosion problems, there are problems of flooding. Floods here, because it is a *live* river, it is a river that moves as he or she wants, and then can the nearby communities, people and the creatures who are beside the roads, plantations, and banks, and can give us a lot of trouble. But *it* (the river) also gives us the advantage, by gifting us a large resource of water, and nature, that if we care can provide ourselves with other productive inputs such as tourism, such as agriculture, irrigation, water used for hunting fish, other mammals and other ecosystems that river and the basin have, we benefit

from this water immensely. Some community members, our indigenous populations, benefit from the water in a spiritual capacity and they hold their waters sacred, such values that we are eager to learn, and explore further how we might incorporate this into our planning and management initiatives on share water resources. For me it is that, it is a river and a basin that are alive, and is it continually saying: “I am here, beware, because if you do not take care, I will take you with me.”



Figure 48. "Boba fish." Spear fishing the headwaters of The Coen River, Alto Coen, Bribri Territory, Talamanca, The Sixaola River Basin

In recent years, we have carried out projects with basin residents, communities, and the populations near the river in the basin, both in the basin above, in the middle, and lower basin, to understand better how to organize, when working in a transboundary basin like this. We have

organized a number of groups to protect the watershed, to reforest the banks, to try to prevent contamination of the waters, and that has promoted certain actions for the use of water that have been taken. There are some problems or challenges presented in the Sixaola River Basin countries of Costa Rica and Panamá, to say that, they wanted some rivers near the basin to be used for dams – hydroelectric. With this, there is a potential that these actions could cause many problems for wildlife, to name one, because it could block the way for species that use the rivers aids to develop.

There were big problems happening a few years back, and remain to the present day. These problems were not located within the basin, but were very close to the basin. UNESCO has worked hard with the two countries and a committee called the International PILE Park La Amistad, to somehow stop all these concepts that aim at building infrastructure or things that can alter the basin and its resources in a negative way. I think that somehow it has been achieved in the case of the Sixaola River Basin.

The basin is protected, the park is protected, but the buffer zones are those are areas that are not readily protected. Here, it depends upon on governments and dams, if they build or do not build near our basin. This is then an iterative process of training and awareness in hydrodiplomacy to try to bring understanding to people where we are in this process today, and tomorrow, and they effect certain infrastructure projects can have on the development of this basin. Here, we always try to have sensitivities and push towards maintaining this basin free of all these sorts of obstacles.

Then water use, it is important that people understand that we must keep the water protected. That's one side. Of course, there are decisions that are very difficult, because it is somehow a contrast between conservation and development, and so far, I believe we have achieved the part of conservation without sacrificing the development.

What we have been learning, is that you can go hand in hand in conservation and development of a basin, with parallel actions that can conserve the basin, but you can also establish mechanisms or projects that are socio-productive and in line with the sustainability of the basin. These basin projects do not interfere with the development of the channel and basin as such, but that works steadily to supports the health and welfare of the people, and the environment.

To try to improve living conditions in the basin, this is what we all want. These projects are like that, they are socio-productive projects where they are coordinated by organized groups by the same people where they are told: good change a bit of a production model than an extensive model as livestock, but seek integrative models, models of sustainability that can help us with what we have, without destroying the basin to extremes and to provide us with financial resources and other resources – humans, to promote the sustainable development and the holistic management planning of our water resources in *our basin*.

CHAPTER 6 – DISCUSSION

The following section presents a discussion on the influence of culture and values on types of data collected in water resources research, the role of “self” as a researcher and themes that emerge from interviews and stories.

6.1 Valuation of Data: Influence of Culture and Values

The stories elicited through this project can and are readily useable by river basin residents to inform a more holistic understanding of management efforts across the Sixaola River Basin. Data produced by this project differ from traditionally generated data in water resources research in that it does not represent river flow production, water allocation rates or the distribution of water resources. In effect, looking at this project through a familiar academic (Western) lens will highlight the absence of quantitative data in this work.

Non-linear data was collected with an understanding of the importance of rigorous academic standards, and the responsibility held by researchers to work in thoughtful collaboration with research participants to select culturally relevant data collection methodologies and appropriate dissemination tools for the use of river basin residents.

Ensuring that the culturally competent research methods and data collected from this project are accessible to research participants is particularly relevant in the Sixaola River Basin but also of paramount importance for basins worldwide when collaborating with indigenous communities, specifically (Jackson, 2012; Moggridge, 2005). Knowledge acquisition, forms of knowledge, and methods by which knowledge or data are disseminated across indigenous communities and cultural paradigms oftentimes, and unfortunately, do not hold up to the

predetermined standards of the scientific method where linearity is commonly presupposed as valid and non-linear is considered unsubstantiated. Examples of stories and oral-based histories of the lived experience of indigenous communities in this research project and beyond overflow with rich data that can be undervalued by researchers. Importantly, the non-linear nature of this data does not preclude it from being valuable in context and does not reflect a lack of academic substance for research when specifically working with indigenous communities.

Thus, researchers regardless of their discipline who work with indigenous communities need to comprehend that this body of data should and ought to be considered knowledge for its own sake instead of aiming to make a fit into the Western academic paradigm of what is considered to be real and valid data. Without taking this understanding into account the researcher risks undermining the agency of indigenous community members and can promulgate damaging impacts.

The relationship and understanding between researchers and research participants should be one of mutuality. Housed within this space, the imperative of inviting and supporting varying kinds of data in research is to tell the fullest story possible. Not acknowledging research mechanisms for how participants generate, perceive and communicate data undermines the purpose and means by which collaborative research is ignited in the first place. In summation, when carrying out collaborative research with participants from indigenous communities, acknowledging that data perceived as different from standard academic forms is not necessarily an antecedent for its presupposed validity or lack thereof.

6.2 Self-Assessment: Researcher as a Bridge, Translator and Selector

In the context of this project, in my role as the researcher I acted as a facilitator, translator and bridge for the methodologies used, the data that was produced and the means by which the resultant data was disseminated to research collaborators. In the case of a river basin telling its own story, it is critical to acknowledge that I am also the selector, channel and vessel for any of the stories to emerge, i.e., the story's "voice." The prominent role of selector is an important concept to reflect on when carrying out this kind of research.

An underlining goal of this co-managed project was to best represent and explain what collaborators, myself—the researcher—and local collaborators believed to be valid and accurate data. Throughout this process I acted as the final authority in determining what stories were chosen in *The Sixaola River Basin Story*. I also served as the selector in determining overarching themes in the data and as the compiler and reporter of these findings to selected audiences that have so far included Sixaola River Basin residents, The Binational Commission of the Sixaola River Basin, other international transboundary river basins and basin groups and researchers that might consider replicating or carrying out similar research.

As the selector in this research I am unavoidably faced with the challenge to dutifully navigate and refrain from inserting my own perspectives and purviews into final interpretations of the data. This dynamic results in influencing, shifting and shaping the research story. For example, I chose to incorporate basin stories beginning at the headwaters, and ending at the basin outlet. I made this decision because I thought it would be interesting to trace the entire length of the rivers throughout the basin residents' stories. Once selected, I conferred with my collaborators that the river basin was wholesomely reflected in the stories. As an outside observer with my own lens and way of interpreting data, there's a potential to cherry-pick data

and skew results and summary findings. My role as the selector in this project can certainly bring unintentional consequences insofar as limiting the data and limiting the research story, which is a critical facet to acknowledge in this kind of research project.



Figure 49. Researcher and Research Collaborator, Alto Coen, Headwaters of the Sixaola River Basin

Bias is an inherent component of research. However, one of the major benefits that co-managed research can offer the researcher is a means by which to navigate bias when selecting data through the inclusion of local collaborators/partners in the discussion of data and its interpretation throughout the entire research process. I found that the collaborative process of co-managed research allows for the identification of incorrect assumptions and redundancies within the data thus allowing for a more accurate research story to develop overtime.

6.3 Principal Themes from Narratives and Interviews

The results of the *Sixaola River Basin Story* uncovered several reoccurring themes. The themes of environmental degradation and change, health, collaboration and inclusion, knowledge and “Our basin” have been derived from all participant interviews (N=38). The following section is a discussion of the themes identified and exhibits how each makes unique contributions towards answering the initial research question: How does a river basin tell its own story?

6.3.1 *Environmental Degradation and Change*

Participating Sixaola River Basin residents expressed concern for observed damages and changes to the natural environment across the basin. Specific alarm for to the environment was linked to the arrival of banana production in the early 20th century across the Sixaola River Basin and the subsequent shift in agricultural practices. Concurrently, residents spoke of deforestation as another strong concern. Independent deforestation for profit and deforestation linked to banana cultivars selected for increased production have dramatically altered the landscape leading to enhanced flooding events in the middle to lower basin. In the present, residents cited climate change as an emerging issue. These observed changes to the environment are interconnected in that they all impact water security within the Sixaola River Basin.

Data provided by the Sixaola River Basin residents illustrated the variance and the degree to which ‘negative’ environmental impacts have been experienced due to banana cultivation, deforestation and climate change by 1) the geographic location of basin residents (upper, middle and lower basin), 2) profession of residents and 3) the community/social group.

Beginning with the geographic location of basin residents, data shows that environmental impacts are most severely reported in residents of the middle-lower basin. Before the arrival of banana cultivation in this region, basin residents claimed that private deforestation practices were already in place. The land requirement needed to grow bananas only worsened the scale of deforestation in these areas – across both indigenous and non-indigenous territories. The United Fruit Company is cited in the data as *the* instigating political and dominating influence of the new wave “land grabbing” and deforestation practices that have dramatically shifted historical agricultural production, culture, and the livelihoods of residents in the Sixaola River Basin.

Basin residents described the United Fruit Company’s actions in taking land by force as dramatically changing the natural and political environment of the basin residents through the loss of family and sacred land, alteration of native crops and soil composition and the forceful arrival of agrochemicals. For local community members, the banana is cited as changing “everything” with regards to the environment.

Residents cited the largest impacts of the banana on the Sixaola River Basin as the seizing of land, basin resident’s “abandoning traditional crops,” by shifting to banana production, adopting the United Fruit Company’s large scale agricultural production practices, e.g., the application of agrochemicals and use of plastic bags (bolsos) to cover the fruit and prevent insect damage. Residents note that a dire result of the observed shift in crop production and historical agricultural practices is the existence of poorer water quality in the rivers of the Sixaola River Basin; water can no longer be used for domestic purposes in areas where there is banana cultivation nearby. This is in contrast to the upper river basin where a different story appeared in the data. The upper basin is sanctioned as “protected areas” in a Binational Park that is also

where the majority of indigenous territories are located. For the most part, participants cited that indigenous communities in this region of the basin do not use agrochemicals on crops; instead, the majority of crops grown by indigenous farmers are without the application of synthetic chemicals and fertilizers. The outlet of the Sixaola River basin has the least amount of agricultural land and is considered a marine area. Here, the data showed that fish and marine life have been gravely impacted by upstream agricultural practices, namely waterway pollution from agrochemicals and plastic bags.

The data showed that the professions most impacted by environmental damages and changes incurred by shifting agricultural practices, deforestation and climate change are agricultural producers and artisanal fisherwoman and fishermen. For the agricultural producers in the basin that elected to change their native crops to banana production, they have faced an increased threat of disease due to the nature of monoculture crops. As stated by a resident, “When one banana is affected, they are all affected. We lost everything. That was 20 years ago, and we are still trying to recover.” Residents showed concern for their livelihoods and are uncertain how this shift from many crops to banana cultivation may impact them in the future.

For artisanal fisherwomen and fishermen, the lessening of fish stocks due to polluted waters from upstream and climate change—the warming of waters and increased intensity and variability in water events—have taken both a financial and cultural toll on this traditional trade. A resident explained, “When the weather allows for us, all of this region carries out its fishing work. Fishing is how we support our livelihoods...with more unpredictable weather, we no longer know when to go out as our families here have always done.”

The data described how various community groups in the Sixaola River basin are impacted differently when it comes to observed environmental changes. The groups most widely discussed in the data are local residents or “locales” that live near riverbanks and the sea and indigenous community members, i.e., *indigenas* or *comunidades*. Local residents consist of farmers, ranchers, foresters, business owners and families in the middle-lower river basin. Locales in the lower basin have been affected most severely by more extreme flooding events as a result of bank erosion coupled with climate change. Damages cited include the loss of homes and agricultural land, and in the worst cases, mortality—residents discussed rivers taking the lives of humans and livestock.

Indigenas include the Bribri, Cabecar, Naso, Brunca and Ngöbe-Buglé. *Indigenas* of the Bribri and Cabecar in the upper river basin have been less impacted by the banana and Chiquita than the middle and lower river basin residents. The upper basin areas are protected from large-scale agricultural production as a UNESCO heritage site; and due to traditional, cultural and spiritual reasons, the Bribri and Cabecar voice themselves to be brothers and sisters of the natural world—the rivers, the trees and the sea— and its protectors. Also voiced in the data is an intergenerational responsibility to take care of the environment. According to basin resident participants, this caretaking principal of the natural world has lessened external influences of agrochemical use and the planting of monocultures introduced in the upper basin. The *indigenas* of the Brunca, Naso and Ngoble-Buglé residing in the middle-lower Sixaola River Basin similarly share this principle of living in brotherhood with Nature with the upper basin indigena residents. However, due to lessened environmental protections in place in the middle-lower basin areas, the data shows these resident groups have been more susceptible and vulnerable to

external pernicious factors with regards to agricultural shifts. The results here showed how changes in the adoption of different farming techniques that depart from each group's unique historic cultural engagements and relationship with the environment have negatively impacted the middle-lower river basin residents.

6.3.2 Health

Sixaola River basin residents voiced health concerns related to water security issues across the basin. Agrochemicals applied to crops on land and aerial sprays by public authorities and private landowners pollute the waterways and generate un-potable water throughout the Sixaola River Basin. According to one resident, "I have been here my whole life, 60 years, and I have never drank the water from the Sixaola River – just look at the color, who knows what's in there." The water of the Sixaola River, specifically, cannot be consumed. In the mid-lower river basin, the government regularly delivers tanks of water to Sixaola Basin residents. The data underlines residents' discussions of documented cancer cases that they have attributed to the large volume of agrochemicals applied in the area, "We were being poisoned by drinking and bathing from our well waters – and didn't know it."

Residents explain, regrettably, that when farming practices in the area shifted from traditional crops such as yucca and mango to cultivating the banana, they too shifted their crops to banana, and their farming practices followed with it. The data discussed United Fruit Company frequently when speaking about the environment and health. United Fruit Company currently operates as Chiquita and thrives as the largest single company in the Sixaola River Basin to export bananas outside the region. Farmers who did not use chemicals, observed Chiquita, and mirrored what the big producer did. Farmers began to apply agrochemical to their

crops – most stated, this was carried out with little to no training. Farmers explained direct exposure to these substances has now resulted in multiple health diagnoses and life-long, long-term impacts.

The human residents are not the only life affected by poor water quality. The fish and macroinvertebrates along the tributaries of the Sixaola River (lower basin), were cited to have experienced population losses. Further, at the basin's outlet, the mouth of the Caribbean Sea, residents cited it suffering from critical health concerns in relation to the biota that resides in this area. Sea life – fish, crabs, shrimp, all biota that sustain the robust artisanal fisheries, have been negatively impacted to do poor water quality “run off.” Species decline is a reality and alarm for basin residents. The reef biome that sustains and maintains these species and many more by providing food and habitat is dying. In less than half a century, basin residents explain that the reefs have changed from bright oranges and reds, to “bone” white in color. Residents explained the importance reef health has for the survival and lifecycle of multiple organisms. From an economic standpoint, lessening habitat of historic river and sea life creatures, directly impacts residents' ability to sustain their livelihoods. Less biota in these systems, means less capital for fisheries, which residents stated as potentially “having damaging effects that may be unrecoverable.” Though health impacts have been expansive and in some cases grave, the data explained that residents are hopeful that their dedication to the stewardship of their natural resources will serve as a catalyst for improved health and well-being for all basin residents – the environment, biota, and human life and livelihoods.

6.3.3 Collaboration and Inclusion

The data generated by Sixaola River Basin residents explained that overall, residents see themselves to be collaborative over shared waters and natural resources more so than not. Especially when Sixaola River Basin residents made self-comparisons with that of neighboring international transboundary river basins in Central America. The data showed basin residents citing their rich culture and biodiversity as key reasons why they should and ought to collaborate in order to support the sustainable management of resources for current and future river basin residents.

Collaboration has several meanings across the data. The first meaning of collaboration can be accounted for through the lens of the Binational Commission of the Sixaola River Basin members, whose group members consist of local residents through the national and international levels. For the members of the Binational Commission, their regular liaising – holding group meetings across the basin to discuss issues of concern for river basin residents, represents concerted and commendable efforts that are rare to observe across Central American international transboundary riparians. The Binational Commission members stated in the research data that positive results have already been yielded within the group's beginning years working together. As an outcome of this kind of collaboration, the impacts cited are improved water quality from reforestation along the banks of the rivers and their tributaries, the design, placement and construction of a new bridge spanning across the border of Costa Rica-Panamá at Sixaola-Guabito, and curtailing multiple dam projects across the Sixaola River Basin that would decidedly, according to Binational Commission members, do more harm than good for the basin and its residents. In the data, the Binational Commission members also explained collaboration as being “a success” when discussing the multiple partners involvement in the Binational

Commission. Diverse ministries are represented from countries of Costa Rica and Panamá, including the ministries of agriculture, the environment, tourism, transportation and finance. Binational Commission members explained greater or enhanced collaboration in the data citing the involvement of international organizations such as the International Union of the Conservation of Nature (IUCN), Central American Rural Territorial Development Strategy (ECADERT, Spain), The Yucatan Program (Mesoamerican Infrastructure Fund), with these supports considered ‘good’ and ‘positive’ and ‘beneficial’ collaborations for the Sixaola River Basin. The Indigenous Territories of the Sixaola River Basin are represented in this collaboration by their own appointment of members. Binational Commission members explained the diverse perspectives of their participants makes this collaboration more effective, as it enhances understandings of the basin, understandings that would not be made available to support sustainable resources management, otherwise.

The second lens of collaboration in the data, is through the data generated by the indigenous communities in relation to water and natural resources. The Bríbrí, Naso, Cabecar, Ngöbe and Brunca, though differing and distinct communities, one strong belief is nuanced in the stories about collaboration with regards to the environment. That is, the community members explained themselves as brothers and sisters of the environment. All born from their God(s), they are placed here on Earth, to nurture this collaboration. Working in tandem with the environment, if it's the rivers, the trees, or the animals – this belief of kinship and collaboration among all living things runs deep in the cultural veins of the indigenous communities of the Sixaola River Basin. Working from this root, an understanding emerged in the data that “Water is life.” What community members do affect their waters, positively or negatively – readily affects them.

The data showed how indigenous community members claim that they are family to, and stewards of the natural world. Placed here by and in collaboration with their God(s) to hold this understanding of connection and stewardship, it is asserted that is of their responsibility to impart this understanding to others – to indigenous and non-indigenous community members.

Aside from their participation in the Binational Commission of the Sixaola River Basin, indigenous community members stated what collaboration means by explaining their existence of their own binational and multi-territorial working group of woman indigenous leaders across the Sixaola River Basin. In this space, collaboration is viewed as a critical means to gain understandings about community members' relation to the natural world– the rivers, the trees, and the lands. Within this working group, there is a specific focus group focused solely on water resources. The result of this 'collaboration' for indigenous community members has influenced daily practices of water resources management at a local and community scale. Impacts cited as 'positive' were the lessening of sanitary waste disposed into the water ways, planting trees across the basin to secure the river banks, thus lessening erosion, and supporting fish habitat, and lastly, placing strong efforts forth to cease agrochemical applications across the communities. With initial support and collaboration of IUCN, focusing on international transboundary basins in the "BRIDGE project," indigenous community members traveled to neighboring international river basins to learn of their collaborations, and exchange information with one another on how best to support the natural environment within each respective river basin. Basins involved were shared between Honduras and El Salvador, Guatemala and Mexico, and the Sixaola River Basin. Years onward, according to the data yielded from participants, the Sixaola River Basin is the only basin out of the three participating transboundary river basins who commenced their working groups

immediately, and have not ceased in liaising in support of a sustainable partnership between community members and the natural environment.

Collaboration, according to indigenous community members of the Bríbrí, Cabecar, Ngöbe, Naso, Brunca, allows for the vital opportunity to impart their understanding of themselves, their culture and values and perspective of the natural environment. That said, though indigenous communities are involved in the Binational National Commission of the Sixaola River Basin, with regards to how the Binational Commission meetings are structured, a barrier of the inclusion exists for these understandings to be brought with indigenous community members to the table.

Across the indigenous communities, it is understood that one single community member does not speak for all. Thus, inviting individual representatives to attend the Binational Commission of the Sixaola River Basin meetings does not allow for the full or complete participation and collaboration of the indigenous community members. When seated at the Binational Commission table, when a vote is raised, the data showed that one representative of an indigenous community cannot and will not voice their individual vote on any given issue without consulting the entire home community beforehand. Indigenous community members stated that when present at the Binational Commission meetings, though they are collaborative in nature, more could be done to include and collaborate with indigenous community members and perspectives in support of the Sixaola River Basin's water and natural resources. Interestingly, the indigenous community members are not the only participants in the Binational Commission that share in this voice. During Binational Commission meetings, where no indigenous representatives were present, committee members spoke out by stating that in order to carry out

what is considered to be good collaboration: “We must do our very best as a working group representing the entire Sixaola River Basin to meet indigenous community members where they are at, both geographically and culturally.”

The third lens of collaboration elucidated from the data is that of the local community members of the Sixaola River Basin. Local community members consisted of farmers, business owners, border patrol guards, municipal employees, and non-profit organization employees. Collaboration here is viewed as something incongruent and scalar. The data suggest that depending on how many connections individuals have across the basin, the data explained the individuals viewing collaboration differently.

In the case of local farmers, the collaboration discussed was a form with that of the government ministries either of agriculture and/or the environment and themselves. This definition of collaboration was more service-focused, and local than other definitions of collaboration. The farmers request financial assistance to cultivate crops, and the government provides or does not provide this assistance. This scope and partnership was defined as “collaboration” for this particular basin resident group. Explained here, are the people, and the government, and a partnership of collaboration out of necessity. Fundamentally, this form and functioning collaboration was explained as one of obligation. Farmers collaborate with government on varying issues including land allocations, cultivation, flooding assistance, and the application of agrochemicals to crops. Without this assistance, and collaboration with the governments, farmers stated that their livelihoods are stake. This collaboration evoked less positive sentiments from residents, by comparison to the collaborations eluded to in the first and second lens observed. Other local residents: business owners, non-profit organizations,

municipal employees, and border patrol guards (Costa Rica-Panamá), followed suit in these sentiments in how they defined collaboration for themselves in the Sixaola River Basin. For them, it is on one that is much more top-down focused, and less of an amiable and cooperative partnership between involved parties striving to convene on mutual interests in benefit of one another, and the basin as a whole.

When comparing what collaboration looks like for basin residents in the first and second lens of collaboration with residents in this third lens of collaboration, local community members were either aware or not aware of the existence of the Binational Commission of the Sixaola River Basin. The local residents that had heard of the Binational Commission, stated that they had not been included in discussions to do geographic and economic barriers in place for them, and/or they were not invited to participate in collaborative groups meetings at all. Residents wanting to participate voiced concern over probable economic burdens that attending a meeting of the Binational Commission would place on their livelihoods. As discussed by a local cacao farmer in relation to defining collaboration:

Leaving my crops for a full day's travel, to share my view on the natural resources, and contribute my personal experience living on the Sixaola River, and how she (the river) consumes my crops... the financial cost for me to make this journey, is far too high, and unfortunately, not worth me voicing my opinion.

Further, for local basin residents that were not invited to participate and/or collaborate in the Binational Commission's discussions about the basin, they asked myself, the researcher, why no one within the Binational Commission had reached out to them previously, before this study? Here, residents voiced wanting to learn of opportunities on

how they might contribute their perspectives to the greater pool of knowledge on water resources management and natural resources management within the Sixaola River Basin, thus enhancing what they defined as collaboration on basin-wide issues.

6.3.4 Knowledge

The stories showed how participants place varying importance on distinct kinds of knowledge across the communities residing within the Sixaola River Basin, and how these knowledge is incorporated into water resources management across this international transboundary basin. The varying types of knowledge discussed in the data included: scientific knowledge, local knowledge, international knowledge and indigenous knowledge.

Scientific knowledge was mentioned in the data in relation to engineering a new bridge (project commenced 2016). The need to support placement location by calculating “predicted” seasonal stream flows, to ensure safety and stability for basin residents emerged in the data as important. Across the data, 19 of 38 participants, 50 percent discussed, scientific knowledge in some capacity. Additional reference of scientific knowledge was examined in the data by way of the Binational Commission hiring engineers to look into the variation of the shifting political border ‘The Sixaola River,’ between Costa Rica-Panamá. Here, interestingly, Binational Commission members, though valuing the information imparted by engineers and scientists during the meeting, countered this scientific knowledge and these findings. Here, the members of the Binational Commission asserted as a collective group, their local knowledge and understandings of what it means to them to be an international transboundary river basin. Local knowledge was discussed across the data by 29 out of 38 participants, nearly 80 percent. This

local knowledge shared was one of adaptability, sharing, and unity, something the scientific data did not, and could not make account for when aiming to delineate a permanent border between the two countries of Costa Rica and Panamá and the three indigenous territories of the Bríbrí, Naso and Ngöbe-Buglé.

The data also expressed importance placed on international knowledge and perspectives on water resources management with respect to international transboundary rivers basins. In the data, 23 out of 38 (60 percent) Sixaola River Basin residents spoke positively of international knowledge and perspectives received from rivers basin and river basin groups outside the Sixaola River Basin. Residents voiced hopes to gain more of this particular kind of knowledge, as to enhance their own understandings and capacity in relation to sustainable transboundary water resources and natural resources management.

Lastly, the data showed the importance that Sixaola River Basin residents place on indigenous knowledge across the basin. More than any other kind of knowledge discussed across the data, 33 out of 38 participants, nearly 90 percent, discussed indigenous knowledge as central in their own and collective community or group's understanding of knowledge in their own lives, and with respect to knowledge within the Sixaola River Basin. Terms to describe indigenous knowledge included: richness, values, connectedness, strong, culture, influential, natural environment, stewardship, spiritual, and peaceful. All respondents that explained indigenous knowledge, spoke of this kind of knowledge positively, with the exception of stating that at times, this kind of knowledge is not voiced as readily as other kinds of knowledge, and thus, should and ought to be accounted for more often when it comes to basin-wide planning initiatives.

6.3.5 *“Our Basin.”*

Examining the data across the expanse of the previous themes encountered of environmental degradation and change, health, collaboration and inclusion and knowledge, an additional theme emerges which is that of “Our Basin.” For Sixaola River Basin residents that participated in this work, all but one participant, who was not a resident of the Sixaola River Basin, explained the aforementioned themes through the lens of “we are a river basin” or “our river basin” or “our basin” or “we are a transboundary river basin.” Interestingly, with the objectives of this work to support agency of individual river basin residents, this collective narrative of “a basin” or “our basin” was voiced by all, 100 percent of river basin residents in the context of sustainable water resources management within this international transboundary basin. Related terms to residents’ discussion of “a basin” or “our basin,” included: sharing, transboundary, richness, natural resources, sharing, unity, understanding, rivers, conservation, the sea, sustainability, protecting, biodiversity, friendship and culture. The voice of “our basin” by individual basin residents in this international transboundary river basin is of significance, and proves to be extremely important to river basin residents themselves. Residents cite that this narrative of speaking of themselves as ‘a river basin,’ and not a country or a river community, is informed by the collective understandings of the richness, of both the environment and the inhabitants of the Sixaola River Basin. According to one resident,

Something important we recognize, with regards to protecting our basin is that if we do not work to protect this side of the streams and rivers, the other side is going to be hurt. The idea then is that all sides of the river are united, and recognize that we all take care of our basin, to ensure that the rivers will not die.

Participants explained how individual residents view themselves as river basin, sets the Sixaola River Basin apart from other international transboundary river basins. The results of the data support residents claim that individuals and community groups in the Sixaola River Basin carry a systemic and basin scale mindset and approach when it comes to supporting water security initiatives in the context of international transboundary river basin management. Sixaola River Basin residents asserted that this collective narrative of “a basin” or “our basin” makes them stand out from other international river basins, not only in Central America, but worldwide who might possess a more individualistic or disparate view of their shared resources across a basin landscape. The stories showed that residents believe there to be a learning space for other international river basins to observe the actions of Sixaola River Basin with regards to water security and natural resources management, and how these international transboundary river basins could adapt their own initiatives accordingly to take on a more systematic basin-wide approach in their sustainable management and planning efforts.

CHAPTER 7 – CONCLUSION

In this research, collaboration initiatives on water security in the context of an international transboundary river basin have been examined by applying my conceptual framework of 1) the values and culture held of water resources, and 2) the role of the water resources researcher serving as a bridge and amplifier of these elements. We learn that these components are two parts of the same whole and have fostered a faithful rendering of the unification of The Sixaola River Basin residents' collective stories of their values held for water resources and their lived experiences of these resources in the basin, that were most kindly and generously shared in this co-cooperative study. The geography and water resources research methodologies employed, cultivated the opportunity to include individuals and groups whose voices and knowledge historically had not been present in the conversation of their water resources management across the Sixaola River Basin. This co-managed research approach of water resources researcher, and river basin residents in shaping the research process, and methodologies selected have promoted rich data for the Sixaola River Basin residents in formats of video (<https://vimeo.com/198096948>), photo and story that can reach further and more widespread audiences than historically had been possible had the dissemination of these research results in general not been considered or alternate dissemination tools had been selected.

For the purpose of data dissemination, holding selected methodologies up to the standard of the kind or form of data they will produce was critical to consider when communicating research results with the river basin residents that are inherent partners in this research. Selecting culturally appropriate dissemination tools for the Sixaola River Basin, e.g., storytelling, videography and photography, leads to greater knowledge sharing across complex geographies,

cultivates enhanced understanding and collaboration and fosters cooperation among groups in the international transboundary water resource management context of the Sixaola River Basin and other international river basins to consider implementing—with the understanding that these selections are not linear and need to be examined from the cultural perspective of basin residents. It is from these conclusions that the core research question for this project is addressed: How does a river basin tell its own story?

A river basin can tell its own story by:

1. Incorporating river basin residents' knowledge, perspectives and lived experiences into the greater basin conversation, residents that have historically not been included in river basin management planning initiatives. With this, the researcher acts as a conduit and a bridge, filling a conceivable gap in the limited capacity of human resources to link river basin residents located in difficult and/or hard to reach geographic locations and terrains with residents on other sides of the basin. Additionally, and imperative in realizing this objective, the researcher serves as a facilitator, introducing basin residents to one another's narratives despite geographic barriers are in place and historic political challenges or barriers are present in the river basin researched, i.e., power differences and cultural assumptions. An amplifier and connector, the water resources researcher supports river basin residents in creating an information exchange platform across the river basin wherein residents can more readily share knowledge in channels that previously were not in existence. Here, it would be recommended for a water resources researcher to receive some degree of mediation and facilitation and cultural competency/diversity training prior to executing this co-managed research.

2. Ensuring that river basin residents work in tandem with water resources researchers to envision culturally relevant dissemination tools of the data to communities receiving resultants of the river basin stories. Selecting appropriate dissemination tools is not a linear process. There is no standard formula or calculation that can be obtained to selecting the “right” tools when a river basin is telling its story. As demonstrated in this research, however, co-selecting tools of data dissemination requires gaining certain familiar and deep understandings of the means by which river basin residents perceive knowledge, receive knowledge and communicate knowledge within river basin communities—paying special attention to the culture and values held within each river basins community. Further consideration follows in supporting how a river basin and its residents tell their story and that when implementing the selected tools or dissemination forms/formats, the river basin and residents may or may not have knowledge and/or training of the tools that are considered the “best fit” for data dissemination. Further training for the researcher is recommended and dependent on the needs of the river basin. As shown in this research, training could prove beneficial for videography, photography and editing tools to provide/offer technical trainings (if culturally relevant) for river basin residents to tell their river basin story by placing tools in their hands, and being able to select what is important and meaningful to them and their life experiences in the river basin;

3. Imparting the resultant data across opposite sides of the basin using the dissemination tools necessary to support basin residents in a river basin telling its own story, and expanding on this by creating channels for more widespread dissemination initiatives

outside the river basin at national and international community levels. Telling one's own river basin story is an affirmation of agency, personhood and part of the greater whole of the river basin community. An enhanced capacity for the exchange of each river basin's collective water resources story with similar or differing river basins fosters an awareness of one's own capacity (the river basin), their initiatives, shortcomings and accolades. Water resources researchers working in river basins play a key role in facilitating this experience for a river basin telling its own story, with regards to the researcher's access and already established connections in the academic world and work across other river basins.

7.1 Recommendations

As a result of this research, *The Sixaola River Basin Story*, I offer the following recommendations for The Binational Commission of the Sixaola River Basin, other International Transboundary River Basins and Basin Groups, Residents of the Sixaola River Basin and Researchers who might seek to carryout similar investigations.

7.1.1 *The Binational Commission of the Sixaola River Basin*

- Though meetings are currently held in rotating locations across the basin, greater efforts should be made to hold meetings in locations that are more readily accessible to basin residents who have previously not been in the conversation and unable to participate.
- To address socio-economic barriers to participation, efforts should be made to incentivize basin residents to attend by offsetting economic impacts.
- Acknowledging the Binational Commission's cultural sensitives, additional efforts should be made for how representatives of communities are determined, e.g., having communities select their "representatives."
- Outside of Binational Commission meetings, further efforts should be made towards community outreach and engagement, e.g., local town hall meetings and radio interviews.
- To further support basin initiatives, the Binational Commission should seek partnerships with external partners, e.g., academic researchers and institutions.

7.1.2 Other International Transboundary River Basins and Basin Groups

- When considering the application of the Binational Commission of the Sixaola River Basin model, scale should be taken into account.
- When considering the application of Binational Commission's model, adjustments should be made to account for the local culture, values and context of the river basin.
- When considering the application of the Binational Commission's model, external basin groups should visit the Sixaola River Basin in person to learn first-hand about this international transboundary river basin working group.

7.1.3 Basin Residents

- Promote the water resources and natural resources management that basin residents would like to see in their basin, e.g., educational opportunities and local town hall meetings.
- Basin residents should participate in local efforts and initiatives. Residents should participate in Binational Commission collaborative group meetings and lend their voice to basin-wide initiatives and planning processes.

7.1.4 Researchers

- Researchers having greater access to established channels outside a region should act as facilitators, bridges of knowledge, amplifiers and translators to support river basin residents with communicating their river basin story to a greater/desired audience.
- When river basins aim to tell their own story, researchers should help craft greater and/or desired channels of communication for a river basin to receive information in return from groups located in other river basins around the world.
- When considering methodologies, researchers should examine whether a selected methodology is culturally conducive for the basin groups researchers are collaborating with, e.g., videography, photography and storytelling in the Sixaola River Basin.
- In co-managed research, researchers (outsiders, observers) should keep biases in check (identification, falsification) to ensure that we (researchers and local collaborators) generate the most comprehensive, accurate and valid data in a research story.

In summation, there exists a gap in the production, type, and dissemination of data.

International transboundary river management only enhances this collective gap with its given complexities of geographic and political climates when aiming to address water security across shared waters and incorporating the underlying social fabric of the values and culture held for

water resources. *The Sixaola River Basin Story*, and the comprehensive conceptual framework that guided this research—the values and culture of water resources and the role of the water resources researchers as a facilitator—support river basins incorporating previously unreachable critical knowledge of water resources from basin residents.

The results of this research culminate in crafting a richer pool of data to avoid the exclusion of vital information and place-based knowledge of river basin residents, and to foster more sustainable water resources management planning initiatives, coordinating across international transboundary basins towards enhancing water security for residents and the environment. From this river basin research story, we learn that it is not enough that river basin stories exist but that understanding what lies beneath the coordination and collaboration of shared waters are deep values, cultures and interests waiting to be brought to the surface.

From these elements and the overall objective for myself as the researcher in this work, is that we learn how collective values can form the underpinnings of what makes collaborations possible in the first place — what makes people act, care and share. As valuable as this comprehension is for water resources management in international transboundary river basins, it readily informs and serves any discipline or group that seeks to find common ground and work together on this ever-changing blue planet.



Figure 50. Talamanca-Caribe, Costa Rica, The Sixaola River Basin

CLOSING THOUGHTS

Sometimes, it takes just one story to change how you see the world in which you live, and what you believe could actually be possible.

And sometimes, it is the telling of your own story, that can change everything and anything for you, and for others.

Because in the end, every conversation can be summarized as a prayer, and a practicable affirmation.

Similar to water in this way, the fabric that connects all life — we do not know how far this sharing goes...

So, WE ask you,

What is the name of the water resource in your life?

And what is the value or significance of this resource to you?

What is your river basin story?

And, what is your water story...?

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