

# Governance of water resources in the Ulí river watershed, Bosawas Biosphere Reserve, Nicaragua

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## ABSTRACT

This article analyzes the current conditions of local water governance in the Ulí river Watershed, Bosawas Biosphere Reserve (RBB), Nicaragua, based on the identification and analysis of formal and informal rules, the identification and characterization of stakeholders and analysis of social-network interactions.

Different methods were applied, among which was a formal review of the water-resource legal framework and an analysis of the same to determine the effectiveness of the respective regulations, being in the development stages, which also served as a base to identify the synergies, shortcomings, contradictions and duplicities of those same regulations. Others employed were partially structured interviews, participative observation to identify the informal rules, analysis CLIP – Collaboration, Conflict, Legitimacy, Interests, Power –and social-network analysis based on the topics of planning and management, training and capacity building, financing and financial management and implementation of actions.

Some of the results in this analysis highlighted the existence of legal pluralism, weaknesses in governability of water law and water-related regulations in the process of application, minimal institutional presence and insufficient resources to implement the legal framework, and no joint water-resource management actions among the three municipalities within the watershed. Other important findings were that formal religious institutions and political parties have an influence over the decisions made by stakeholders in non-formal agreements, people are not used to paying for water consumption, and land ownership is directly linked to access rights, along with daily water utilization and management. With regards to the stakeholder's network, planning is the strongest while funding is the weakest. In addition, social analysis CLIP shows that stakeholders who are categorized as forceful and dominant are present in all the networks.

**Keywords:** *water governance, legal pluralism, legal framework, effectiveness, , indigenous territories, social networks.*

## INTRODUCTION

The socio-environmental problems and conflicts in Central America are related to water management, which arises from circumstantial factors, such as weaknesses of governance and governability, poor applicability of ecosystem approaches, and the lack of integration among government sectors and holistic approaches to nature.

The implementation of integrated environmental management remains a constant concern for governments as they have been facing the problems of shortage of or

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inefficient public policies, a complex and disintegrated legislative framework and a lack of incentives for the participation of new stakeholders in environmental management. As a result, these factors are considered the cause for the "crisis of governability and governance" in the management of watersheds (Dourojeanni et al. 2002).

Global Water Partnership (2003) defines water governance as "the range of political, social, economic and administrative systems that are in the place to develop and manage water resources and the delivery of water services, at different levels of society. To achieve more effective water governance it is necessary to create an adequate environment in order to facilitate the work of public and private sectors and the participation of stakeholders, articulating their needs" (Rogers and Hall 2003).

Ulí river watershed is a complex political mosaic – a jurisdiction covering 732 km<sup>2</sup>, which is divided between the department of Jinotega and part of the area known as Región Autónoma del Atlántico Norte (RAAN). The municipality of San José de Bocay (40.9%) belongs to Jinotega and the municipalities of Bonanza (29.6%) and Siuna (29.5) make up the RAAN. 61.7% of the watershed is the core zone of Bosawas, and 38.3% is a buffer zone of Bosawas. There are also three indigenous Mayangnas territories, which cover 61.4% of the whole area: Mayangna Sauni As (3.8%), Mayangna Sauni Bu (4.1%) and Mayangna Sauni Bas (53.4%) (Cruz 2009).

Ulí river watershed is a very important source of livelihood for the indigenous people of Mayangna Sauni Bas (Sikilta), as it has multiple ecological functions, apart from its serving as drinking water to the urban area of the municipality of Siuna (RAAN) (about 1316 users), it also provides food and recreation (Toval 2009).

Nevertheless, the watershed is facing environmental-degradation threats due to weaknesses in governability and water governance, where extreme poverty and a complex political-administrative context play an important role in water-resource management, what with deficiencies in coordination, communication and consorting of stakeholders and their intermediaries, low institutional capability in regulation and control, and a lack of harmonization between formal and informal norms on interaction among municipal, departmental, regional and national stakeholders, indigenous communities and protected areas. Degradation is also associated with a context of historical production activities in mining, livestock and logging.

The current conditions of governance promote unsustainable behavior on the part of the stakeholders that has led to over mining and the degradation of natural resources, encouraged by the poor and inefficient formal rules, the lack of recognition and legitimacy of informal rules and ineffective mechanisms in the conservation of the RBB.

The aim of this study is to analyze the governance of water resources in the Ulí river watershed, to obtain elements that can help in decision-making processes for better governance and management.

## **METHODOLOGY**

The methodological procedure is made up of three parts: identification and analysis of formal and informal rules related to water resources and their fulfillment, identification and characterization of key stakeholders, and analysis of their interaction.

**a. Identification and analysis of formal and informal rules and their fulfillment**

A document review on the historical context of water policy in Nicaragua was carried out, as well a description of the following formal rules were included: the National Water Policy, Laws Relevant to Water Resources, Protected-Area Laws, Autonomy of the RAAN Law, Municipality Law and related decrees, Municipality arrangements, and Ethnic Communities of the Nicaraguan Coastal law.

In general terms, the information collected was organized and systematized into tables to proceed with its analysis and synthesis. It was complemented by other sources, such as local documents and secondary information. The National Legislation information was organized into topics: i) the policy, legal and institutional framework at the national level, ii) Municipality arrangements and iii) water-management techniques and practices, even if they were not written for the community level.

To follow on, an analysis of effectiveness was carried out on the regulations applicable to the study area. Afterwards, formal rules were characterized using the Natural Resource Assistance and Governance Handbook methodology (Fischer et al. 2004), for which the degree of formality of the rules and their effectiveness in implementation were considered.

Based on the collected information on water resources from the national and the local policy framework, a characterization of synergies, shortcomings, contradictions and duplicity with other regulations associated with the study area and the uses of water resources was carried out. In the context of this research, in referring to synergy, the study implies that there is a coherent and clear connection between the rules, which favors its interpretation upon implementing water-resource policies. The contradictions refer to arrangements which may be controversial, confusing or ambiguous in that of water-resource management; and the shortcomings imply that there is no legal regulation which will develop the elements proposed in Water Law and Policy (FAO 2008). Duplicity involves performing the same functions in different government sectors which generates wastage of institutional resources. This analysis is applied to the General Water Law No 620/97, Decree No. 106/07 law ruling and other laws, for the study area context, governing actions in the field of water resources.

Field trips, participative observation, some interviews with authorities and local stakeholders about the existence of informal rules in practice were conducted. A total of 26 surveys were carried out, which involved 45 inhabitants of the three municipalities that make up Ulí river watershed and from different backgrounds were interviewed. Two of the 26 surveys were group interviews, one with the indigenous community Sikilta and another with the community in the municipality of Bonanza.

The interviews were conducted not only to know how many people know about the laws and which of them apply to them, but also to identify the informal rules that are practiced in the management of water resources. The information obtained from the surveys was processed through Excel® and a frequency analysis of information when it proved necessary.

**b. Identification and characterization of key stakeholders in water governance in the Ulí river watershed**

To characterize key stakeholders in water governance, we needed to use written records and checklists, identify key informants, and perform random selections (Jiménez 2008). To select them, an interview was carried out, in which the type of stakeholder, their category, proximity to the watershed and their functions were all taken into account. 26 surveys were conducted and 45 residents were interviewed. Then, a social analysis CLIP (Chevalier 2006) was applied to the information collected in order to create the stakeholders' profiles (Table 1), which was based on four factors: 1) power 2) interest, 3) legitimacy; and 4) existing relation of collaboration and conflict. The principles governing the social analysis CLIP are (Chevalier 2006):

- Interests are the gains and losses that the individuals experience based on the results of existing or proposed actions. These gains and losses affect their access to power, legitimacy and social relations.
- Power is your ability to influence others and use the resources you control to achieve your goals. These resources include economic wealth, political authority, ability to use force or threats of force, access to information (knowledge and skills), and the means to communicate.
- Legitimacy is when other parties recognize by law or by local customs your rights and responsibilities, and the resolve you show when exercising them.
- Social relations involve existing ties of collaboration and conflict (including group memberships) that affect you in a certain situation and that you can use to influence a problem or an action.

*Table 1. Assessment to categorize the stakeholders, according to the methodology of social analysis CLIP*

Stakeholder Categories		Ratings high / middle	Low ratings / unrated
<b>Upper</b>	Dominant	PIL: Power, Interest (+ or -), Legitimacy	
	Forceful	PI: Power, Interest (+ or -)	L: Legitimacy
<b>Middle</b>	Influential	PL: Power, Legitimacy	I: Interest
	Dormant	P: Power	L: Legitimacy, Interest (+ or -)
	Respected	L: Legitimacy	Power, Interest (+ or -)
<b>Lower</b>	Vulnerable	IL: Interest (+ or -), Legitimacy	P: Power

	Marginalized	I: Interest (+ or -)	PL: Power, Legitimacy
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### c. Analysis of the interaction between the key stakeholders

This is performed using the social-network-analysis methodology that studies the relationships and specific interactions between a defined set of elements, which focuses on the interaction of the stakeholders and not the attributes of the elements (Clark 2006).

In order to apply the methodology, the first step was to create an inventory of institutions through an initial review of documents and interviews with key stakeholders and database creation using Word® and Excel® software.

To analyze the levels of relation between stakeholders in the water governance, the social-network-analysis methodology was applied (Clark 2006), for which the following components were included: Planning and management exchanges, training and strengthening capabilities exchanges, the financing and financial management exchanges and finally, implementation of actions management of water resources exchanges. Each component is as follows:

- a. *Planning and management exchanges*: Planning and programming actions that the stakeholders exchange for achieving post-implementation
- b. *Training and capability building exchanges*: Events where stakeholders exchange knowledge in meetings such as workshops, seminars and courses, among others.
- c. *Financing and financial management exchange*: Obtaining funding, donations and financial aid for projects and institutions in the water resource area.
- d. *Implementation of actions exchanges*: Actions that are being implemented in the watershed, which link the relationship between stakeholders.

The indicators used to analyze stakeholders' relationships concerning the four components mentioned above, are listed in Table 2 (Velasquez and Aguilar 2005).

Table 2. Most common types of indicators in the network

Type of indicator	Node	Full Network	Description
Density	Yes	Yes	Shows the density of the network, and is a measure expressed as a percentage of the ratio between the number of existing and potential relationships
Centrality	Yes	No	The number of stakeholders to which a stakeholder is directly linked
Centralization	No	Yes	Special conditions in which a stakeholder plays a central role in the network
Betweenness	Yes	No	Possibility of an intermediate node or serving as a link between two nodes. They are also called bridge nodes.

Source: Velásquez and Aguilar (2005)

For analysis and data processing, UCINET software, version 6135 was used, with which the value of indicators was estimated. Also 2.41 NetDraw (part of UCINET) was used to obtain the views and graphs.

The graphs created by this tool report on reality. They help people outside the locality identify the key players in the network, which is a good guide when deciding whom to involve in a project. Also, the display graphics help to stimulate discussion among key stakeholders on their relationships and the benefits of working collaboratively to build a network that works towards common goals (Vasquez and Cervantes 2007).

For the interpretation of indicator data obtained in the UCINET program a reference was used (Table 3).

*Table 3.* Benchmarks to evaluate performance indicators of the relationships between stakeholders UCINET

<b>Value (%)</b>	<b>Meaning</b>
0 to 19.9	Very Low
20 - 49.9	Under
50 to 79.9	Average
80-100	High

## **RESULTS AND DISCUSSION**

### **1. Identification and analysis of formal and informal rules**

#### **a) Formal rules (regulations) of water-resource management applicable in the Ulí river watershed**

Although Nicaragua has about 42 rules related to water resources (Lanuza 2008), the regulations which apply to the study area are the only ones analyzed for effectiveness, the same ones that have the specific features of being part of the RBB and indigenous communal lands. Part of the legislation consulted is found in the Water and Sanitation Legal Compendium, 2008.

The results of the water-resource formal rules characterization in terms of their effectiveness are shown in Tables 3 and 4. This analysis provided the fundamentals for identifying synergies, contradictions, shortcomings and the duplicity of the formal rules.

Table 3. National formal rules for water resource management applicable in the Ulí river watershed and its effectiveness of implementation.

National legislation	Effectiveness in the implementation
Nicaraguan Constitution	Not implemented effectively, thus water resources are declining in quality and quantity. The State, as the main stakeholder, is not able to protect and conserve it for the entire population located in the watershed. Although water resources are national patrimony, the land owners have taken possession of them.
Penal Code (Law No. 641/07) and the Special Law on Crimes Against the Environment (Law No. 559/05)	The implementation is feeble. The authority in charge of administering justice (Environmental Attorney or 'Procuraduría del Medio Ambiente' in Spanish) does not have enough staff or resources to effectively execute the functions assigned to it by law.
National Water Law (No. 620/07) and its Regulations (Decree No 106/07)	As yet the law has not been made instrumental, as the structures and institutions established by law are in the process of being made. All the same, it supports the establishment of a committee in the Ulí river watershed.
General Water and Sewage Services Law (Law No. 297/98)	It has been implemented to some extent. For instance, in rural areas of the watershed, water is taken directly from the river and wells, while in the urban area of the municipality of Siuna, water supplies are provided by the company EMAPSA, which belongs to the Municipality. However, water quality is neither optimal for human consumption, nor is there a sewage system.
General Environment and Natural Resources Law (No 217/96) and Law on its amendments and additions (Law No. 647/08)	Application is lacking, which is evident in the decline in water-resource quality and quantity. State Institutions are neither capable of nor have the necessary resources to protect and conserve it. Environmental incentive mechanisms are not yet well structured in law.
Regulation of the General of Environment and Natural Resources Law (Decree No. 9 / 96)	It has been implemented partially. The management of natural resources has been done by Environmental Management Units or 'Unidades de Gestión Ambiental' (UGAM) in the municipalities and by the Secretary of Natural Resources or 'Secretaría de los Recursos Naturales' (SERENA) at the Regional Government of the Autónoma Atlántico Norte Region or 'Gobierno Regional de la Región Autónoma Atlántico Norte'. Although these institutions do carry out certain activities, coordination and planning are lacking.
Statement and Definition of the Bosawas Biosphere Reserve Law (No. 407/01)	It is implemented in part. The Bosawas boundaries are defined by law; however, people do not recognize them, and so invade the core and buffer zones. In addition, resources and monitoring are limited.
Conservation land use in Bosawas Law (No. 669/08)	It is not effective, as is evident in the invasions of more than 115 people ("third parties") in the Mayangna Sauni Bas territory, which makes up the RBB area and Ulí river watershed.
Regulatory of Protected Areas in Nicaragua Decrees (No.	These are implemented only partially. The RBB management plan is not implemented at all. Besides this,

01/07) and its amendments (No. 26/07)	lands are sold in these areas, which is backed by the political parties and supported by illegal documentation.
Reforms Laws and Additions to Law No. 40/88 (No. 40 and 261/97), Decree - Law on Municipalities and Regulation of the Law (No. 52/97)	These are more effectively implemented at local level. The Siuna Municipality is the most active in taking steps to protect the Ulí watershed. The Municipal Environmental Commission or 'Comisión Ambiental Mjunicipal' is planning the organization of the Ulí committee. Central government has delegated authorities to the Siuna municipality as is the case in permitting small non-metallic mining. Also, EMAPSA was set up to provide water supplies to the residents of the urban area of Siuna.
Communal Property Regime of the Indigenous Peoples and Ethnic Communities of the RAAN Law (Law No. 445/02)	It has already been implemented, though the municipal authorities recognize that the indigenous community is autonomous in making decisions about their territories by establishing standards, including environmental standards.

Table 4. Local formal rules in the management of water resources in the Ulí river watershed and the effectiveness in its implementation

Local rules	Effectiveness in implementation
Ecological Norms of Indigenous Territories and Mayangnas Sauni As and Bu	They are applied effectively, as in the case of monitoring which is conducted to ensure people will not arrive in the area to pollute and destroy the natural resources.
Ecological Norms of indigenous territories Mayangnas Sauni Bas	It is only partially implemented; fecal contamination in the river is culturally traditional and openly practiced. Furthermore, there are no well defined regulatory bodies and penalties for non-compliance.
Siuna Municipal arrangement on establishment of the Environmental Management Units (UGAM) (No. 06/2002)	It is implemented moderately. The UGAM is the most active stakeholder of the municipality on the issue of water resources protection and conservation projects in the Ulí river watershed.
License small-scale mining arrangement (No. 06/06 and 08)	It is not implemented effectively. The UGAM Siuna has granted a special license for small non-metallic mining for the extraction of sand at the bottom of the Ulí watershed that can affect the quality of water taken out by EMAPSA.
Regulation of functions of the auxiliary mayor in Siuna Municipality arrangement (No. 02/08)	It is implemented moderately. They have established the structures of auxiliary mayors in rural areas of Siuna. Although the Municipality of Siuna has delegated many important functions to the community development, several of these functions have not been fulfilled

### **Synergies, contradictions, shortcomings and duplicity in the legal framework and national water policies in the Ulí river watershed**

Tables 5, 6, 7 and 8 show the results of major synergies, contradictions, shortcomings and duplicity of existing water-resource regulations applicable to the Ulí river watershed (Garcia 2010).

Table 5. Major synergies of Ulí watershed water-resource legislation

Water Resources Policy (Decree No. 107/01) shows synergy with the Nicaraguan Political Constitution, in considering second- and third-generation rights, as too with the General Environmental Law and treaties ratified by Nicaragua. The objectives, guiding principles and specific principles in the policy include the Dublin principles.
Environmental policy and its action plan emphasize the decentralization of natural-resource management to local governments, harmonizing with the Water Law which delegates to participatory management and the creation of watershed committees.
The Water Law synergizes with the Municipalities Law and the Law of the Regiones Autónomas to devolve some features of the National Water Authority's or 'Autoridad Nacional del Agua (ANA)' functions to the local territorial level. In Siuna, an agreement establishes the UGAM (DIGAM) and delegates functions as in the granting of small-scale mining licenses. Furthermore, there is decentralization of water management at the municipal level as evidenced in the districts, counties and villages through functions being delegated to the mayor of Siuna's assistants.
The Water Law is coherent in recognizing the right of use and enjoyment of the waters in the ethnic communities of the Atlantic Coast in compliance with Law No. 445/02. It is also consistent on the issue of water use with the Environment Law and prioritizes the use of human consumption over all other uses. In addition, it defines State Institution control measures.
What the Water Law states with regards to the causes of licence suspension has been consistent with its provisions, and in the Special Law on Crimes Against the Environment and the Penal Code.
The Water Law, on matters of the protection of waters, set up the prohibition of felling or cutting of trees or plants of any species which are within 200 metres of the river site, consistent with the National Policy for Sustainable Development of Forestry in Nicaragua.

Table 6. Major contradictions in the legislation on water resources in the Ulí river watershed.

In the Water Law, institutions such as the MINSA, MIFIC, SINAPRED and CONAPAS are not recognized as water-sector related institutions (art. 12). However, in the law, MINSA, INETER and SINAPRES are designated coordination and one and another functions in the water issue.
The Water Law has some contradictions, or at least it is not clear, as in articles 17, 26 and 30. Article 17 mentions the development of watershed plans and programs as being the responsibility of the watershed organizations, while Article 26 states that it is a function of ANA. Article 30 indicates that the aquifer management plans, whether surface or underground, their use and quality will be proposed by ANA (Gomez et al 2007).
The Environmental Policy set up guidelines on environmental planning, especially at the municipal level, ignoring the set of environmental-management or joint-biophysical environment units, such as watersheds.
Ecological Norms of the indigenous territories, Mayangna Sauni As, Bu and Bas contradict Article 96 of the Water Law, which prohibits the felling or cutting of trees within 200 meters of the riverside. In its rules, Mayangna Bas Sauni establishes a 100-meters boundary, and a 200-meters one for crop activities.

Table 7. Major Shortcomings in the legislation on water resources in the Ulí river watershed

<p>The statements of the Water Law (art. 2) refer to the authorities and the coordination to be excluding the indigenous communal lands authorities. Also, the Water Law (art. 6), established; omits the rights of the indigenous people and ethnic communities of the Atlantic Coast to natural-resource management bodies in their territories; only recognizing the rights of use and enjoyment.</p>
<p>Ecological norms of the indigenous territories set out what can or cannot be done, but do not establish synergies with national law, nor do they state which is the regulatory institution, the types of sanctions and management tools. Additionally, the standards are not communicated to all members of the community.</p>
<p>Article 17 of the Water Law sets out that water planning, plans and programs for watershed, have to be developed by watershed organizations and then be approved by CNRH and the making of these plans must be based on the National Water Plan developed by ANA, even though it does not have any such developed as yet.</p>
<p>In the Water Law, everything to do with the setting up of the CNRH is excluding, as no single representative of the indigenous communities of the Atlantic Coast is a member of the CNRH.</p>
<p>In the Water Law and its regulations, specific functions of the Technical Advisory Committee (CTA) of CNRH and ways of financing for the session are not laid out, resulting in institutional wastage, if the objectives of the CTA are no clear.</p>
<p>In the Water Law and its stipulations, exactly how to elect or the requirements for members of the watershed committees are not clear. This can generate political bias in the election of members, especially representatives of user's water.</p>
<p>The Water Law mentions that the National Water Fund will operate on the basis of a special regulation, which has not yet been established, which limits the harmonious development of Water Law and Policy.</p>
<p>The Water Law introduces the topic of payment for environmental water services as a way to stimulate the "production" of water in watersheds, but with no further details as a follow on.</p>
<p>In the Water Law, who is obliged to report on the procedures for requesting a right of use or enjoyment of water is not clear.</p>
<p>The Water Law does not include water committees as stakeholders in the watershed committees. In any case, the law does not make the distinction between the requirements to be fulfilled by community organizations (including water committees) or other users (Gomez et al 2007).</p>

Table 8. Mayor duplicities of regulations for water resources in the Ulí river watershed

<p>The Water Law sets out that ANA will carry out the characterization of water bodies for potential uses, while the 311/99 Law and its regulations empower INETER and DGRH for the characterization of surface and underground water resources in watersheds.</p>
<p>The Water Law states that ANA carries out periodic studies and analysis on economic and financial assessment of water supply sources, location and type of use, that support the criteria for the collection of water rates and fees, while the Decree No 23/95 provides that the provisions for setting rates in the water and waste-water sector, including its methodology for the calculation are the responsibility of INAA.</p>
<p>The Water Law, on the drinking water service, establishes that two licenses are required for this use. One issued by ANA and the other by INAA. These two licenses are independent, which generates more resources and institutional wastage.</p>

The results of formal legal framework analysis of water resources in the Ulí river watershed show that the formal legal framework is in developmental stages, the applicability of national regulations is limited due to limited institutional presence and poor coordination, and the integration of control activities, monitoring and enforcement (sanctions). Also, it is characterized by limited economic resources, infrastructure and equipment, along with few human resources to perform regulatory activities that require monitoring and enforcement of penalties laid down in the regulations. In addition, water resource management is part of a complex political-administrative division.

The complexity of the case study requires an interdisciplinary and comprehensive effort with which Mayangna environmental standards (over 60% of the watershed area in Indigenous territory) and its daily custom of application is harmonized with national legislation in terms linked into local practice (Garcia 2010). In this way the social and procedural law and the relationship between law and behavior are based on the interests of a legal-pluralist approach (Boelens et al 2003).

Likewise, some stakeholders in the formal rules on water resources are not described; daily practice links them and they can even perform actions that are not directly within its formal know-how, creating conflicts of legitimacy, power and authority. According to Jiménez 2008 "The combination of legitimacy and effectiveness of regulations in their implementation determine the level of acceptance of the community about power and authority."

The decentralization processes and responsibility reassignment to local municipal authorities is a beginning to promote good governance, but it is also necessary to establish regulations for the non-abuse of power by the authorities in their development actions and promote transparency in authorities' decision making by users.

Gentes (2008) proposes two parallel action areas to achieve the objective of local water governance in Central American countries: i) from the State's public policies, respecting and enforcing the autonomy rights enshrined for local stakeholders in the watersheds and ii) from the communities and municipalities, accompanying and supporting the autonomy and given decision-making power, for example, in the water supply and conservation of natural resources.

In the case of the Mayangnas communities it requires the establishment of an agreement with the community on corrections deemed necessary in cases of infringements of fairness and justice with bases on their cultural beliefs and worldview, understanding that the rules of indigenous communities do not have the same means of duress and force to oblige compliance as do State regulations (Garcia 2010).

b) Rules, agreements and non-formal uses of water resources in the Ulí river watershed

Table 9 shows the results for the rules, agreements and informal water-use rules analysis in the Ulí river watershed, which are discussed in more detail below (Garcia 2010).

Table 9. Rules, agreements and informal water uses in the Ulí river watershed

- Not used to paying for water
- Conflicts for non-payment of water-supply services
- Rights of access, use and management of water are associated with land ownership
- Differences in water management and use by two cultures that live in the rural area of the watershed (Mayangnas indigenous and mestizo)
- The geographic location influences water access, use and management
- The role of women is essential in providing water at home
- Formal religious institutions and politicians influence decisions and informal agreements
- Informal arrangements tend to be formalized by way of legal documents

### **Not used to paying for water**

This is shown in a) in Nicaragua rural areas there is little tradition of paying for water supply, because it is a free-to-use resource, with the exception of users of drinking water supply (CNRH and Danida 1998); b) the historical context of the urban population in Siuna has been characterized by their obtaining free water from foreign mining companies; c) in the urban area of Siuna, the water supply is given by the EMAPSA Company, but not all residents contribute to the payment of the water rates for the maintenance of the system, d) some of the Siuna urban area residents dig wells close to their homes.

### **Conflicts for the non-payment of water supplies**

There are complaints due to the irregularity of the service (low frequency) and poor quality water (Medina 2009), which cannot be consumed by the inhabitants (letters, messages on radio programs and even political parties involved), and illegal access to water because the inhabitants have taken the water from the aqueduct without authorization and stored it in tanks.

### **Water access, use and management rights are associated with land ownership**

In rural areas of the Ulí watershed, the landowners take advantage of the underground water by excavating wells (Bolt and Castillo 2002), as well as taking directly from the river. Overall, each family is very much at liberty with regards to water access and use.

### **Cultural differences in water access, use and management rights in two cultures living in the rural area of the watershed (Mayangnas indigenous and mestizo)**

This situation manifests itself in several ways: a) the institutional arrangements in indigenous communal lands indicate that water is equally accessible for all community members; b) the Sikilta and mestizo communities use of water resources for livestock production (cattle and pigs) does not have any delivery system, and the

animals are loose and are herded into the river to drink water. There is no control agreement; c) in the Sikilta community, although there are codified rules about fisheries, these are not fulfilled, so when there are visitors in the community, the fishing community fish more than that established as per family for sale; d) the extraction of sand from the Ulí riverside is only used for construction of community places in the Sikilta community, however, the mestizos in the town of Siuna, performed this activity legally and illegally, since control and surveillance is limited, e) the Sikilta community uses the Ulí river way to transport visitors to the watershed by canoe. The communities lend canoes among themselves through arrangements and food or favor exchanges. The community established that transportation for the visitors would cost 200 cordobas (about \$ 10 dollars) one way.

### **The geographic location influences water access, use and management**

The middle of the Ulí watershed is located between high mountainous areas, thus is difficult to access. It is also a core zone of the Bosawas and part of the Mayangnas indigenous community territories, the reason for no greater human settlement that requires water resources. The lower part of the watershed has most human settlements, therefore is where there is greatest demand.

### **The role of women is essential in providing water at home**

In the indigenous and mestizo communities, women are responsible for ensuring water for various domestic purposes and household consumption. In the case of the Mayangna Bas Sauni indigenous community, water resources in the watershed bring women, children, the group of women and thus families together, which creates a space for interaction and learning exchange.

### **Formal religious and political institutions influence decisions and informal agreements**

In the Sikilta indigenous community the minister of Moravian religion is a spiritual authority, however he has informally become the authority for making decision in the Indigenous territorial government meetings as well as having his say and vote. Also some People Power Committees or 'Comites del Poder ciudadano (CPC)' were found in the Ulí river watershed, affiliated to the government's political party, with the president's backing. The informal rule is all about favoritism or fast processing of CPC leader demands in various fields by the formal institutions of national Government, which can include access to and use of natural resources, including water.

### **Informal arrangements tend to be formal by way of legal documents**

The informal decentralization of government functions in the Sikilta community was formalized by functionaries of the institutions and community leaders to exercise some functions of the law and are government informants. On occasions they are compensated financially and have the backing of the institution that delegated the community leader. For example SETAB MARENA- assigned Sikiltas volunteers

ranger and warden functions while the Humbolt Center funds the same in the Bocay indigenous community.

Based on the results of the rules analysis, agreements and informal uses of water in the Ulí watershed help to establish more sustainable institutions, strengthen governance and solve specific environmental problems. According to Li (1996) "Communities and local stakeholders become an attractive system for the management of natural resources through easy answering of dominant narratives that favor state control or privatization of resource management, from a vision where communal or collective local management is compared with governance, whereas the first have established more sustainable and positively impacting schemes through different historical eras".

However, informal rules are not always embedded in the formulation and structuring of formal institutions (laws and policies on watershed management). This is due to the lack of effective participation mechanisms and a lack of knowledge of or omission of non-formal agreements establishing local level water access, use and management policies and laws. However, one should not assume that all informal rules are linked to the formal system; this can cause exclusion and discrimination of other informal rules that are not incorporated into the formal system, causing injustice in water management. The national legal framework and non-formal rules must be treated differently but harmonically.

Formal mechanisms have lesser acceptance for a number of reasons, including ignorance of the laws (Bolt and Catillo, 2002). Thus, on making a complaint for water-resource violations and environmental crimes, the plaintiffs face different obstacles, among them being their not always knowing the type of violation, not knowing where or who to go to, and so have to spend money and time on mobilization. After the complaint is made, the competent authorities do not always open administrative processes (political favoritism), which overlap with judicial procedures and the process becomes slow in the implementation of the sanction. Quite often the complainants are threatened for using formal procedures.

All these obstacles and constraints drive stakeholders to reduce participation in the formal institution system, creating conflicts and promoting a negative perception on the part of the population. This was shown in the interviewee's answers, when asked whether they consider the legal framework on access, use and management can be applied in the watershed and why? 58% said no legal framework is applied in the watershed due to the limited presence or weaknesses of institutions and actions of the authorities, the lack of rigor in applying the sanctions of law, bribery, and not receiving complaints nor following-up on time and the lack of administrative processes (Garcia 2010).

## **2. Identification and characterization of key stakeholders in the governance of water resources in the Ulí river watershed**

Figure 1 shows key stakeholders in water governance in the Ulí river watershed, which are grouped according to the level of incidence, meaning stakeholders with

the highest and low involvement and those who must take part in water-resource management or activities by order of the law.

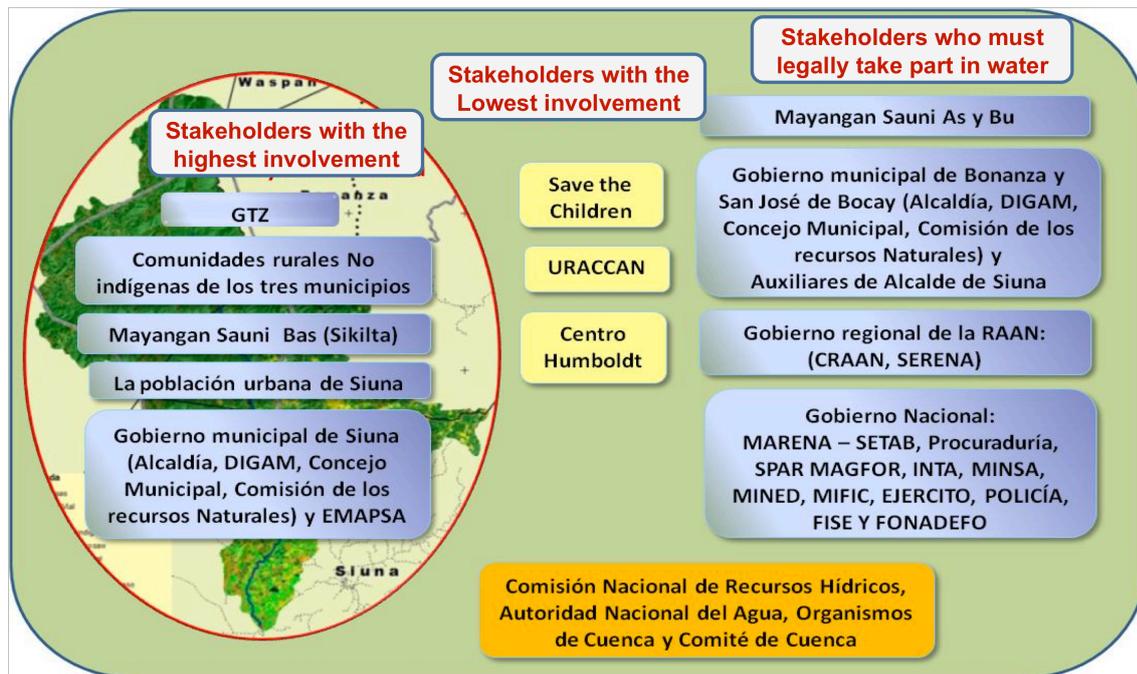


Figure 1. Key stakeholders of water governance in the Ulí river watershed

The identification and characteristics of stakeholders is one of the factors to analyze in water-resource governance at the Ulí river watershed, and this should take into account the description of the incentives that drive the stakeholders' behavior with respect to water use and management. Moreover, incentives are the motivations that move a person or a group of people to taking actions, and they can be: money, prestige, fears, ideals, goals, among others. Also, the incentives depend upon stakeholder characteristics which in turn are influenced by their way of life, history, culture, education, environmental conditions, among others. Thus, the incentives received by stakeholders determine decision making on the uses of natural resources. The decision affects elements such as values (ethics), information available, alternatives, costs, benefits, access, use and legal framework, among other aspects.

The profile and the attributes of the water resource users, the communities and the other involved stakeholders have a strong impact on the degree of functioning of a resource-use scheme (Fischer et al. 2004). As well as the fact that water-resource management depends on decisions made by society, which is made up of stakeholders.

Table 10 shows the stakeholders' categorization in the Ulí river watershed by using the Social Analysis CLIP methodology which are considered the factors that influence decisions made by key stakeholders which have the greatest and the least impact on the watershed. The way power, interests, legitimacy, and social relations are distributed in each situation determines the stakeholder structure and possible strategies to manage social and environmental problems (Chevalier 2006).

Table 10. Analysis and categorization of the stakeholders with major and minor impact on the Ulí river watershed, using the CLIP analysis methodology

KEY STAKEHOLDERS		POWER (high, middle, low)	INTEREST (high, middle, low)	LEGITIMACY (high, middle, low / none)	CATEGORY
Non-indigenous rural communities in three municipalities	Legal owners of farms	High	High	High	<b>Dominant</b>
	Farmers	Low	Middle High	Middle	<b>Vulnerable</b>
	Third people* (ranchers and farmers)	High	High	None	<b>Forceful</b>
	Community leaders (mayor's assistant)	High	High - Low	High	<b>Dominant or Influential</b>
	People Power Committees	High	Low	Middle	<b>Influential</b>
Sikilta Community	Low	High	High	<b>Vulnerable</b>	
Siuna Urban population	Middle-Low	High	High	<b>Dominant Vulnerable</b>	
Municipal Government of Siuna	High	High	High	<b>Dominant</b>	
EMAPSA	High	High	High	<b>Dominant</b>	
GTZ	Middle	Middle	Middle - Low	<b>Dominant – Forceful</b>	
"Save the Children"	Middle - Low	High - Low	High	<b>Respected Dominant</b>	
Centro Humboldt	Low	Low	Middle	<b>Respected</b>	
URACCAN	Middle	Middle	High	<b>Influential</b>	

\* Illegal owners: people who have settled in the lands of indigenous communal property and are named “third parties” under Act 445.

It is worthwhile mentioning that non-indigenous people in rural communities within the three municipalities may belong to different groups of stakeholders. For instance, legal owners can be part of the people-power committee, so they have more influence on decision making. Thus, people who belong to two or more groups of stakeholders strengthen the capacity for actions.

The analysis CLIP also includes a collaboration and conflict assessment which influences stakeholders interaction towards water resource. Figure 11 presents collaboration operation and conflict relations among identified key stakeholders, identifying in the Ulí river watershed. These relations will be further evaluated employing the social network analysis methodology.

Table 11. Collaboration and conflict relations among key stakeholders, which have major and minor impact in the Uli river watershed.

KEY STAKEHOLDERS		COLLABORTION RELATIONSHIPS	CONFLICT RELATIONSHIPS
Non-indigenous rural communities in the municipalities	Legal farm owners	The People-Power committees influence, when part of the same political party, may result in receiving more benefits and cooperation to either obey or infringe the law. Also, this situation occurs with farmers and the “third parties”.	When People-Power committees belong to different political parties, there is a power clash that generates distrust among stakeholders. It can also occur with farmers, especially the third parties and the auxiliary mayor.
	Farmers	No relationships with other stakeholders on the water resource.	
	Third parties (farmers)	No relationships with other stakeholders on the water resource.	They have taken communal lands from the Sikilta indigenous community illegally and overexploited natural resources, such as water and timber; as well as entering into conflicts with SETAB because illegal activities are developing in Bosawás.
	Community leaders (mayor's assistant)	They communicate constantly with the mayor and apply for water and sanitation projects.	No relationships with other stakeholders on the water resource.
	People-Power Committees	Along with the national government institutions, they are working to obey or infringe the law according to the political self-interests	No relationships with other stakeholders on the water resource.
	The Sikilta Community	Giving information to GTZ in order to help them implement a water project.	Third parties have taken their lands and degraded water resources
	Siuna Urban population	Through water rates payment, EMAPSA carries out maintenance on the aqueduct.	Problems with EMAPSA, because the water supplied does not meet the needs of quality and continuity.
	Siuna Municipal Government	EMAPSA is subsidized by Municipal Government, so they can perform maintenance on the aqueduct. Through DIGAM (which is part of the Municipal Government), they carry out watershed-protection activities.	No relationships with other stakeholders on the water resource.
	EMAPSA	With the urban population of Siuna, they provide drinking water.	They have conflicts with the Suina population because of discontinuity and poor quality

		drinking-water supply. In addition, EMAPSA charge for water people do not consume.
GTZ	They co-operate with EMAPSA with finance and technical assistance; the Sikilta indigenous community in consultancy on the small aqueduct. Also, with the Siuna Municipal Government, providing consultancy services on reforestation projects.	No relationships with other stakeholders on the water resource.
"Save the Children"	A safe-water campaign has been organized with and the Siuna urban population's help.	No relationships with other stakeholders on the water resource.
Centro Humboldt	They advise the Municipal Government of Siuna - CAM on environmental issues, including water resources.	No relationships with other stakeholders on the water resource.
URACCAN	Giving advice to the Municipal Government of Siuna - CAM on environmental issues, including water resources.	No relationships with other stakeholders on the water resource.

The participation of stakeholders in decision making in relation to water access, use, and management is a process embracing governance and the practice of water governability. For this reason, an interview was performed to identify the stakeholders who make decisions. The results show that key stakeholders with the highest involvement in the study are the decision makers on water resources in the Ulí river watershed (Table 12).

*Table 12. Stakeholders who make decisions about water-resource access, use, and management*

No	Answers	Frequency response (%)
1	Residents living inside and near the Ulí watershed.	65
2	In the Mayagna Sauni Bas Indigenous community, decisions are made by Sindico, Witha, the council of elders and the community government.	62
3	Government institutions, MARENA-SETAB.	46

4	Community leaders.	35
5	Those who have land ownership.	35
6	Mayors and politicians.	35
7	In the Mayagna Sauni As Indigenous community, decisions are made by the MASAKU community government.	19
8	The Municipal Environmental Commission of Siuna (CAM)	8
9	EMAPSA and DIGAM	4

### 3. Key stakeholders interaction analysis on local governance of water resources in the Ulí river watershed

#### a. Density and Degree of Centralization Stakeholder

Table 13 and Figures 2, 3, 4 and 5 illustrate the results of density and degree of centralization of the four components (planning, funding, implementation and training) considered in the study. It was found that the planning and management network has the greatest density among the four components, with a classification of “medium”. The stakeholders handle good exchange in the planning and management network, establishing and maintaining continuous information links at various levels and with others stakeholders. Collaborative planning and management creates synergies and complementarities with stakeholders, leading to collective action.

The other three components give an idea of just how weak the articulation and coordination with stakeholders is necessary to increase the network density and strengthen connections between stakeholders to thus increase the social capital, which is the basis for self-management and empowerment of water resources.

In financing and financial management terms, poor coordination in state institutions can occur as a result of a lack of financial resources and temporary financial cooperation. Hence, establishing a financial strategy to ensure financial resources for implementation of protecting activities, management and sustainable use of water resources in the watershed is required.

the implementation of action networks, there is most definitely a lower density than the planning and management network, which leads us to the conclusion that several stakeholders are connected during the planning process; yet there are less exchanges with the stakeholders who implement the projects.

In assessing the degree of the four-component-network centralization indicator, according to the qualitative scale of reference specified in the methodology, the inputs and outputs show as low and very low respectively. As a result, the network figure is not star-shaped, which means that central stakeholders are not clearly defined. This indicates that there is not an absolute concentration of activities around a single stakeholder; nevertheless, the activities are distributed among several stakeholders, showing great potential for exchange. In conclusion, this situation is positive for the network, however there is not a central stakeholder who controls the other stakeholders, because it depends on partnerships and synergies between them.

Ophuls (1973) argues that "in the light of the tragedy of the communes, environmental problems cannot be solved through co-operation ... and the rationale for government with major coercive powers is overwhelming..." Ophuls concludes that "even if we avoid the tragedy of the communes, it will only be by recourse to the tragic necessity of Leviathan "(stakeholder who controls or is supreme). In this regard, the lack of a central stakeholder, assuming responsibility for planning and water management of water resources in the Ulí river watershed, can lead to overexploitation and resource degradation. However, when power is distributed among several stakeholders, more commitment to supervision and control activities undertaken by them is necessary. Besides, accountability is the key element for transparency and fairness in management (access) of water resources among stakeholders.

Financing and financial management component, the network figure is not star-shaped; rather is triangular shaped, as there are three key stakeholders. Therefore; this situation is not totally favorable, but the existence of more than one central stakeholder creates more confidence than with only one stakeholder. In this case, it is necessary to increase stakeholders' involvement in the financial component to strengthen the network.

**Table 13. Density and degree of centralization Stakeholders**

Components	Density indicator (%)	Centralization indicator (%)	
		outputs	inputs
Planning and management	64.4	39.5	27.2
Training and Skill-building	30	28.4	28.4
Funding and financial management	23.3	35.8	48.1
Implementation of actions	48.6	15.6	15.6

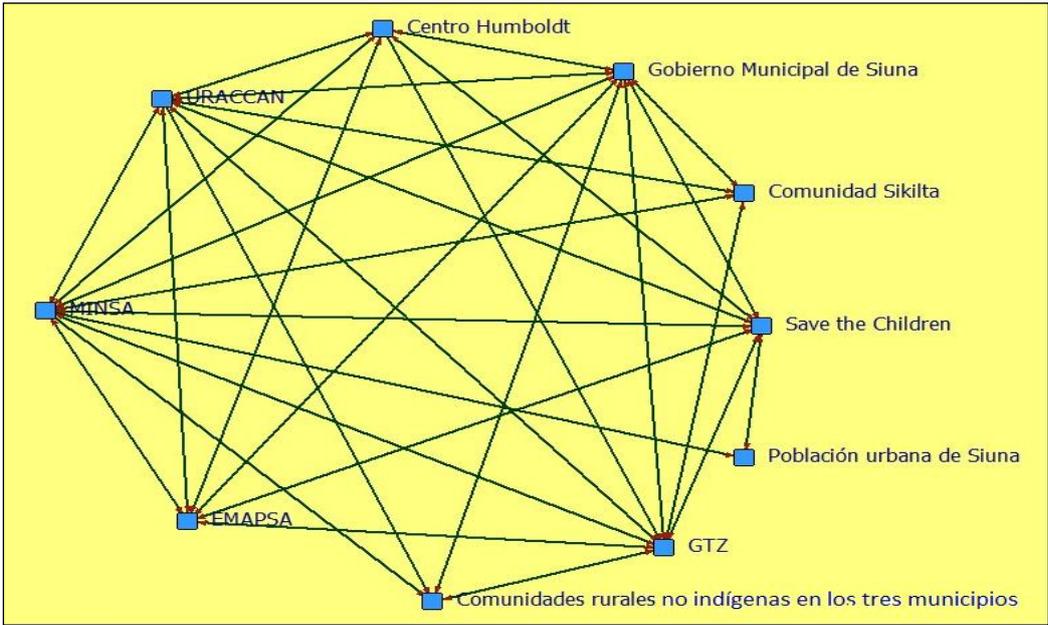


Figure 2.

Planning and management exchanges of water resources in the Ulí river watershed

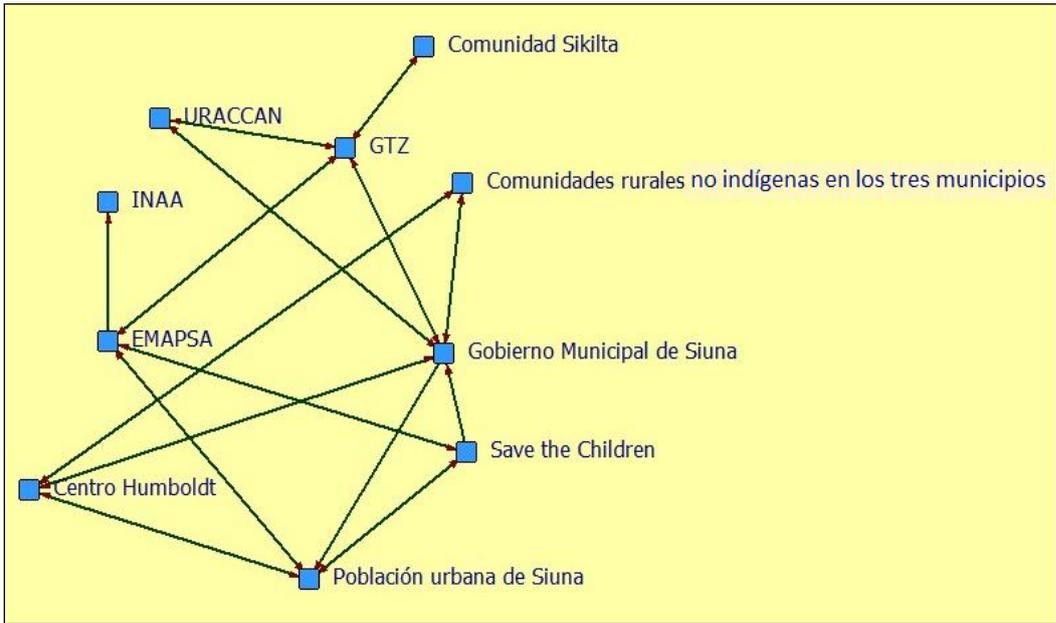


Figure 3. Training and Skill-building Exchanges with regard to water resources in the Ulí river watershed



Figure 4. Financing and financial management exchanges on water resources in the Ulí river watershed

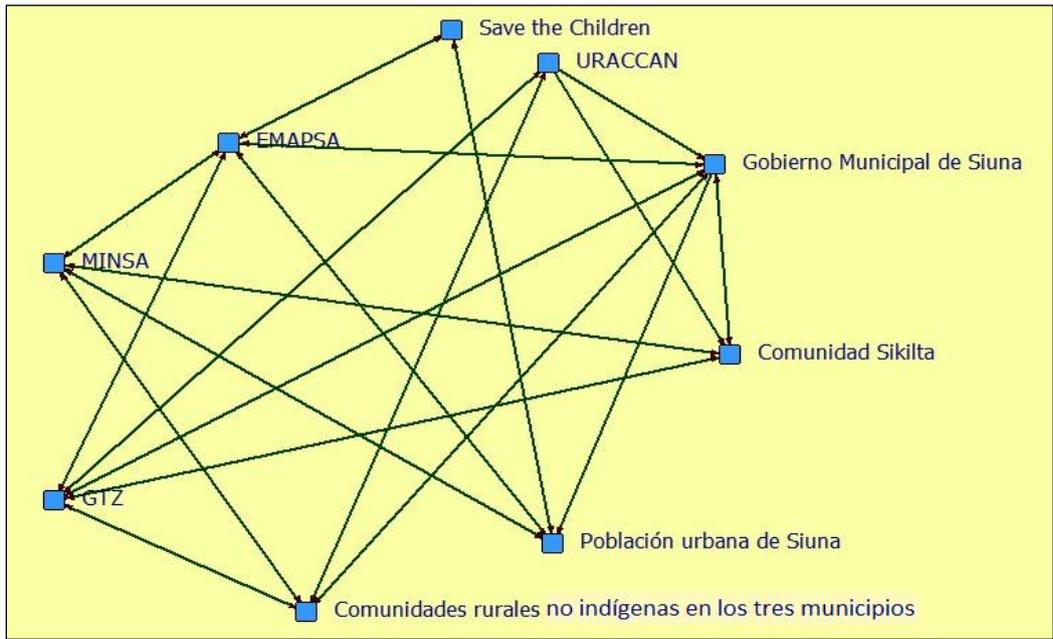


Figure 5. Implementing action exchanges on water resources in the Ulí river watershed

**b. Degree of centrality and betweenness indicators**

Table 14. This shows the degree of centrality and betweenness indicators. The results of assessing the degree of the four-component-centrality networks concerning stakeholders represent the Municipal Government of Siuna as the principal stakeholder with the highest percentage in output (OR) and input (IR) relationships. As a result, it is the most proactive stakeholder, which shows power of leadership and interests in working in alliance. In conclusion, the Municipal

Government of Siuna is the stakeholder recommended to start water-management projects up due to its prestige, power, exercising of leadership in the networks and great ability to initiate relationships with other stakeholders.

Generally, municipalities with a high degree of centrality are closely linked to entities to coordinate actions at the local level. However, municipality workers might be tactful when coordinating and facilitating exchanges among stakeholders because a misunderstanding can lead to failures or delays in projects (Orozco 2006). On the other hand, the community and residents are the stakeholders with fewer output relations and greater number of input relations, indicating that stakeholders obtain information, yet they are weak in starting relationships with other stakeholders for planning and management points, training and skill building, and financing and financial management.

From the results of the betweenness indicator assessment for the network stakeholders, one can deduce that the Siuna Municipal Government and GTZ have the highest percentage in the four aspects, and both are stakeholders who have optimal communication-flow control. We can say that these entities can be considered bridges for connecting stakeholders, so they help them to work together.

Table 14. Degree of centrality and betweenness indicators evaluated in the four aspects

Aspects	Stakeholders	Centrality (%)		Stakeholders	Degree of betweenness (%)
		OR	IR		
Planning and management	MINSA	100	77.7	Save the Children	15.5
	GM - Siuna	88.8	88.8	MINSA - GM Siuna	10.1
Training and skill building;	GM - Siuna	55.5	55.5	GM - Siuna	30
	GTZ	44.4	44.4	GTZ	29.6
Funding and financial management;	GM - Siuna	55.5	66.6	GM - Siuna	60.4
	GTZ - EMAPSA	44.4	44.4	GTZ	41.6
Implementation of actions	EMAPSA, GTZ and GM - Siuna	62.5	62.5	EMAPSA	23.4
	Non-indigenous communities	50	50	GTZ	13.6

## CONSTITUTED DISCUSSION ON WATER-RESOURCE GOVERNANCE IN THE ULÍ RIVER WATERSHED

Sehring (2009) identifies water-resource governance at local level is determined by the specific context of each country. When we talk about local governance, we refer to the particularities of institutions in each place, which are based mainly on non-formal rules that come to be established and personal relationships. It can be said in general terms that water-resource governance in the Ulí river watershed is decided

upon under a neopatrimonialism, along with cultural-legal pluralism and weak governability.

Citing Sehring (2009), many developing countries carry out water-resource institutional reforms, included under the category of neopatrimonialism, while democratic institutions formally coexist alongside non-formal patrimonial institutions. This situation applies to Nicaragua where their national policies, laws and regulations refer to access, use and management of water resources, but at the same time coexist with non-formal institutions at local level (their actions are more personal, word of mouth, friendship, and stem from political favoritism).

The legal pluralism is evident in the different uses of water in the watershed. Furthermore, the uses of water resources in the high and upper zones of the watershed are limited due to the fact that they are conservation areas of the Mayangnas indigenous communities, as established in their environmental standards. Also these areas are part of the core zone of the Bosawas in national legislation (Law 407/01).

The water uses at the top of the watershed are communal and public, which are suffering due to their high vulnerability to resource degradation by the advance of the agricultural frontiers and "third-party" invasions. This is a result of the feeble implementation of control measures, inspection, monitoring and application of penalties for environmental crimes by competent authorities of governmental and traditional indigenous authorities. What is more, indigenous communities break their own environmental rules when they show favoritism in their decisions on penalizing offenders. This occurs because community leaders make biased decisions without the participation of community members in community assemblies, which have gone from being spaces of participation in joint decision-making to information spaces for activities carried out in the territory. Consequently, community members observe the abuses and corruption of the leaders after the events occur. Apart from this, internal tension originates within the community because rules are not applied equally to all the members and this depends on the close relationship or association in the community, demonstrating lack of control and supervision on the part of the community when decisions are made by leaders of the territory (Mairena 2007). Corruption and lack of transparency in decision making for natural and social resource usage is a weakness in governability and governance also made evident in the non-fulfillment of established ecological norms.

According to Lam et ál (1993) common – pool resource, such as water in the Mayangnas indigenous territories, it is difficult to exclude users from obtaining benefits from water resources, even though the use of the resource by one person can reduce availability for others.

Olson (1965) states that "someone cannot be excluded from enjoying the benefits of a collective good, once the good is provided, they have little incentive to voluntarily contribute to the provision of such goods". This occurs with the ecological norms in the indigenous communities, where there is no real clarity on who have rights and responsibilities in terms of access, use, and management of water resources. Also, the supervising authority within the community is not defined, and mechanisms of

sanctions are not established. In addition, environmental standards are not disclosed to all community members.

According to the Millennium Project, United Nations (2005), “the cause of the global water crisis is the weak governability, the lack of appropriate institutions at all levels and chronic dysfunction of existing institutions.” Although there is not any formal structure established for watersheds, such as the Ulí river watershed committee, institutions are joining forces to work together on water-resource projects, and there is a tendency towards collaborative behavior in the management of local natural resources. On the other hand, relevant national-level institutions are not present in the Ulí river watershed, so the framework established at national level has not been fully implemented as yet.

Additionally, there are several stakeholders with responsibilities in water-resource management assigned by the legal framework. In consequence, duplication of efforts and in some cases duplication of functions are commonplace (Gomez et al 2007). Also, the operational capacities of the institutions are limited by the low budget assigned to staffing, control equipment and supervision activities, as is made evident in measures taken by the national government under the executive decree No. 2/09, which deals with cut-back measures and savings in public institutions.

Local-level roles in implementing the water-resource regulations at the Ulí river watershed basin (Siuna Township) are evident in the various municipal government bodies, such as: EMAPSA, DIGAM, CAM, the City Council, assistant mayor and ecological brigades.

According to Hoogendam and Vargas (1999), subsidiarity means the transfer of public resources, tasks and legitimacy to lower levels of public administration and from the public sector to the community and/or private ones. The subsidiarity principle of the Ulí river watershed applies to the case of the Sikilta indigenous community, where MARENA - SETAB delegate functions to forest wardens and two volunteers.

Also, Centro Humboldt fund the forest warden in the Bocay Indigenous community and the Siuna police, who are working alongside the Sikilta community police. In the town of Siuna, the judge appointed a community representative to function as a judicial facilitator to the Sikilta community. However the subsidiarity principle is not well designed, considering that the capacity of stakeholders in the implementation of duties assigned is deficient (equipment and training requirements). The objective of subsidiarity is that the municipal government does not duplicate efforts and activities already implemented by other stakeholders, rather that the capacity of these stakeholders be strengthened (Hoogendam and Vargas 1999).

The laws may change over time as needs dictate in terms of demand and supply of water resources (Mc Kean 2000), for which the stakeholders made some change to the rules, using their characteristics (interest, power and legitimacy) to influence decisions on water use (Clavelier 2006). However, the stakeholders not only act individually, they also establish alliances and cooperation networks to achieve a common goal to change the rules. Inclusively, they try to avoid the legal framework

for their own gains, in accordance with the principles of maximizing utility. Thus, the rules play a role by providing the framework of direct expectations, limiting the range of choice of actors to introduce penalties and incentives (Peters 2001).

The Siuna Municipal Government was placed in the dominant category in the analysis CLIP because of its characteristics (power, interest and legitimacy) and its being the stakeholder with major availability of information (resources) which are used to place themselves in an important position regarding the issue of water-resource management and to influence a major player central in the social networks studied in their four aspects (Clark 2006). The Siuna municipal government has cooperated to a high degree with other stakeholders, can be an intermediary or bridge to other stakeholders, and has the capacity to establish new terms of trade. Under these conditions, the Siuna municipal government is a promoter of governance.

The Sikilta indigenous community was awarded the category of vulnerable in the analysis CLIP, due to the limited indigenous-population participation in developing water resource policies. The principal reason for this situation is the poor and difficult access to information available to participate in the decision-making processes. According to Fischer et al (2004), "The less the knowledge, the greater the risk of people changing their behavior." Access to information exchange in decision-making processes is a key element in the effectiveness triangle, named 'good governance at the science-society interface' (Turton et al 2007). In conclusion, the Sikilta indigenous community can be considered to be the players with less "voice and vote" (Gentes 2008).

According to Davila and Olazabal (2006), empowerment refers to changes that could not occur on their own, which depend on involvement in political structures, or collective action sustained in cooperation mechanisms. In the Ulí river watershed, one of the cooperation mechanisms is the fact that the stakeholders are affiliated to a political party. A situation that arises frequently in the Ulí river watershed is that of the problem of illegal land sales in the RBB area, which directly affect the watershed's water resources, with many of the actors in the study involved, meaning the so-called "third parties" categorized as forceful and influencing; the community leaders (mayor's assistants) influence greatly, too; the People Power Committees also are; the Sikilta indigenous community is vulnerable and the Siuna municipal government is dominant, through which the stakeholders, thanks to their attributes, can establish natural-resource intervention strategies.

According to Delclos (2008), "Corruption means breaking with the social exceptions that dictate what appropriate behavior is. Fraud involves the manipulation or distortion of information, facts and expertise on the part of people who swore to serve the public good, in order to derive personal benefit. Fraud is an intentional act and does not include intentional or negligent behavior. Favoritism, client preference, friendship, and partiality are the use of power granted to bestow preferential treatment on friends, clients, family, relatives, close friends or confidants. This form of corruption is particularly worrying as it concerns the distribution of resources, rather than the accumulation of them".

In this way, in the Uli river watershed, there is a neopatrimonialism in which non-formal rules are presented in different aforementioned aspects. In the case of the Siuna-urban-population water supply, situations arise as a result of the collection of water rates in homes where meters are not used. Another situation is the non-payment of the water service by users who are benefiting from them, albeit making illegal connections in "free riding" taking behaviour (Ostrom 1990, Fischer et al 2004).

In countries with weak governance, as is the case in Nicaragua, the management of water resources has been addressed in terms of accessibility, quantity and quality as a universal human right. However, it is suggested that these should be managed as a public service to comply to social, environmental and economic efficiency criteria (Delclos 2008). Even so, this human right has not been adhered to on equal terms in all the river Uli watershed population. In the case of Siuna urban population, which benefits from the Uli watershed through the EMAPSA service provision, this is neither constant, continuous, of good quality nor at a reasonable price. According to Delclos (2008), a criterion related to the establishment of water rates for them to be fair and reasonable is that they must be fixed based on the purchasing power of users (cannot exceed 3% of family income).

## **CONCLUSIONS**

- Nicaragua has an extensive legal framework with respect to water resources; however, the Water Act and its regulations are in the developmental stages, and so result in institutional dispersion or overlapping of responsibilities. There are also contradictions and regulatory shortcomings, though some synergies, too.
- Mayangnas Ecological norms have weaknesses in their equity and justice in implementation. The rules are not known to all, thus are not accepted nor well defined in terms of responsibilities, duties, rights, control and monitoring instruments and the type of penalties provided.
- Current water-resource governance in the Uli river watershed displays a neopatrimonialism, legal plurality and weaknesses in governability in a context of extreme poverty, and indigenous and mestizo communities.
- There is complex political-administrative division, where neither coordination nor integration of activities between the municipalities that make up the watershed exists.
- In the lower part of the watershed, the applicability of national regulations are limited due to insufficient economic resources, infrastructure, poor institutional presence and coordination, and meager integration of control activities, monitoring and enforcement (sanctions).
- Standards with greater effectiveness in their application are the Law of Municipalities, Ecological norms for Mayangna Sauni As and Bu Indigenous

Territories, communal ownership of indigenous peoples and ethnic communities in the RAAN.

- The religious institutions and political parties can influence decisions made by stakeholders in formal agreements that are established. This creates conflicts due to bias for a political party and these are reflected in the weaknesses of coordination.
- There is an auspicious environment in terms of governance for the establishment of a Ulí River watershed committee that is legitimate and recognized by the Water Law and Regulations No 620/07.
- The high area of the watershed is highly vulnerable to resource degradation from the advance of the agricultural frontier and the invasions of the "third parties", a consequence of the weak implementation of control measures, monitoring and enforcement of regulations in terms of sanctions for environmental crimes by competent government legal authorities (political patronage) and traditional authorities of indigenous friendship.
- The analysis CLIP results show that there are two stakeholders, who are vulnerable to non-indigenous communities in the three municipalities of the class of farmers and indigenous community or Mayagna Sikilta Sauni Bas. This situation reveals that the Sikilta indigenous community is vulnerable despite being highly legitimate and having a great interest in water resources. Their influence is low in making decisions on the use and management of water resources in relation to other stakeholders in the watershed, which is worrying when you consider they are the stakeholders of 53.4% of the Ulí river watershed.
- The dominant category of stakeholders is also of high power, legitimacy and interest, and these use their attributes to influence decision making. Sometimes there is abuse of power favored by there being little social control, a great deal of mistrust and lack of accountability.
- The analysis of social collaboration and exchange relationships among stakeholders involved in the governance of water resources in the Ulí river watershed revealed that the networks are under construction and strengthening through the projects currently being implemented, which are small networks of about ten stakeholders and the Siuna municipal government is one of the central most stakeholders in all four aspects.

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