Chapter 19
Basin Comanagement Plans – A Participative Approach to Water Governance: A Case Study in Honduras, Central America

Claudia Cecilia Lardizabal

Abstract This case study addresses the governance and institutionality of integrative and participative basin management in the micro-basin of the Valle de la Soledad located on the outskirts of the Honduran capital Tegucigalpa. The initiative comprises four basic stages: (1) identification of existing laws and state institutions, (2) knowledge of local actors' capacities to protect and administer water resources, (3) determination of water conflicts and steps for its possible solution, and (4) determination of factors and actors in favor and against water protection. The process allowed to develop municipal capacities, participative and efficient basin, and land use management programs that benefited local communities, particularly small and medium farmers, as well as to develop financial sustainability mechanisms.

Keywords Comanagement • Conflict resolution • Basin management • Water governance

19.1 Introduction

Global water problems are likely to increase in severity, rendering existing approaches inadequate to deal with such issues (Dellapena et al. 2013). The Caribbean is not exempt from such problems. According to Cashman (2012), due to increase in and on water demand, reordering of institutions in the Caribbean is under way by altering their institutional roles in order to achieve adequate water governance. In the majority of democratic countries, water-related decisions are left to government officials; however, in many parts of the world, water users have additional possibilities to provide input on such decisions before implementation. The involvement of water users and stakeholders in decision making can produce fairer and increasingly sustainable results (Susskind 2013).

C.C. Lardizabal (✉)
Department Francisco Morazan, National Autonomous University of Honduras, Tegucigalpa, Honduras
e-mail: claudia_lardizabal@unah.edu.hn

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For more than 30 years, the Tropical Agricultural Research and Higher Education Center (CATIE) has been working in the comanagement of watersheds. According to Kammerbauer et al. (2010), the comanagement approach is based on the need to ensure drinking water availability through participative actions and decisions. The following chapter reviews a successful case study of comanagement for the Rio Soledad basin in Valle de Angeles, Honduras, where the involvement of water users, stakeholders, and decision makers in comanaging the watershed has proved to be an effective collaborative management scheme of water resources. First, a definition and reason for the use of the comanagement approach is provided, followed by the key elements involved and an overview of the legal framework in place and conflict resolutions that have taken place. Furthermore, the chapter attempts to identify the factors that help achieve the social, administrative, and financial sustainability of the comanagement approach.

19.1.1 Definition

According to Prins (2009), comanagement refers to the conjugation of wills, capacities, and responsibilities of a series of actors that play different roles in a particular basin, who together through interaction should develop the desired results. A comanagement model should result from a series of participative processes that will provide the foundation for a sustainable and operative action that should carry out the management of the watershed. Comanagement plans should present a foundation based on a participative approach among actors that can be leaders of key sectors such as municipalities, social organizations, or any other with influence over the area (Bucardo 2007). This approach is a shared management process based on experimental observation and attentive consideration of action results, feedback, and action readjustments through analysis (Faustino and Jiménez 2005).

Faustino and Jimenez (2005) also propose that the action research and learning alliances are a fundamental support for the implementation of adaptive comanagement in river basins. This process seeks to strengthen the governability of the local political structure in its role as articulator and authority of actors and interest groups. The model starts from the impact in water quality and quantity as the ultimate goal of the basin management as well as an indicator of the efficiency of the processes and a solid foundation due to the convergence of diverse interests and conflict resolutions regarding water (Kammerbauer et al. 2010).

Adaptive comanagement is referred to as the adaptation of intervention activities in accord to the particular characteristics of a basin as well as the modification of strategies, methodologies, and actions in order to advance effectively toward the programs' vision (Prins 2009).

19.1.2 Why Comanagement

The base hypothesis for the comanagement model is that basin conflicts are so complex and demanding that no one actor by itself can effectively address the conflicts. Therefore, it is necessary to bring together wills, capacities, responsibilities, and resources of a relevant group of actors through a basin organism. In other words, this new and viable organism should be the critical factor in order to obtain a successful basin management (Prins 2009). Many municipalities have formulated strategic, management, territorial, and protected area plans, among others, that are not being implemented. Comanagement addresses the need for implementing formulated plans rather than discarding and producing new ones.

19.1.3 Key Elements

The central purpose of the comanagement model is to regulate water use and extractions in order to guarantee continuous water supply and quality. The model seeks to promote measurable positive changes that improve the population's quality of life. The hard part is finding change tendencies since hydrological cycles are influenced by a number of external factors that require the dedication of time and constant analysis for a certain amount of time to establish direct correlations between cause and effect (Kammerbauer et al. 2010).

In order to find a middle point in situations involving multiple actors and sectors who possess similar capacities and wills, *conversation platforms* are mandatory. These platforms bring together actors with different competencies and roles in order to unite efforts toward developing joint planning and monitoring activities in the watershed. Furthermore, these platforms will depend highly on the steering capabilities of individuals, the adequate articulation among them, and the disposition of addressing conflicts of interest. Finally, the communication during these conversation processes has to be of high quality in order for them to succeed (Prins 2009).

Comanagement is directly related to governability (ASDI CATIE a, 2008). Actions agreed during the process are flexible and adaptable to the changing conditions of the area and to the various actors involved ranging from the local to the regional scales. One of the necessary conditions is convergence mechanisms (Kammerbauer et al. 2010) among key players in order to ventilate latent conflicts in search for common solutions. On a local level, different structures can undertake these key functions, contrary to a higher level, such as municipality, where some sort of formalization process must take place. Another condition is the equal and representative participation of all actors with disregard for sex, race, economic status, or other in order to attain efficiency and credibility.

A comanagement plan is based on a collective territorial vision (Kammerbauer et al. 2010); this is not an official plan but rather a flexible tool that affects

agreements between different organizations. The common agenda is based on organizational needs in order to achieve higher efficiency, equity, and legitimacy in the agreed actions, arrangements, and practices.

In order to implement the agenda, minimum financial requirements must be met. These can be autonomous and decentralized funding or contributions from each institutional actor. A very effective way to guarantee process sustainability is the creation of a common initial fund with clearly defined rules and mechanisms aimed to strengthen the fund. In addition, the acquisition of government funds through forward-thinking mechanisms, such as payment for environmental services, is a must in order to achieve local governability (Kammerbauer et al. 2010).

Due to the high uncertainty that characterizes systems where a social factor is involved, it is necessary to implement feedback mechanisms through collective processes that include technical as well as popular and ancestral knowledge (Bucardo 2007). The multiple perspectives of the different actors will allow to develop innovative and unique approaches. For example, in the Rio Soledad basin, one of the main experiences was the resolution of water conflicts (Prins 2009).

19.2 Study Area

The Soledad River micro-basin is mostly located in the Valle de Angeles County with the rest of the area distributed between the Central District, Santa Lucia, and San Antonio de Oriente at approximately 22 km from Tegucigalpa to the Francisco Morazán state (Fig. 19.1). The micro-basin covers an area of 5,542 Ha and is located in the upper Choluteca River basin (lat 14° 7′ 15″ to 14°11′22″ North, lon 87°0′13″ to 87°5′40″ East). The mean annual rainfall of the area ranges from 1,500 to 2,500 mm; the average annual temperature is 18 °C, and average relative humidity is 84 %. In Honduras, according to Argeñal (2010), two very distinct seasons can be distinguished; from May to October, the rainy season takes place, and from November to April, the dry season occurs.

The soil of the basin is of medium fertility, humid, and mainly of forest vocation. Most of the soils in the watershed have developed from sedimentary rocks. Such soils include Chimbo,[1] Chandala, Espariguat, and El Naranjito. These soils tend to be deep to very deep depending on the altitude, with the exception of the Chimbo soils that are shallow and severely erodible. In general, soils of sedimentary origins have good drainage and medium to fine texture with a defined structure. Its parental material corresponds to conglomerates and red sand and in lesser proportions of calcilutites.

In the lower parts of basin where there are gentle slopes, agriculture can take place (Barahona 2006). Most of the basin, approximately 4,357.50 Ha, is covered

[1] Chimbo, Chandala, Espariguat, and El Naranjito are Honduran soil series (Simmons Honduran Soil Study).

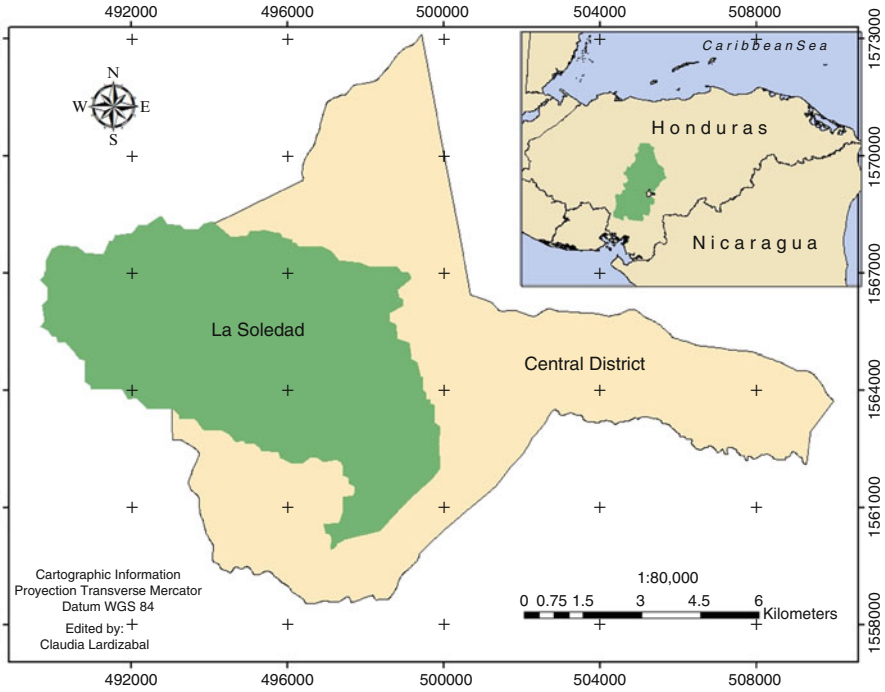

Fig. 19.1 Rio Soledad basin, Valle de Angeles, Honduras

with pine forests, and in a lesser percentage of broad leaf and mixed forest, also there is a smaller part (175.7 Ha) dedicated to traditional agriculture which comprises mainly of subsistence production crops such as grains.

Hydrologically, the Rio Soledad micro-basin belongs to the Yeguare River subbasin, which in turn is part of the Choluteca River upper subbasin. The Rio Soledad basin is very mountainous, with approximately 70 % of its area consisting of steep slopes with no rocks and only 24 % corresponding to relatively flat and soft slopes.[2] The natural resources of the basin are sensitive to accelerated land degradation due to the intensity of land use changes for agricultural production purposes, as well as inadequate production practices. Land cover is constantly being diminished, there is a reduction in water producing areas, and this is directly related to water resources degradation along with intensive agrochemical use in crop production and practices related to mineral extraction which was one of the main economic activities of the area (PREVDA 2008).

The Valle de Angeles municipality has an approximate population of 13,400 inhabitants of which 44.6 % can be considered urban and 55.4 % rural. According to PNUD (2013), illiteracy in Valle de Angeles is 19 %, with the biggest illiteracy problems in the rural area. The watershed has an extension of 55.47 km^2 and a

[2] Soft slopes refer to topography with less than 5 % inclination.

population density of 116 persons per square kilometer. Depending on the number of inhabitants per area and the low illiteracy percentage, there are different ways that the development and environmental situation of the basin can be addressed (PREVDA 2008).

19.3 Water Management Policies

19.3.1 Legal Framework

The Honduran legislation has a wide legal framework for the protection of natural resources, dating from 1902 when concessions and natural resources were legislated. Municipalities are given the responsibility to monitor the areas in which water sources are located. There are 14 laws regarding water and watershed management (Table 19.1). However, only a few of these have a direct relationship with the management of the resources: the Law for National Water Use was approved in 1927 and is still in use, the General Environmental Law (1993), the Framework Law for Potable Water and Drainage (2003), the General Water Law (2009), and the Forest Law approved in 1972 and reviewed in 2007 in which watershed management is addressed (Ley 98-2007).

The Law for National Water Use was the legal instrument that addressed water resources. The General Water Law is based on it and elaborates on water resource management, including the creation of the National Water Resources Council which is the institutional entity in charge of regulating the policies regarding water resource use and management. However, there are several other institutions and entities that provide technical and operational support (Fig. 19.2).

19.4 Local Actors

The Valle de Angeles has a 3-level organizational chart that includes the municipal corporation, the mayor, and five departments: land registry, treasury, auditory, municipal justice, and the UMA.[3] However, there is no specific entity to handle drinking water. Drinking water is under the Department of Municipal Justice (HYTSA 2005). Water system maintenance is usually handled by plumbers, while water boards are in charge of the administration of the water system (Aguilar et al. 2008). Water boards have their legal background in the Framework Law for Potable Water and Drainage and are set up in three parts: the user assembly, which is the top authority since it expresses the will of its members; the board of directives that is comprised of seven members; and a support committee. However, in none of

[3] UMA Municipality Environmental Unit (acronym in Spanish).

Table 19.1 Honduran legal framework for water resources

Law	Decree	Date	Observations
Law for National Water Use	137	April 9th 1927	
Forestry Law	85	February 10th 1972	Revised in 2007 where watershed management was included
Law for agricultural reform and other dispositions	170	December 30th 1974	
Municipalities Law	134-90	November 7th 1990	
Health Code	65-91	August 8th 1991	
Law for the Modernization and Development of the Agricultural Sector	31-92	March 19th 1992	
General Environmental Law	104-93	June 6th 1993	
Law for forestry incentives, reforestation, and forest protection	163-93	September 22nd 1993	
Law for the Environmental and Natural Resources, Attorney General's Office	134-99	September 17th 1999	
Law for Sustainable Rural Development	12-2000	March 30th 2000	
Framework Law for Potable Water and Drainage	118-2003	September 29th 2003	
Territorial Ordainment Law	180-2003	November 28th 2003	
General Water Law	181-2009	December 14th 2009	

the communities is the support committee organized, and according to law if the committees are not organized, the organizations are incomplete.

According to Aguilar et al. (2008), despite the importance of the water boards' work and the fact that they manage approximately 50 % of the total amount of water that is captured in the dams that comprise the potable water system, none of them have an annual plan. Overall decisions are taken on a daily basis and according to system necessity or the day to day. In general, most of the water boards have mentioned of the absence of general assemblies as their main issue.

Water boards have also mentioned that some of their main problems are related to the lack of system maintenance and also water source protection and chlorination system maintenance deficiencies. In terms of social aspects, the central issue is the indifference of the assembly, the lack of collaboration, and in some cases the board of members does not fulfill its responsibilities.

However, despite a generalized indifference from the general population, some organizations in the area provide support to the Valle de Angeles municipality (Table 19.2).

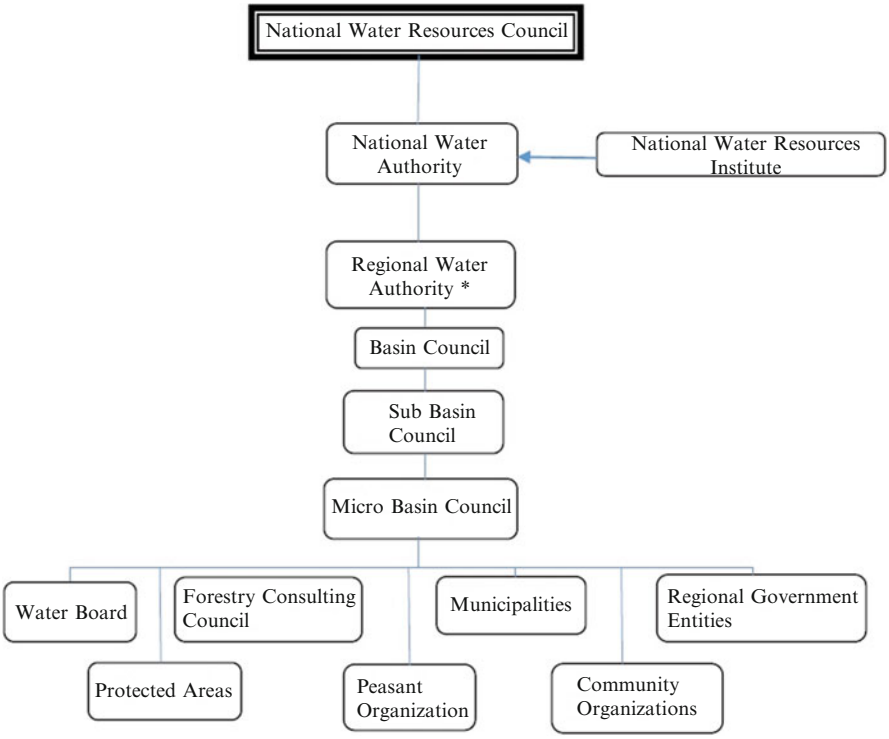

Fig. 19.2 National Water Resources Council organization chart

Table 19.2 Supporting institutions of the Valle de Angeles municipality

Institution	Type of support	Legal framework
State Finance Ministry	Financial and technical support and infrastructure construction	Signed financing agreement
Friends of the Valley Foundation	Infrastructure construction	Signed agreement
FOCUENCAS II-CATIE	Support in water source protection and rural bank implementation	Signed agreement through the Basin Council
AFE-COHDEFOR (now Forestry Conservation Institute, ICF)	Technical support in forest inspection	Signed agreement, joint work with the UMA
Friends of La Tigra National Park (AMITIGRA)	Infrastructure construction	Signed agreement
FOCUENCAS	Technical support in natural resources management	Signed Agreement
Ministry of Natural Resources and Environment	Conflict resolution in water resources issues	N/A
Governance and Justice Ministry	Technical assistance	Defined by law

Source: Data from Aguilar et al. (2008), water management in Valle de Angeles, Honduras

19.5 Conflict Resolution

Diverging interest and perspective conciliation can be achieved through diverse methods of communication, transactions, and compensations which can be accomplished through binding contracts or payment of water ecosystem services (Prins 2009). In this section, different cases per type of conflict will be discussed. Also, the steps toward their solution will be listed.

Of the 22 water supply systems in Valle de Angeles, 13 have some sort of conflict. Conflicts in the Rio Soledad basin can be classified in six types which allow prioritization of actions and the illustration of cases important in determining key elements toward good water administration and management.

19.5.1 Soil Use

It is common to have a problem related to agricultural activities in areas where water capture infrastructure for potable water is present. A common element in conflicts arising from these situations is that such problems are not perceived as one, but are rather considered latent problems. In the Rio Soledad basin, such problem can be found in the communities of San Francisco, Las Martitas, and Jocomico (Aguilar et al. 2008).

In the San Francisco case, problems presented themselves when agricultural activities reached the upper part of the creek and surrounding areas of the reservoir that supplies water to the town center of Valle de Angeles. The area inhabitants would deposit trash and biological human and animal waste in the field which in turn began contaminating the water collected by the dam (Aguilar et al. 2008).

In order to correct the problem, first the water recharge areas for that particular catchment were delimited. Next, the specific problems were identified, in this case source of the human and household waste. In turn, the situation of such contamination was reported to the municipality's Commission of Health and Environment which resulted in onsite visits to verify the contamination. This leads to the elaboration of a budget for the purchase of materials needed to protect the area. Such budget included mainly the fencing of the catchment. The fencing turned out to be a very easy solution. After its construction, no contamination in subsequent visits was found. In hindsight, this problem was easily solved due to the fact that the land, where the conflict was taking place, was property of the municipality, and therefore no permits were regulated to build the fence. However, environmental education programs on the importance of water production areas to capacitate the inhabitants of nearby towns are necessary (Aguilar et al. 2008).

19.5.2 Ownership of Water Sources

This type of conflict is better exemplified by the case of the Chiquistepeque community. The intake supplying water to this community is located near a road. Since it is close to a transit area, it was exposed to contamination. This was a multipurpose intake in which the structure served for providing both potable water to the community and as a drinking place for animals. According to Reyes (2006), water analyses were done, and the results demonstrated contamination due to organic matter. A decision to fence the reservoir was made. However, a particular person (offender) of the community went ahead and fenced a part of the reservoir but built a direct access. He sustained his action alleging that his right to water usage of the reservoir was being violated and a conflict for the property of the water source arose.

In order to find a solution to the conflict, several steps had to be taken. First, a complaint was filed in the municipality citing the abuses of the offender. Subsequently, the municipality intervened and summoned both parties to explanatory meetings. However, the first two meetings had to be suspended due to the absence of the offender.

As an alternative to the offender's absence, the municipality in turn visited the conflict area, managing to meet with both sides and hear their positions. As a result, an approach began and a date for a second meeting was defined; during this meeting, legal documents of land ownership were presented and possible solutions were discussed over the course of two more meetings. Finally, during the last encounter between the affected community, the offender and the municipality, an agreement was reached to move the water intake further upstream to land property of the community, and in doing so both parties would have access to the water (Aguilar et al. 2008).

19.5.3 Access to the Water Source

For more than 30 years, the community called "Bordo de las Martitas" has sheltered more than 35 families, which are permanently supplied with water from a source located in a private property. Traditionally, the water has been collected by hoses, but recently the water board decided to install permanent piping. Simultaneously, the property was sold and the new owner denied the permit since he planned to divide the area into lots. This conflict came about because of the plan to build an urbanization project which challenged the prior acquired rights of a community.

In this case, the parties involved are the community and the land owner who plans to develop a housing and tourism project which depends on this water source. However, he offers to cooperate with justifying alternative mechanisms in order to solve the water problem in the area. On the other hand, the community demands respect to its common law right to water and desire to improve its water supply by

building a pipeline all the way to the community water tank (Aguilar et al. 2008). Despite the fact that the conflict began in 2007, there is yet a solution to be found since current law states guidelines for contamination, service abuse, or bad quality cases but not about access to water resources. There are a couple of possible solutions; one option is to declare the area an area of priority for water production through a municipality regulation, but this would mean that according to law the land would be expropriated. A second option would have to guarantee the water supply to the aforementioned project (Aguilar et al. 2008).

19.5.4 Water Quality

This problem usually presents itself when agricultural activity happens near water catchment zones and thus contaminates. A common element in these cases is that neither producer nor water users attribute any importance to the matter. For water quality, the case study will be the Jocomico community. The water source is on private property, and very close by upstream of the subbasin, there is a vegetable plantation on which agrochemicals are used. Despite the danger of the situation, water users have made no formal complaint for the possible illnesses as a result of agrochemical-contaminated water. This water use conflict is not perceived by the owner of the plantation nor by the community; as a matter of fact, there is a good relationship between the involved parties that could prove to be of benefits in future conflict resolutions (Aguilar et al. 2008).

19.5.5 Water Availability

This basin is characterized by the small amount of water in catchment zones which in turn doesn't allow a proper supply to the communities. In some cases, water availability is scarce as in El Chaguitillo and Los Lirios communities where water supply is supplemented by hose connections to other smaller water sources. In other cases, water demand is higher than water supply due to population growth like in La Esperanza where the water system was built to supply 50 users, but the current users are above 250 (Aguilar et al. 2008).

Stream flow varies according to seasonality, which is an important information that the board of directives of the water board needs to use in order to plan distribution and calculate the total number of users. In the case of Chaguitillo, bad decision making has influenced the problem, as previous local councils subscribed agreements with the neighboring municipality of Santa Lucia to supply water with no foresight to future supply problems of the local communities. These agreements were not analyzed, socialized, or agreed with the local communities (Aguilar et al. 2008). The solution process has involved two types of parties, the

community and institutions working on water issues (AMITIGRA,[4] PRRACAGUA[5]). This conflict has taught the community to assume other strategies to increase water supply. In addition, institution support and guidance have also contributed to promote a collaborative management of the conflict.

In La Esperanza, because of the disproportional population growth, water provisioning is insufficient. Currently, water rationing is in place; houses receive water 12 h a day. Alternatives to increase water supply are being sought such as water extraction from adjoining areas such as Buena Vista.

19.5.6 Deforestation

Deforestation conflicts usually arise in water sources. In two cases, the areas are close to residential areas where firewood is needed to cook and in other areas in communal land with no protection or preservation activities in place. This problem is difficult to control since it usually involves low-income families that collect firewood for food preparation. These situations require integral actions in which ecologic stoves are a good solution since they require less wood and provide shorter cooking times. In addition, the local council has to incorporate in its municipal politics the protection of water production areas and the promotion of alternative cooking mechanisms that do not include firewood as well as environmental education regarding water protection (Aguilar et al. 2008).

19.6 Good Water Management: Supporting Actors and Factors

There is a diverse internal dynamic as well as external factors that affect water management in the basin. There are favorable factors that promote good water management such as a positive attitude, an extensive legal framework, and the presence of an active basin council (ASDI CATIE b, s.f.). However, adverse factors can also be found such as the inexistence of a local policy regarding water, water conflicts, and land titles provided by National Agricultural Institute.

Some interested parties in the basin such as restaurant owners and the Catholic Church have yet to announce their participation; such actors are considered potential collaborators in favor of water management, especially the Catholic Church which reaches all areas of the municipality and also addresses natural resources conflicts in their regular meetings (Aguilar et al. 2008).

[4] Friends of La Tigra National Park, nongovernmental organization.

[5] Honduran Rural Aqueduct, Wells and Basic Drainage Project.

Contrary to many watersheds in Honduran territory where land use is over- or underutilized, 98.49 % of the Valle de La Soledad basin has an adequate land use category and only 1.5 % in the improperly used category. The aforementioned data, point to a positive potential regarding the execution of actions directed to establish compensations to land users in the basin that will allow adequate water management (PREVDA 2008).

In order to have a clearer picture regarding positive and negative forces affecting water management, a table comparing both has been elaborated (Table 19.3).

19.7 Results: Local Implementation Strategies

All scenarios are changing and processes have constant readjustments. Problems and conflicts are gradually addressed in order to look for solutions that benefit all the players involved. This allows negative factors to be transformed into positive factors through the implementation of strategies. Additionally, in participative processes such as comanagement activities, the actors involved widen their knowledge and learn the importance of protecting the basin (GWP 2009).

19.7.1 Basin Council

With the help of *FOCUENCAS*[6] and *FOCUENCAS II*,[7] the participation of local actors, as well as other programs, a Basin Council for the Valle de la Soledad Watershed was organized. Internal problems of Basin Council are now being addressed, such as changes in land use through binding contracts. These contracts specify the agreement between municipalities and farmers to halt the advance of farming activities in water production areas in order to protect water sources (Aguilar et al. 2008). Basin councils tend to have better results when its operation is decentralized and base committees are formed in the communities which in turn during the process allowed the creation of bonds among the inhabitants of the different ecological levels in the basin (Prins 2009).

[6] Program for the strengthening of local capacities in watershed management and natural disaster prevention.

[7] Program for innovation, learning, and communication in the integrated adaptative management of watersheds.

Table 19.3 External and internal factors that influence positively or negatively on water management

In favor		Against	
External factors	Internal factors	External factors	Internal factors
General Water Law regulates conservation, protection, and adequate water management	Awareness and local politics will be for good water management	Disperse institutional framework regulation, administration, information, planning and policy-making roles	Lack of a local water policy
National Territorial Ordainment Law establishes basins as areas under special regimen and basin councils as integration mechanisms	Presence of a mixed local basin council that gathers actors from all different sectors	Lack of coordination and knowledge of activities among state entities	No local regulations or bylaws for water management
Natural Resources and Environment Ministry supports in establishing vinculating contracts	Comanagement plan that addresses water management and establishes the protection of water sources and recharge areas	Municipality unaware of land title granting of water-producing areas by INA	No municipal information and communication system in order to convey news or messages
General Direction of Water Resources in charge of the measurement, conservation, and evaluation of water resources as well as the authorization of its use	Availability of qualified local human capital	Urbanization of water producing areas due to the uncontrolled expansion of the nation's capital Tegucigalpa	No information on water management and care available
Private organizations support such as AMITIGRA, CATIE, and VIDA Foundation which support and promote good water management activities	Base water organization is promoting and strengthening capacitation and participation in water management to different inhabitants	Vegetable production increase due to higher demand from Tegucigalpa, causing a demand for more farming land diminishing water production priority areas	Little municipal capacity for water resources management, organization structure lacks a water management department as well as logistical support
	Growth and organization of water boards; leading conservation, administration, and protection activities in rural areas		No economic resources available to water boards
	Adequate local practices for water protection and usage		Not all local organizations participate actively in water management

(continued)

Table 19.3 (continued)

In favor		Against	
External factors	Internal factors	External factors	Internal factors
	Implementation of fencing practices to protect water sources		Deforestation of water source areas
	Positive land use and land use practices change such as agroforestry		Land use conflicts in water source areas
	Binding contracts between municipalities and farmers in order to protect water sources		Dispersion of efforts and resources

Sources: (Aguilar et al. 2008), (Law 181-2009)

19.7.2 Comanagement Plan

In order to make decisions, develop strategies, and establish structured directives with technical validity, several principles and criteria are to be taken into account (Fig. 19.3). According to Faustino and Jimenez (2005), comanagement plans are based on the premise "it is not about making new plans"; rather the purpose is to implement existing ones that are of interest to the community regarding natural resources management. The main reason of comanagement plans as an alternative is due to the increasing trend found in multiple municipalities in which strategic, management, territorial, protected areas, and other types of plans have been formulated and very few have been implemented. This in turn brings the question, why haven't they been implemented, when the plans have been elaborated through participative methodologies and respond to strong needs of the community? One of the considerations regarding these aspects could be the need for management processes and actions in a participative and collaborative way in order to achieve the resources and means necessary to implement these actions.

19.7.3 Critical Factors

Critical factors that influence the viability and sustainability of the watershed management processes[8] can be identified, such as adequate management of the complexity of the issue, the adaptation of the processes to the peculiarities of the basin, the construction of a common agenda, and the development of capacities to

[8] Processes refer to all the actions regarding watershed management such as conservation of water sources and land use among others.

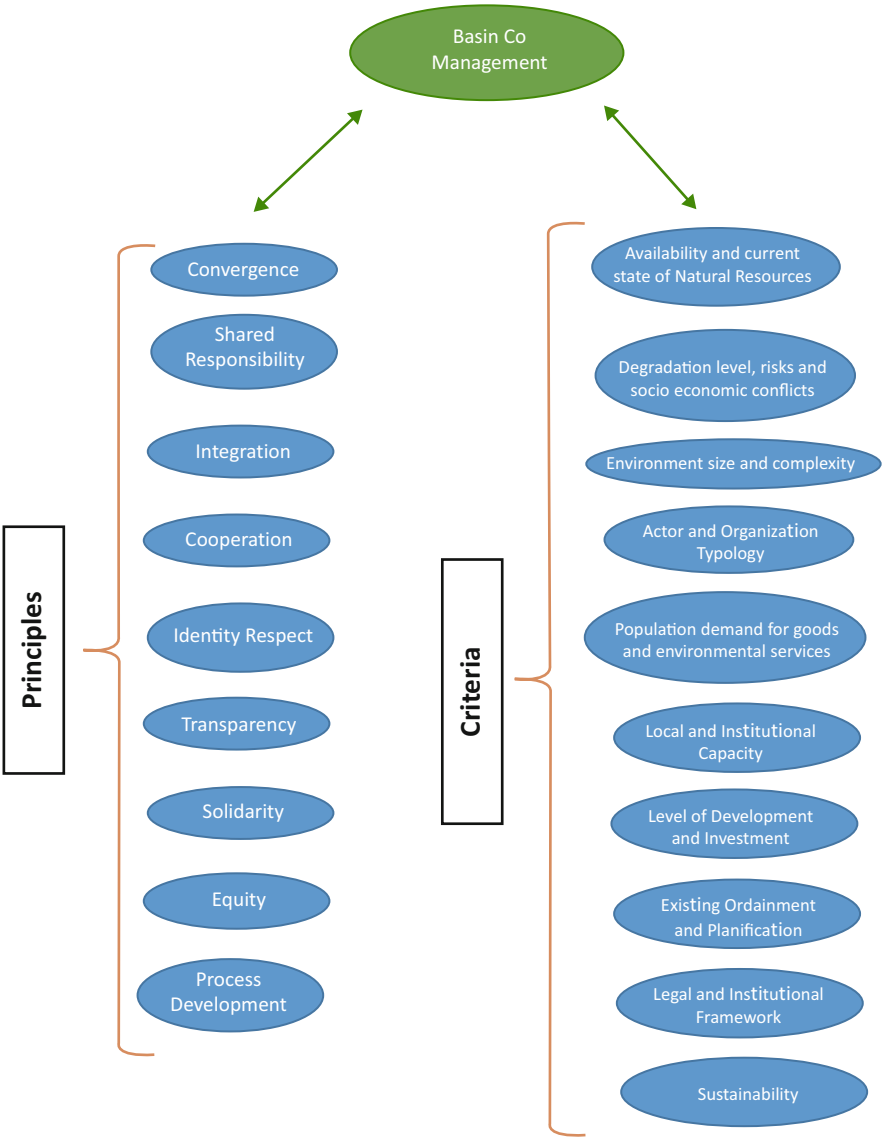

Fig. 19.3 Comanagement principles and criteria (Source: Faustino and Jimenez 2005)

conciliate common and personal interest, as well as support from the civil and public sectors. Also, an adequate balance between public and private sectors as well as role definition of each actor that will in turn lead to the construction and appropriation of work instruments such as rules, procedures, tasks, and responsibilities can be identified (Prins 2009).

19.7.3.1 Sustainability

In order to fulfill activities oriented toward sustainable management, it is necessary for national and even local organizations to be able to manage and procure technical, financial, and administrative resources. Also, the strengthening of local capacities is needed in order to adequately manage their available human and financial resources in the most efficient way without losing focus of the integral approach required for natural resources management (Espinal 2007).

Current financial mechanisms for watersheds include international cooperation funding, private sector contributions, PSE,[9] binding contracts for commercial activities, natural resources exploitation, and contamination canons.[10] However, these mechanisms have no legal framework or specific regulations; only municipal bylaws and private agreements between parties are legally binding.

The Valle de Angeles municipality does not have the necessary resources to develop continuous conservation and management activities in the basin; therefore, it is necessary to generate local resources for these activities. However, the basin generates diverse goods and services to the local and external population (Tabora 2004). Additionally, 43.5 % of its territory forms are part of La Tigra National Park which is one of the main water sources for the Honduran capital Tegucigalpa, as well as to other communities and industries surrounding the watershed (Espinal 2007).

One of the purposes of a comanagement is the creation of an environmental fund that is managed by the local actors. In the case of the Soledad River micro-basin, the fund was created, but also a novel approach was implemented through the use of loans granted from the environmental fund using binding contracts conditioned by an environmental conduct code between the person receiving the loan and the Basin Council. This strengthens the capacities of the Basin Council and the municipality to generate appropriate mechanisms for the use and control of the fund in order to stimulate watershed management impact on water quality and quantity (Espinal 2007).

19.8 Conclusions

Good water management and empowerment of protection activities in basins are the main goal of many organizations. The Soledad River basin case addressed in this chapter allowed to identify key elements for water management such as the national and regional laws of Honduras orienting water management and municipal

[9] PSE, Ecosystem Service Payment referring to any payment received for the conservation, sustainable use, or other of the natural resources of a particular area.

[10] Contamination canons refer to the "fee" paid by companies or institutions whose activities generate some sort of contamination; fees paid are typified by the General Natural Resources Law of Honduras.

bylaws and the identification of certain communities that already have good water management and use which can also serve as examples for future municipal bylaws and strategies.

The three components of municipality plumbers and UMA[11] can condensed into a single water management department in order to coordinate and maximize efforts. Collaborative efforts between the municipality and the Basin Council resulted in effective strategies and actions in different areas of the basin that allowed to resolve otherwise difficult conflicts in an appropriate way that was beneficial to all parties; these collaborations should be strengthened.

Basin councils and water boards are vital to good water management in order to promote participative actions and processes. In general, experiences generated through pilot programs such as the one described in this chapter are excellent as examples when addressing future conflicts in other areas.

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