

Governance of the Commons and Institutional Practices: The Committee of Hydrographic Basins of the Extreme South of Bahia in Question

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Abstract

An article on the Hydrographic Basin Committee of Peruípe, Itanhém and Jucuruçu rivers (CBHPIJ), located in the extreme south of Bahia, Brazil, is presented here. The Committee, as a collegiate institution, was created on December 18, 2012 and the members of the various water user sectors, civil society organizations and / or public authorities participate on it. Its main competences are: to approve the Water Resources Plan of the Basin; arbitrate conflicts over water use; establish mechanisms and suggest the values of the collection for the use of water; among others. In this sense, the focus of attention of the article resides in the members of the executive organizational structure of the mentioned Committee, mainly in the plenary and in the board of directors. The plenary is composed of 24 members representing the public power, users and civil society; with deliberative and consultative power, and are directly involved in the management actions. Through interviews, we want to understand the reasons why the said Committee, even after nearly six years of existence, still does not develop environmental management actions that guarantee the preservation of one of its rivers, Itanhém. The methodology that guides the study is based on Ostrom's (1990, 2009) Institutional Development Analysis for Socio-Ecological Systems (IAD-SES Framework) model, which consists of an ideal type of common resource resource governance. In the form of a questionnaire, the members of the Committee will be interviewed. The analysis model used allows us to compare the field reality to the ideal type and, in this way, to analyze the set of internal and external information that form the decisions and motivations of the CBHPIJ's leading agents in the exercise of their functions, understand why the Committee is unable to carry out the actions proposed, a situation that has dragged on over the years. The findings of the research reveal that the Committee needs to better understand its limits and biophysical conditions,

Introduction

This article analyzes why the Hydrographic Basin Committee of the Peruípe, Itanhém and Jucuruçu Rivers (CBHPIJ), located in the extreme south region of Bahia, did not implement operational sustainability rules, since in the bed of the Itanhém river - focus of this research - negative environmental impacts occur that deteriorate the river year after year: there are no springs and recovered riparian forests, erosion and sedimentation remain.

The paper discusses the operation of the CBHPIJ and therefore the focus of attention lies in the actors who have a direct influence on the fulfillment of their social and environmental functions. Through 17 structured interviews aimed at the body of actors that exercise decision influence in the water parliament, we intend to understand the reasons why the aforementioned Committee, even after almost 6 years of existence, has not yet developed the environmental management actions that guarantee the preservation of one of its rivers, the Itanhém.

Ostrom (1990) shows that in a world where the rule is individual action, collective associations can make a difference. Actors can aggregate common interests in order to practice actions that lead to a more socially and environmentally just world. Its Institutional Development Analysis for Socio-Ecological Systems (IAD-SES Framework) shows the steps for the empirical study of associations, helping to reveal whether a particular group is strong or weak in complying with environmental conservation laws.

Thus, the article is divided into six sections. In the first section, we present the collective organization of environmental management from CBHPIJ. The second section deals with the theories that involve the study with emphasis on Ostrom's (1990) Institutional Development Analysis for Socio-Ecological Systems (IAD-SES Framework) model, and the eight design principles of the author that conform an ideal type of management. In the third section, we present the empirical study model where we describe how the theory will be applied to the study of the Itanhém river governance. In the fourth section, we present the data obtained in the field after the application of the framework. In the fifth section, the weak and strong points in the CBHPIJ's performance are discussed using the eight design principles as a benchmark proposed by Ostrom

(1990). In the sixth and final chapter, the possibility of an institutional change for collective governance CBHPIJ is discussed in light of the findings, evaluating future challenges and prospects for the collegiate body.

Brief history of the institutional age of CBHPIJ

The normative organization of water management in Bahia was improved with the elaboration of its State Policy of Water Resources (State Law 11.612 / 2009). This law included among its principles the conception of the participative social model, a proposal to involve society in the acts of management, ordering the decentralized management, with the participation of the Public Power, users and communities, and their actions should be articulated together with the Identity Territory policy. The planning and management of water resources by this Law consider the river basin as the territorial unit defined for environmental management, including the formatting and application of its environmental policies.

One of the water resources policies foreseen in Law 11612/09 are basin committees divided by state zones. In the extreme south region of Bahia-Brazil, the negotiations for the institutionalization of its basin committee began with the election of its provisional board of directors on November 23, 2009; but only then on December 18, 2012, it gained official status, now CBHPIJ, after its approval by CONERH - State Council of Water Resources. The CBHPIJ, following the principles of Law 11612/09, became a collegiate body of advisory, normative and deliberative character, part of the State Water Resources Management System, linked to the State Council of Water Resources (CONERH), acting in the respective basin river basin within its jurisdiction. The CBHPIJ's areas of activity are included in the Water Planning and Management Region (RPGA) IV, in accordance with the State Plan for Water Resources, approved by CONERH Resolution No. 43 of March 2, 2009 and comprise river basins Jucuruçu, Itanhém and Peruípe located in the extreme south of the State of Bahia, draining the municipalities of Alcobaça, Caravelas, Ibirapuã, Itamaraju, Itanhém, Jucuruçu, Lajedão, Medeiros Neto, Mucuri, Nova Viçosa, Prado, Teixeira de Freitas and Vereda.

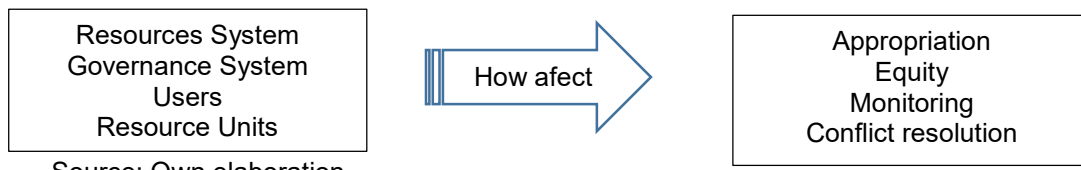
By the normative structure headed by Law 11612/09 and its by-laws, the CBHPIJ proposed to: I - promote integrated and democratic participation; II - to monitor the preparation, approval, and monitoring the implementation of the Hydrographic Basin Plan; IV - to arbitrate, in the first administrative instance, conflicts related to the use of water; V - propose the creation of the Watershed Agency; VI - propose the values and mechanisms to charge the use of water resources as well as resources collected; VII - promote studies, dissemination and debates on the priority programs of services and works to be carried out in the interest of the community; VIII - resolve actions arising from compliance with the State Policy on Water Resources; IX - promote and support initiatives in environmental education.

The collegiate representation of the Committee is given by 8 members of the public power, 8 members representing the users and 8 members of civil society. These are the 24 members who represent a model of collective institution of environmental management, a social structure that participates decisively and directly in the collective decision making in a polycentric environmental management.

Collective Participation and Environmental Management for Sustainability to the Commons : Theory of empirical study

An environmental management institution presents flaws when environmental resources, users and actors, and the environmental management system tortuously address the rules of appropriation, fairness, conflict monitoring and resolution (POLSKI & OSTROM, 1999; BALDWIN et al. 2018). In this reasoning implicitly occurs the premise that the CBHPIJ will work if its biophysical and social system (first frame to the left of Figure 1) respect the rules of sustainability when practicing in the socioeconomic set environmental acts (second frame to the right of Figure 1) balanced by management.

Figure 01. The interactions between biophysical attributes and social practices.



Source: Own elaboration.

The system illustrated in Figure 1, to a certain extent, shows that everything, directly or indirectly, is linked to individual rationality. Otherwise, how the management system affects operational rules are key to influencing how the agent makes his choices. And usually he, the agent, chooses the cheapest and short way to solve his problems. It is when the man, we can say in a foreground that, at least implicitly, will be based on the *homo economicus* model.

In the fictional representation of *Homo economicus*, the abstract individual actively maximizes his personal "function of utility" through rational calculations, with a time horizon almost always immediate. See that your thinking and concern is focused on the opportunities and problems of today. If today I can extract from the environment everything I want, with more profit, I will, because others will do the same, tomorrow is uncertain, let us give rise to a new option. Curious that in this relation, the present is individual, individual rationality maximizes present profit and withdraws all that it can without caring for the collective; the collective tomorrow, when he knows he will pay a price, but these costs will be shared by everyone. The choice of strategy by an actor in any particular situation depends on how he perceives, and weighs, the benefits and costs of the available strategies and their likely outcomes, and he will choose the one that will maximize the net worth of the expected returns to himself (OSTROM, GIBSON, SHIVAKUMAR, ANDERSON, 2017).

The management system must in some way be the force (positive or negative) that shapes the behavior of the subject, since he, by his individual laws, will tend to deviate from the collective rules. Hardin (1968) referred to the tragedy of common to open access, unregulated goods, generating highly valued resource units, illustrating that this resource is likely to be overused or even destroyed in a process where individual action is likely to create negative externalities for others (POTEETE, JANSSEN & OSTROM, 2009).

Externalities, according to Ostrom (1990), are in the relations between private desire and its relationship with the public, a line that must be drawn on the basis of the extent and reach of the consequences of the facts that need control, either by inhibition or by promotion. The problem of externalities occurs when the agents interact in the environment, generating, with or without intentionality, harm or benefits to individuals unrelated to their process (OSTROM, TIEBOUT & WARREN, 2009, 55).

In this perspective, adapting Olson's collective action theory (2009) to the environment, we can understand that individuals cannot be expected to form large (collective) voluntary associations to pursue matters of public interest, unless there are incentives (coercive or positive). The collective association comes when members obtain concrete individual advantages sufficient to justify the cost of association or when they can be coerced (compelled) to bear their share of the costs. The cost to the individual can be high when compared to the diffuse benefits in the collective body. Thus, we can not expect individuals to have individual resources to organize themselves into a strictly voluntary association for diffuse collective interests. The actions of an individual will be calculated by the probability that their efforts alone will make a difference. If this probability is zero, and if he is a rational person, we would expect his effort to be null. (BURGESS AND ROBINSON, 1969, Leoni 1957, OSTROM & OSTROM 2009).

The tragedy of the commons occurs in the Itanhém river when the uses of natural resources are deprived of the long-term care of preservation, but also when the leviathan (the government) exerts his bureaucratic authority "from top to bottom" to the subjects of his interest, as the collection of taxes, leaving the task to the collective (disarranged) the tortuous walk of the practical application of the other subjects involve environmental education and / or environmental protection.

Ostrom (1990) argued that authors justify a government with great coercive powers, the "Leviathan" who does not believe that environmental problems can be solved through social cooperation. According to Ostrom (1990), Hardin also believed in this premise. Leviathan would be the answer to the solution of the ecological imbalance, the force that would bring control over people, and control their individual psyches, a leviathan in the form of central governments.

Fortunately, Ostrom (1990) has proved that there are many ways out of this dilemma. One of the alternatives was demonstrated through the application of the Institutional Development Analysis for Socio-Ecological Systems framework (IAD-SES Framework) in its empirical analysis, which culminated in the formulation of 8 (eight) design principles related to institutions resources. Those institutions that collectively have found sustainable solutions to their problems. In Ostrom's (1990) analysis of the performance of collective institutions, we may believe that there are ways to organize governance in order to increase opportunities for adaptation and learning. Given the wide variety of ecological problems faced by individuals at various scales, design principles are an ideal parameter of governance as an instrument to assess whether or not the collective will succeed in implementing its sustainable rules Ostrom (1990, 2009).

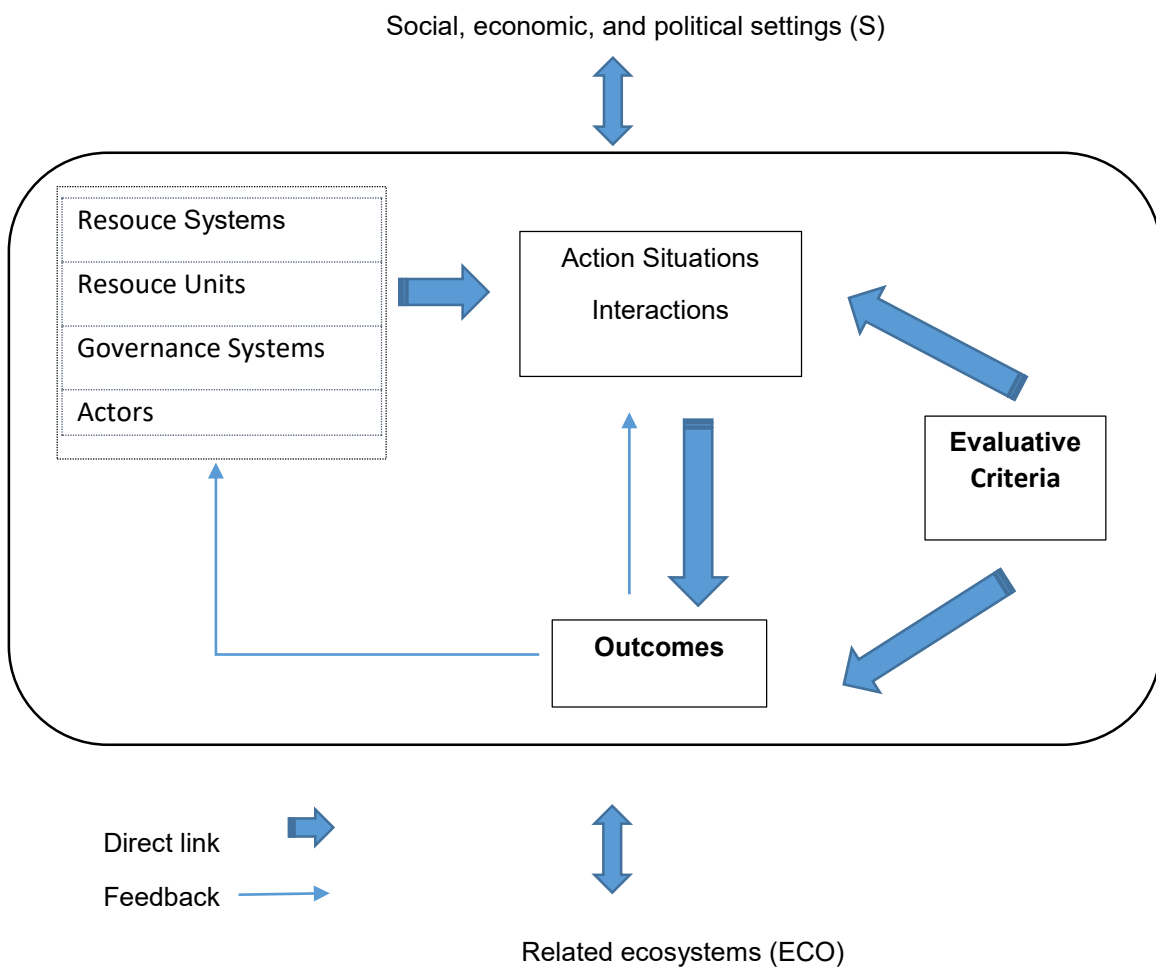
Ostrom (1990) pointed out a way of studying collective governance and presented principles present in each successful collective organization without the pretense of creating a perfect and unique universal law for environmental management. He stated that there are many ways for the collective organization to achieve success, several paths that can lead to sustainable collective governance. And even social organizations that have reached maturity levels considered satisfactory in environmental management are still subject to failures. And what threats challenge any governance system, even the most successful ones, even those that best fit Ostrom's design principles (1990, 2009).

Considering the environment and its relationship with the social body tending to tragedy, by behaving individually in the face of the needs of balance between actions of use of environmental resources, this work focuses on the possibility of collective governance in a bias that believes in the strength of viability of the theories left by Ostrom's work on the governance of the commons. This is the north of our empirical study. In the analysis of the Itanhém River we will focus on the effects of collective environmental management, on the ways in which the forces that lead the individual to collective behavior, or the individual act, are presented. Thus, we will try to understand the process that involves the advances and challenges directly related to the acts of management by the collective representation CBHPIJ.

Method

In order to analyze why the CBHPIJ did not solidify its proposals, we propose the identification and analysis of the relationships between the multiple environmental relations that make sustainability complex. The Institutional Development Analysis proposed by Ostrom (1990, 2009) thus appears as a Framework to analyze the success or failure of a Socio-Ecological Systems - SES's. Figure 2 provides its overview, showing the results between the relationships between four major first-level subsystems of an SES, as well as the related social, economic, and political configurations, yet related ecosystems.

Figure 2. Core of subsystems in a framework used to analyze a given Social-ecological System (SES).

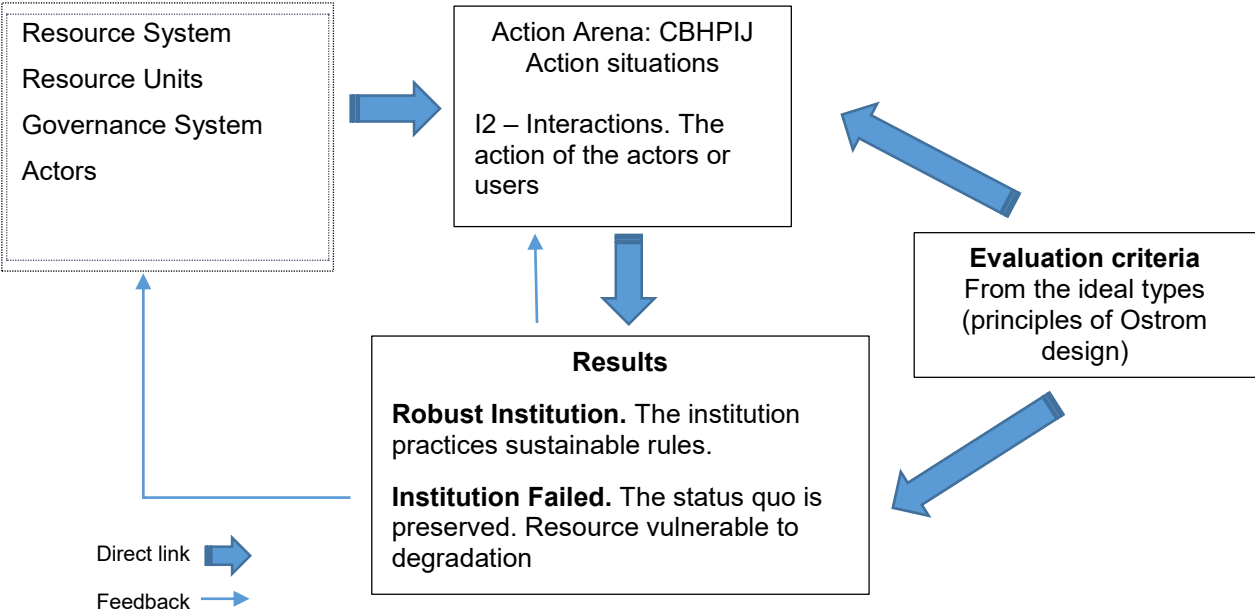


Source: adapted from Ostrom (2009) and Cole et al. (2014).

Subsystems are described as: (RS) resource systems (the river basin and its water flows); (UK) resource units (eg quantity and water flow); (GS) governance systems (eg, government and other organizations involved in basin management, operational rules and how they are made); and (U) Actors or users in our case (for example, individuals who use water in a variety of ways for livelihood, recreation or commercial purposes).

The CBHPIJ analysis begins with the application of the IAD-SES framework and visualization of this structure to our problem. Thus, we adapted the framework for the reality of the management committee, and found, for our study, the reasoning developed by Figure 3 below.

Figure 3. IAD-SES framework for the analysis of the collective organization.



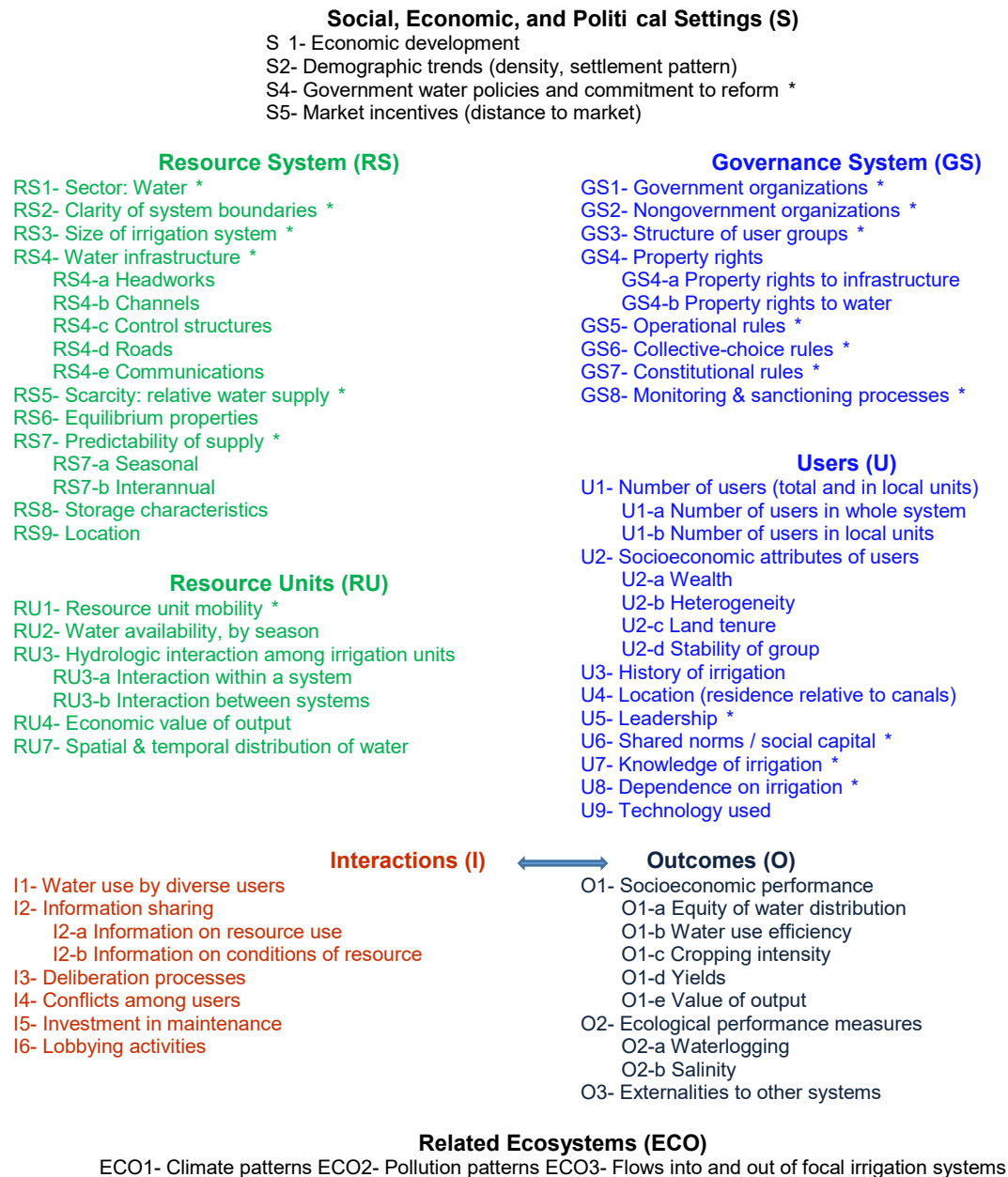
Source: Adapted from Cole et al. (2018) and McCord et. al. (2018).

It is worth noting that Ostrom did not claim that the individuals involved consciously satisfied these conditions, but rather that each success group eventually elaborated a set of rules and procedures that supported sustainability or left the resource vulnerable to degradation or destruction in a relationship illustrated by Figure 3 (McGinnis, 2018).

Given the main structure of our reasoning in the concrete case, and formed the web of interactions between the parts of the whole following the view of Ostrom (1990) in

the form indicated above by Figure 3, we further unfold each frame into new subdivisions. So, each main subsystem is composed of multiple other second-level variables (for example, size of a resource system, mobility of a resource unit, level of governance, knowledge of users about the resource system) as presented by Table 1 (OSTROM, 2009; MEIZEN-DICK, 2007).

Table 1. IAD-SES and its factors that may affect the sustainable management of the river basin.



Source: Adapted from Ostrom (2007) and Meizen-dick (2007).

In this perspective, the methodology that guides the study is based on the model of the Institutional Development Analysis for Socio-Ecological Systems (IAD-SES Framework), constructed by Ostrom (2007, 2009) and Meizen-Dick (2007), and understands the environment as a complex set of interactions between the economic, social, and political environment. This exchange produces results for the decision-making agent, and constitutes the main source of information for this or that conduct. Thus, the understanding of processes from complex socioecological systems (SES's) used as a common structure for organizing discoveries is an advantage.

In this work the IAD-SES framework and its subsystems are used as empirical analysis framework to reveal the variables that affect the probability of an organization achieving a sustainable system. The framework provides data that can be discussed and compared to the model that society has elected as sustainable.

We chose the variables (highlighted in Table 1 by asterisks) as far as their application to the concrete case. In this way there may be variations in the reality of the CBHPIJ. From the chosen variables were formulated the questions of the field questionnaire. And from that the data obtained by the application of the empirical work were compared to an ideal type, a model taken as a comparative parameter. Our ideal type is that described by Ostrom in *Governing The Commons* and listed as design principles below.

Principle 1 - Limits should be clear. The management system should define the resources to be protected, it should classify individuals among those who act collectively or not. Those who have access to those same resources, and those in which they are excluded from participation. The biophysical boundaries of the environment under the jurisdiction of that collective organization must be clear.

Principle 2 - Rules molded to reality. The rules of appropriation and provision must be adjusted to social practices. For example, appropriation rules that restrict time, place, technology, and / or quantity of water must be viable to local conditions, otherwise society will not comply with them or at least will always be tempted not to follow them because it is not fair . A rule shaped to reality allows the benefits obtained by users to be proportional to the amount of inputs expended in the form of labor, material or money. The

appropriators (water users) must still have the capacity for self-organization, and the right of this should be recognized by the higher institutions.

Principle 3 - Participate in the elaboration of rules. The rules that define who can use the resource (water) and who is responsible for maintaining this resource must be formatted through participatory processes; involving all persons, their representativeness, or those that will be directly affected by these rules.

Principle 4 - Monitoring. Fiscal (government and / or social body) must be present and should actively audit the biophysical conditions of the river basin, they should also actively monitor the behavior of users by detecting deviations in the exact moment that they occur.

Principle 5 - Sanctions. Penalties must be imposed on those who disregard the rules. Direct users who violate operating rules should receive gradual sanctions (depending on the severity and socioeconomic context of the person).

Principle 6 - Mechanisms for conflict resolution. With the rules imposed and effective monitoring, one can expect disagreements to arise. If this occurs, users should have quick access to low-cost local arenas to resolve conflicts with each other, or between themselves and the government.

Principle 7 - Recognition of Class Rights. The right of classes to participate in the formulation of rules and be recognized as holders of this power, must be ratified by the government authorities. The classes must have legitimacy recognized by the government, respected in their social, economic and environmental characteristics. If the government practices unilateral acts for collective effects, as if only it were legitimized to such, the classes will always tend to reason with distrust, and will try to discredit this unilateral authority seeking always to deviate from the conduct.

Principle 8 - Network management entities. The activities of appropriation, provisioning, monitoring, supervision, conflict resolution and governance are practiced and organized in various social strata, various institutions. Networked entities can attack various problems in a heterogeneous social organization of such mixed interests and needs.

Thus, in the form of a questionnaire were interviewed the agents who have a direct influence on the CBHPIJ. The framework used the raw data to compare the field reality to

the ideal type and, therefore, analyze the set of internal and external information that form the decisions and motivations of CBHPIJ agents and leaders in the exercise of their functions. The discussions aim to understand why the Committee is not able to carry out the actions proposed, a situation that has dragged on over the years.

Application of the IAD-SES method and data analysis. The Framework, theories and the model in practice

The Resource System, Resource Units, Governance System, and Actors directly influence the way in which interactions occur in the arena of action: the CBHPIJ. The results of these interactions may be following the collective rules, or not. From this relation, we offer an evaluation criterion based on Ostrom's eight design principles, used as an ideal type of governance, to be able to compare if the results approximate (or not) the model considered in this work as ideal. Aware of these relationships, we organized the discussion of the application of the method by the parties. We dissect the classes indicated in Table 1, discussing their characteristics to the empirical case one by one. That is, we begin with the discussion of subsystem S - Social, economic and political arrangement; RS - Resources System; RU - Resource Units; GS - Governance System; U - Users; I - Interactions; O - Results, respectively. After this revelation, we compare the advances and challenges of the CBHPIJ to our model chosen as "Ideal Type".

Following this proposal, the research revealed in the field surveys, with regard to subsystem S - Social, economic and political arrangement, the situation according to Table 2 below.

Table 2. S - Social, economic and political arrangement

S - Social, economic and political arrangement		
	Goals	Management Status Revealed
S4.a Existence of collective environmental policies	Identify if there are policies that promote sustainability.	gift
S4.b Operation of environmental policies	Evaluation of the level of effectiveness of government policies.	ineffective

Source: Direct data collection.

In this subsystem, the objective is to evaluate the level of effectiveness of government policies. If in the social, political and economic arrangement environmental policies are present and if their functioning is effective. It is assumed that the socio-environmental organization at the level of collective choices (CBHPIJ) should promote actions for the preservation of environmental resources, for example, those that include the preservation of springs through environmental programs. The CBHPIJ collective related to collective choices showed that it promotes actions for the preservation of environmental resources (S4.a), but in the practical field, they do not produce significant effects (S4.b).

For the next sub-level, Resource System (RS) analysis, the survey revealed the data shown in Table 3, below.

Table 3. RS - Resources System.

RS - Resource System		
	Goals	Management Status Revealed
RS2 - Clarity of limits	To evaluate if territorial boundaries of the river basin are perfectly clear for individual. When actors have a clear perception of the territorial limits of the basin, they tend to know better how to direct their actions of management, monitoring and enforcement.	Failed
RS3 - Basin size RS4 - Infrastructure	Perception of the size of the resource system. When the river is small, communications and transportation technologies allow users to gain accurate knowledge of the system dynamics. When it comes to a large extent, technologies are even more required, and can minimize problems in the flow of information.	Failed
RS5- Water supply	Shortage: relative water supply - system productivity. Whether users think it is a plentiful or scarce resource. If a water source is already depleted or on the contrary, apparently very abundant, users will not see the need to expend efforts to manage it.	Robust
RS7 - Predictability in supply	If the dynamics of the river allows planning according to a reliable predictability supply. The dynamics of the system need to be predictable enough that users can estimate what would happen if they set up specific extraction investments. If the user can predict that there will be water at its catchment point, the user will commit making management and conservation investments.	Failed
, RS10 - Environmental conservation of the basin	Perception of the state of conservation of the resources in the basin. Users tend to pay less attention to a much-conserved feature. Conversely, when the resource shows signs of scarcity, agents tend to care more about their preservation status.	Failed

Source: Direct data collection.

The data group shown above evaluates if the Resource System is clearly established, with adequate preservation to the point where society relies and wants to

keep the environmental resource sustainable. The data obtained in the Resource System variable (RS) showed for the subsystem (RS2) - Clarity of Limits that the actors involved in the management of the river Itanhém do not know the limits of the basin (100%), nor the totality of its main tributaries (58%), although the group knows some of its main tributaries. Those involved in management still can not count on specific and validated data of the attributes of the rivers it defends. The subsystem (RS3) and (RS4) were analyzed jointly by the local conditions of this study. The size of the basin is directly related to the issues of running infrastructure and communication, the latter being able to "shorten" the distances. Thus, the study of this subsystem revealed that the majority of the access roads along the basin (47.06%) is in the middle line or hardly (23.53%) could be covered, also that communication between the communities of the Itanhém river is medium (58.82%) to difficult (23.53%), associated with the fact that the majority (76.47%) consider that there is great difficulty in the interconnection of all the communities and social agglomerations involved. Regarding water supply (RS5), most interviewees believe that the river has enough water to meet demand, in quantity (70.59%) and quality (58.82%). In the subsystem that analyzes the predictability of supply (RS7), although approximately half of the actors (52.94%) believe that the volume of water is regular throughout the year, they (88.24%) believe that users can not trust the river Itanhém to invest in projects that demand human and financial costs. Finally, for the Basin Environmental Conservation subsystem variable (RS10), only 5.88% of the actors see it as conserved.

Analyzing the Resource Units (RU) system, the research revealed the data shown in Table 4, below.

Table 4. RU - Resource Units

RU - Resource Units		
	Goals	Management Status Revealed
RU1 - Mobility of the Resource Unit	Assessment of the level of mobility of resources. Environmental management becomes more difficult when the resource unit has great mobility, and in our case, water for all its fluidity along the waterways. A source of pollution in water becomes very diffuse, making it difficult to monitor and apply sanction to those who polluted, where the source of the damage is or was, among other inherent difficulties.	Difficult

Source: Direct data collection.

Table 4 presents the data obtained regarding the degree of Mobility of the Resources Unit (RU1) in the river basin. Status has proved difficult, since we are dealing with the waters of a river with great mobility. The degree of mobility directly influences the costs of observing and managing a system. Self-organization is less likely with mobile resource units, such as wildlife or water in an unregulated river, than with stationary units such as trees and plants or water in a lake (Schlager et al., 1994).

The Governance System (GS) subsystem was disclosed in the form of Table 5 below.

Table 5. GS - Governance System

GS - Governance System		
	Goals	Management Status Found
GS1 - Government Organizations	Identification of governmental organizations working in the basin	Present
GS2 - Non-Governmental Organizations	Identification of non-governmental organizations operating in the basin	Present
GS3 - Hierarchy between institutions	Identification of the macrostructure governing the basin	Present
GS5 - Operational Rules	Identification of the operational rules in use and their effectiveness. Local users should have some degree of autonomy at the level of collective choice to participate in the making some, or all their operational rules	
GS5.a - Clear operational rules		Absent
GS5.b - Strong operational rules		ineffective
GS6 - Collective participation in the choice of rules	Assessment of level of autonomy level for collective choices. Collective choice of rules. It evaluates the autonomy to choose the operating rules in the field	
GS6.a - Collective participation in the choice of rules		ineffective
GS7 - Compliance with rules (laws and regulations)	Assessment of compliance with environmental laws	ineffective
GS8 - Monitoring and sanction process	Perception of the monitoring and application of sanctions for those who do not comply with environmental legislation	
GS8.a - Existence of Penalties to deviations		strong
GS8.c - Practical result of the application of sanctions		ineffective
GS8.d - Sanctions according to recurrence and / or severity		Strong
GS8.d.1 - Sanctions respect equity		adequate
GS8.e - Practical monitoring of environmental resources		ineffective

Source: Direct data collection.

For the Governance System (GS) in the Itanhém river, the actors perceive the existence of governmental (GS1) and non-governmental (GS2) organizations that act in the environmental management of the river Itanhém. Regarding the network structure that these entities form (GS3), the majority (70.59%) believe that there is a superior hierarchical bias supported by the financial power of the State that exercises command to the CBHPIJ's attributions. As for the operational rules that this system participates in, 94.12% of the actors involved believe that the rights and duties attributed to users of the river basin are unclear (GS5a); although they are strong, the operational rules are not effective. Regarding their participation in the choice of operational rules (GS6, GS6.a), local actors in their entirety did not participate in the process of choosing the rules to follow. The environmental norm at the federal, state, and municipal levels for them are then either partially (29.41%) or little fulfilled (47.06%). All involved are aware of the existence of a sanctioning and monitoring process for deviations in the actions to use the Itanhém river basin, but only part of them considers to be very strong (5.88%) or strong (29,41 %). The punishments gradually were shown according to the social, economic, and environmental reality of the person (GS8.d). The monitoring and enforcement process (GS8.e) proved to be inefficient, since 82.35% of the actors believe that there is no practical monitoring of river use and preservation rules and 52.04% (GS8. i) do not know anyone who has already been monitored by the responsible agents.

The data obtained by the survey, for the Subsystem Users (U), are synthesized as shown in Table 6 below.

Table 6. U - Users (MANAGEMENT ACTORS).

Table 6. U - Users (MANAGEMENT ACTORS)		
	Goals	Management Status Revealed
U5 - Leadership	Identification and general description of the profile of the leaders involved. Some water users have entrepreneurial skills of local leadership and organization as a result of self-learning through internal and neighboring cultural processes.	partial
U6 - Shared norms - social capital	Observes aspects of reciprocity in sharing acquired rules, legally imposed and socially followed rules. In general, users can develop trust among them in order to keep promises and compensate reciprocity with more reciprocity	failed
U7 - Knowledge of the ecological partner system	Observes the degree of knowledge that the actions of individuals are interdependent. Users share knowledge of how their own actions affect each other within an interconnected environment	
U7.a - Sharing of information between users		failed
U7.b - Access to accurate socio-ecological attributes data		failed
U8 - Dependence on resources	Observe how much and how users depend on the resource as a means of subsistence.	failed

Source: Direct data collection.

In this subsystem Users (U), the leading players in the Itanhém river management (CBHPIJ and associates) believe (88.24%) that direct water users do not care about availability to neighbors (U6), performing their activities as they please individual, without thinking about whether the collective resource will be left over. On the other hand, the leaders of management in terms of collective choices, despite talking to each other (94.12%) about the biophysical attributes of the river (U7.a), do not have (76.47%) available validated data, and / or accurate information that underlies their conversations (U7.b). Almost all (94.12%) do not work and / or participate in activities directly linked to water (U8.a).

The Interactions Subsystem (I) revealed the data as shown in Table 7 below.

Table 7. I - Interactions (AT COLLECTIVE LEVEL).

I - Interactions (AT COLLECTIVE LEVEL)		
	Goals	Management Status Revealed
12 - Sharing information among the actors	Evaluation on the level of information sharing among users	
12.a - Sharing information among the actors		failed
12.b - Communication between groups		failed
13 - The deliberation process	Description of the deliberation process for collective decision making	
13.a - Operation of the collective decision-making process		partial
13.b - Forms of collective participation in the decision-making process		failed
13.c - Practical participation of social groups in the decision-making process		failed
13.d - Exercise of power in collective meetings		failed
13.e - Normative (theoretical) representation of groups in the decision-making process		strong
14 - Conflicts	Evaluation at the level of occurrence of conflicts between actors in the management and / or use of water. Disagreements may arise between those involved at the operational level or collective rules management.	
14.a - Level of conflict between water users		partial
14.c - Level of conflict between actors at the water management level		partial
14.e - Level of conflict between users and management actors		partial
15 - Investment in maintenance	Evaluation of the social maintenance of collective actions in progress	
15.a - Maintenance activities of the socio-environmental union		failed
16 – Lobbies	Evaluation of the external pressure level	
16.a - External pressure on decision-making at the collective decision level		absent

Source: Direct data collection.

The Interaction Subsystem (I) has shown that the level of user sharing (12) of subjects related to the Itanhém River was low (47.06%) to zero (17.65%), even though there is no means of communication (12.b) to convene the commons to participate in the

environmental management process. The actors at the management level are aware of the deliberation process (I3.a) and collective choice from the CBHPIJ plenary sessions, but acknowledge that users (I3.b), at the end of the process, do not know what rules to follow, nor the process of adaptation to their realities, if any. Social and governmental groups (I3.c) have not shown themselves to be involved in the tripartite forces (organized civil society, users, and government) and, through reports, the government exerts the greatest voting power. The actors report that the government has the financial and material resources, and ends up unbalancing this force in their favor, when it uses financial and material resources such as daily rates, tickets, hotel and other costs (I3.d). Reinforcing this analysis, the research has shown that it is possible to perceive the absence in the deliberative plenaries of some representatives of the "people's" powers, mainly the representatives of the users, and therefore the spheres are not well represented in the collective process (I3.e). There is no charge for water (I3.f) and, probably, the actors believe that the construction of this norm will not allow the participation of all, listening and pondering the opinions in search of the democracy of the common good. The level of conflict between those involved was small but present. Conflicts between users (I4.a) almost always come from irregularities practiced by individual acts and without regulatory authorization, such as the construction of buses and / or water blockage for users downstream of the water flow (I4.b). There are conflicts between those involved in the level of water management (I4.c), almost always by disagreements not related to water basin problems, such as ideologies of party politics, personal interests, among others. There are also conflicts between the users and the agents at management level, when they practice their control function, even punctual and ineffective, nevertheless, according to the research reports (I4.d, I4.e) occur when, for example, a bus prevents supply to surrounding communities, and these offer complaints to the monitoring body. Therefore, trying to build the structure, management actors believe that water collection (I4.f), even with no counterpart of state efficiency, is fair, since it will allow investment in personnel and management infrastructure, monitoring and implementation of sanction, that is, giving more efficiency to the management machine (I4.g). The reported cases of social participation among the dependents of the Itanhém river, including management actors, were punctual, involving some local projects

promoted by municipal Education and Environment Secretariats, as well as the performance of some other non-governmental institutions, (15.a). Concerning to lobbies suffered (I6), the actors believe that the CBHPIJ does not suffer this effect (58.82% - I6.a), with the proviso that, by the comments, some believe that the CBHPIJ has no decision power or did not work fully yet, so you does not suffer this kind of pressure either.

The data from the Result subsystem (O) were those of Table 8 below.

Table 8. O – Outcomes

O – Outcomes		
	Goals	Management Status Revealed
O1 - Socioeconomic performance	How is the equity and efficiency of water distribution	
O1.a - Distribution of water in order to meet all demands		positive
O1.b - Rational use of water		negative

Source: Direct data collection.

The data from the Result subsystem (O) shows a sample of the socioeconomic performance of the Itanhém River basin. The interviews revealed that the actors see the river in good environmental condition, and therefore it presents a good distribution of water according to social, economic and environmental needs (O1.a), with the unfortunate counterpoint that the society does not use the water in an efficient form, wasting and / or polluting large amounts of its resources.

These were the data revealed by the survey. They show a collective organization immersed in a context of identity crisis. There is a lack of basic information about itself, the environmental complex that assists in protection, even identity, in a context of mutual mistrust of effective resolution between the leading actors and society, since the rules are not collective, are not regularly monitored, and such a barrier impedes to reach a better social justice. Thus, it's needed to think if CBHPIJ and leaders exercise an ideal model of environmental governance, at least satisfactory to find a way out of the outlined environmental tragedy in which the rivers of the region are found.

Final considerations

Under the IAD-SES parameters, does the CBHPIJ have an ideal governance model?

The data revealed by the research and shown in the previous section will now be better discussed with the help of Ostrom's design principles (1990). It will be analyzed whether the polycentric environmental management collective organization (CBHPIJ) is cracked and therefore belongs to the scenario of described tragedy, or is robust to the point where its resilience overcomes collective difficulties, reinventing itself in an agile way in every adversity, and thus be more synchronized with the problems in due course. Unfortunately the data compared to our efficient management standard did not prove to be good.

The IAD-SES framework for collective management organization proved to be flawed from the point of view of Principle 1 - Clarity in Limits. From the tables in the previous chapter, the collective institution does not understand well the limits of the drainage basin. It does not understand well its social, environmental and economic limits. It is also not well identified who are the users of the resources, the temporal and spatial use profiles of the good. The practical outcome of environmental policies has been absent, making it difficult for the population involved to become aware of the limits of their system.

The Itanhém river basin is large (more than 6,000 km²), the water supply is good, and the environmental conservation of the basin is not yet shown to the actors in a critically degraded way, in a context that undermines the interest to know the system of resources. To complicate the matter, terrestrial and / or technological communication infrastructure does not favor the exchange of information between communities and agglomerations related to the basin, so that clarity in the basin's boundaries becomes even more impaired.

The clarity of the boundaries has still been undermined by the criteria of the system of governance since, despite governmental and non-governmental institutions operating in the system, there are operational rules for the use of environmental resources, users despise them for being flawed or ineffective in practical reality. Thus, rules exist by laws and standards, but are not known and fulfilled by users. Users, those involved in collective management, in the vast majority do not rely directly on basin water and so do not have or do not share accurate information on the biophysical and social attributes of the basin.

Their interactions in this way do not help in a better knowledge of the limits since the sharing of information between the actors is flawed, the deliberation process does not make it known and the actions therefore become even more individual.

Finally, the problem still appears in the way that the individual does not know the environmental system, and since water (the main product of the basin in this study) is somewhat accessible and abundant, it does not produce a sense of care, of environmental education in the use of water.

In the light of "Principle 2 - Rules molded to reality, the collective organization of environmental management proved to be flawed. How to balance the contribution of investments (costs) with the results (profits) of the activity to the sustainable way of working the environment?

The rules that control the use of the resource must be shaped to reality. The research revealed that the theoretical rules try to address this question correctly, but do not achieve the practical effect. Management institutions are bureaucratic, time-consuming and inefficient. The rules of appropriation and provision somehow establish ideal sustainable conditions, but remain in the abstract field. In practice, users experience high compliance costs, high bureaucracy expenditures, and slowness of control bodies, so that the benefits gained by users (those who follow the rules) are not proportional to the investments of time and money spent. Users are wary of the management initiatives proposed by management bodies (almost always state-owned), because of the long history of high costs in taxes and fees, producing a low counterpart in efficiency. In this way, following the rules is not a very attractive alternative, and therefore users lose interest in self-organization.

Worse, when classes try to improve the rules of their reality, their rights are not always recognized by higher institutions. The system of government promotes even more disproportion in the process of equity, when its actions do not favor equal collective participation in the formulation, discussion and choice of rules. In theory the collective organization is tripartite (government, organized civil organizations, and users) but the government, holding the financial power, ends up unbalancing the participation, since the others are not able to abandon their daily activities to participate in bureaucratic meetings, and if they participate, they do not receive incentives for this.

The actors involved in the management are suspected of achieving equity, because before their decisions, they do not know the socioecological system. Those who make the collective decisions also do not have accurate data of the attributes of the river, besides not having a channel of communication between them to diminish these distances. How to respect the differences if they are not perfectly known?

The result is the escape of the rules and a cyclical process of distrust generating even more mistrust. When the rules are fair, the agent tends to respect and follow them. Otherwise, the citizen will always look for reasons to follow his own rules (more attractive according to his reality) and will abandon, at the first opportunity, those that he thinks unfair.

The analysis under the light of Principle 3 revealed another flaw in the management of the Itanhém river. Most of the individuals affected by the operational rules do not participate (although they may participate) in the modification of the operating rules. There is no incentive for the social body to participate. Also the CBHPIJ does not keep the environmental system informed about its social, environmental and financial conditions. The supply of water is still abundant and in this way, in the context of disbelief to the management bodies, the user tends not to be interested in actions that will produce long-term effects. In this way, they do not participate intensively in the elaboration of effective rules and strategies for the Itanhém river, since the individual rules followed by each one are more profitable than the bureaucratic and costly rules of proposed collective management. CBHPIJ can improve participation. The collective body that follows this principle is more resilient and therefore more able to adapt its rules to local circumstances in a more productive way, because individuals who interact directly with each other and with their own world can modify the rules throughout the time, and then better fit the specific characteristics of the environment.

However, knowing the limits, having rules molded to reality and having the opportunity to participate in the elaboration of rules does not, in itself, comply with the collective agreement. Agreeing to follow the rules is easier than complying with what is agreed upon in faithful daily practice when strong incentives target diversion.

We will now talk about data related to compliance with Principle 4 - Monitoring. Agents responsible for compliance observation (government and / or social body) should

be present and should actively audit the biophysical conditions of the river basin, as well as monitor users' behavior. This does not happen in the Itanhém river basin. The way it is also will not work because the management agents do not have accurate data of the socioeconomic attributes of the basin. For a high mobility resource (water) monitoring practices are costly, a scenario that worsens with basin size and terrestrial communication and poor technologies. The state agents now in charge of monitoring only respond to complaints, even if they are many, when they are monitored by "wholesale" in cases where damage has already been consolidated and environmental damage is usually irreversible. Related to monitoring the the network of users, it is not done either because there is a lack of social connection tools. Usually, as reported, complaints are made during periods of resource shortage. As scarcity is not common in the space and time present, users are often not working on their own surveillance network to the extent of preventing damage affecting the basin in the long run. Monitoring should also help improve the profile of water use, assisting in environmental re-education, and altering the rooted culture that water is an unlimited resource. Table 4 presents data on the degree of mobility of the Resource Unit (RU1). The degree of mobility directly influences the costs of observing and managing a system. Self-organization is less likely with mobile resource units, such as wildlife or water in an unregulated river, than with stationary units such as trees and plants or water in a lake (Schlager et al., 1994). In the Itanhém river, the resource units are typified by the cubic meters of water withdrawn. How to control the sustainability of a resource unit as mobile as the water of a river? For quantity, as long as the average withdrawal rate does not exceed the average refueling rate, a resource is sustainable. For water quality, a difficulty inherent in its mobility: how to know precisely who spilled a certain pollutant in water?

The data revealed under the analysis of Principle 5 - Sanctions show for the reality of the river Itanhém that the system fails to apply penalties to those who fail to comply with the rules. Users who violate operating rules should receive gradual sanctions according to the severity and socioeconomic context of the person. If the enforcement and the enforcement of sanctions are carried out by government agents, or with the help of the participants, it does not matter, the most important is to function well, which does not happen. There would be no deviations of conduct if the governance system was effective,

and if the individual realized that his neighbor is prosperous when he complies with the rules of sustainable practice. Sanction as coercion in a certain way causes adherence to collective rules to be implemented. The individual would receive incentives (negative or positive) to follow the norm and this would help in the practical operation of the public policies of environmental protection that are now absent.

Another fault presented in the analysis is the "top-down" governance system as the government holds the economic power, power to edit laws, police power, and assumed responsibility for monitoring. As the government does not monitor, there is no sanctioning process properly. Almost always too, the rare cases of punishment are received displeasingly and without the educational bias, since the rules, under the deviant agent's view, are not fair, because the government does not produce its counterpart in the system. Conflicts at the user level almost always come to the attention of those in charge of management, presenting the same faults reported.

So far we understand that when users create their own operational rules (principle 3) and these rules are formulated with fairness to local conditions (principle 2) defining the rights and duties of each one in the system (principle 1) and its practical application is under the monitoring mantle (Principle 4) that punishes deviations using graduated sanctions according to the recurrence and severity of the event (Principle 5), the commitment and the monitoring problem are solved in an interrelated way.

Principle 6 - Dispute resolution mechanisms were flawed. Users do not have quick access to low-cost local arenas to resolve conflicts with each other, or between users and the government. The government has assumed responsibility for the management, monitoring and enforcement of individual sanctions (top-down) but does not effectively exercise its responsibilities, including the conflict resolution process. As shown by the research, the only way of resolving conflicts, in the practical sense, is to offer complaints to government bodies. However, they tend to monitor only if a particular set of complaints are made. He does not have the quick and effective practice of carrying out visits at the time of the denunciations are made. When the resolving power of the state arises it is in the sense of reparation and not of the prevention of harm, even so, the remedial measure comes months or years after the damage is done. Principles 7 and 8 are addressed in the vision of the level of environmental resource management.

Principle 7 - Recognition of class rights. Research has shown that there are no functional and creative efforts by users to create effective sustainability mechanisms for resources. The government shows theoretical interest, but in practice the actors are suspicious if their contributions are acknowledged and validated even after the participatory process. The rule-making mechanism is remote from present local reality. In this way it has not been proved if such rules made outside the environmental context of Itanhém River, by people who do not know the river and the populations that live around it and practice their daily activities, respect the local reality. For example, if a riverine community, with its culture and particularities, is not recognized in the process of formulating the rules, how will we develop a fair management process?

Principle 8 - Entities in a network. The research has shown that there is a certain structure of entities in network, multilevel and polycentric, but without the effective practical result. The social, economic, and political arrangement is reasonably formed from the reported institutions, but the functioning of public policies is ineffective. Whoever promotes public policies does not live the reality of the river basin, and who lives the reality of the basin does not care to add the sustainability network when participating in management acts.

One of the factors that the research calls attention is the heterogeneity of interests. The tripartite composition of environmental management shows few representatives who live the collective social reality, with the others occupying the seats due to work and / or personal interests. It was not enough a basin of more than 6 thousand square kilometers, very large, where it shelters natives, quilombolas, fishing village, urban agglomerations with more than 100 thousand inhabitants and rural with few houses, all these interests are channeled in the normative form *postea* to be satisfied by only one environmental management team.

As stated, despite the presence of governmental and nongovernmental entities, they, in a sense, exert a perverse hierarchy by political forces. Collective management agreements are almost always not supported by the lack of network activities. There are no actions that involve the communities, call them to participate, share with them the problems, the solutions pointed out, the actions taken, the improvements made, and that at the end results in a sense of collective belonging, the one in which people feel like

owners of an environment that requires care and that needs to be sustainable under the penalty of perishing all.

The analysis of the 8 design principles showed the major clashes that collective management must overcome. It shows that there is a severe crisis of trust between entities, between people, and the whole system caused by a misgovernment that in a way contributes to the tragedy. Fortunately, as there is still time, how can we think of a new reality in the face of the shortcomings we have?

What about institutional change, assessing future challenges and prospects for the CBHPIJ

It happens that, after almost 10 years of bureaucratic meetings, the rivers to which it manages, are still under the same risks than before. The environmental management practiced by the CBHPIJ has not yet been able to arm the watersheds of the PIJ against individual actions. It has not yet led the social group towards sustainable development.

For the design principles discussed in the text the CBHPIJ needs in the foreground to improve relations between the Resource System, the users, and the governance system in how they affect appropriation, rule-making mechanisms, monitoring, and mechanisms for resolving conflicts.

On appropriation, the collective must understand the rights and duties in relations with the river basin as well as its biophysical and social limits. This is the moment when the group asks: Who are we? What are our needs? What are our differences? Where is it located and what are the boundaries of our natural resource? What does the resource offer me? How do I need it? The society that depends on the river basin needs to answer so many other questions associated with the process of knowledge, of biophysical and social delineation. In the particular context of the Itanhém river, there is still the task of managing a large basin with only one multi-social team. Only one group to observe social and environmental needs, to shape the rules for sustainability and to offer universal rules to a heterogeneous population living in a river with its own nuances at each curve. Even with this problem, the rules must be clear to everyone. Who can take, how much, and how should be clearly established even in this heterogeneous context. On the other hand, the

exclusion rules should be clear, excluding those who do not know them, by a bureaucratic mechanism (an environmental license for example) or practical operational rules associated with the possible profiles (prohibition by monitoring, for example) . Knowing the limits means that the collective body can identify itself with the rules from the moment they are understood, understood as molded to reality, without any mismatches between the force of law and social reality. This improves participation in the elaboration of rules as the individual gets to know himself, his rights and duties and his practical reality, he will have more incentive to participate in what affects him in his daily decisions. The collective participation promotes great advances.

The collective participation makes known the limits as the population seeks to better understand their rights and duties with the best way, democracy. When the individual knows himself, he reinforces ties of trust and esteem to seek solutions to his problems, whether in the individual or collective sphere. And as the individual becomes known, it becomes a fertile moment for strengthening in the chain of participation, demanding respect for social justice, equity. Collective participation promotes that the rules are shaped by his reality because he will participate in the formulation of the rules that he must follow. Collective participation means that the being is recognized by the external and internal authorities, since he, the right holder, imposes itself in the process. It is the recognition of the rights of the classes, of the opportunity of participation promoting the best synchrony between the entities in network. The process of participation tightens the ties and promotes better intertwining of fundamental rights and guarantees. In order to effect the rules of appropriation and collective participation, monitoring rules must be well applied.

Self-knowledge and collective participation means that the monitoring instrument must be followed. It makes the attention to law and collective order must be instituted and maintained. Monitoring can be done by the collective entities or the very body of individuals that relates to the ecosystem. The objective is to keep the sense of ownership to all, making everyone assist in an effective process to identify as soon as possible the deviation, in the case of a very diffuse and highly mobile environmental resource. How to identify the process of water pollution days after the event of the fact? If monitoring is effective to quickly identify deviations, the sense of compliance will be strengthened, and

inhibit further deviations. The reverse is true. Further, the monitoring process will provide data so that the collective decision-making process improves as it helps the system to know itself. After a process of knowledge and collective participation, detecting deviations by monitoring, we finally use the mechanisms of conflict resolution.

Conflict resolution is directly linked to the fulfillment of individual rights and duties. When the individual respects the rules that he himself has helped to build, with knowledge of the socioeconomic and environmental attributes of the basin, making rules that suit his reality, he tends to respect the rules of appropriation. The resolution of conflicts must always use the means of collective participation as an indication of the paths of virtuous understanding between the divergences. When the system plays its role, monitoring deviations, the choice of access routes to conflict resolution mechanisms tends to be more vigorous. Such means of jurisdiction should be easily accessible, applying fair rules in the view of the socioeconomic context, and accepted by the general group.

In conclusion, the research findings reveal that the Committee needs to better understand its limits and biophysical conditions, to assert with fairness the rules in use, and always to respect the heterogeneity of the community involved according to its diverse narratives. If CBHPIJ overcomes these challenges, the mutual trust process will achieve concrete results of sustainability.

However, this analysis does not mean a single access route. A law of obedience without which the CBHPIJ will succumb if it does not follow them. Nor does it mean that the path is straight, without mishaps or setbacks. It does not mean that the CBHPIJ the way it is will succumb. We only observe that the correlation between the time of its existence and its practical results is bad, since after many years of its foundation, in practice they do not show a healthy and productive organism, presenting little or no advance beyond discourse. The path is built as the CBHPIJ proceeds towards the proposed desires, through the democratic and participative way, following the greater principle: the sustainability. What is good for the individual, should be good for the collective, not meaning that the individual does not need to have a profit, or advantage. Only a good strategy is one in which the individual and the environment win together and perpetuate themselves.

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