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ASPECTOS INSTITUCIONAIS DAS INICIATIVAS DE PSA NA REGIÃO DO SISTEMA
CANTAREIRA

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Institutional aspects of PES schemes in Cantareira System Region

Aspectos institucionais das iniciativas de PSA na região do Sistema Cantareira.

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Abstract summary: The forest conservation in Atlantic Forest has always been threatened by several factors. Traditionally, the environmental policy in Brazil relies only on command-and-control instruments. Recently, policies using economic instruments, such as PES, have experienced a rapid growth across the country. Some of them are located in the Cantareira System Region, which is responsible for providing about 50% of the water consumed by the São Paulo Metropolitan Region (RMSP, in Portuguese acronym). Our aim is to understand how existing institutions have contributed to the design and implementation of current policy instrument. This understanding will provide the basis to determine the institutional feasibility of up-scaling the PES use in Cantareira Region. Following the approach of Corbera (2008), this paper will use an institutional analysis. First, we will examine the process of institutional design, whose results would shed light on understanding why PES is proposed as a policy tool in a particular context and which actors shape the design process. The analysis of existing institutions is fundamental to understand the design and implementation of this instrument. The instrument performance will be assessed regarding with the purpose of PES policy and how it has been achieve their proposed objectives.

Keywords: Institutional analysis, PES, Environmental policy.

Resumo: A conservação florestal na Mata Atlântica sempre foi ameaçada por diversos fatores. Tradicionalmente a política ambiental no Brasil baseou-se principalmente em instrumentos de comando e controle. Recentemente, as políticas com uso de instrumentos econômicos, como PSA, experimentaram um rápido crescimento em todo o país. Alguns deles estão localizados na região do Sistema Cantareira, que é responsável pelo fornecimento de cerca de 50% da água consumida pela Região Metropolitana de São Paulo (RMSP). Nosso objetivo é compreender como as instituições existentes contribuíram para a concepção e implementação do instrumento de política atual. Esse entendimento servirá de base para determinar a viabilidade institucional de expansão no uso de PSA para toda a região. Seguindo a abordagem de Corbera (2008), este trabalho irá utilizar uma análise institucional para examinar o processo de desenho institucional. Os resultados devem lançar luz sobre a compreensão do por que o PSA é proposto como um instrumento de política em um contexto particular e como os atores moldam o processo de desenho. A análise das instituições existentes é fundamental para entender a concepção e implementação deste instrumento. O desempenho do instrumento será avaliado em relação com o fim da política PES e como ele tem sido sucedido em alcançar seus objetivos propostos.

Palavras-chave: Análise institucional, PSA, Política ambiental.

Within the scope of biodiversity and forest conservation, the use of economic instruments has gained prominence in the world, especially in developing countries. Usually environmental policy was limited to the creation of protected areas and

restrictive usage rules, such as the forestry law. However, evidence of inefficiency of this model, using only restrictive rules, boosted the use of new instruments. More recently, Payments for environmental services (PES) has been used as an alternative environmental policy that, using market logic, it would be more efficient than the regulatory mechanisms (or command and control policy).

The introduction of this policy instrument setup a new institutional arrangement, creating institutions and modifying old institutions. Institutions are rules governing what to do in a given situation (Ostrom, 1990). They act as filters guiding human action and act in a decisive way, shaping the way that nature and the environment is perceived and handled (Young, 2002; Primmer et al, 2011). According to Vatn (2005), institutions "provide expectations, stability and meaning essential to human existence and coordination. Institutions regularize life, support values and produce and protect interests ". According to Young (2005), institutions are the set of rules, rights and procedures that give rise to social practices, enabling the role of actors in a particular way, governing the interactions between them. They are usually divided into formal and informal institutions. Formal institutions are rules that change the behavior, possessing mechanisms of coercion. Informal institutions are more related to social norms and are often characterized as cultural conventions and standards established and controlled socially (Primmer). In turn, also the organizations are important in dealing with management regimes, defined as important components in systems of governance. Its creation is not necessarily sufficient to ensure that institutions are efficiently implemented.

Another key point regarding the institutional setting is the concept of governance. Vatn (2010) defines governance in setting goals, defining rules of how to achieve these goals and controlling outcomes. In the case of PES, it refers to definition of the environmental service, the way that resources are managed, the actors' rules and how to monitor the results (Vatn, 2010).

This study will analyze the PES programs in Cantareira System region, focusing on the institutional aspects of "Conservador de Águas", performed by the municipality of Extrema, considered a successful policy. The main objective of our analysis is to understand how these programs were designed and the necessary arrangements for its implementation. The first section gives a brief history of the main environmental policy instrument, the Brazilian Forest Code. Then conceptualize and present the PES and the way it has been applied in Brazil. The third section presents the Region System Cantareira important area of water supply in the Metropolitan Region of São Paulo, and PES initiatives that have emerged in the region. In the last section we make a brief comparison between them, giving prominence to the "Conservador de Águas"

FOREST CODE

The Brazilian environmental policy is traditionally performed by command and control instruments. Decisions on land use and its modifications in are shaped by a series of rules and laws, being the Forest Code the most important. The first design of the forest

code was promulgated in 1934 (Decree 23,793), establishing the concept of protective forests and the requirement for a forest reserve inside the rural properties. However, the use of these reserves was not thought in terms of environmental protection, but as a way to ensure firewood supply, allowing initially the replacement of such forests by homogeneous planted forest.¹The "new" forest code was enacted in 1965 (Law 4771) defining, among other issues, the landowner limitations about the land use, and the management of forests and others kind of vegetation. Among the instruments, two are worthy to mention: the Legal Reserve (RL) and the Permanent Preservation Areas (APP). The RL is an area located within the property "necessary to the conservation and rehabilitation of ecological processes and biodiversity conservation" (Brazil, 1965). The APP was defined as a protected area, or not, covered by native vegetation, with "the environmental function of preserving water resources, landscape, geological stability, biodiversity, gene flow of wild fauna and flora, soil protection and ensure the well-being of human populations "(Brazil, 1965). These areas are priority for water resources and their recharge, and follow along the rivers, springs, lakes and water reservoirs and hilltops. Initially it was required rural properties in the Amazon and in the savannah ("Cerrado") region to maintain 50 percent of the native forest on the property and also 20 percent for the rest of the country. In 1986, Law 7511 modifies the concept of RL. Although it was no longer allowed the deforestation of native forests, this update permitted restoring deforested areas with exotic species. This law also changed the boundaries of APP, leaving 5 to 35 meters. Also, for the rivers with more than 200 meters, the APP areas were equivalent to the required width of the river. In 1989, the obligation of the RL was extended to other regions and its registration was officially required. In 1996, the Legal Reserve requirement in Amazon region raised to 80 percent. It is only with the enactment of the Environmental Crimes Law, Law No. 9.605/98, that environmental legislation is consolidated, setting penalties, punishments and responsibilities. The Atlantic Forest protection counts also with Law No. 11,428 (Atlantic Forest Law), enacted after 14 years of discussion, defining the types of intervention permitted / prohibited in the biome, and procedures for sustainable use by small farmers and traditional population.

Failure of the forest code becomes evident when analyzing data concerning APP and RL areas. According with Sparovek ET AL (2011), an analysis underestimating some factors shows that the amount needed to comply with the legislation is 100,000 hectares, but there is still a deficit of 43,000 hectares. Regarding the requirement of RL, an amount of 235,000 hectares required to fulfill the requirements of law, the actual deficit is around 42,000 hectares. Hence, it would require the conversion of 85 Mha of land into forests, raising doubts about the technical, financial and political capability to enforce the law.

¹ For a complete Brazilian environmental policy review, check BANERJEE, O.; MACPHERSON, A. J.; ALAVALAPATI, J. Toward a Policy of Sustainable Forest Management in Brazil: A Historical Analysis. **The Journal of Environment & Development**, v. 18, n. 2, p. 130-153, 2009.

In 2012, after intense political discussions, a new version of Forest Code was approved by Congress, even over popular protests. Although it maintained the percentage of biomes' protection, it exempted properties with up to 400 hectares of this rule, which represents about 90% of farms and 50% of the territory. Moreover, granting amnesty to deforestation made so far (according to the old forest code), which accounted for about 220,000 km². However, President Dilma Rousseff vetoed some points, forcing reforestation, but creating some exceptions mainly for small properties. Regarding the riparian areas, the requirements that previously went from 30-500 feet, were reduced to 5-100 meters, depending on the size of the property. The protections of hilltops were removed and allowed planting of exotic species (in small quantities).

The revision of the Forest Code, the most important formal institution for the environmental decisions, was a clear demonstration of power of agribusiness dominant groups in the political arena. Despite successive attempts of scientists, society and NGOs, politicians were conspicuous by their logic to sustain the power of agribusiness groups instead of seeking for a economically, socially and ecologically reasonable text. Vatn (2005) argues that the definition of what is efficient is not based on technical issues, but rather "is a question about interests and values we want to protect by using the power of the state."

Payment for Environmental Services as new policy tool

The emergence of economic instruments for forest conservation had been boosted with the verification that prohibitive instruments do not work in the way they should work. More recently, market instruments were introduced in global environmental policy, supposedly as being efficiently, like Payment for Environmental Services (PES). The underlying logic of PES is that actors who incur efforts to ensure provision of ecosystem services must be monetarily rewarded for beneficiaries of them. Perhaps the most used definition for the PES is from Wunder(2005), defining it as an (a) a voluntary transaction where (b) a well-defined environmental service (ES) or a land use likely to secure that service (c) is being 'bought' by a (minimum one) service buyer (d) from a (minimum one) service provider (e) if and only if the service provider secures service provision (conditionality). This conceptual definition has theoretical basis on Coase theorem, which places great emphasis on reducing transaction costs, allocate property rights and establish bargaining processes between suppliers and buyers (Muradian et al, 2010).

However, the majority of PES initiatives is not fully included in this definition, causing a separation between theory and practice. Most of PES schemes depends on the state or community engagement, beyond the voluntary condition often not be observed (Vatn, 2010). Although often considered as a coasen market instrument, most PES schemes in Brazil support the idea that this definition is only diagrams should be according to a given theoretical position (Vatn, 2010). Due to its inherent complexity, environmental services are not always clearly defined and it is difficult to define in advance a clear causal relationship between land use practices and the expected increase of a certain service, reflecting the difficulty in measuring efficiency. Monitoring usually consists of

checking land use changes, rather than checking changes in the current provision of certain ecosystem service (Muradian, 2010).

The PES schemes operate with a high degree of uncertainty in accounting the provision of services, in addition to the inherent complexity of the services and land use. An alternative view of PES defines it as a transfer of resources between social actors, in order to create incentives to align decisions on land use (collective or individual) with the social interest (Muradian, 2010). More than "almost-perfect" market transactions, the monetary transfers of PES are incentives for collective action (Muradian and Rival, 2012). In this sense, it is an instrument of reconfiguration of relations between state, market and community (Vatn, 2010). The PES should be considered, at least in the schemes adopted in developing countries, as part of a rural development programs portfolio, rather than just an economic tool used to ensure environmental protection more efficiently. In these countries, the PES programs do not focus on ecosystem services individually, but in different types of land use practices that provides certain environmental service (Porras, 2011 in Schlaack & Ring, 2011). The introduction of policies using the PES requires the formation of new institutional arrangements, designed to improve or change the behavior of those responsible for natural resource management through the provision of economic incentives (Corbera et al, 2009). The performance of a given institutional arrangement needs to be measured through its interaction with other institutions (Young, 2002)

As seen in the previous section, Brazil has an extensive and detailed forest code, which mostly is not fulfilled. The idea of using PES has been suggested and discussed with enthusiasm as an additional tool for command and control policy. However, concerns have arisen in the sense that such mechanisms would be just payments for uphold the law, not generating additionality (Wunder, 2007). Some policymakers argue that it is not simply afford to comply with the law, since payments are made with implementation of actions envisaged in contracts and projects in priority areas. Thus, the PES would be a complementary management tool and not just a pass-through to fulfillment of the law (Carrascosa, 2012). Compared with PES policies in Latin America, Pagiola (2012) points out that the mechanisms in Brazil use formulas to determine values and are characterized by effecting management plans of contracted areas.

Sistema Cantareira

The Cantareira System is a set of four interconnected lakes, being responsible for providing more than 50% of the water consumed by the São Paulo Metropolitan Region (RMSP, in Portuguese acronym). It is one of the largest artificial systems for water supply in the world, producing 33,000 liter of water per second in an area of approximately 228,000 hectares (incorporating five watersheds). It encompasses 12 municipalities (four in Minas Gerais and eight in Sao Paulo State) and the majority of the water produced comes from Piracicaba River Basin which is carried to the Alto Tietê watershed.

The region is an important area of remnants of the Atlantic Forest. This biome has only 8% of its original forest cover spread out in a myriad of fragments. Despite the existence of protected areas, the most of fragments are located in private properties. The predominant farming in the area has been dairy cattle farm and eucalyptus. The region is considered a high priority for the conservation and recovery of fragments and increasing connectivity between fragments has been a strategy advocated to increase and maintain the biodiversity.

Since its construction in 1973, the region surrounding the reservoirs and their forming watersheds were being transformed under the influence of different variables. Originally held a tradicional familiar agricultural practices, now much of the pressure comes from the new-rural: urban inhabitants seeking recreational refuge in its picturesque landscapes which outcomes an excessive fragmentation of land. The continuous rural exodus and the valuation of these spaces has fostered a market for agricultural land differently from usual.

According to Whately & Cunha (2006), between 1989-2003 the amount of area converted to urban use grew by 30%, while more than 3000 hectares of forests were converted to other land uses. Within the area, there are five conservation units, where three are Environmental Protection Areas and two state parks. However, only the state parks are considered full protection (corresponding to 0.5% of the entire area System). The APAS aims to reconcile the protection of natural resources with the land use, and both must have an environmental management plan that governs the activities and the changings in land use. The management plan for the APA acts as an umbrella law, organizing the implementation of various actions. They should, for example, align the municipal master plans to the APA. All municipalities in Brazil with more than 20 thousand inhabitants have had to adopt a master plan to define measures related to development policy and urban sprawl. However, as the APA council does not have an extra power to enforce, the same control agencies are responsible for compliance. The APA then act as an institution that only reinforces the requirements of the forest code.

Since their creation, the management of reservoirs was exclusive right of the Basic Sanitation Company of the State of São Paulo (SABESP). In 2004, the basin committees had significant participation in discussing the renewal of concession right. Currently, management is done jointly by SABESP, PCJ Committee and Alto Tietê and ANA. The next renewal of the grant will take place in 2014, which is considered an opportunity to introduce or rethink environmental policies.

Table 1: Conservation Unities at Cantareira Region

| Conservation Unity | Total Area (há) | Area inside Cantareira (há) | Area inside Cantareira / Total Area (%) | Status |
|--------------------|-----------------|-----------------------------|---|--------|
| | | | | |

| | | | | |
|--------------------------------|---------|---------|----|--|
| APA Piracicaba e Juqueri-Mirim | 349.121 | 97.299 | 28 | Not regulated and without management council |
| APA Fernão Dias | 180.007 | 102.059 | 57 | Regulated and has environmental management plan |
| APA Sistema Cantareira | 253.298 | 124.568 | 49 | Not regulated |
| PES Juquery | 1.925 | 457 | 24 | No management plan |
| PES Turístico Cantareira | 7.482 | 834 | 11 | Regulated |

Source: (WHATELY & CUNHA, 2006)

Currently in Atlantic Forest biome there are about 40 PES initiatives related to environmental services of water, and these projects represent an approximate area of 40,000 hectares. According to Guedes and Seehunsen (2011), the initiatives generally rely on more than one organization for their execution, and much of its resources come from the public budget. The design and implementation of policies using the PES in Brazil has been done primarily in four ways: 1) Municipalities and municipal sanitation respective companies, 2) Watershed Committees, 3) Voluntary initiatives (mostly NGOs), 4) Large water supply companies and large users.

There is some perception that traditional policy instruments (command and control) has been in somehow effective in preventing deforestation in the region, given the character of the environmental pressure different from other regions such as the Amazon. However, there is no evidence of effectiveness in stimulating recovery and reforestation, despite the legal requirement. The impacts of forestry and conservation practices in the availability and quality of water resources is used as justification for all PES projects in the region. There is relative consensus in the literature about the linkages between land use and water quality, where sediment production in devastated areas is clearly higher. Regarding the amount of water, since there is little evidence of this relationship, there are many variables that affect water availability and human alterations, as reforestation, can affect the amount of water on site. (Porrás et al, 2008)

In System Cantareira Region there are three PES programs ongoing, performed at three different levels of government: by municipality, by basin committee and by state government (in partnership with municipalities). In the following section, a description will be made with the available data. Only one program (Conservador de Águas) has a consolidated structure and is considered a reference in PES in Brazil, while "Produtor de Água" is a pilot involving different organizations and "Mina D'agua" is still in the implementation phase. By analyzing the design of these programs, we seek to discover how was the articulation of key players and, with the comparison between them, we draw some conclusions about the different models of PES in the Region. Interviews were conducted with program managers, relevant actors in the process, as well as field visits to projects, and analysis of secondary documents (meeting minutes, project reports, etc.) as well.

Table 2: PES initiatives at System Cantareira

| Program | Buyer | Location | Start | Type of ES | Contract s (area) | Payment type |
|------------------------------|------------------------------------|--|-------|------------------------------|-------------------|----------------------------------|
| Programa Mina D'água | São Paulo State Government (State) | Piracaia (SP) | 2010 | Spring protection | - | Degree of spring protection |
| Produtor de Água PCJ | PCJ watershed committee (Regional) | Joanópolis (SP) e Nazaré Paulista (SP) | 2006 | Restoration and Conservation | 15 (240ha) | Area of remnants and restoration |
| Conservador das Águas | Extrema City council (Municipal) | Extrema (MG) | 2006 | Restoration and conservation | 100 (2850 há) | Total property area |

“Mina D'água” Project

In 2009 was enacted the State Policy on Climate Change (PEMC), by Law 13,789, aiming at the establishment of state commitments facing the challenge of climate change. From this, the Forest Remnants program was established, coordinated by the Department of the Environment (SMA). Subsequently, Decree 55947 of June 24, 2010 SPCC was regulated by defining the concepts and guidelines necessary to design PES programs. Such legal framework was preceded by the experiences in the Recovery Program Riparian Forest (PRMC), which was executed between 2005 and 2011. Such program was supported by Global Environmental Fund (GEF), and aimed at the recovery of riparian areas, being responsible for defining the strategies for a PES state policy, in addition to providing support for the development of studies to understand the relationship between riparian and water quality (Souza Junior, 2011) and monitoring methods (Metzger, 2011).

At the state level, São Paulo has built a framework that allows the creation of PES schemes without the need to create a specific state law. These projects are defined through a resolution of SMA and should observe the guidelines and criteria set forth in PEMC and define priority areas for implementation such, for instance, the connectivity between remnants in areas of public water supply sources. Each project under this framework has the autonomy to set their eligibility criteria, monitoring indicators and the monetary values to be paid for environmental services sellers.

The "Mina d'água" project is the first project implemented under the PEMC. Launched in 2010 by the Coordination of Biodiversity and Water Resources (CBRN), in its initial phase were chosen 21 cities in the state with the aim of conserving the springs of public supply. Project implementation is through partnerships with municipal governments,

which must formulate a law authorizing the Government to make payments in form of PES. Furthermore, municipalities must have a Municipal Environment Council, which must include the participation of society and a team for monitoring and servicing of shares that will be provided in the contract. The funding is made by the state government through the State Fund to Fight Pollution (FECOP), having been allocated R\$ 3.6 million to the project.

In selected cities, priority areas were chosen by municipalities with an initial budget for payment up to 150 springs in each city. In the Cantareira System region, Piracaia, a city of 22.335 inhabitants, was chosen in the first phase. In a preliminary survey it was identified 995 springs in the municipality, which still has 19.30% of the forest cover. Adherence must be voluntarily and contract (2-5 years) is signed between city and landowners. The payment amount is variable and takes into account such factors as: risk factors, protection of surrounding spring and priority biome. The program also provides technical support and does not provide financial resources for the operation by municipalities. Small towns of usually have a poor infrastructure. Often there is not even the environment department, and possibly the political-administrative change can lead to abandonment of the project. One difficulty experienced is that activities involving forest restoration require a trained staff, which many cities do not have. This role is often delegated to agencies of technical assistance and rural extension, such as 'Coordenadoria de Assistência Técnica Integral' (CATI) and Agriculture unions, however they suffer from a lack of resources (human, financial and instrumental) for execution. The monitoring is done by checking the actions proposed in action plan and also includes the development of a methodology for impact assessment with support from the World Bank.

The legal justification for payment is based on the concept of provider-receiver, where payments depending on the degree of regeneration. Although the legislation does not specify the replanting of vegetation preservation areas, it prohibits their removal (Nusdeo, 2012). The program was set based on previous forest code, which required the composition of forest 50 meters radius around the source. With the new forest code, the requirement now ranges from 5 to 15 meters, depending on the size of the property. There is no way to measure, but it is possible that these changes have an impact on the willingness of landowners to 'give up' more area than necessary to fulfill the law.

Besides the operational difficulties, the accession pace of municipalities (with the State government) and landowners (with municipality) has been lower than expected. The requirement of full documentation and no pending with the state government is also a complicating factor. If the property is not appropriate with environmental legislation, a commitment term sheet must be designed for that. The policymakers see this requirement as an opportunity for adequacy, while landowners can see it as a limiter factor. The program was officially launched in 2011 and in Piracaia there is only a few owners in initial contract and project design.

“Produtor de Água do PCJ” Program

The “Produtor de Água” program is an initiative of Piracicaba-Capivari-Jundiá (PCJ) basin committee. Since the National Policy of Water Resources, Federal Law 9.433/97, the watersheds were able to charge for use, which is regulated in São Paulo from 2005, by Law No. 12,183. The possibility of investing charging revenues for water use in PES initiatives was included in PCJ Basin Watershed Plan Joint (Resolution 051/2006). Based on this determination, it has been built pilot project, which was approved by the Technical Chamber of Use and Conservation of Water in Rural Areas and the Committees.

The Recovery Project Riparian Forest (PRMC), cited in previous section, was also important for the development of “Produtor de Água”, developing the criteria for priority areas selection within the basin. The goal was to remunerate producers who preserve / regain native forest and do conservation practices. The watersheds chosen by PRMC also aimed to validate the methodology for monitoring, measuring and test compliance of producers in such institutional arrangement.

Tabela 3: Main actors and its roles at “Produtor de Água PCJ”

| Actors | Role | Scale | Type |
|----------------------------------|---|---------------|--------|
| Secretaria Meio Ambiente | Financial, technical and material support | State | Public |
| Agência Nacional de Águas | Technical and material support | National | Public |
| The Nature Conservancy | Executive actor | International | NGO |
| Secretaria de Agricultura (CATI) | Technical and material support | State | Public |
| PCJ Watershed Comittee | Financial support | Regional | Public |
| WWF | Technical and material support | International | NGO |

The charging for water use goes to a federal fund (FEHIDRO) and from this, there is a prioritization of demanded projects. Because there are some restrictions on the government to make payments directly to the owners, it was necessary to choose a private institution to claim the resources. For this pilot a NGO, "The Nature Conservancy" (TNC), was as borrower resources. An institutional arrangement was made, consisting of public institutions such as the National Water Agency, Department of the Environment of the State of São Paulo, Integral Technical Assistance Coordination (CATI) and Extrema Prefecture, forming a Project Management Unit (PMU). This group is responsible for activities monitoring and verification of actions (biannually) and report the results to the committee.

According to PCJ Comittee, in Cantareira System there is a need to reforest 35,000 hectares of APP forests. With investments in reforestation managed between 1997-

2009, only 544 hectares was reforested. Through the recovery and conservation, the project has considered target environmental service as reducing erosion (sedimentation) and flow. Before the formalization of the project, the initial estimate was meet about 200 owners, which has been shown unattainable due to operational difficulties². The watersheds selected were Ribeirão Cancan (in Joanópolis) and Ribeirão Moinho (in Nazare Paulista). According to, the selected area of 4212 ha has 311 people living in 130 farms. The program uses the methodology of the “Produtor de Água”, created by the National Water Agency (ANA) in order to stimulate PES projects focused on water protection. Therefore, it provides technical and financial resources, such as building micro-dams and environmental rural sanitation. The projects that follow its methodology are then certified and up to date there are eight initiatives supported (ANA, 2012).

The selection of participants was made through edicts where those interested should seek the “Casa de Agricultura” (Agriculture Dept.). With the registration, it is designed a specific project for the property and contract signature. So far only 15 contracts were signed, totaling 240 hectares of protection, which generated payment of R \$ 72,827. This amount corresponds to less than 20% of the funds available for payment. Transaction costs, primarily related to operationalization of the program, proved to be relevant. Although it was a diagnosis that showed there previous environmental conditions for implementing the project, the executor says that is lack of properties with agricultural vocation. The difficulties of accession of the owners made the Conservancy asked for the expansion of operations to nearby watersheds, under the justification of not having eligible properties. The fact is that contractual and documents requirements is high, which many farmers do not own or have fear of supply. The formalization itself via contract is treated with suspicion by the landowner.

With the formation of such management unit, it has gained in experience and learning opportunities and lost with the difficulty in articulating those involved. Moreover, the network of partnerships needed to develop the project, used projects already ongoing (as the PRMC), and some projects ended up leaving a gap in certain activities. For this, the UGP must frequently seek partnerships for actions ‘viability.

“Conservador das Águas”

The municipality of Extrema, Minas Gerais has 28,564 inhabitants, covering an area of 24.370 ha., and is located on the border of São Paulo and Minas Gerais State. From 1990 to 2010 its rural population fell while the urban increased. This phenomenon, beyond the traditional explanatory variables, can also be assigned by modifying the city's economy. The municipal economy was traditionally composed of the agricultural sector, specifically dairy and cattle. Since 2000, Extreme has attracted companies via tax incentives. Its proximity to São Paulo and proximity to other centers meant that many industries were installed since then. The result is that tax revenues grew up, turning it into a dynamic hub of southern Minas Gerais. The municipal budget was \$ 19

² Minutes of the 1st joint meeting PL-CT and CT-PB - 12/09/06 - Extrema - MG

million in 2002 to R \$ 110 million in 2012, and this amount comparable to the budgets of cities with a larger population and one of the largest in the Cantareira System region. Such economic growth is one of the factors that gave conditions for emergence of the first municipal program of PES in Brazil, largely financed by municipality.

We will analyze the design of “Conservador de Águas” based on framework presented by Corbera et al (2009), highlighting three dimensions. The first dimension, Institutional Design, seeking to know why the PES has been proposed as an instrument of policy and in what ways the actors involved have shaped the design of the program. The second dimension, Institutional Performance, presents the results for the stated objectives. Moreover, it shows how it is done to monitor the provision of SE, and possible side effects at the local level. The Institutional Interplay dimension refers to how a set of institutions affect another, where possibly influence on their results.

Institutional Design

The origin of the "Conservador de Águas" had its first step in initiatives to stimulate environmental compliance in order to preserve water quality in Extrema. This initiative was implemented with the support of the Environmental Ministry, within ‘Política Nacional Meio Ambiente’ (National Policy on the Environment). From 1996 to 1998, the project reforested riparian forests and spread soil conservation practices, beyond the beginning of monitoring the quantity and quality of water. Later, in 2001, the city has developed an environmental diagnosis that could serve as basis for environmental policies, consisting of georeferencing and biophysical and socioeconomic surveys. Some environmental compliance actions were performed non-voluntary, which led to the questioning of the effectiveness of command-and-control practices, regardless of the restrictions from landowners.

Still with the justification environmental compliance, but in a more harmonious way with the land owners, Extrema was the pioneer municipality to use the framework of “Produtor de Água”, from ANA, and launch the idea of PES for landowners. However, there are restrictions on payments and transfers of funds between public organizations (municipalities) and private agents. The way to avoid this is by creating a specific law authorizing the government to make such a transfer. In 2005, the first municipal law enacted in Brazil regulating PES, authorizing the transfer through the execution of established contracts.

The selection of participants is restricted to sub-basin chosen for the project, and is actually performed in two of them (Extrema has seven sub-basin). The priority watersheds were elected by forest cover, where the first basins are those that have less forest. The property must be greater than two hectares, and be engaged in farming with economic purpose. After signing the contract, it develops a technical project with the goals and actions. The municipal technicians are responsible to make all actions of intervention, so the landowner must release their full access to property. As payments come from the municipal budget, in 2009, was constituted a municipal fund for the financial resources not being affected after the project period. The articulation of

landowners was through the association of residents, which was stimulated to organize itself, with several meetings and clarifications, which gave assent to the application of project in 2005. Social cohesion was stimulated by municipality, trying to make the process of implementing the project something more cohesive and less laborious. However, the owners showed some skepticism about the effectiveness of it, while participation in rural union is motivated mainly by the technical material assistance. In general there is a lack, or a superficial knowledge of legal requirements.

The character of top-down policies potentially results in disagreements and dissatisfactions about staying in the program. Studies of Gavaldao (2008) and Zanella (2011) have demonstrated this. Although the payment is considered reasonable, the program participants of Extrema have more doubt about their permanence in relation to other programs (Zanella, 2011).

The City Council acts as executor and central figure in the development of the policy, seeking partnerships for reforestation techniques and monitoring. Such partnerships gravitate around the central actor, supporting and acting in a supportive but secondary way. The institutional arrangement was designed in order to leave decisions to main agent, being responsible for the crucial actions. This is a demand of projects involving public-private partnerships and institutions with different levels of governance. Public institutions are often forced to abandon projects due to infeasibility or by political reasons. This design was made possible largely by political stability and abundant financial resources. With the core of the instrument under the tutelage of master agent, gives flexibility to seek partnerships with other organizations for auxiliary or occasional activities.

Table 4: Main actors and its roles at ‘Conservador de Águas’

| Actors | Role | Scale | Type |
|--------------------------------------|---|---------------|-------------|
| Instituto Estadual de Florestas - MG | Financial, technical and material support | State | Public |
| Agência Nacional de Águas | Technical and material support | National | Public |
| The Nature Conservancy | Technical and material support | International | NGO |
| SOS Mata Atlântica | Technical and material support | National | NGO |
| Comitês PCJ | Financial support | Regional | Public |
| Private corporations | Financial and material support | Local | Private |
| Universities | Technical support | Regional | Public |

Another key factor to “Conservador de Agua” project success is the political arena. The municipal elections in Brazil happen every four years and the alternation of political parties in power often causes drastic disruptions in the continuity of projects from previous administrations. In Extrema, the same political group has been in power for

more than four consecutive mandates, ensuring implementation of management plans built over time. Furthermore, the individual initiative of the Environment Municipal Secretary has been shown crucial to the continuity of actions, being responsible for the environmental decisions since 1998.

Institutional Performance

The first basin selected within the municipality (Posses) has about 1200 hectares distributed over slightly more than 120 properties. Of these, 76 had signed contracts, and 18 have not signed contracts but have had some type of intervention. The second sub-basin chosen (Salto de Cima), owns 4,169 acres, spread over 204 properties. From these, actions are being carried out in 32, which represent about 38.31% of the total area of the sub-basin.

Payments are made monthly in twelve equal installments only after the approval report certifying compliance with the targets. The benchmark used is equal to 100 UFEX (Fiscal Unit of Extrema). This value is supposedly equivalent to the opportunity cost of livestock, the predominant agricultural activity in the region. However, Extrema not only pay for the area immobilized. When considering the entire property as ecosystem services producer the program pays more (in absolute values) than the other programs in the region. As an example, if a property has 20 hectares whit only 2 hectares of forest, the landowner would receive R\$ 4,000 per year (based on 100 UFEX = R\$ 200), while only would receive R\$ 400 if it would be paid only by forested or recovery area.

Nowadays the program budget for payment is around R\$1,5 million per year. The environmental structure has a budget of approximately R\$ 4.2 million per year, which includes other environmental programs. The estimate is that the transaction costs for the ‘Conservador de Águas’ rotate around 30-40% of the amounts paid to farmers.

The implementation of restoration activities, monitoring and administrative staff require expert human capital. Earlier the difficulty of technical training and staff retention was a factor of difficulty in implementation. Nowadays Extrema has its own team of about 30 employees, which is considerable given the size of the municipality and the specificity of the work.

Extrema elected environmental compliance as a major goal, while in the “Produtor de água” are the conservation practices, meanwhile to increase forest cover in the city. To achieve this, the city has also bought private areas and converting into public areas. Until now, around 70 hectares of land were purchased. In other hand, the main instrument for intervention in private areas has been the PES.

Table 5: “Conservador de Águas” results

| Year | Number of Contracts | Area (hectares) | Values (R\$) |
|------|---------------------|-----------------|--------------|
| 2007 | 21 | 459 | 16.165 |
| 2008 | 14 | 301 | 106.858 |

| | | | |
|--------------|-----|------|-----------|
| 2009 | 26 | 725 | 226.101 |
| 2010 | 15 | 867 | 340.529 |
| 2011 | 24 | 498 | 420.161 |
| Total | 100 | 2850 | 1.109.814 |

Source: Extrema Municipality

Through the partnerships, it was possible to foster the development of several studies. Universities and research institutes had developing their research in Extrema, such as the development of methodologies for reforestation. The ANA has installed seven monitoring stations of quality and quantity in the project area, in order to monitor project outcomes. Furthermore, hundreds miles were enclosed by barbed wire fence, to prevent the invasion of external agents and contribute to the conservation of watersheds and forest remnants.

Population of the region is characterized by a low level of education and high age (61 years on average), with a monthly income of up to R\$ 3,000. They are usually small farms (2-80 hectares), with income revenue mainly from dairy cattle. It's worthy mention that landowners generally perform multi-activities as strategy of social reproduction, where most have more than one type of income. The reflection of continuous process of rural depopulation is a constant shortage of skilled labor at affordable prices and the low adherence to financial mechanisms. According Gavaldao (2008), the original participants did not perceive the project as an aid-tool, but as imposing character. About half of the respondents claimed to participate in a non-voluntary. Besides not realize clearly what the goals of the project, or do not recognize what is spoken about what they feel. Project participants use the money to

Partnerships with private companies seek to create more attractive incentives to participants, highlighting the actions related to rural sanitation, through the installation of septic tanks by private companies. Another way to create an incentive to stay the program is through the payment of a higher value (10%) in milk price to participating farmers. The bond of traditional rural activity with new forms of management advocated by the project seeks to act not only by the economic stimulus directly, but indirectly through the range of benefits.

Institutional Interplay

The project has been successful in their restoration and conservation objectives. However, the motivations that lead landowners to enter the program often do not meet these objectives, but still have the power to change the perception of some formal and informal institutions. Historically the forest code has not been perceived as a present legal framework. With this recent review and discussion, it became clear the lack of knowledge about the legal requirements governing landowners activity. The historical ignorance, lack of support and information, coupled with the low efficacy of the legislation, the forest code became something almost nonexistent. From the moment that the discussions were taken to the central arena, the landowners were being charged by law enforcement.

The property rights regarding land use is a formal institution represented by land title. This institution determines the possibility of access to resource and autonomy over it. The requirement to release it to Extrema Environmental Dept. and give free access to interference within property is a considerable change in this institution. The change in the way landowners manage their land and the restriction of certain uses (livestock in hills with steep slope or in riparian areas, for example) is the most striking feature of instruments like PES.

With significant water availability in the region, it was not possible to identify serious conflicts for its use or access. It also did not lead to establishment of collective arrangements for their access, but culminated in individually land use decisions. The project helped to some extent the establishment, or the resumption, of social cohesion through the neighborhood association of Poses basin. Furthermore, frequently is quoted as an example by policymakers and has gained high level of visibility (including a special reporting in the highest-rated rural program in Brazilian television). There is evidence that the project has moved towards the promotion and development of other initiatives in Brazil, being one of responsible for widespread economic instruments among citizens.

Discussion

As demonstrated with this comparison, projects differ in their design, institutional arrangement and target. Each project operates on a different scale and institutional level. The institutions differ from policy instruments in several ways, not intended to be just a set of actions, but also influence and frame behavior (Primmer et al, 2011). PES policies, even indirectly, alter some formal and informal institutions. In the case of policies in Cantareira System, taking Extrema as an example, our study identified as institution more broadly modified the traditional knowledge about the land management and property rights over land by landowners. The farming techniques practiced even today follow a set pattern according to learning by doing and with low technical standards. The introduction of reward practices for soil conservation and agro environmental measures aim to change this perception and disseminate new knowledge to improve or keep provision of ecosystem services. The property rights over the land, as a formal institution, are usually the predominant target by policies. Environmental services are products of certain land use, so PSE is nothing more than pay landowners to abide certain traditional practices, established by policymakers. This bond is possible with the agreement amending the restrictions on land use, which requires that property rights be well defined.

The Extrema initiative, from the standpoint of institutional design, appears as the evolution of different environmental policies made by the municipality, allied to several factors that led to the introduction of the PES. Analyzing the success of the program should take into account the political institutional framework that Extrema is inserted. Despite the similarity with other cities in the region, the process of industrialization in Extrema and consequent rural exodus, coupled with political stability and increased government revenues, has emboldened initiative. Furthermore, the proximity of

polymakers with contractors is Extremely important to the results of program. The centrality of the city government, taking on the lead role in driving the program and seeking only external additional supporters differs from the way that other programs have been designed.

The study of IPE (2012) shows that most part of surveyed landowners in System Cantareira Region know or have heard about PES initiatives, especially the "Conservador das Águas". However, the low participation of municipal technicians in rural communities demonstrates the distrust of the population regarding PES policies. This is due to historical policies implemented in the region by external agents which have not been taken forward. Farmers demonstrate beyond doubt about initiatives, ignorance of legal requirements.

The need for reforestation in System Cantareira and the particularity of region indicates that organizations and traditional ways of action had not support and were not sufficient for good environmental local governance. The acting of various entities and organizations in the same physical space tends to generate overlapping policies. Thus, there is the need for integration initiatives. Good governance must act in a fashion that benefits from complementarity between the municipal, regional (within the Committee basin) and the State level.

In order to compare the design policies using PES we have previously reported two initiatives in the region. On a regional scale, the initiative of "Produtor de Água – PCJ" with the definition of an 'executive board' (UGP) enabled the incorporation of learning by different actors. By trial and error, it has developed a specific policy for the region where the rules and institutional articulation have been revised often. However, this format has shown several difficulties mainly due to heterogeneity of actors and operational issues.

The state program "Mina D'água" was designed in opposite direction of initiatives in Brazil, by did not have established an organization exclusively dedicated to PES management in state, but through partnerships with municipalities government. The advantage of this design is the ability to make projects more locally specific, though a statewide policy. However, by decentralizing the actions cannot earn economies of scale. The legal framework established by the State of São Paulo, within PEMC framework is limited to actions that promote carbon sequestration, and later were added the element of water protection and biodiversity conservation. This project should be analyzed by the legal framework that gave rise to this, giving experience to new policies PES led by state. Example of this is already in the final stages of preparing a policy to PES for Private Property Nature Reserves (RPPN).

The extrapolation of initiatives headed by local governments are hampered by several difficulties, such as: 1) lack of funding: despite support initiatives such as the program for the ANA, there is not financial viability for most municipalities to adopt the model of Extrema; 2) lack of administrative structure: many of the municipalities do not even have management plans or environmental councils, and many lack adequate

professional (either in an environment department or not); 3) lack of legal regulation: the legal uncertainty under federal acts as an inhibitor of initiatives at the municipal level, whereas state framework (in the case of São Paulo) gives no possibility of creating a program for municipalities, in addition to the programs already institutionalized; 5) difficulties in starting a project within the watershed committee, more fruitful arena for such, led by municipalities. Thus, the possibilities to gain scale in the use of the instrument of PES are not very promising regarding the emergence of new initiatives in the region. The special political and especially economic conditions in Extrema are not observed in any other county in the region.

Final conclusions

The Brazilian Forest Code is an emblematic example of the ineffectiveness of certain legal standards, mainly due to lack of supervision of compliance and lack of regulation by the State concerning the legal reserve requirement. In Brazil, we can still observe a dubious position of public power, where certain sectors defend the requirement of compliance with the law, while others stimulate increased production and advocate the reduction of legal requirements (Nusdeo, 2012).

We have demonstrated how environmental policies using PES in System Cantareira Region differ in their design, arrangement and target. Economic instruments like PES have been implemented in Brazil in a high pace. However, the difficulties of operationalization and lack of regulation of these contributed to increase the costs of operationalization. The states (i.e. São Paulo state) have taken the lead to launch standards and regulations that give support to the use of these. In a smaller scale local initiatives, as Extrema, has been taken as an example to other cities. However, because of their specific political and financial, the "Conservador de Águas" cannot serve as a model for other similar cities in the region or in other parts of Brazil. Although it provides important and useful information to analyze how was the adoption of 'market-based' instruments. Policies using market instruments are still far from being the dominant strategic environmental policy. As suggested by Muradian & Rival (2012), the hybrid schemes, combining governmental command and control, market tools and community institutional arrangements are best suited to deal with the governance of ecosystem services.

Instruments of PES has served as a tool to support land use management of land use, whereas initiatives should also encourage rural production in the region. The institutionalization of PES as environmental policy is a response to the constant questions about the socialization of benefits to society, but at the expense of the privatization of the burden for landowners.

References

Brasil, 1965. Código Florestal Brasileiro. Lei 4.771 de 15 de setembro de 1965

VON GLENH, Helena Carrascosa. Projeto Mina D'água. In: PAGIOLA, Stefano; VON GLENH, Helena Carrascosa; TAFARELLO, Denise (Org.). Experiências de pagamento por serviços ambientais no Brasil. São Paulo: Sma/cbrn, 2012. 274 p.

CORBERA, E.; BROWN, K. Building Institutions to Trade Ecosystem Services: Marketing Forest Carbon in Mexico. **World Development**, v. 36, n. 10, p. 1956-1979, out 2008.

Corbera, Esteve, Carmen González Soberanis, and Katrina Brown. 2009. "Institutional dimensions of Payments for Ecosystem Services: An analysis of Mexico's carbon forestry programme." *Ecological Economics* 68(3):743–761.

Gavaldão, M. (2009). Analyse sur un Projet de Paiements pour les Services Environnementaux: une Etude de Cas sur le « Conservateur des Eaux » à Extrema - Minas Gerais (Brésil). Tese de Mestrado . Geneva: Graduate Institute of International and Development Studies.

GUEDES, FÁTIBA BECKER; SEEHUSEN, S. E. **Pagamento por Serviços Ambientais na Mata Atlântica**. Brasília: [s.n.], 2011. p. 272

GÓMEZ-BAGGETHUN, E.; KELEMEN, E. Linking Institutional Change and the Flows of Ecosystem Services : Case Studies from Spain and Hungary. **Change**, n. MA 2005, 2007.

Metzger, J.P., 2010. O Código Florestal tem base científica? *Conservação e Natureza* 8 (1), 92–99.

Muradian, Roldan, Esteve Corbera, Unai Pascual, Nicolás Kosoy, and Peter H May. 2010. "Reconciling theory and practice : An alternative conceptual framework for understanding payments for environmental services." *Ecological Economics* 69(6):1202–1208.

Muradian, R. et al. 2013. "Payments for ecosystem services and the fatal attraction of win-win solutions." *Conservation Letters* 00:1–6.

Nusdeo, Ana Maria de Oliveira, 2012. Pagamento por Serviços Ambientais: sustentabilidade e disciplina jurídica. Editora Atlas, São Paulo.

Ostrom, E., 1990. *Governing the Commons: the Evolution of Institutions for Collective Action*. Cambridge University Press, New York.

Primmer et al (2011)

Porras (2011) – Ring & Schlaack, 2011

PORRAS, I.; GRIEG-GRAN, M.; NEVES, N. **All that glitters**. [S.l: s.n.], 2008.

Souza Junior (2011)

SPAROVEK, G.; BARRETTO, A.; KLUG, I.; PAPP, L.; LINO, J. A revisão do Código Florestal brasileiro. **Novos Estudos**, v. 89, p. 111-135, 2011.

Vatn, A., 2005. Rationality, institutions and environmental policy. *Ecological Economics* 55, 203–217.

VATN, A. An institutional analysis of payments for environmental services. **Ecological Economics**, v. 69, n. 6, p. 1245-1252, 2010.

WUNDER, S. Payments for environmental services: Some nuts and bolts. **CIFOR Occasional Paper**, n. 42, 2005.

WUNDER, S. The Efficiency of Payments for Environmental Services in Tropical Conservation. **Conservation Biology**, v. 21, n. 1, p. 48-58, 2007.

Young, O.R., 2002. The Institutional Dimension of Environmental Change. Fit, Interplay, and Scale. The MIT Press, Cambridge, MA.

Whately, Marussia & Pilar, Cunha. Cantareira 2006 : um olhar sobre o maior manancial de água da Região Metropolitana de São Paulo. São Paulo : Instituto Socioambiental, 2007.