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**A community-based approach for managing forest patches in the  
Atlantic Forest of Brazil – A Case Study of the Micro-Watershed  
Barracão dos Mendes, Rio de Janeiro State**

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## **ABSTRACT**

In the last 400 years, the coastal Brazilian Atlantic Forest, one of the world's top biodiversity hotspots, has been transformed from once being a continuous forest, into an intensely fragmented landscape due to human activities. Rural small communities living embedded into this mosaic of forest fragments rely on natural resources, and their livelihoods depend on their capacity to use and manage these fragments effectively. Thus, the inclusion of rural communities in the processes of forest conservation and management may serve both environmental and community development objectives. The current study aims to close the existent gap between communities and legal environmental requirements to ensure livelihoods and to preserve functioning ecosystems and ecosystem services, in Barracão dos Mendes micro-watershed. The objective is to develop ideas how local people can be involved in forest conservation processes within the concept of community-based development. The study area is located inside the buffer zone of a protected area, the Três Picos National Park. The methodology consists of the following steps: as a basis, the Brazilian legal framework for nature conservation was analyzed. In addition, interviews with 34 local people, 5 local actors as well as a participatory mapping was carried out, to identify local assets regarding their organizational profile and individual talents, local knowledge on ecosystem values, as well as, their sense of attachment to place; and interviews with 3 external actors to identify their supporting role inside the study area. The results show that the Brazilian legal framework is still centralized-commanded and excludes rural livelihoods. External actors mainly act as funding agents, which partly causes communities dependency on external interventions instead of capacity building, which may mobilize local assets. On the other hand, the existing local assets such as organizational ones are significant – such as local associations and committees for their representation – in addition of local knowledge on ecosystem values – such as establishment of riparian forests for water provision – showing a positive trend for grass-root development and conservation to occur. Through the proper use of the natural resources by local people, rather than prohibition, the local conservational status and community development may succeed. Moreover, the study showed that additional in-depth researches under a community-based development and conservation approach is needed for Barracão dos Mendes micro-watershed.

**Key-words:** forest conservation, natural resources, local assets, community development.

## RESUMEN

En los últimos 400 años, el Bosque Atlántico brasileño, uno de los “hotspots” más importantes en biodiversidad en el mundo, ha sido transformado de bosque continuo a un paisaje fragmentado debido a actividades humanas. Pequeñas comunidades rurales viviendo adentro de este mosaico de fragmentos forestales se basan en los recursos naturales, y sus formas de vidas dependen de la capacidad de usar y manejar adecuadamente estos fragmentos. Por lo tanto, la inclusión de comunidades rurales en los procesos de conservación y manejo de bosque deben servir tanto para los objetivos ambientales cuanto para los de desarrollo comunitario. El presente estudio tiene como objetivo cerrar el gap existente entre las comunidades y los requerimientos ambientales legales a fin de garantizar sus maneras de vida y preservar el funcionamiento de los ecosistemas y de los servicios ecosistémicos, en la micro cuenca de Barracão dos Mendes. El objetivo es desarrollar ideas de como las personas pueden ser involucradas en los procesos de conservación forestal bajo el concepto de desarrollo embazado en la comunidad. El área de estudio está localizado dentro de la zona de amortiguamiento de un área de protección, el Parque Nacional Três Picos. La metodología consiste de los siguientes pasos: como una base, el cuadro legal brasileño para conservación de la naturaleza fue analizado. Además de eso, entrevistas con 34 locales, 5 con actores locales, así como un mapa participativo, fue realizado, para identificar las habilidades locales relacionadas con su perfil organizacional y sus talentos individuales, conocimiento local en relación a valores ecosistémicos, así como, su sentimiento de pertenencia al local; y entrevistas con 3 actores externos para identificar su papel de soporte dentro del área de estudio. Los resultados muestran que o cuadro legal brasileño es centralmente comandado excluyendo las maneras de vida. Los actores externos actúan principalmente como proveedores de fondos, lo que parcialmente puede causar dependencia de las comunidades en intervenciones externas al revés de capacitar, movilizand o habilidades locales. Por otro lado, las habilidades locales existentes, tales como las organizacionales son significativas – asociaciones locales y comités para su representación – demás de conocimiento local sobre valores ecosistémicos – como el establecimiento de bosques de galera para provisión de agua – enseñando una tendencia positiva para que ocurra un desarrollo y conservación desde abajo. A través del uso apropiado de los recursos naturales por las personas locales, al revés de prohibirlas, el estado de conservación local e el desarrollo comunitario tienen espacio para éxito. Además, el estudio concluyo que investigaciones adicionales bajo el concepto de conservación y desarrollo basado en la comunidad son necesarios para la micro cuenca de Barracão dos Mendes.

**Palabras clave:** conservación de bosques, recursos naturales, habilidades locales, desarrollo comunitario

## ZUSAMMENFASSUNG

In den letzten 400 Jahren hat sich der atlantische Küstenwald in Brasilien, einem der wichtigsten Biodiversitäts-Hotspots weltweit, von einem ehemals kontinuierlichen Wald auf Grund menschlicher Aktivitäten in eine intensiv fragmentierte Landschaft verwandelt. Kleine ländliche Dorfgemeinschaften, die in diesem Mosaik von Waldfragmenten eingebettet sind, leben von der Nutzung natürlicher Ressourcen. Ihr Lebensunterhalt ist abhängig von ihrer Fähigkeit, diese Fragmente effektiv zu nutzen. Somit kann die Einbeziehung der ländlichen Gemeinden bei der Erhaltung und Nutzung des Waldes sowohl Umwelt- als auch Gemeindeentwicklungszielen dienen. Die vorliegende Studie zielt darauf ab, die vorhandene Lücke zwischen Gemeinden und umweltrechtlichen Anforderungen zu schließen, welche ihren Lebensunterhalt gewährleisten und funktionierende Ökosysteme und sogenannte *ecosystem services* in der Mikro-Wasserscheide in Barracao dos Mendes erhalten sollen. Ziel ist es, Ideen zu entwickeln, wie Menschen vor Ort in Waldschutzprozesse im Rahmen der gemeinschaftsbasierten Entwicklung beteiligt werden. Das Untersuchungsgebiet befindet sich in der Pufferzone des Naturschutzgebietes, dem Três Picos Nationalpark. Die Methodik besteht aus folgenden Schritten: Als Basis wurde der brasilianische Rechtsrahmen zum Umweltschutz analysiert. Darüber hinaus wurden Interviews mit 34 Menschen vor Ort, fünf lokalen Akteuren sowie eine partizipative Kartierung durchgeführt. Dadurch sollen lokale Potentiale hinsichtlich der Organisationsstrukturen der Menschen und ihren individuellen Fähigkeiten, lokales Wissen über den Wert eines Ökosystems genauso wie ihr Gefühl der Verbundenheit zum Ort identifiziert werden. Abschliessend identifizieren Interviews mit drei externen Akteuren deren unterstützende Rolle innerhalb des Forschungsgebietes. Die Forschungsergebnisse zeigen, dass das brasilianische Rechtssystem noch immer zentralistisch orientiert ist und Menschen in stark ländlich geprägten Gebieten nicht berücksichtigt. Externe Akteure fungieren hauptsächlich als Financiers, was zur Folge hat, dass Dorfgemeinschaften anstelle der Entwicklung von eigenen Potentialen von externer Unterstützung abhängig werden. Andererseits unterstreichen die bestehenden lokalen Gegebenheiten, etwa die vorhandenen Institutionen und zusätzlich das lokale Wissen über die Nutzung des Ökosystems, dass sich ein positiver Trend der Graswurzelentwicklung und Bewahrung vollzieht. Durch die Förderung der lokalen Bevölkerung im verantwortungsvollen Umgang mit den natürlichen Ressourcen kann der lokale Status der Bewahrung und die Entwicklung der Gemeinschaft erfolgreich sein. Darüber hinaus zeigte die Studie, dass zusätzlicher Forschungsbedarf hinsichtlich gemeinschaftsbasierter Entwicklung und Bewahrung der Mikrowasserscheide Barracao dos Mendes vonnöten ist.

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## LIST OF ABBREVIATIONS

ABCD	Assets-Based Community Development
APA	Área de Proteção Ambiental (Environmental Protected Area)
APP	Área de Proteção Permanente (Permanent Protected Area)
CBC	Community-Based Conservation
CBNRM	Community-Based Natural Resources Management
CD	Community Development
CECA	Comissão Estadual de Controle do Meio Ambiente (State Committee for Environmental Control)
CONAMA	Conselho Nacional do Meio Ambiente (National Council for Environment)
CONEMA	Conselho Estadual do Meio Ambiente (State Council for Environment)
EMATER	Empresa de Assistência Técnica e Extensão Rural (Enterprise for Technical Assistance and Rural Extension)
FECAM	Fundo Estadual de Controle do Meio Ambiente (State Fund for Environment Control)
Ibama	Brazilian Institute of Environment and Renewable Natural Resources
IBDF	Instituto Brasileiro de Floresta
ICMBio	Instituto Chico Mendes de Conservação de Biodiversidade (Chico Mendes Institute for Biodiversity Conservation)
IEF	Instituto Estadual de Florestas (State Institute for Forests)
INEA	Instituto Estadual Ambiental (State Institute for Environment)
IUCN	International Union for Conservation of Nature
MMA	Ministério do Meio Ambiente (Ministry of Environment)
PARNASO	Parque Nacional da Serra dos Órgãos (Serra dos Órgãos National Park)
Pesagro-Rio	Empresa Governamental para Pesquisa Agropecuária (Governmental Enterprise for Agriculture and Cattle Research)
PETP	Parque Estadual dos Três Picos (Três Picos State Park)

RBMA	Reserva da Biosfera da Mata Atlântica (Atlantic Forest Biosphere Resreve)
Resex	Reserva Marinha Extrativista (Marine Extractive Reserve)
RJ	Estado do Rio de Janeiro (Rio de Janeiro State)
RL	Legal Reserve (Reserva Legal)
RPPN	Private Natural Heritage Reserve (Reserva Particular do Patrimônio Natural)
SBF	Serviço Brasileiro de Florestas (Brazilian Service for Forests)
SEA	Secretaria Estadual do Meio Ambiente (State Secretary for Environment)
SEMA	Secretaria Especial de Meio Ambients (Special Secretary for Environment)
SISNAMA	Sistema Nacional de Meio Ambiente (National System for Environment)
SNUC	Sistema Nacional de Unidades de Conservação da Natureza (National System of Nature Conservation Units)
UC	Unidade de Conservação (Conservation Unit)
UNDP	United Nations Development Program
ZA	Zona de Amortecimento (Buffer Zone)

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## **1 INTRODUCTION**

### **1.1 Habitat Loss and Forest Fragmentation**

Habitat loss and fragmentation are the main threats to forest ecosystems (Heywood et al., 1995). In general, deforestation is mostly associated with human settlement expansion and exploitation of the natural landscape, (Gascon et al., 2001), particularly agricultural activities. The fragmentation has great impacts once, besides diminishing the vegetation cover, generates edge effects and isolated forest patches embedded into a new matrix habitat (the modified landscape habitat surrounding habitat remnants) negatively affecting the landscape level (Gascon et al., 2001; Lambin, Geist, & Lepers, 2003). Forest fragmentation, in addition, has resulted in the elimination of many populations, and potentially, in the erosion of the genetic diversity of several species (Brown & Brown, 1992). Proximate causes are human activities or immediate actions at the local level, such as agricultural expansion, coming from the intended land use and which directly impact forest cover (Leal & de Gusmão Câmara, 2003). Through fragmentation innumerable ecological aspects are impacted, such as pollination and nutrient cycling, in addition of forest functions, such as hydrological cycles and evapotranspiration (Geist & Lambin, 2002).

### **1.2 Background Information on Atlantic Forest**

The Atlantic Forest (Mata Atlântica) “*is one of the most spectacular forests growing under a tropical wet climate*” (Medici, 2010, p.40), being more diverse than nearly all the Amazon forests (Brown & Brown, 1992) being recognized as an important biodiversity hotspot world-wide (Leal & de Gusmão Câmara, 2003). It has originally, continuously, extended through the Brazilian coast, from 4° to 32°S, penetrating to the east of Paraguay and northeast of Argentina (Tabarelli et al. 2005), covering more than 1.5 million sq km of which 92% being inside Brazil (Fundação SOS Mata Atlântica & INPE, 2001; Leal & de Gusmão Câmara, 2003). The orientation of the coastline and mountain ranges gives rise to orographic rains and a considerable winter rainfall, resulting in an ever-wet rain forest climate with annual precipitation ranging from 2,000 mm to more than 4,000 mm. (Scarano et al., 2001).

In the last 400 years the Atlantic Forest has lost approximately 250 species of birds, mammals, reptiles and amphibians due to human activities (Leal & de Gusmão Câmara, 2003; Morellato & Haddad, 2000). Species extinctions cause shifts in ecosystem

processes diminishing products and services, which are clean air and water, fertile soils and varieties of plants and animals that humans rely on for food, fuel, clothing, medicine and shelter (Toledo et al., 1995). Around 11 to 16% of the forest original cover remains, more than previous estimates, from which around 36% is represented by immense archipelagos of tiny and widely separated forest fragments (Ribeiro et al., 2009; Tabarelli et al., 2005). Some studies show that it is important preserving even small forest fragments (Leal & de Gusmão Câmara, 2003; Tewksbury et al., 2000; Raedig & Lautenbach, 2009). The importance of connecting the fragments may ensure their conservation or preserve and restore "corridors" of vegetation, allowing the fauna to move from one fragment to another (Beier et al. 2010). Alternative management procedures, such as the control of edge effects, which are particularly a problem in small fragments, should be considered (Morellato & Haddad, 2000).

People living in across the Brazilian Atlantic Forest, in urban – most of them in megacities such as São Paulo and Rio de Janeiro – and rural areas, who depend directly or indirectly on the products of healthy ecosystems (Salafsky & Wollenberg, 2000). Around 100 million Brazilians live in more than 3,000 cities embedded in this ecosystem (Bueno, 1998; Chiarello, 1999). Uncontrolled urban expansion, industrialization and land use change are the main drivers of forest fragmentation in this region (Medici, 2010; Morellato & Haddad, 2000). Also, the biodiversity loss in the Atlantic Forest has complex causes fuelled over time, since colonization, by a history of inequitable land tenure system and local, national, and international exploitation cycles (Dean, 1996; Nehren et al., 2013).

Despite there are legal instruments for Atlantic Forest conservation and management, many impacting legal activities are being performed, such as cattle and intensive agriculture and illegal such as logging, poaching of flora and fauna and human settlements, besides industries creation, oil exploitation, among others, all contributing to the loss and deterioration of biodiversity (Leal & de Gusmão Câmara, 2003; Nehren et al., 2009).

Establishing protected areas in the region has been one of the most important tools for conserving the Atlantic Forest biodiversity, although the conservational aims afforded by these protected areas are not sufficient (Medici, 2010; IUCN 2008) once lots of them lack management plans, land tenure definition, monitoring, among others (Leal & de Gusmão Câmara, 2003). In addition, most of the protected areas are small

and need to be enlarged, have their systems of protection strengthened and restored, establish actions to include local people living nearby, create connectivity through biological corridors, among others (Salafsky & Wollenberg, 2000). In addition, the vast majority of the protected areas does not take into account local activities and development, excluding local communities to take part on decision making and environmental awareness processes (INEA, 2013).

The most important corridor established to protect remaining areas of Atlantic Forest is the Serra do Mar Corridor being critically important due to its endemic species. The Serra do Mar Corridor is composed of three important mosaics (MMA, 2014) and the protected areas inside them are under a complex network environmental regulations at different levels and power relations, such as the Forest Code policy, the Atlantic Forest policy and regulation instruments such as SNUC, IMCBio, among others (ICMBio, 2007; Medeiros, 2005; Nehren et al., 2009)

### **1.3 Problem Statement**

Even though the Atlantic Forest accounts with a large institutional framework for forest management and conservation (MMA, 2014) it still carries the burden of being one of the most endangered biomes in the world. Due to its coastal location, deforestation has begun more than five-hundred years ago, when the European colonization took place in the east portion of South America (Bueno, 1998; Dean, 1996), enabling the recent uncontrolled human settlements in the area. Since then, people living in the surroundings of Atlantic Forest, historically has these places as home and cannot be considered as non-part of this landscape.

The remaining fragments of Atlantic Forest are mostly in regions where the access is not easy and the terrain is not suitable to agriculture and cattle activities that are on the slopes of the Serra do Mar mountain range (Nehren et al., 2013) . Besides huge urban centers, a lot of rural small communities living embedded into the Atlantic Forest rely on natural resources, and their livelihood depends on their capacity to use and manage them effectively (IFAD, 2006; Salafsky & Wollenberg, 2000).

Thus, forest management and conservation may be improved by increasing a more direct inclusion of people (Ellis & Porter-Bolland, 2008; Heinen & Mehta, 2000; Koch & Kennedy, 1991). This is because traditional forestry institutions operating centralized command-and-control structures are becoming increasingly outmoded as natural forests



are depleted of timber and demands for ecosystem services such as watershed protection, biodiversity conservation and climate change mitigation increase (Berkes, 2007). In addition, calls for greater social and economic justice and for greater local participation are growing and responsibilities to local levels are increasingly seen as key to achieve social, economic and environmental improvement goals (FAO, 2008).

Following this track, it has been identified that many forest-dependent communities and smallholders are not included in policy processes. Thus, they cannot influence development strategies, largely because they are not organized in networks, associations or other groups (IIED, 2011). There is a clear call on the need to work with communities, government, NGOs and businesses, supporting the development of local partnerships that may create the possibility to improve forest management. Local skills and capacities might be collected to permit bottom-up processes on new forest management to occur (IFAD, 2006).

There are strategic gaps between activities employed by rural people and the centered legal framework for Atlantic Forest conservation. Local actions should be considered and properly fostered aiming to contribute to forest conservation. Thus, local people may be key elements for both conservation and rural development, by their involvement and true engagement in these processes.

#### **1.4 Justification**

Although many papers on conservation and management of Atlantic Forest fragments have been published (CAPES, 2014), the biological conservation literature has very little overlap with the rural development and livelihoods literature, a barrier to involve local people into forest management and conservation (Berkes, 2007). If conservation and development can be simultaneously achieved, the interests of both can be served, however many community-based development projects are primarily concerned with social development while nature conservation through management plans let the social issues behind (Salafsky & Wollenberg, 2000), but rarely both are considered (Berkes, 2007).

Therefore, it is necessary to analyze data on local communities living embedded into the Atlantic Forest that rely on natural resources or ecosystem services from them. According to Berkes (2004), forest protection and community development could be simultaneously achieved if the interests of both are truly considered. The attempt to find

new solutions for the failure of top-down approaches to conservation relies on the recognition that local communities must be aware over the utilization and benefits of natural resources, in order to value them in a sustainable manner (BCN, 1997; CBNRM, 2014).

The current research aims to close this gap for the study area of Barracão dos Mendes micro-watershed under the concepts of community-based development and conservation, in order to come up with ideas how local people can be involved in forest conservation processes.

## **1.5 Research Objectives**

### **General Objective**

To close the gap between local livelihood actions and legal regulations for forest management and conservation through people-involvement alternatives under a community-based development and conservation approach.

### **Specific Objectives**

1. Analyze the Brazilian laws, regulations and instruments, and their actuation levels, designed for environment, such as for protected areas and for forest conservation that are relevant to understand Atlantic Forest and the study area status.
2. Identify and analyze the external actors intervening inside the community, their roles and objectives, under a community-based approach.
3. Identify and analyze the role of local actors and the local skills – associational, natural and individual – and local knowledge (perception) on natural resources use and ecosystem values under a community-based approach.

To finally, come up with alternatives on how local people and their livelihoods could be included in nature conservation processes.

## 2 CONCEPTUAL FRAMEWORK

### 2.1 Community-based Development

Nowadays, Community Development (CD) has evolved into a recognized discipline of interest to both practitioners and academicians. However, CD could be defined in very different ways. While practitioners usually understand CD as an outcome, academics define CD as a process. Therefore, Philips & Pittman (2009, p. 6) give a common definition of CD, combining both outcome and process. They define CD as “*a process: developing and enhancing the ability to act collectively, and an outcome: 1) taking collective action and 2) the result of that action for improvement in a community in any or all realms: physical, environmental, cultural, social, political, economic, etc.*” As ambiguous as CD is, also is the definition of the term “community” itself. Community might refer to geographic terms, like neighborhood or town (“place-based” or communities of place definitions), or to social terms, such as a group of people sharing a common interest (“people-based”) (Phillips and Pittman, 2009). A combined definition of community, people- and place-based, is provided by the National Research Council (1975) which defines community as “*a grouping of people who live close to one another and are united by common interests and mutual aid*”. This combination of place- and people-based is important as policy options for CD also addresses these two scopes (UN-Habitat, 2008). Furthermore, other definitions of community are provided by research fields as Politics or Psychology, for example; however, the current study will make use of the latter definition. In addition, it is worth defining who the local people are. According to Brosius (2006), invoking “local” might refer to all the voices of peasants, farmers, fishers or indigenous peoples, often living in out-of-the-way places, frequently marginalized politically and economically.

According to Brophy & Shabecoff (2001) CD has three main goals: 1) to change the economy of a community, 2) to improve the physical nature of the community, and 3) to strengthen social bonds between people in the community. Thus, CD presents a very complex task to reach these goals and therefore, in most CD projects various organizations or institutions are involved. They might be donors who provide financial support to the activities, practitioners who design and/or perform the CD, research organizations who conduct studies or surveys for project planning, implementing agencies responsible for executing all the project activities, or consultants who provide technical support or advices (Nagahata, 2010). Furthermore, the actors involved in CD

are differentiated according to the scale (local, regional, national, and international) and according to the sector (public, private, civil). Thereby, for purposes of the current thesis, an external actor is any actor that is not local and therefore not part of the community, irrespective of the sector.

Based on the involvement of these external actors, CD could nowadays be performed on two primary methods of approaching: needs-based or assets-based (Phillips & Pittman, 2009). The conventional needs-based approach identifies the problems of a community and the outsiders try to fix them by providing external services to the community. This practice is widely applied; however, it is not considered a sustainable solution as it causes dependency on external resources and/or services. Thus, the alternative assets-based community development (ABCD) approach is focused on a community's strengths and assets to drive the development from inside-out and therefore it is considered as an innovative strategy for community-driven development (Mathie & Cunningham, 2002). In this scope, it is understood that every community has assets, which are cultural, physical, economic and social as well as organizational, associational, or institutional. Moreover, there can be local knowledge, local associations, social networks and people's attachment to place, just to quote some examples (UN-Habitat, 2008). This approach is also a driver to build locally driven and bottom-up development.

Regarding the asset attachment to place, it is considered a skill throughout the literature as it is considered a "public good" from which everyone in a community should benefit from (UN-Habitat, 2008). When a community is identified by its qualities, rather than needs, they are generally vibrant places, with a strong feeling of belongingness. This talent may be, in many cases, ignored by the external actors promoting the development inside a community. However, it should not be the proper approach. The feeling of being part of that place brings along much to say. It is the base from which the desire for a community to change may emerge. It is the same as feeling home, wondering the best for your place. When this feeling is identified, it is possible to identify a sincere commitment to the community's well-being. It may be a motor to start up a change from inside-out (Phillips & Pittman, 2009).

The community-based development focuses on assets (or skills), considers that the community's interests and goals should target the outside institutions making clear the role of the external agencies and institutions aiming to not create dependency among

community members (Keeble, 2006). According to UN-Habitat (2008), external political connections might muster the support for local projects to materialize. The networks build between the community and the external actors can strengthen and expand the community cohesion. In the long-term, talents are not anymore only linked in a neighbor-to-neighbor basis, but also with external agencies avoiding the so-called marginality, which is the physical, social and political isolation from mainstream society (Perlman, 1976). **Table 1** shows the differences in the needs-based approach and the assets-based approach, also clarifying their components.

**Table 1** – Differences among needs-based and assets-based community development

	<i>Needs-based</i>	<i>Assets-based</i>
<b>EMPHASIS</b>	Deficit Model (weaknesses)	Dynamic Model (strengths)
	Experts-based	Local and expert knowledge
	Top-down	Bottom-up
	Needs lacking (Marginality)	Skills lacking (Capacity Building)
	Neighborhoods Needs Map	Community Assets Map
<b>OUTCOMES</b>	External resource allocation	Local resources
	Providing Services → Dependency, short-term	Creating Care → Self-help and technical assistance, long term
	Redistribution	Empowerment
<b>RELATION</b>	Vertical relation of actors	Horizontal relation of actors
	Revitalization	Partnership and network

Source: Own table based on Keeble (2006) and UN-Habitat (2008).

Perceiving the community itself as responsible and able to improve its welfare and status of marginalized has been a crucial change allowing the appearance of alternative theories, interventions and methodologies. Emphasis is given on how local people's abilities and knowledge could be tapped to make conservation empowering and culturally compatible, being used as substrate for new grass-roots approaches (World Bank, 2004) . Under the CD umbrella approach, some branches regarding natural resources and communities have emerged such as community-based conservation (CBC), community-based natural resources management (CBNRM), among others.

The community-based conservation (CBC), derived from community development and arising in part as a reaction to the failure of exclusionary conservation, in a world in which social and economic factors are increasingly seen as key to conservation success (Ghimire & Pimbert 1997) and also in reaction to the panacea of state-managed conservation (Murphree, 2002). The definition of community-based conservation provided by Western & Wright (1994) is that CBC should “*include natural resources or biodiversity protection by, for, and with the local community*” (p. 7). Berkes (2006) extends the definition so that “*community-based conservation includes natural resources or biodiversity protection, by, for, and with the local community, taking into account drivers, institutional linkages at the local level, and multiple levels of organization that impact and shape institutions at the local level*” (p. 3). CBC as a concept – once as a use it has a long history – is relatively new. It has emerged in the 1980s by the World Bank and Asian Development Bank based on a protected-area concept, aiming the increase of benefits from alternative livelihood activities as a way to reduce the threat to conservation from local people. In the 1990s, CBC went further by aiming to establish a direct connection between conservation and local benefits, closing the gap between biodiversity and livelihood, becoming a driving force leading to conservation by establishing a direct incentive for local people to protect biodiversity in long term (Salafsky & Wollenberg, 2000). Berkes (2007) also states that implementing governance to deal with the complexity of biodiversity conservation requires developing the capacity to deal with multiple objectives, using deliberative processes and partnerships and learning lessons from commons research.

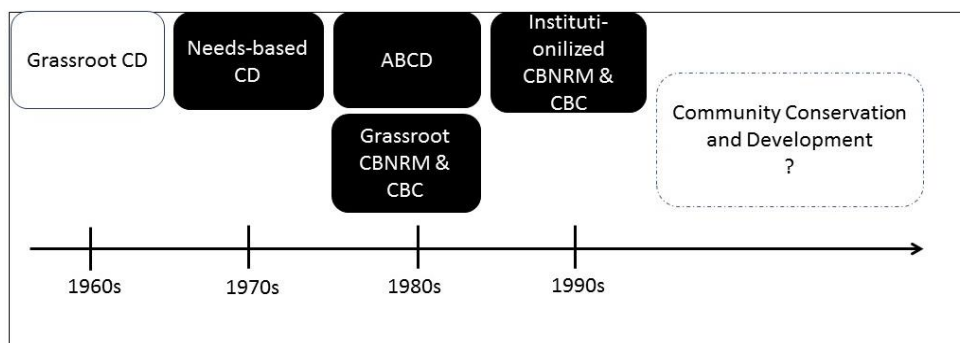
Regarding the conceptual aspect of these community-oriented approaches, it corroborates the emergence of social capital literature in the mid-1990s, being social capital broadly accepted as “*the features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions*” (Putnam, 1993, p. 167). The social capital issue has relative accuracy to address complex issues, fitting into CBC characteristics to accomplish with two complex objectives: community development and nature conservation.

Another approach regarding natural resource conservation and community development has emerged as community-based natural resource management (CBNRM) in line with the rise of social movements, when conservation initiatives drew on notions of participatory engagement, indigenous knowledge and community needs

(Dressler et al., 2010), but it is considered as the same as CBC by Ballet et al. (2007) (**Figure 1** – Chronologic overview of community development theory). However in the literature, it is possible to observe that the latter has emerged and developed as a third way between government administration and market-oriented management (Baland & Platteau, 1996; Ostrom, 1990), in contrast to the CBC.

Actually, the given examples consider unifying development and conservation, but with the same premises of community-development based on the characteristic of the communities' surrounds. Indeed, it is yet possible to find in the literature even more highly specific CD derivatives, such as community-based marine protected-area conservation, among others. Because they are biased, they sometimes may not be reproduced for different ecosystems. Thus, in this regard, the current research will make use of the community-based development premises that are repeated in CBC, although both community-based development and community-based conservation terms will be used throughout the document.

**Figure 1** – Chronologic overview of community development theory



Source: own figure based on Keeble (2006) and Dressler et al. (2010)

As already mentioned, the role of the external actors when locals are seeking for external help is an important component of community's development, and the one with which, in a long-term base, may lead to empowerment. The external help may enable the community by establishing contacts with external experts and sources of funding (UN-Habitat, 2008), which should be able and aware of the resource allocation externally provided. As the external actors are present in all community-based approaches (ABCD, CD, CBC, etc.), their role and characteristics will be further detailed, as follows.

### **2.1.1 The Role of External Actors**

According to Nagahata (2010), there are different reasons for outsider involvement in CD:

- Provision of important knowledge, that is not available within the community (e.g. basic concepts, problem analysis, expert knowledge);
- Coordination of community and actors impacted by community issues on another scale;
- Provision of funds;
- Mobilizing the community; and
- Providing external resources (e.g. equipment and facility).

The UNDP (UN-Habitat, 2008) also calls external actors as technical assistance which shapes the way government and non-government resources help people find solutions to their important issues. It defines that technical assistance may help in two major ways:

- Transferring financial, organizational and political assistance from external sources to the communities - partly overlaying Nagahata's theory (2010) – and;
- Boosting self-confidence in marginalized communities.

The role of external actors within a needs-based approach could be based on the preceding explanations as follows: they are experts fixing the communities problems from outside by providing their services and external resources to the community. Consequently, under the needs-based approach external actors have the power of the development process and are in a vertical relation to the community; thus, local groups deal more with external actors than with other local groups (Kretzman and McKnight, 1993).

To determine their role within the assets-based approach, further explanations are required. Communities being developed under the assets-based approach may need additional help from outside, and one clear and obvious support may be the provision of funding. In this case, outsiders act as donors. Moreover, Russell (2009) synthetizes that even under an asset-based approach, the external intervention is still needed; however, it might come as a supportive pillar. The difference between needs-based and assets-based



approach is that outside interventions will be much more effective if the local community is itself fully mobilized and thus can itself define the agendas for which outside assistance, resources and knowledge must be obtained (Ketzman and McKnight, 1993). As the community shall be shifted from ‘clients to citizens’ while replacing the needs-based approach by an assets-based approach, the job of external agents is to support local individuals, on their journey (Mathie and Cunningham, 2009). The challenge is to avoid the level of involvement that can induce dependency (Mathie and Cunningham, 2002).

Second, the relation of external actors and the community has to be considered. The relationship of external actors with local actors has to be at arm's length resulting to a horizontal relation of all actors involved. Thus, external actors shall be partners for the community (Mathie and Cunningham, 2002). Laverack (2001) argues that partnerships can be especially effective toward community empowerment because the individual partners share the same responsibilities, tasks and resources (Laverack, 2001). At an initial stage, the external actors might act as facilitators of the whole process, and as a node in a widening network of connections, which the community may have with other actors.

Third, the power owned by external actors has to be relocated to the communities (empowerment). This implies, that external actors have to step back especially when it comes to decision-making and ownership scope (Mathie & Cunningham, 2002). Community ownership and decision-making are crucial in the CD and the involvement of outsiders cannot take the place of local ownership and the decision-making (Stiglitz, 1998). Rather external actors have to act on community empowerment and local asset mobilization (Ketzman & McKnight, 1996).

The challenge with respect to the role of external actors is to identify a legitimate role for these outsiders in CD so that control over development stays within the communities themselves, but in a climate where participation of other actors could enrich the CD. Less indirect involvement from the outside is considered to bring a greater chance of success when applying an assets-based approach (Mathie & Cunningham, 2002).

To sum up until this point, **Table 2** gives an overview of how the external actor's behaviour inside a community-based development should be.

**Table 2** – The role of external actors in under an ideal optic for community-based development

<b>Purpose</b>	<b>Ideal role of external actor</b>
Knowledge	Local knowledge and expert knowledge
Orientation	Bottom-up/ Grassroots
Interventions	Partnership
Participation	Co-production of knowledge
Problem solving	Technical empowerment

Source: own table based on Keeble (2006)

As the external help is a key issue in order to change the reality of the given communities, it is important to emphasize how it is addressed. When the external help comes in a top-down manner, without considering the real aspirations of the community, targeting only the needs in a fast alleviating way, it may not be enough nor concrete to mitigate the settled issues. This model may create a dependency on external resources brought by public, private or non-profit organizations, being translated as the extent of the community's problems, valued by the target community as services which will improve and transform their condition of in need community (Kretzmann & Mcknight, 1993). To overcome this paradigm, some components inside the community should be considered. Using the words of Goldsmith (1979), "ghetto as resource", the community's assets may be visualized. The construction of the assets inventory owned by the community strengthen the involvement and relation among parts (UN-Habitat, 2008). The local social networks play a great role when considering the community's assets, once it is supposed that ownership remains on the hands of the local people, representing their interests and worries.

### **2.1.2 Partnerships**

Partnerships are great avenues for communities to attract external resources (UN-Habitat, 2008). The Convention on Biological Diversity considers that conservation-development arrangements that involve communities as partners are key components for success. Partnerships play a key role in several cases for capacity building and participation through working relations, rather than top-down interventions, a major

reason for failure in many community-based projects (Katrina Brown, 2002). Developing them may be a key component to highlight the political nature of capacity and asset building (UN-Habitat, 2008).

Partnerships, in the case of conservation and development can be built between managers and resource users and may be seen as a co management tool, for example, between community and government (Berkes, 2004). In order to be solid and concrete, the partnerships must be established and penetrate several hierarchical levels of organization; among intra-community groups; NGOs, government agencies and other parties; and one or more international groups. For this to be feasible, it requires mutual learning and trust-building (Berkes, 2004). The objectives of the partnerships are innumerable, but they share the common profile of benefiting the parties involved.

Knowledge partnerships, for example, represent a way of investing in the community, (UN-Habitat, 2008). Regarding politics, the local scope may form new relationships with capable partners whose resources lie outside the local community. Private companies and organizations participate in community development through grants, technical assistance, and staff involvement in community leadership roles. These private companies, such as banks, utilities and private developers are the most common partners to undertake activities related to their specific business or that may create revenue-generating opportunities for them (Philips & Pittman, 2009).

A network can be considered an interaction of partnerships in a multi-level system. When two or more organizations, leaderships, or simply groups, collaborate to achieve a common goal, then it may be formed. This is because problems or issues may be better addressed together than independently; the number represents a leverage of power in flexing political structures and/or pressing influence; more effective operation in a co-management pattern; the possibility to broad limited human and financial resources of a community, by reducing duplicate organizations; among others (Philips & Pittman, 2009).

Networks that take local priorities and objectives, as well as the external ones, into account require systematic interaction. They are processes for communication and for raising and collectively considering issues in which the various parties engage in discussions, exchange observations and views, reflect on information, evaluate results, and attempt to persuade each other (Stern, 2005). Some UNDP projects indicate that

successful projects tend to have not only rich networks involving more than a dozen partners but also links across four or five level or organization (Berkes, 2007).

Thus, integrated responses may be a way of moving from problem solving as if conservation involved simple interactions to problem solving in a complex network that requires multilevel governance. Consistent with the needs of managing complexity, integrated responses tend to involve networks and partnerships of various levels of the governmental and private sectors as well as civil society (Brown, Mackensen, & Rosendo, 2005; Carlsson & Berkes, 2005). However, there are barriers to establishing such networks and partnerships because of differences in power held by the various parties involved. In particular, there has been resistance to dealing with livelihood and biodiversity conservation objectives simultaneously, with the argument that social objectives dilute the all-important conservation objectives (Brechin et. al, 2003).

### **2.1.3 Local knowledge**

Knowledge can be defined as *“the socially produced acknowledgment of the existence of real phenomena and the characteristics they possess, presenting a way of viewing the world”* (Mehta, 1999, p. 153).

Locals must be valued by their richly detailed knowledge representing generation of observation and experimentation about medical plants, crop varieties, trees, the habits of animals and much more. The “local knowledge” is mainly labeled as how societies interpret their natural surrounding world, how they exploit them and understand environmental processes, and so forth; thus the referred local or indigenous knowledge can be defined as environmental knowledge (MA, 2006). Although it is already a positive development, to consider the value of local knowledge, it might be not only limited to nature. It must be taken into account that the local knowledge that provides information *“not scientifically credible are salient and legitimate as well”* (MA, 2006, p. 135). This knowledge is cumulative and handed through generations by cultural transmission; hence, the local knowledge is different from scientific in a number of ways, tending to be experiential and closely related to a way of life; being orally passed rather than through book learning (Berkes, 2004).

When communities are targeted for technical assistance, generally they rely subjected to the ‘expert knowledge’, such as an imposition from the ‘strongest’ ones (UN-Habitat, 2008). The most recent approaches, such as ABCD, attempt to reverse the

conventional expert-based, top-down government intervention, once conflicts are prone to arise between expert and local knowledge, due to their great difference on how things are learned, taught, analyzed. The relationship between expert knowledge and local knowledge may be conflicting and not comfortable (Berkes, 2004; UN-Habitat, 2008)

The expert knowledge should be complemented with the community becoming partner in the cooperative process of knowledge creation and sharing, as opposed to being the object of research. These two types of knowledge can interact to improve the understanding of both parties, generating possibilities for the complementary use. Different actors define knowledge in different ways (Rose, 1996). This is because different groups, organizations or stakeholders value differently a resource, such as a forest (Ostrom et al., 1999).

In multilevel conservation, such understandings require the input and knowledge of players at different levels, from local to international; local and indigenous knowledge can complement science not only in terms of adding to the range of information available, but also in terms of scale, giving a more complete accounting at the various levels of analysis from local to global and vice-versa (MA, 2006).

### 3 METHODOLOGY

#### 3.1 Study Area

##### 3.1.1 Geophysical and biological description

The study area is a micro-watershed<sup>1</sup> called Barracão dos Mendes (22° 30'63''/42°71'94''), geographically positioned in the southeast part of Brazil, in Rio de Janeiro State, inside the Região Serrana (Mountain Region). Barracão dos Mendes belongs to the municipality of Nova Friburgo (**Figure 2**), in a distance of approximately 110 km from Rio de Janeiro city, being accessed through the road Teresópolis-Friburgo (RJ-130). It covers an area of approximately 2,800 ha in an average elevation of 1,020 m.a.s.l., receives a mean annual precipitation of 1650 mm with deficit in the winter season (Rio Rural maps 2009; not published data). Barracão dos Mendes micro-watershed is very rich in water resources. It belongs to the watershed Rio Dois Rios which is part of the sub-basin Paraíba do Sul, in the macro hydrological region of the Southwest Atlantic (national level division), with an average annual precipitation of 1,401 mm and a mean water flow ( $Q_{95\%}$ ) of 3,167 m<sup>3</sup>/s (ANA, 2013). Rio Dois Rios watershed has an area of approximately 4,375.5 sq km and is the largest watershed within the municipality of Nova Friburgo with greater water demand (49%) in comparison to the other cities composing the watershed. The total water flow of Rio Dois Rios is 16 m<sup>3</sup>/s, of which 0.082 m<sup>3</sup>/s are used for agriculture consumption. There are 2022 registered enterprises for water use inside Rio Dois Rios watershed, mostly of them under irrigation use category (1120 enterprises from 2022). Nova Friburgo accounts with 217 registered enterprises (AGEVAP, 2013). At the micro level, Barracão dos Mendes is characterized by the Rio Grande valley and by its stream valleys, having by one side the Córrego Grande water body and at the other side Serra do Rio Grande, Florândia da Serra and Barracão dos Mendes water bodies.

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<sup>1</sup> The micro-watershed is defined as a small river basin delimited to a drainage network (water streams) flowing into a main river (Rio Rural, 2014).

**Figure 2** – Localiation of Barracão dos Mendes micro-watershed, Rio de Janeiro State, Brazil



Source: own map based on Rio Rural not-published data.

### **Barracão dos Mendes nature surroundings – the Serra do Mar**

Barracão dos Mendes is embedded in the Serra do Mar corridor where the largest remaining patches of Atlantic Forest are present. In Rio de Janeiro State, the Serra do Mar Corridor is known as Serra dos Órgãos. It is one of the richest biodiversity areas of Atlantic Forest, with greatest concentration of endemic species for many groups (Manne et al., 1999; Brown & Freitas, 2000) and greatest concentration of threatened bird species (Manne et al., 1999). Although the Serra do Mar corridor passes through and by the two largest Brazilian metropolitan areas, relatively large forest areas are well preserved, thanks to steep slopes that are not suitable for human occupation (Silva et al., 2007) and for agriculture (Leal & de Gusmão Câmara, 2003). The Serra do Mar is a set of festooned cliffs with about 1,000 km long, which ends in the Atlantic Plateau in

the stretch toward Santos Basin. The origin of this sub parallel mountain range probably dates back to the Paleocene (Almeida & Carneiro, 1998). In the central-eastern region of Rio de Janeiro – where the study area is located – it consists of tilted fault blocks to north-northwest toward the river Paraíba do Sul.

The Serra do Mar includes some of the most important protected areas of Atlantic Forest, being 38% of all them under federal jurisdiction, presenting an average size of more than 350 sq. km (ICMBio, 2007). Just in Rio de Janeiro State, there are 109 different types of Conservation Units (UCs) under federal, state and municipal jurisdiction (P. C. Morellato & Leitao-Filho, 1996). The current research is performed inside a portion of the Fluminense Central mosaic, in the proximities to the Serra dos Órgãos National Park (PARNASO, from Portuguese, Parque Nacional da Serra dos Órgãos). Under federal regulation by the Chico Mendes Institute for Biodiversity Conservation (ICMBio), it is a continuity of Três Picos State Park (PETP, from Portuguese, Parque Estadual dos Três Picos), where the study area is embraced (ICMBio, 2007). PARNASO stands out as a continuous forest of the montane and high-montane type, showing impressive levels of endemism, richness of invertebrates, and numbers of threatened species of mammals, amphibians, and reptiles (Bergallo et al., 2000). In addition, documented flagship species that are critically endangered are found, such as the *Brachyteles arachnoides* (ICMBio, 2014). The PETP covers, besides Rio Dois Rios watershed, four other river basins having a great importance to water resources. The municipalities covered are five amongst which, Nova Friburgo is found. It has an area of approximately 65,113 ha and represents an imposing granite mountain range with an elevation of 100 up to 2,316 m.a.s.l., being the largest state park of Rio de Janeiro State for integrated protection<sup>2</sup>.

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<sup>2</sup> See Appendix Section for definition of integral protection.



**Figure 3** – PETP and other protected areas conforming part of the Serra do Mar Corridor nearby the Study Area, Barracão dos Mendes micro-watershed



Source: own map based on Rio Rural not-published data.

The predominant vegetation types of the area are low montane dense rain forest, high montane, misty forests and “campos de altitude”, which are “highland grass-dominated formations” (DeForest Safford 2004, p. 693). The most abundant arboreal genera inside the study area are *Ocotea* sp., *Tibouchina* sp, *Myrcia* sp., and *Cabralea* sp. (INEA, 2013). Moreover, the area inhabits 301 registered bird species representing 40% of the total bird species of Rio de Janeiro State (INEA, 2013). The park contributes economically to the region due to the offered activities in ecotourism, such as tracks, climbing and cascades, in addition of a known sightseeing inside the PETP, a specimen of *Cariana legais* (pink jequitibá) with a twenty feet in circumference canopy, rising to about fifty feet tall with an estimated age of nearly a thousand years (Clube dos Aventureiros, 2014).

Barracão dos Mendes region presents a highland tropical climate (*Cwa* according to the climatic classification of Köppen), with cold and dry winters and humid and pleasant summers. The mean temperatures are registered around 18°C, being the

average temperature around 24°C in summer season and 13°C in the winter, with possibilities of frost in the lowland areas and hailstorms in summer (Barracão dos Mendes PEM, not-published data).

### 3.1.2 Historical development and socio-economic figures

Nova Friburgo municipality is divided into seven (7) districts; one is Campo do Coelho district with the study area Barracão dos Mendes. Before the European colonization, the region was mainly inhabited by indigenous groups, such as Goytacazes and Puris. From the year 1818, Swiss immigrants colonized the area due to the current Portuguese Emperor initiative to establish a friendship with Switzerland, against the French Empire. Few time later, German immigrants came into the region, establishing the first non-Portuguese colony in the country, Nova Friburgo (Agenda 21 Nova Friburgo, 2014). Later on, in 1890, the colony was elevated to the category of city, having its population increased by Italian, Portuguese and Syrian immigrants (Prefeitura de Nova Friburgo, 2014), following the trend of entire Brazilian immigrations flows. The economy of the region is until nowadays, based on agriculture, besides textile industry hub (Prefeitura de Nova Friburgo, 2014; Moré et al., 2010). In the year 2011, considered the biggest climatic disaster of Rio de Janeiro State, in a one-week period raising daily water rates caused huge landslides, due to a 220 millimeter storm/sq. m, timbered many Atlantic Forest remnants, turned several agricultural fields unproductive and killed almost 1,000 people (Prefeitura de Nova Friburgo, 2014; Estrella et al., 2014).

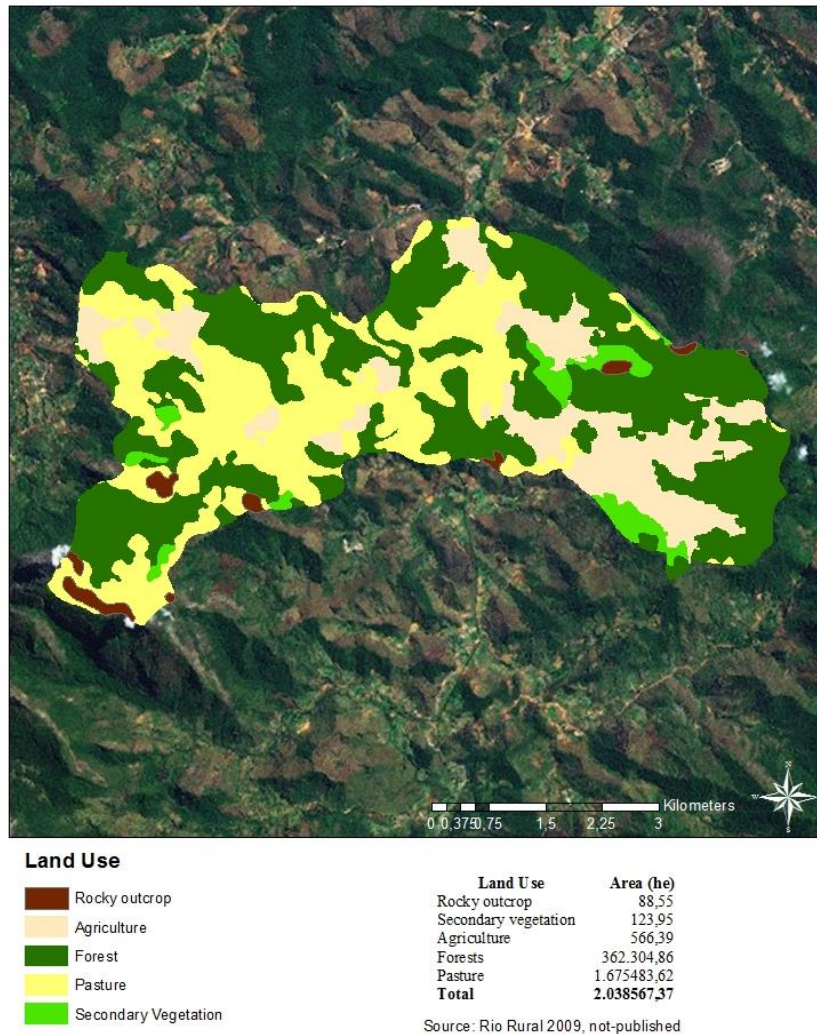
The land profile of Barracão dos Mendes micro-watershed is defined as follows: the largest land cover inside the region consists of pasturelands, followed by remnants of the Atlantic Forest, and then, agriculture (**Figure 5**). The great amount of pasturelands consists of abandoned areas; some left for regeneration, once cattle is few performed as an economic activity. The following photos give an overview of the study area.

**Figure 4** – Overview photos of Barracão dos Mendes micro-watershed



Source: own photos.

**Figure 5** – Land use of Barracão dos Mendes micro-watershed



Source: own map based on Rio Rural not-published data.

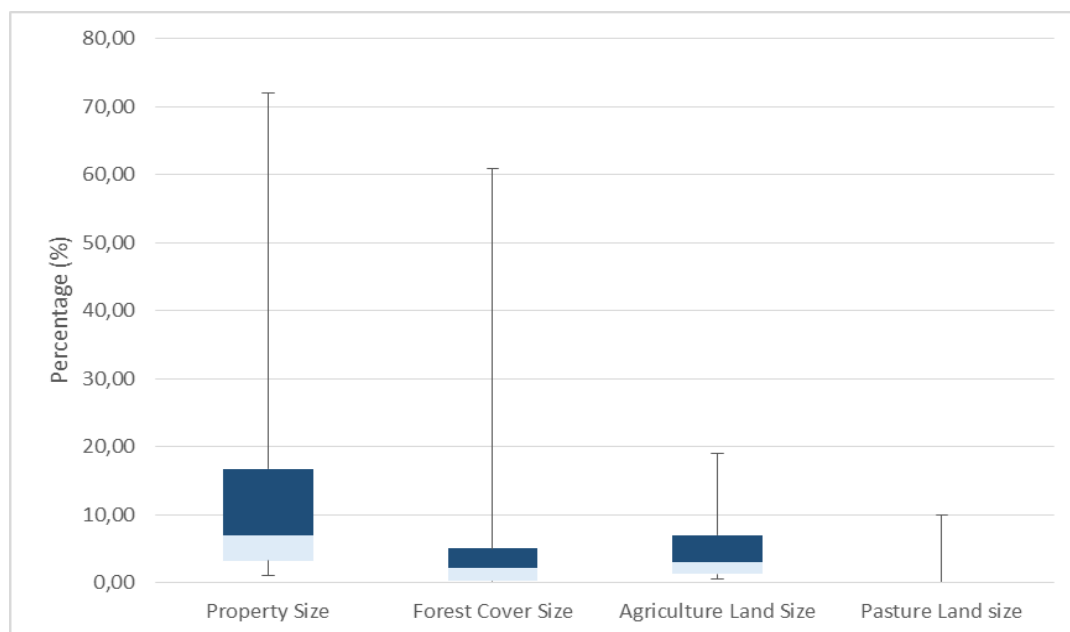
The economy of Barracão dos Mendes micro-watershed relies on familiar agriculture, a political category crystalized inside the National Program for Familiar Agriculture Strengthening (PRONAF, from Portuguese, Programa Nacional de Fortalecimento da Agricultura Familiar) and by a national law. It is defined as where the rural enterprise does not exceed four fiscal modules<sup>3</sup>, the workforce used in the development of economic activities is predominantly familiar the family income is predominantly generated from these activities and the land or enterprise is managed by the family (IBGE, 2006). In Barracão dos Mendes micro-watershed income data is not available and it was not possible for this investigation to summarize it, once mostly respondents stated that income widely fluctuates regarding crop cultivation, seasonality and “atravessadores<sup>7</sup>”. In Brazil, family agriculture is of great relevance once in familiar lands, the average human occupation is of 15.4 people per 100 hectares and in non-familiar lands, the average decreases to 1.7 people for the same area (Coronel et. al, 2007), a huge historical problem on agrarian reform. Data surveyed for the current thesis shows the property structure of Barracão dos Medes micro-watershed (**Figure 6**). An important characteristic of the agriculture activity for the study area, is that the great majority of farmers make intensive use of pesticides (INEA, 2013).

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<sup>3</sup> It is an agriculture unit size established by Law 6746/79 expressed in hectares and it is variable depending on the municipality, taking into consideration: 1) municipality main production type; 2) income through main production type; 3) other different production types relevant for income generation; 4) definition of familiar property (BRASIL, 2006a). For Barracão dos Mendes micro-watershed, one fiscal module is of 10 hectares (EMBRAPA, 2012). Thus, to compose a familiar agriculture, the agricultural land should not exceed 40 hectares.



**Figure 6** – Data on property structure of Barracão dos Mendes micro-watershed



Source: own figure

There are five communities throughout the micro-watershed:

- Barracão dos Mendes, a mixed-structured community, with farmers and urban residents. The rural houses were targeted in the current research. It is the biggest community inside the micro shed.
- Fazenda Rio Grande, where all houses are rural ones, i.e., all inhabitants are farmers of their own land or work as farmers in leased farms.
- Serra Nova, located in the mid-slopes of the micro shed, and all the inhabitants are farmers working by themselves or being farm employees.
- Serra Velha, located in the mid- and high-slopes of the micro shed, also all the inhabitants are farmers working by themselves or being farm employees
- Florândia da Serra, with only rural houses.

### 3.2 Methodology Overview

The cognitive interest of this thesis was achieved by a combination of different methods.

To comply with the **first specific objective** (legal framework), secondary data was surveyed through literature review – articles, reports, websites and laws. Relevant information on the national and state instruments, such as councils, secretaries and

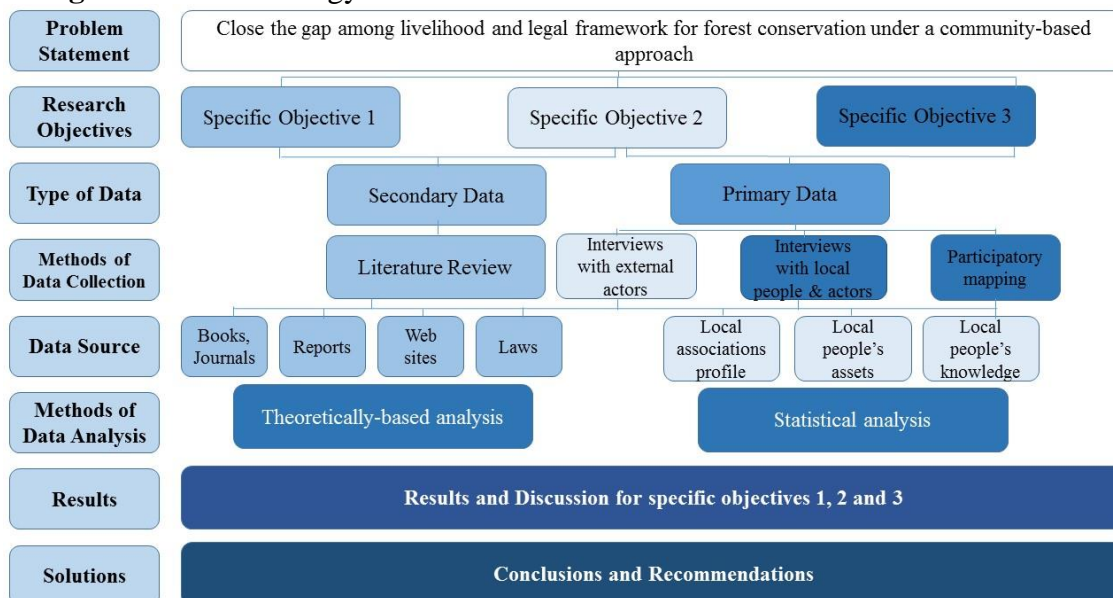
committees was gathered in order to understand how they are coordinated and what the extent of their responsibilities is. In addition, regulations for protected areas establishment and, more specifically, requirements established in the Forest Code and Atlantic Forest laws are presented. At the regional level, a synthesis of the PETP Management Plan in order to better comprehend the policies employed in the surroundings of the study area.

For the **second specific objective** (external actors), primary data was collected by semi-structured interviews with three (3) key external actors. Data on external help provided for study area, besides of information on their roles and objectives was surveyed. The external actors were selected through experts consultation, i.e., at the first Intecral Workshop carried on Teresópolis (see following sections), it was recognized that Rio Rural, EMATER and Pesagro are important external actors for Barracão dos Mendes micro-watershed, thus, one actor of each institution was interviewed. The current research does not exclude the fact that there are more external actors for the study area, however, due to time limitation and availability of the institutions' employees, only the three aforementioned interviews were performed. Secondary data was also collected, mainly from institutions web sites.

To comply with **the third specific objective** (local skills and knowledge), primary data was collected through semi-structured interviews with thirty-four (34) household members; five (5) local key actors and; through a participatory mapping with five (5) attendants to the. The household members were randomly selected throughout Barracão dos Mendes micro-watershed. The participatory map collected data mainly on individual skills, besides of organizational and nature assets. The local people was invited when a local meeting was happening, however only five (5) people attended to it. The five (5) local actors were interviewed to gather data on local associations and their networks and roles. The local actors were selected in order to cover all the local associations established within the study area. Four (4) of them were associations' president and one (1) was association' vice-president.

Detailed descriptions for the semi-structured interviews and the participatory mapping activity are given in the following sections.

**Figure 7 – Methodology overview**



Source: own figure

### 3.2.1 Primary data sources

#### 3.2.1.1 Preparatory Workshop and Field Trip

The first general approach to the study area was achieved in the Intecral Workshop (a collaborative project among Brazilian universities and government and German universities), which has gathered many key actors and different investigators acting in common areas and with overlapping objectives. The workshop was held on March 12<sup>nd</sup> and 13<sup>rd</sup>, 2014 at the headquarters of Serra dos Órgãos National Park, in the city of Teresópolis. Contact with supporters and research partners were established, in addition to the arrangement for field logistics to comply with the research work. All involved parties presented and discussed their projects inside different work packages, established an agenda and expected outcomes. At the day after, a field trip throughout the Rio de Janeiro state was performed, from March 14<sup>th</sup> to 18<sup>th</sup> with investigators from German universities. The accomplishment of this step aimed to briefly gather an overview on Rio de Janeiro state different scenarios and on different governmental and research initiatives besides of politic strategies being performed.

#### 3.2.1.2 Field work in the study area

The fieldwork in Barracão dos Mendes study area began on April 3<sup>rd</sup>, through the presentation of activities and objectives of the current research to the community during the monthly Barracão dos Mendes local association meeting. Around 200 people were

present. It was possible through invitation of the local association's president, Mr. Japuaba. In the meeting, questions done by the local people could be clarified.

Afterwards, the interviews and field visits could be performed from April 7<sup>th</sup> to April 18<sup>th</sup> inside Barracão dos Mendes micro-watershed and its five communities.

The current research was oriented by the theoretical sampling for qualitative research theory by Glaser & Strauss (2009) where a sample size is not previously defined once the goal is not to representative capture all possible variations, but to gain a deeper understanding of analyzed cases and the development of analytic frame and concepts used in the research.

### **Interviews**

Within the fieldwork, the following face-to-face interviews were performed:

- Thirty-four (34) semi-structured interviews in Portuguese language with local household farmers. Data regarding family structure, property structure, main familiar economic activity, associational and network issues, local knowledge on value of forest fragments, use of direct products, knowledge of legal requirements for environment, among others (**Appendix 8.3**) was surveyed. The interviews were not strictly followed by the questions, being flexible to the interviewee perspective and interest. Thus, the interview sheet was used only as a guideline, once it has its own flow according to the interviewee speech. A test pass was made in the first two days of the field work and then, the interview guidelines were adapted to comply with the objectives.

Although household members had been randomly selected, some important details to cover different groups inside the study area were taken into account. They are as follows: not only houses close to the main road were selected, instead, far away houses with difficult access were included; both man and women were interviewed in order to include the female historically marginalized groups; property owners and farm workers (at their respective houses) were also included, involving people with different income share and land tenure profiles. These aspects are worth saying, once they are pillars for the community-based development and conservation approach.

- Five (5) semi-structured interviews with the local key actors. As aforementioned, these five interviews, took into consideration the five existing local associations within Barracão dos Mendes micro-watershed. Thus, the local



actors were non-randomly selected due to their position as local associations' presidents. The local actors are not part of the external actors and the results coming from these interviews are presented in the section **Local Assets**. The interviews covered issues such as association general data; periodicity of meeting; character of the meetings – informative, deliberative, etc.; partnership relations among local leaderships and other parties; capacity building aspects; external help; among other relevant issues. The complete semi-structured interview can be seen in the **Appendix 8.3**.

- Three (3) semi-structured interviews with external actors, non-randomly selected subjected to their availability to be interviewed during the limited time of the field work. The main external actors of Barracão dos Mendes micro-watershed were firstly recognized in the Intecral Meeting aforementioned. Thus, one EMATER technician in charge of projects inside Barracão dos Mendes micro-watershed; one Rio Rural agent responsible for projects inside the same region; and one Pesagro-Rio researcher were interviewed. Although EMBRAPA was also identified as an external actors intervening in the study area, an interview with any of its employees was not achieved due to time limitation of the current thesis. The external actors were selected due to their major intervention inside Barracão dos Mendes micro-watershed. The interviewees were asked about issues regarding projects being held in the area, type of external support, objectives and expected outcomes for the planned local projects.

Interviewing was chosen as it presents a technique to gain an understanding of the underlying reasons and motivations for people's attitudes, preferences or behaviors (Evidence Base, 2006). Almost all the interviews performed were semi-structured open-ended questionnaires allowing the respondents to express themselves in more detail, through which they may provide more qualitative data (University of Surrey, 2014). Other advantages of interviews are the possibility to ask follow-up in-depth questions, which the interviewer has control over the interview and might assist the interviewees if they do not understand a question. Furthermore, interviews give a possibility of investigating the motives and feelings of the respondents and they allow the production of record for future reference.

However, the method of interviewing has some disadvantage of being time consuming due to the necessity of setting up the interviews, travelling, recording,

transcribing, etc. In addition, it shows the bias of the respondents, being especially negative if they want to impress, create false impression or end the interview quickly (Evidence Base, 2006).

According to the time limitation of this investigation it was not possible to audio record all the interviews (only the interviews with stakeholders were recorded) neither to transcript them. Manually notes were taken during and directly after each interview in order to record the data.

### **Participatory mapping**

A participatory skills mapping with five local people (for women and one man), including the president of Serra Velha association was carried out at the end of the fieldwork, on April 28<sup>th</sup>. The local people were invited one week before, when a local meeting with all the communities to discuss and clarify topics on the funding project being held in the study area was performed. The activity of participatory mapping was explained, based on Kretzmann & Mcknight (1993), and people were free to give their names to participate or not. Thus, the selection of people depended on their willingness to attend to it.

The aim of this activity was to map the skills of the community, according to the local's perception. They were asked to discuss and point down group skills, i.e., what did they consider important as communities strengths; nature skills, i.e., what did they consider as important in their surrounding nature; and, finally; individual skills. At this point, they were asked to point down individually the things they considered as personal talents. According to the ABCD approach, assets/skills identification boosts the image and feeling community categorized as needy. Nevertheless, they were free to discuss and point their concerns and needs.

### **3.2.2 Secondary data source**

The secondary data surveillance for the legal framework was performed by literature review. The books, journals and papers were reviewed to gather information on historical facts regarding Brazilian instruments and policies for environment legislation. Moreover, some provided a critical discussion that was also used also reference for the current thesis. Laws and the PETP management plan were reviewed to further understand the legal rights and duties there provided. Websites were consulted for both of the objectives. For the role of external actors, websites were the main source of

consulting to gather information on their theoretical roles. As the current study area presents barely any published information, data on Barracão dos Mendes were totally surveyed and collected as primary data.

### **3.3 Data analysis**

Both secondary and primary qualitative and quantitative data was analysed. The secondary and primary qualitative data was theoretically organized and analysed in order to generate the proposed results. The quantitative data was documented in Excel sheets, being subsequently handled with functions and formulas in order to generate graphs, tables and calculations. R software was also used to generate graphics. It is important to clarify that any calculation was performed in order to define a representative sample size, rather, the data intend to express a deep understanding from the local interviewees perception.

Finally, data were analysed under the indicators of community-based development and conservation approach to be later discussed in order to meet the proposed outcome.

## 4 RESULTS

### 4.1 Legal Framework

In this section, information on Brazilian legal framework for environment was collected and analyzed. The aim of the current analysis is to understand the instruments employed to achieve nature conservation. Data will be presented for national and regional levels, in order to understand requirements for protected areas and for forest conservation that are relevant for Atlantic Forest ecosystem and, thus, to the study area.

For purposes of this thesis the Brazilian governmental agencies, committees, councils will be called **instruments** for planning, regulating and executing environmental policies.

#### 4.1.1 History of Brazilian Policies for Protected Areas

The legal framework for establishment of protected areas emerged with the creation of National Parks in 1934 through the Forest Code (Código Florestal) (Decree 23,793 from January 23<sup>rd</sup>, 1934) (Borges et. al, 2011). The law was consolidated by the first National Park creation, the Itatiaia Park in 1937, followed by the Serra dos Órgãos National Park in 1939, both for Atlantic Forest biome conservation, in Rio de Janeiro State (Rylands & Brandon, 2005).

Around the 1960s, the environmental degradation assumes a form of global political problem, thus the relation between development and environment starts to emerge (Maia, 2008). At this time, the category National Forest was created, more precisely, in 1965 (Law 4,771 from September 15<sup>th</sup>, 1965). The same did not occur to the category Forest Reserve that was throughout time transformed into governmental programs of human settlements and indigenous reserves (Rylands & Brandon, 2005). The National Parks were managed until 1967 by the Ministry for Agriculture, being later replaced by the Department for National Parks and Reserves, established on the newly created Brazilian Institute for Forest Development (IBDF, from Portuguese, Instituto Brasileiro de Desenvolvimento Florestal). Subsequently, the Special Secretary for Environment (SEMA, from Portuguese, Secretaria Especial do Meio Ambiente) was created in the year 1973 (Nogueira-Neto & Carvalho, 1979).

In the 1980s, the sustainable development presented itself as a product of the 1960s debate, orienting a new society conception (Tabarelli et al., 2005). Brazil followed this trend, evolving the concept of the environment as being, in its completeness a common

good, not anymore only few natural resources (Camilo, 2009). It transcended the right of common property, once it surpassed the limit of the individual sphere (Maia, 2008), giving chance for other environmental instruments to arise. In this respect, environmental licensing became one of the most important tools of the Brazilian National Policy for Environment (de Mello Florêncio & Malpass, n.d.) to regulate any economic activity using natural resources, which may be potentially contaminating, in order to protect nature. By this decade SEMA and IBDF were united to compose the aforementioned Ibama (Ibama, from Portuguese, Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis) becoming the most important governmental instrument and agency for environmental issues for the following decades. Ibama creation was part of a great governmental restructuring and organization (Tambellini, 2007).

In 1981, the National System for Environment (Sistema Nacional do Meio Ambiente) was established and regulated in 1990 with six components (MMA, 1999). Ibama became part of the new Ministry for Environment, which is subjected to the National Council for Environment (CONAMA, from Portuguese, Conselho Nacional do Meio Ambiente), a consulting and deliberative instrument, with strong representation of civil society, including non-governmental organizations (NGOs) (MMA, 1999). In 1988, the Brazilian Constitution was established, giving provisions for environment conservation and rights for extractive communities. Herein, an excerpt of it:

*“(...) the ecologically balanced environment is a right, as well as its common use for all as essential to a healthy quality of life, being the duty of the Public Power and of the collectively, defend it and preserve it for the current and future generations” (BRASIL, 1988, p. 204).*

In addition, an important instrument to protect nature inside particular properties arose. Although other norms have previously established private reserves, they were not too effective, being later replaced by the Private Reserve for Natural Heritage (RPPNs, from Portuguese, Reserva Particular do Patrimônio Natural) through Decree 98,914, from January 31<sup>st</sup>, 1990 (Medeiros, 2005). The private refuge for native animals (from 1977) was later replaced by the Private Reserves of Fauna and Flora, in 1988. Even SEMA and IBDF were gathered together, forming Ibama, a demand for a consolidate and rational system was required, and, after a ten years-debate, the proposal for the National System of Conservation Units (SNUC, for Portuguese, Sistema Nacional de

Unidades de Conservação) was accepted (ICMBio, 2007; Medeiros, 2005). SNUC was established in the year 2000 (Law 9,985) (Rylands & Brandon, 2005). SNUC defines and regulates several categories of Conservation Units (UC, from Portuguese, Unidade de Conservação) in federal, state and municipal instances. The SNUC was especially defined to be in charge of territorial spaces and their environmental resources, including jurisdiction water with relevant natural features, legally instituted by the Public Power, with objectives of conservations and defined limits, under special management regimen, for which grants to proper protection are applied" (BRASIL, 2000); separating them into two major groups: integral conservation units (indirect use of natural resources) and sustainable use units (direct use of natural resources). Integral protection units accounts with 5 (five) sub-categories and sustainable use units with 7 (seven) sub-categories (see **Table 3**). The additional description of their purposes can be found in **Appendix 8.1**. In short, integral protection conservation units have the objective of preserving the nature, where natural sources can only be used indirectly and the use is limited to human intervention. Sustainable use units have the main objective of reconciling conservation with sustainable use of natural resources parcels, making possible the direct use of them (BRASIL, 2000). It is worth saying that the widely used term ‘Conservation Unit (UC)’ was established after the SNUC establishment.

The following table (**Table 3** – Evolution of the main legal marks for Protected Areas creation in Brazil) gives an overview of the main legal marks throughout time for the creation of protected areas in Brazil.

**Table 3** – Evolution of the main legal marks for Protected Areas creation in Brazil

<b>Period</b>	<b>Legal marks</b>	<b>Incorporated legal marks</b>	<b>Protected Areas creation/modification</b>
<i>From 1934 to 1964</i>	Forest Code (Decree 23793/1934)	-	National Park, National Forest, Reserve for Biological of Aesthetical Protection
<i>From 1965 to 1999</i>	New Forest Code (Law 4771/1965)	Forest Code (Decree 23793/1934)	National Park, National Forest; Permanent Protected Areas (APPs); Legal Reserve
	MaB Program, 1970 (Decree 74685/74 and Decree Pres. 21/09/99); Law for creation of Ecological Stations (Law 6902/1981); Law for Environmental Protected Areas (Law 6902/1981); Decree for Ecological Reserves (Decree 89336/1984); Law for of Areas of Relevant Ecological Interest (Decree 89336/1984); Law for RPPNs (Law 1922/1996)	-	Biosphere Reserve; International Recognition Areas; Ecological Station; Environmental Protected Areas (APAs); Ecological Reserves; Areas of Relevant Ecological Interest; Private Reserve of Natural Heritage, respectively
	‘New’ Forest Code (Law 4771/1965)	Forest Code (Decree 23793/1934)	Permanent Protected Areas (APP) and Legal Reserve (RL)

Period	Legal marks	Incorporated legal marks	Protected Areas creation/modification
<i>After 2000</i>	National System of Nature Conservation Units (SNUC, Law 9985/2000)	Law 6902/1981, Decree 89336/1984, Law 1922/1996, Part of Law 4771/1965	Integral Protection Conservation Units and Sustainable Use Conservation Units
	New Forest Code (Law 12651/2012)	‘New’ Forest Code (Law 4.771, 09/15/1965	Reestablishes conservation and restoration measures; amnesty to previous environmental crimes; reestablishes APPs and RLs requirements

Source: Own table adapted from Medeiros, 2005 & Soares-Filho et al., 2014.



#### 4.1.2 National Level

SNUC centralized the management of several categories of protected areas into a single instrument. They are, as follows<sup>4</sup>: ecological station; biological reserve; national park; natural monument; and, wildlife refuge for **Integral Protection UCs**. Environmental protected area; area of relevant ecological interest; national forest; extractive forest; fauna reserve; reserve for sustainable development; and private reserve of natural heritage for **Sustainable Use UCs** (Medeiros, 2005); however, SNUC does not cover the management of Areas of Permanent Protection (APPs) and Legal Reserves (RLs) (Medeiros, 2005). CONAMA, a broader instrument is responsible for their attributions (Borges et al., 2011)

The APPs and RLs were defined and established by the Forest Code, edition of 1965 (**Table 1**), being redefined by the last Forest Code version, from 2012. In the first Forest Code, the requirements for APPs establishment were: 1) along rivers or any other water bodies; 2) around lakes or water reservoirs; 3) around water springs with a minimum radius of 50m 4) top of hills, mountains and mountain ranges; 5) on the slopes or on its parts, with inclination higher than 45°, equivalent to 100% on highest inclination line; 6) in *restingas* (sandbanks) as dunes fixers or mangrove stabilizers; 7) on the edge of plateaus, from the rupture line of the relief, never less than 100m in horizontal projections; 8) in altitudes higher than 1800m (all vegetation, no matter the type). For RLs, they were: 80% of PR inside Legal Amazon; 2) 35% of PR inside the Brazilian savanna area located in the Legal Amazon; 3) 20% of PR in native vegetation of forest area in other biomes; 4) 20% of pampas area in any region (Medeiros, 2005).

The New Forest Code establishes new requirements for both. Now, the most important change is that their establishment depends on the rural property size (number of fiscal modules<sup>3</sup>). The new requirements, for rural properties, are summarized, as follows.

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<sup>4</sup> See Appendix 8.1 for the description of all UC categories defined by SNUC, both for integral and sustainable use.

### **General APP establishment**

The relative maximum area of the property that should be composed by APPs is 10% of the rural property for smaller than 2 fiscal modules-property; 20% for 2-4 fiscal modules-properties (EMBRAPA, 2012).

### **APPs as riparian forest establishment**

APPs as riparian forest should present a minimum width of 5 meters for smaller or equal to 1 fiscal module-properties; 8m for 1-2 fiscal modules-property; 15m for 2-4 fiscal modules-property. For properties ranging from 4 to 10 fiscal modules, the APP at the river side varies accordingly to the water stream width: if less than 10 meters wide, a 20m-width APP is required, if more than 10m, the APP should have half of the water stream width (minimum 30m and maximum 100). The same applies to properties bigger than 10 fiscal modules. For APPs around natural lakes and lagoons it should have at least 5 meters for smaller or equal to 1 fiscal module-property; 8m for 1-2 fiscal modules-property; 15m for 2-4 fiscal modules-property and 30m for properties bigger than 4 fiscal modules. APPs are required in the surrounding of water springs, at any topographic profile, at a minimum radius of 50 meters (EMBRAPA, 2012).

### **RLs**

Every rural property must have a native vegetation cover, regardless of the application for APPs norms. For properties inside the Atlantic Forest biome, a 20% cover is required. In the New Forest Code, the APPs can be accounted as RLs. The restoration of the RL can be performed not only inside the property, but it can be compensated inside other property or inside a UC (IPEF & Imaflora, 2013).

For the application of the New Forest Code, it is required the Environmental Rural Registry (CAR, from Portuguese, Cadastro Ambiental Rural). The exceeding vegetation covers inside a property, after CAR, can be attributed as RL, as RPPN or as Environmental Easement<sup>5</sup> (Camilo, 2009).

The subordination of the APPs establishment to the size of the rural property may encourage false cartographic delimitations in order to property owners to become free from legal environmental requirements (EMBRAPA, 2012). In addition, the changed text in the New Forest Code requires less length for APPs as riparian forest and at the

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<sup>5</sup> The owner of the area voluntarily renounces to, temporally or definitely, the rights of suppression of exploitation of the native vegetation (Law 4771/1965) (Camilo, 2009).

hills top and it allows, in specific cases, the restoration with non-native plants, such as eucalyptus (IPEF & Imaflora, 2013).

Moreover, the New Forest Code gives amnesty to previous environmental crimes (EMBRAPA, 2012), allowing huge debate regarding its creation nationwide (Greenpeace, 2012). The Forest Code is the governing in force law. Other environmental laws biome-specific, for example, are subjected to it. For other Environmental Policies, see the **Appendix 8.2**

For the Atlantic Forest biome in specific, the decree 750 from the year 1993, has primarily established about logging, exploitation and suppression of primary or of more advanced status vegetation of Atlantic Forest. The given regulation focuses on small farmers, with a property not exceeding 50 hectares; traditional population depending on natural resources for sociocultural reproduction; land resting; preservation practices; sustainable exploitation; ecological enrichment; public utility; activities for national safety; social interest (BRASIL, 1993). The Law 11428 from 2006 lately suppresses the decree 750. Debate has also been generated around it, once the latter allows some sorts of logging, e.g. due to public interests (Varjabedian, 2010). The new regulations allows the non-harmful use of natural resources by traditional populations and foments reforestation at the borders of Atlantic Forest (BRASIL, 2006). Suppression of primary vegetation is prohibited when the patch: has threatened fauna and flora, acts as water sources protection and in erosion control, composes corridor among fragments with primary or secondary vegetation in advanced regenerating stages, protect the surroundings of the conservation unit (BRASIL, 2006). As the oldest regulation prohibited logging, exploitation or suppression of primary vegetation at advanced and medium stages or in exceptions cases, under previous approval by Ibama and CONAMA; the new law gives more aperture to log vegetation at these stages, in addition of allowing exploitation of tree species in medium regeneration stage, where its presence is superior to 60% (Varjabedian, 2010). Logging of medium regenerating stage vegetation in urban areas, is now only subjected to municipal approval and the suppression of secondary or primary vegetation in medium or advanced stages is allowed, as it did not before, however it is conditioned to Environmental Compensation<sup>6</sup>

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<sup>6</sup> The environmental compensation can be performed when the vegetation cover exceeds the amount required by law (the surplus). The APPs can be recompensed as RLs, for example. The compensation is also possible inside other property, by leasing or acquisition of CRA (Environmental Reserve Quote). The owner with exceeding vegetation cover, can sell the CRA for an owner who lacks the required vegetation cover, acting as a “green currency” (BVRio, n.d.)

(Varjabedian, 2010). The new Atlantic Forest law foster projects proposing restoration of APPs, RLs, RPPNs and UC buffer zones (BRASIL, 2006).

For the regulation of the aforementioned laws, as well as other environmental laws, many instruments were conformed to plan, execute and regulate the environmental regulation (**Figure 8**). The most relevant instruments are briefly presented, as follows.

The higher Brazilian environmental instrument is the Ministry for Environment (MMA, from Portuguese, Ministério do Meio Ambiente), as formulator and implementer of public policies throughout all levels and instances of government and society. It is responsible, according to the Law 10683 from 2003, for the following subjects: national environmental and hydric resources policy; preservation, conservation and sustainable use of ecosystems policy, as well as biodiversity and forests; proposal of strategies, mechanisms and economic and social instruments for improvement of environmental quality and sustainable use of natural resources; integration of environment and production policies; environmental programs and policies for Legal Amazon and; ecological-economic zoning (MMA, 2014).

MMA is the central actor of the National System for Environment (SISNAMA, from Portuguese, Sistema Nacional do Meio Ambiente). SISNAMA, in turn, was established by Law 6938/81, being responsible for the improvement of the environmental quality. Along with SISNAMA creation, the National Policy for Environment was also established (BRASIL, 1981).

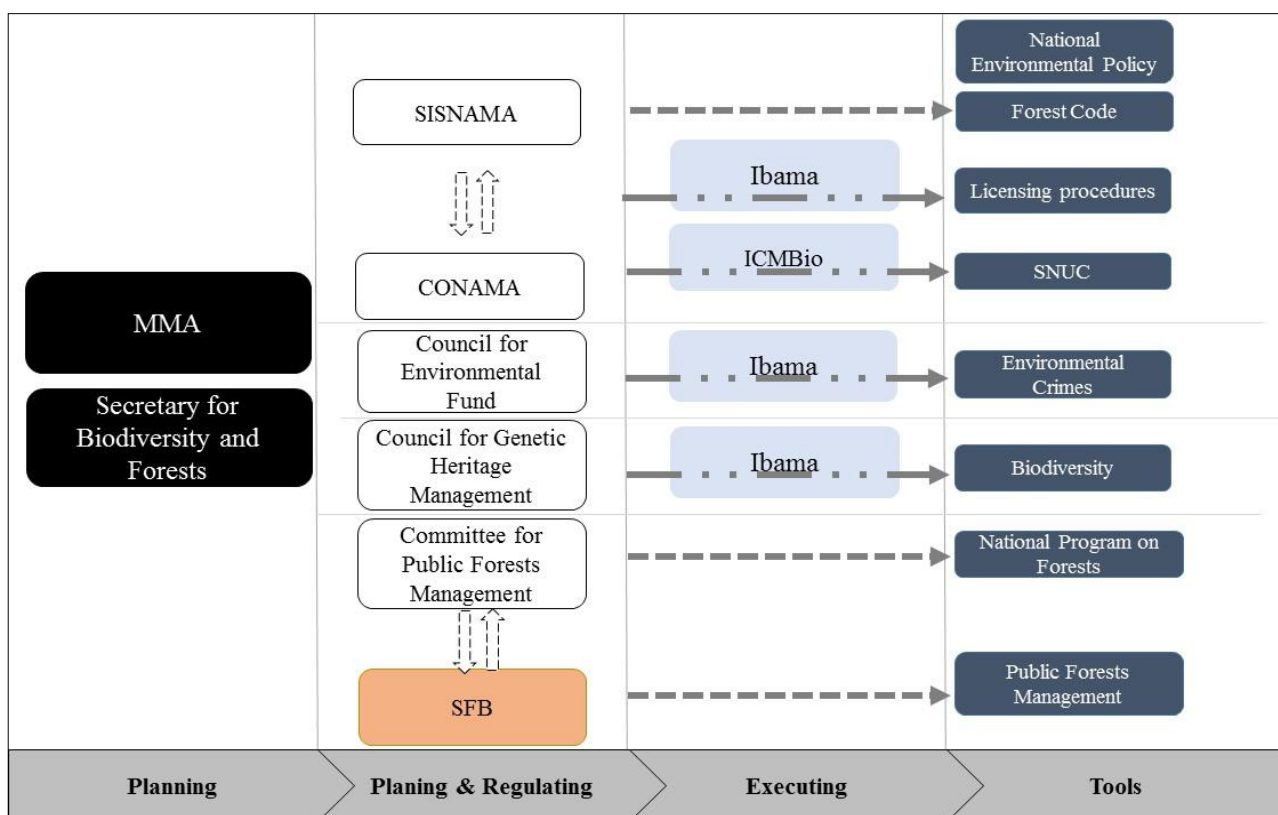
As SISNAMA's consuler and deliberative instrument, it is found the National Council for Environment (CONAMA, from Portuguese, Conselho Nacional do Meio Ambiente), established in the same law as for SISNAMA creation (CONAMA, 2014). Who chairs the SISNAMA, is the current MMA president along with other agencies' representatives, at federal, state and municipal scopes, enterprises and civil society. CONAMA is the main regulator for environmental issues, not only those established by SISNAMA (MMA, 2014; Ambito Jurídico, 2014). It accompanies, for example, activities established by SNUC, licensing procedures along with MMA and Ibama, and the accomplishment of the National Policy for Environment (Ibama, 2014). Other councils are part of the MMA, such as the Deliberative Council for Environmental Fund, Council for Genetic Heritage Management, and Committee for Public Forests Management. The latter acts in compliance with the Forests National Program (PNF,

from Portuguese, Programa Nacional de Florestas) created under the Decree 3420/2000, articulation varied governance levels under the MMA regulation. The Brazilian Forest Service (SFB, from Portuguese, Serviço Florestal Brasileiro) is an autonomous entity, being responsible for all the Public Forests nationwide (MMA, 2014).

As executor agencies, the most important are Ibama and ICMBio. The first is responsible for the execution of the National Policy for Environment and evaluator and executor of environmental licensing procedures (ICMBio, 2013). The process of environmental licensing is decentralized, meaning that according to varied aspects, such as place, extent of impacts, type of activity involved, amongst others, the supervision and concession of the licenses may be performed by a different government agency at municipal, state or federal level (de Mello Florêncio & Malpass, n.d.). Depending on the degree of dangerousness of the activity and if the activity is being held into two different cities or countries, distinct level agencies will act (de Mello Florêncio & Malpass, n.d.). Generally, they are supposed act in an integrative manner, nevertheless the environmental and social impacts are barely not considered (Maia, 2008). The licensing tool tends highlight the economic benefits, given chance for social and civil issues to be discarded (de Mello Florêncio & Malpass, n.d.)

ICMBio is an autarchy bounded to the MMA, and it is mainly responsible to manage the federal conservation units through their Management Plans, elaborated uniquely for each UC (MMA, 2014). The Management Plan is a “*technical document, upon which, based on the general objectives of a Conservation Unit, it is established the zoning and physical structures needed to manage the Unit*” (ICMBio, 2007, p. 9).

**Figure 8** – Main governmental instruments for planning, regulating and executing different environmental tools at national level

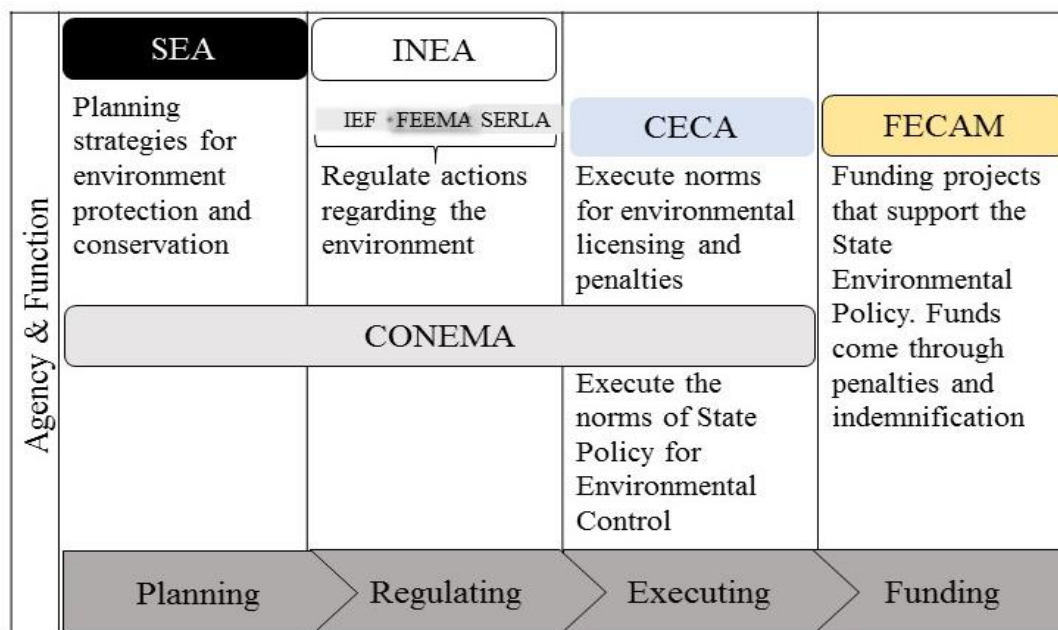


Source: Own figure.

#### 4.1.3 Regional level

The State Secretary for Environment (SEA, from Portuguese, Secretaria Estadual do Meio Ambiente) constitutes the first hierarchical agency for environment state management (INEA, 2014). It is supported by other governmental agencies to comply with its objectives of nature conservation. They are: State Institute for Environment (INEA, from Portuguese, Instituto Estadual do Meio Ambiente); State Committee for Environment Control (CECA, from Portuguese, Comissão Estadual de Controle Ambiental); Environment State Council (CONEMA, from Portuguese, Conselho Estadual de Meio Ambiente) and; State Fund for Environment Control (FECAM, from Portuguese, Fundo Estadual de Controle Ambiental) (SEA, 2014) (**Figure 9** – Main governmental instruments for planning, regulating, executing and funding environmental regulations at state level

**Figure 9** – Main governmental instruments for planning, regulating, executing and funding environmental regulations at state level



Source: Own figure.

According to INEA (2013), the state UCs for sustainable use compose around 243,000 hectares and the UCs for integral protection sum approximately 210,000 hectares (**Table 4**). It does not include the RPPNs that are recognized by law and are under the administration of their respective owners, considered invaluable for the protection of biodiversity and for the integration of ecological corridors (Oliveira et al., 2010). There are other UCs in the Rio de Janeiro State under federal jurisdiction, such as Serra dos Órgãos and Serra da Bocaina National Parks (ICMBio, 2014). Of these state conservation units, there are 19 UCs for integral protection and 14 for sustainable use (INEA, 2013).

**Table 4** – UCs inside the Rio de Janeiro State, their category and area (for 2007 and 2013)

<b>Integral Protection UCs</b>	<b>Area in Jan/2007 (hectares)</b>	<b>Current area (hectares)</b>
Ilha Grande State Park	5,600	12,052
Aventureiro Marine State Park	1,778	1,778
Parque Estadual Cunhambebe	-	38,054
Serra da Concórdia State Park	804,000	804,000
Pedra Branca State Park	12,492	12,492
Serra da Tiririca State Park	2,076	3,568
<b>Três Picos State Park</b>	<b>46,350</b>	<b>65,113</b>
Desengano State Park	21,444	21,444
Chacrinha State Park *	14,000	14,000
Grajaú State Park*	113,000	113,000
Costa do Sol State Park	-	9,841
Lagoa do Açú State Park	-	8,252
Pedra Selada State Park	-	8,036
Praia do Sul Biological Reserve	3,600	3,600
Guaratiba Biological Reserve	3,601	3,360
Araras Biological Reserve	2,069	3,838
Paraíso Ecological Station **	4,920	-
Guaxindiba Ecological Station	3,280	3,280
Juatinga Ecological Reserve	9,960	9,960
Mendanha State Park	-	4,398
<b>Total</b>	<b>118,101</b>	<b>209,997</b>
<b>% of RJ State Area</b>	<b>2.69%</b>	<b>4.80%</b>
<b>Sustainable Use UCs</b>	<b>Area in Jan/2007 (hectares)</b>	<b>Current area (hectares)</b>
Tamoios APA	20,636	20,636
Mangaratiba APA	24,483	24,483
Nova Sepetiba II APA	172,000	172,00
Rio Guandu APA	-	74,272
Gericinó-Mendanha APA	7,972	7,972
Maricá APA	970,00	970,00
Massambaba APA	10,647	10,647
Serra de Sapatiba APA	6,000	6,000
Pau-Brasil APA	10,564	10,564
Bacia do Rio Macacu APA	19,508	19,508
Bacia do Rio dos Frades APA	7,500	7,500
Macaé de Cima APA	35,038	35,038



<b>Integral Protection UCs</b>	<b>Area in Jan/2007 (hectares)</b>	<b>Current area (hectares)</b>
Floresta do Jacarandá APA **	2,700	-
Alto Iguaçu APA	-	22,109
Resex Itaipu	-	3,943
<b>Total</b>	<b>146,190</b>	<b>243,814</b>
<b>% of RJ State Area</b>	<b>3.34%</b>	<b>5.57%</b>
<b>RJ State Area (hectares)</b>	<b>4,378,017</b>	

\* Under municipal management

\*\* Extinguished by law 6573/2013

APA= Permanent Protection Area; Resex= Extractive Reserve

Source: Own table adapted from INEA (2013).

Other areas for nature conservation exist, which are not under these categories. It is the case of the Alcobaça and Jacarepiá Ecological Reserves.

In Rio de Janeiro State, the Atlantic Forest Biosphere Reserve (RBMA) is part of a strategy to conserve and connect the fragments of Atlantic Forest inside the Serra do Mar Corridor, which extends, inside Rio de Janeiro State, from Parati, the southernmost city of the State until the Desengano State Park (Rambaldi et al., 2002).

Historically, the recognition of the RBMA in the Rio de Janeiro State took place in two steps, between 1991 and 1993. In March 4<sup>th</sup>, 1991, it was registered by a publication of the Secretary of Culture of Rio de Janeiro State (Rodrigues, 2001) and in the middle of the same year, three Conservation Units for integral protection were included inside the RBMA: Tijuca National Park, Serra dos Órgãos National Park and Tinguá Biological Reserve. Later, the State Institute for Forests (IEF, from Portuguese, Instituto Estadual de Florestas) proposed the enlargement of the RBMA area to 42% of the Rio de Janeiro state territory consisting of 83 municipalities, representing 90.22% of all Rio de Janeiro cities, which are in total 91. The RPPNs plays an important role for the Atlantic Forest conservation in Rio de Janeiro State summing around 3,000 ha of vegetation cover inside the RBMA, a thirty percent of all the RBMA at Rio de Janeiro state (approximately 6,000 ha of UCs) (Medici, 2010).

Although the RMBA is a national initiative to protect Atlantic Forest biome, at the state level it is managed by the State Committee of RBMA established in 2000 (SEA, 2014).

The Região Serrana was considered as priority for Atlantic Forest conservation, being the Três Picos State Park (PETP) established as part of the RBMA (ICMBio, 2007). The PETP was created by the Law n. 31.343 from June, 2002 and it had its Management Plan approved by Ordinance 193 on December, 2006 (INEA, 2013). It has a surface of 46,350 ha and a perimeter of 512 km, being nowadays the largest protected area of its category (integral protection UC) throughout Rio de Janeiro state (ICMBio, 2007). The PETP establishment purposes are scientific, cultural, educational, spiritual, recreation conforming a common public good supporting the regional development. Its main objective is to protect the natural ecosystem against any alteration that may misrepresent it. It is under INEA management (INEA, 2013).

For purposes of the current investigation, some relevant information found in the PETP Management Plan will be presented. It has identified weaknesses, strengths, threats and opportunities to engage in the improvement of the park management. Some of them are, as follows, presented.

**Table 5** – Weaknesses, threats, strengths and opportunities of PETP

<b>Weaknesses</b>	<b>Threats</b>	<b>Strengths</b>	<b>Opportunities</b>
Precariousness of administrative structure and of material and human resources; Lack of touristic information	Non-valorization of its natural importance and its ecotouristic potential	Research potential, excellent conservation status and offer of ecosystem services.	Interest of institutions and researchers to develop investigations at the UC and in its buffer zone
Lack of information on objectives of park creation and rules of its use and of its buffer zone; Lack of cultural space for rescue of beliefs and regionals customs; Lack of environmental education project	Lack of environmental education for the surroundings communities; Absence of projects for sustainable economic alternative activities inside the park's buffer zone.	Preserved natural area; INEA goodwill to dialog with communities; Preservation and conservation of natural resources	Organized civil society may participate in the good management of the park; Potential to implement agroforestry systems in the park buffer zone; potential for regional sustainability through ecotourism.
Existence of exotic species; Precariousness of the inspection structure; Deficient administration responsibilities for the PETP area Unregistered potentially partner institutions and people; Park boundaries unknown by the population.	Leading to lack of integration of the park management guidelines with the directive plans from the surrounding municipalities.	Park employees come from the surrounding communities	Establish more cooperation among communities and government.

Source: own table based on INEA, 2013.

Moreover, the PETP Management Plan establishes the following zoning model: a) buffer and surrounding zone; b) intangible zone; c) primitive zone; d) extensive use

zone; e) historic cultural zone; f) intensive use zone; g) special use zone; h) restoration zone, and; i) conflicting use zone.

As the study area overlaps with PETP buffer zone, it is worth to present its definition. Thus, Management Plans of every UC establishes about the park buffer zone. The buffer zone (ZA, from Portuguese, Zona de Amortecimento) area was defined, by the Brazilian Law (9985/2000) as “*the surroundings of a conservation unit, where the human activities are subjected to norms and specific restrictions, in order to minimize the negative impacts on the conservation unit*”.

The PETP Management Plan describes the surrounding of Barracão dos Mendes as “*characterized by extensive pasturelands on hilltops of 1,800m, not in compliance to the Forest Code regulation. Some are abandoned to regeneration at vegetation initial or medium status. These areas are embedded among forest patches in different regeneration stages, but in a matrix dominated by the greenery cultivation with indiscriminate use of agrochemicals*” (p. 129). The Córrego Grande, passing through Barracão dos Mendes drains to the north, but it is still considered inside the PETP Management Plan. It is described inside the Management Plan as being “*under great deforestation pressure*” (p. 43).

The Plan also establishes objectives regarding the articulation with local associations and governmental institutions for research and extension, such as EMBRAPA and EMATER to support sustainable agriculture for people occupying the PETP ZA.

#### **4.1.4 Summary**

To sum up it at this point, the presented results first gives an overview of the evolution over the time for the protected areas establishment, as well as its respective planning, regulating and executing instruments under a national and regional level. It is important to say that the current research failed in the identification of the innumerable Brazilian instruments for environmental regulation, once much key information is not available or simply, does not match for their responsibilities and actuation scope. Under the regional level lens, the PETP Management Plan was briefly presented, to serve as substrate for later discussion.

## **4.2 External Actors of Barracão dos Mendes**

### **4.2.1 Identification of external actors of Barracão dos Mendes**

The external actors for the study area were firstly identified in the Intecral Workshops, besides of field visits and through interviews with local people. Once they were identified, data surveyed through interviews with the external agents and, mainly, through their institutional webpages were gathered and analyzed, in order to understand their role inside the study area, under a community-based approach.

In this first section, a brief description for each external actor is given, along with proposed objectives and roles. The external actors are defined as any actor that is not local and therefore not part of the community, irrespective of the sector.

The main external actors involved with the communities inside the study area are:

- The International Bank for Reconstruction and Development (IBRD), an arm of World Bank, which defines itself as aiming to reduce poverty in middle-income countries and creditworthy poorer countries by promoting sustainable development through loans, guarantees, risk management products and analytical and advisory services (World Bank, 2013);
- Rio de Janeiro State Government, through four main bodies:
  - Rio Rural, governmental program for rural sustainable development in micro watersheds (Rio Rural, 2014);
  - EMATER-Rio, governmental enterprise responsible for technical assistance and rural extension inside the Rio de Janeiro State (EMATER, 2014);
  - Pesagro-Rio, governmental enterprise for agriculture and cattle research (from Portuguese, Empresa Governamental para Pesquisa Agropecuária), and;
  - EMBRAPA, bounded to the Ministry for Agriculture, Cattle and Supply is an agency for technological innovation focused on knowledge development and technology for the Brazilian agriculture.

#### **IBRD**

IBRD was established in the 1944 due to the conflictual European situation post-II World War. It is an arm of the World Bank, which, in turn, is composed for four other

more institutions. It is structured as a cooperative, owned and operated for the benefit of its 188 member countries. Brazil is a member since the year 1946 (World Bank, 2013). IBRD is a key loan provider for infrastructure projects (Mehta, 2001) working along with the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), the International Monetary Fund (IMF) and other multilateral development banks. It collaborates with foundations, civil society partners and other donors (IBRD, 2013).

### **Rio Rural**

Rio Rural program is executed by the Agriculture and Cattle Secretary of Rio de Janeiro State (SEAPEC, from Portuguese, Secretaria de Agricultura e Pecuária do Estado do Rio de Janeiro) in cooperation with the Sustainable Development Superintendence (SDS). The program has emerged after the partnership with the IBRD (from World Bank) and it aims to benefit directly 300,000 inhabitants from 470 different micro watersheds throughout the Rio de Janeiro State. The micro-watershed definition used by Rio Rural is a small river basin delimited to a drainage network (water streams) flowing into a main river, however, associated with programs for sustainable development, whose benefitted are the rural communities (Rio Rural, 2014).

### **EMATER-Rio**

It is a public agency with legal, administrative and economic autonomy. It aims to collaborate with the institutions in a multi-level manner, under the federal, state and municipal scopes to formalize and execute projects for technical assistance in rural communities of the Rio de Janeiro State. It has as premises the knowledge diffusion, being this knowledge from technical, economic and social nature, in order to improve the agriculture production of small farmers. EMATER also sets a mark on environment: *“fight for preservation of the environment, aiming the ecological balance among men, plants and animals”*, providing to the rural farmers the needed input for their economic activity (EMATER, 2014).

### **Pesagro-Rio**

Pesagro-Rio was established in 1976 as a public agency linked to the State Secretary for Agriculture, Cattle, Fishing and Supplies and as integrant part of the National System for Agriculture Research (SNPA) and of the National Council of State Systems for Agriculture Research (CONSEPA). It aims to produce investigations in order to fit

the needs of the small farmers, turning them independent from the modern agriculture supplies. Pesagro-Rio also establishes partnerships with investigators from other educational institutions, such as the Rio de Janeiro public universities. To carry on some pilot projects, it accounts with experimental fields in several municipalities throughout the state (Pesagro, 2014).

### **EMBRAPA**

EMBRAPA conforms, along with state and federal universities and research institutions, besides other private and public organizations, the National System for Agriculture Research (SNPA, from Portuguese, Sistema Nacional de Pesquisa Agropecuária), established in 1992. The SNPA (as EMBRAPA) points out several objectives, such as: harmonize the directives and strategies for agriculture research with the nation development policies; to promote the shared execution of research projects which are for common interest, encouraging partnerships among institutions; to provide technical, administrative, material and economic support for the integrative institutions; among others. EMBRAPA also accounts with international offices outside the country (EMBRAPA, 2014).

#### **4.2.2 Role of external actors**

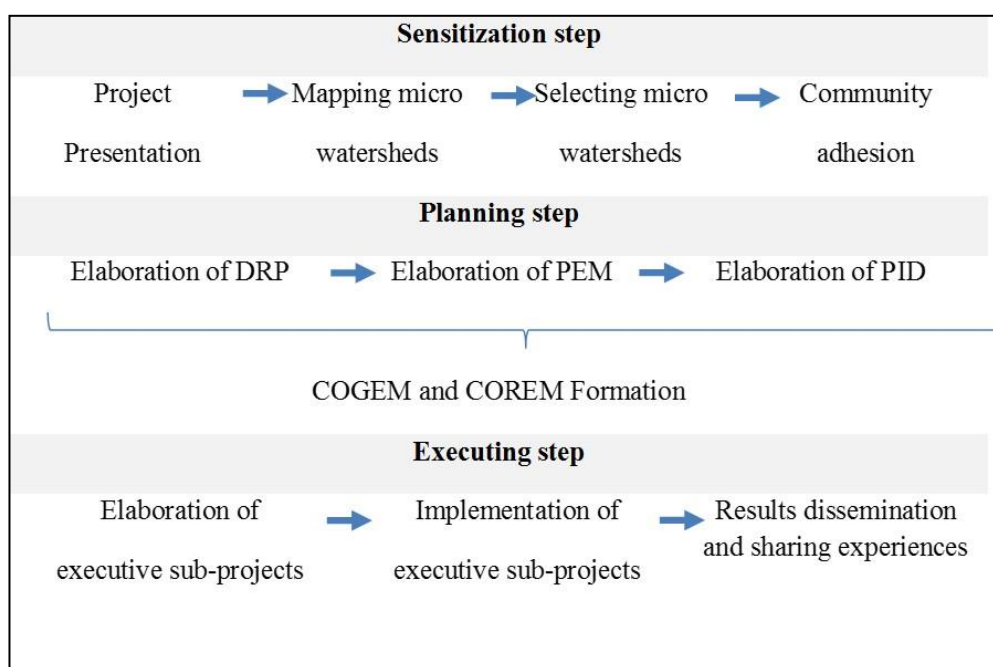
IBRD acts as a funding actor for the current study area. The inversion amount provided for the whole project is of US\$39.5 million addressed to implement sustainable practices for small farmers in the North and Northeast regions of Rio de Janeiro State, Brazil. It aims to cover 270 micro-watershed dispersed over 59 municipalities until the year 2015. Such fund amount represents a fifty percent part (Rio Rural, 2014); the other half part is provided by Rio de Janeiro State government. Therefore, the state government is also a funding actor. It is worth mentioning that Rio Rural-IBRD is a continuity of a previous partnership between Rio Rural and GEF (Rio Rural-GEF). Rio Rural-IBRD proposes mainly the adoption of sustainable practices by the farmers in order to diminish biodiversity threats. According to Rio Rural-IBRD proposed methodology, participatory and inclusion of local people are expected (Rio Rural, 2014). Rio Rural itself, in turn, acts mainly as a capacity builder inside the micro watersheds. It assumes itself as trainer and provider of continued capacity building of the external actors approaching the micro-watershed communities with sustainable rural

development. From now on in this document, the Rio Rural program, funded by IBRD and the state government, will be called Rio Rural-IBRD. When functions delivered only to Rio Rural, apart from this project, are going to be discussed, Rio Rural will be used instead.

Rio Rural aims to engage in several themes during the capacity building and training processes, such as public governance, participatory democracy and networks, sustainability practices, among others (Rio Rural, 2014). The Rio Rural capacity-building agenda is mainly executed by Rio Rural itself and EMATER actors. Thus, Rio Rural presents itself as a main connector between the outermost part, IBRD and the actors who directly work inside and with the communities, namely EMATER technicians.

The approach given by Rio Rural, Rio Rural-IBRD and EMATER mainly assumes a top-down sense during the project agenda. It can be noticed through the working steps established by the project, presented below, and afterwards briefly discussed.

**Figure 10** – Rio Rural-IBRD workflow



DRP= Rural Participatory Diagnosis; PEM=Micro watershed Executive Plan; PID=Individual Plan of Development; COGEM=Management Committee for Micro Watershed; COREM=Regional Committee for Micro Watershed.

Source: Rio Rural, 2014

Throughout the entire work steps, Rio Rural-IBRD and EMATER engage practices whereby the local people and communities play any role at all. The funding objectives



were previously established, rather than built together, and the practices to be implemented already defined by the external actors, not taking into account the yearnings of the local people. On the other hand, it is important to say that these external actors engaged efforts to formalize a representative body for the local communities, such as COGEM and COREM idealization. COGEM is composed by locals, being farmers or not, living inside the communities. The committee is elected by the inhabitants of the micro-watershed and it is in charge of leading the actions of sustainable rural development (Rio Rural, 2014). COREM in turn, is the outermost committee for local communities, which develops the dialogue function front to external actors. COGEM as a committee, perform the DRP, the participatory diagnosis for the main demands and strengths of the micro-watershed. However, there is no space for co-decision making, once through the example of this activity (DRP) shows that local people are allowed to point out their needs and their preferences for funding allocation, however they are not considered in the agenda of Rio Rural-IBRD

For the projects expected to occur, throughout Barracão dos Mendes micro-watershed, 253 householders were selected to receive the nonrefundable benefit of around US\$3,500 to apply in sustainable practices for agriculture See **Appendix 8.4** for the entire list of Rio Rural-IBRD practices). However, few of them are truly focused on the implementation of methods or tools to comply with a less impacting agriculture activity regarding the surroundings natural resources.

. The main connector between the outmost actor (Rio Rural-IBRD) and the communities themselves is EMATER actor. EMATER technicians plays the role of hearing the local voices, in order to remediate local people's anxieties. Its competency relies mainly on the elaboration of the management plans for the micro-watershed (PEMs) and individual plans of development (PIDs). For the PEM elaboration, local people of all the existing communities in Barracão dos Mendes were invited to take part, but again, they took the back seat in the meeting.

The PID elaboration is an execution step where the local individual has a direct relation to external actors and to the projects to be implemented. Thus, PID elaboration lands in at an individual sphere. At this moment, the interests of the farmer are heard, and clarification about the practices to be implemented are given by the technician. Unfortunately, the farmer's yearnings are restricted to the advisory panel of the EMATER technician, who will preferentially opt and guide the farmer to adopt already

well-known practices. The interviewed EMATER technician clearly stated that few practices represent substantially changes in the agriculture system – for example, alternatives to reduce pesticides use – and no practices were ever implemented for forest conservation and restoration, although it is one of the practices roll suggested by the program. Moreover, it does not make cross-reference to the DRP and only partially to the PEM performed before. Therefore, there is a gap inside the continuity of the work steps by Rio Rural-IBRD. An interesting alternative, worth quoting, is that in Barracão dos Mendes, EMATER technicians came with a new idea of transferring the responsibility to build the PID to a local technician. That is, a local person receives a capacity building by EMATER and then, perform the PID. It is worth quoting, once it may represent an opportunity to directly involve local people in a positive way, firstly, by capacity building provision, secondly, for local engagement in the proposed practices and finally, regarding economic issues, once the money paid for the PID elaboration would remain inside the community. Through this type of avenues between local people and the project itself the development may become more locally driven, step by step.

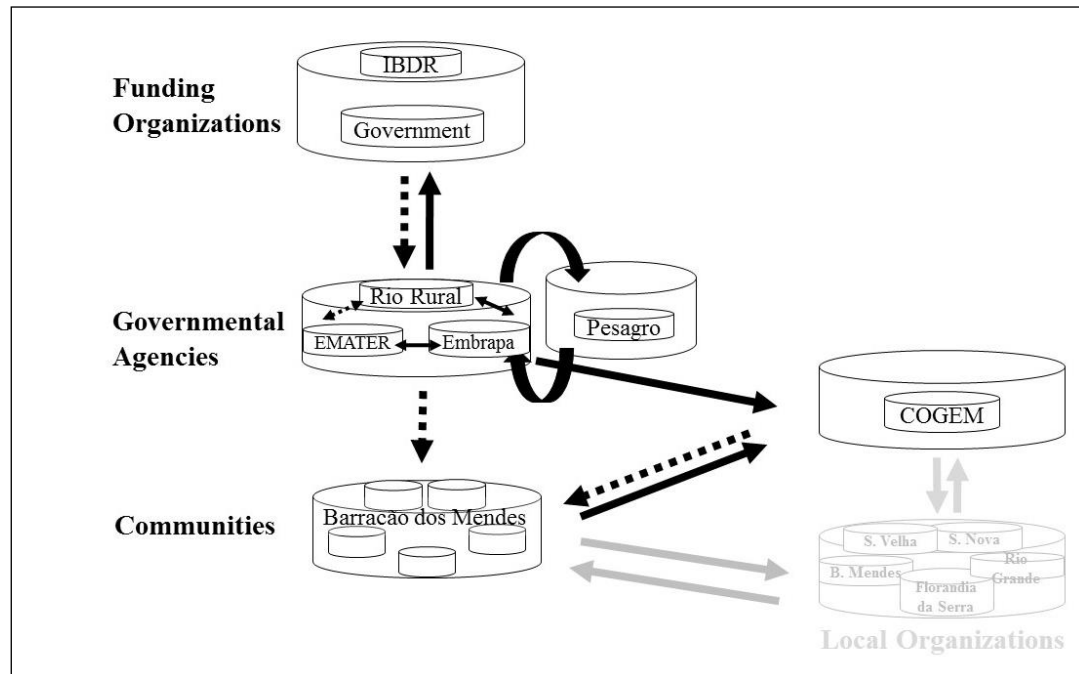
Apart from the Rio Rural-IBRD, Rio Rural agency has performed other important activities inside the micro watersheds such as capacity-building for sustainable agriculture techniques, for improvement of water use, sanitation, fertilizers among others. The capacity building on clean water was an identified successful example there was a campaign on clean water. It was a program to arise awareness for water spring protection, including conferences, planting and visits to protected water sources, bringing together the educational sector. The success of this campaign can be noticed in the results for local knowledge.

The Pesagro-Rio acts as an external knowledge provider inside Barracão dos Mendes providing researchers and consultants for pilot projects inside the micro-watershed. As an example, a huge land sliding impacted lands of small farmers and an experimental research for landslide rehabilitation and slope stabilization was carried on inside a farmer's property. Thus, Pesagro-Rio may be an important external actors, which brings knowledge that can be combined with the local one, in order to promote improvements on agriculture and natural conservation inside Barracão dos Mendes micro-watershed.

EMBRAPA acts both as external knowledge provider and capacity builder inside the area. Two identified activities for this external actor for Barracão dos Mendes.

Finally, to give an overview of the external actors and their flow of funding and knowledge, the following figure is given.

**Figure 11** – Key external actors acting inside Barracão dos Mendes micro-watershed



Source: Own figure

The arrows show information and financial flows. The dot arrows represent stronger interactions. The light gray figures on the bottom-left side are local actors, which will be further discussed.

#### 4.2.3 Summary

The main external actors identified in Barracão dos Mendes were presented, as well as their roles and additional relevant information that was available. Nevertheless, the identified external actors were key players at the time of this investigation, what does not mean that there are no other external actors inside the region. What could be said is that these external actors were the most relevant in the communities' reality at this moment. The current research does not exclude the possibility of other external actors, once due to the time limitation of the research; some may not have been untapped. In addition, the external actors come and go, once when projects are concluded, they generally leave the target zone (UN-Habitat, 2008).

Comments around the partial results already available for Rio Rural-IBRD will be presented and discussed in the **Discussion** section, for a clearer understanding.

### **4.3 Local Assets**

This section is dedicated to present the results of existing local assets in Barracão dos Mendes micro-watershed. As already exposed, local assets are skills and talents inherent to every person or group of persons, being them cultural, physical, economic, social and natural; organizational, associational, or institutional; local knowledge; social networks; people's attachment to place, among others (Green, 2001; Kretzmann & Mcknight, 1993, 1996; UN-Habitat, 2008). In this regard, the results presented in this section come completely from primary data surveyed through interview with householders and with local actors and through participatory mapping. The outcomes herein presented are substantially important to identify characteristics and trends, which may be potentially considered and further developed, to close the gap between livelihoods and community development and nature conservation, as the main objective proposed by the current thesis.

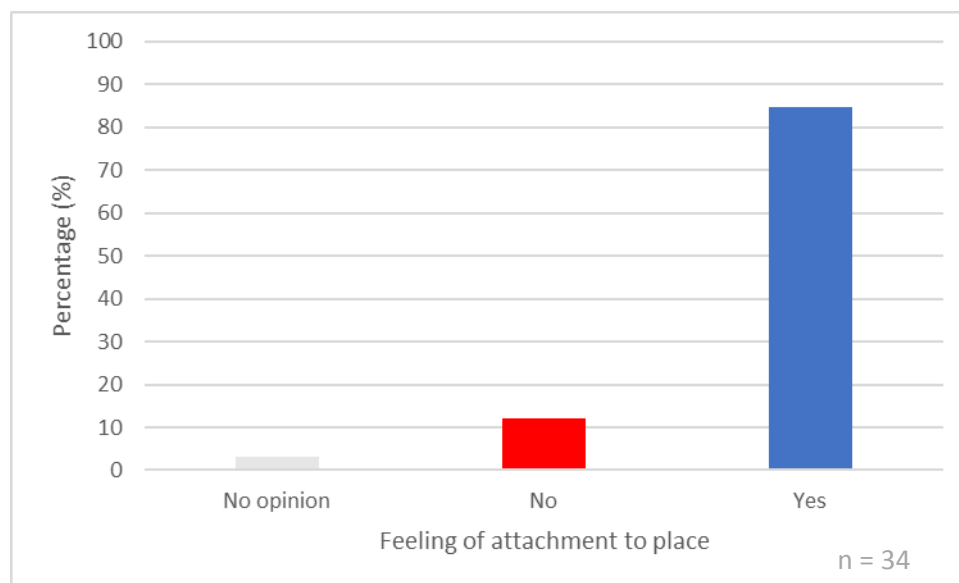
#### **4.3.1 Attachment to place**

The sense of place or attachment to place is considered a skill throughout the literature as it is considered a “public good” from which everyone in a community should benefit from (UN-Habitat, 2008).

The feeling of attachment to place is not an easy aspect to identify. The first assays to design the interviews had established a direct question on this topic (Do you feel attached to this place?). However, it was quickly concluded that it was not the right manner to approach the given issue. Thus, other questions and free talks guided a better manner to come with some conclusions about the theme. Asking about migration of parents and grandparents; for how long the people were living in the place; how was the feeling of pertaining to the community; and the feeling they have regarding the other people inside the community resulted in better-shaped results. The guidelines for these questions are provided in the complete interview (Appendix 8.3).

The following figure gives results regarding the sense of place delivered by the local people in Barracão dos Mendes micro-watershed.

**Figure 12** – Feeling of attachment to place of local people from Barracão dos Mendes micro-watershed



n = number of respondents

Source: own figure

As we can see, over than 80% described as positive their feeling of attachment to place. The great majority of interviewees were born in the place, many times, in the same house they are living until now. Some indeed, expressed that their parents were also born in the same house expressing great respect to their surroundings.

#### 4.3.2 Organizational Assets

The first noticeable local asset inside the study area are the local associations. Noticeable because everybody inside the community talks about it, being easily identifiable. Thus, Barracão dos Mendes micro-watershed accounts with remarkable organizational assets: five (5) local associations, one for each existent community. The local associations are of local ownership, established under government suggestion.

The local associations are:

- APROBEM, Association of Barracão dos Mendes, with 144 associated householders;
- Fazenda Rio Grande, with 40 associated householders;

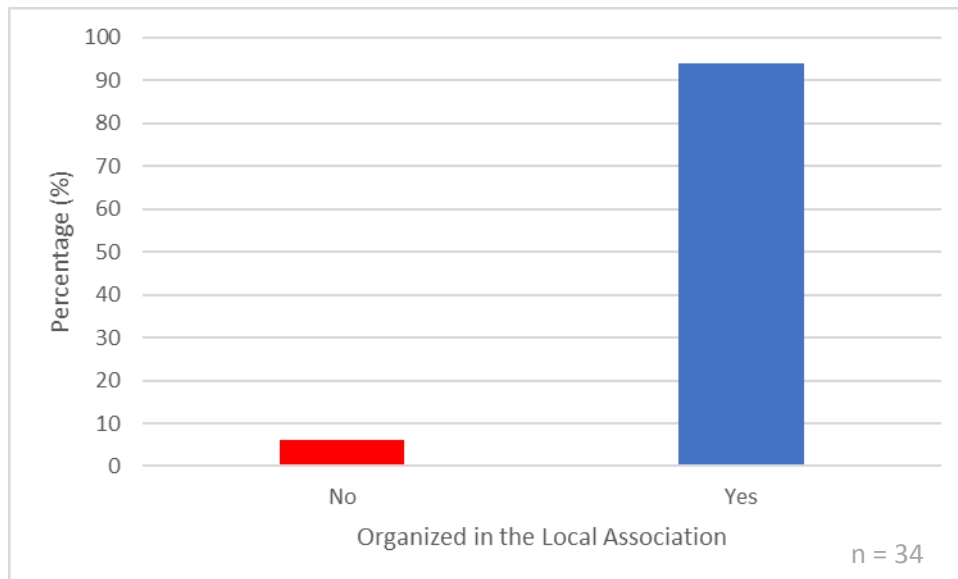
- Serra Nova with 26 associated householders;
- Serra Velha with 22 associated householders, and;
- Florândia da Serra with 21 associated householders.

The number of householder for each local association was obtained through local actors interviews; however, they do not represent the total number of householders for the complete micro-watershed, once many of them are not registered as associated.

The local associations have a representative and informative character, being also, deliberative for community issues. The biggest associations – APROBEM and Fazenda Rio Grande – have monthly meetings, while the other three perform the meetings according to the “demand”. According to the presidents’ discourse, the subjects approached in every meeting may widely vary: transportation, roads, agriculture and funding projects, retirement issues, health, among others. At any time, environment was a mentioned issue.

For surveying data on the number of people being associated to the local associations, respective to their community, the interviews with householders approached the issue. Thus, the following figure presents the percentage of people being affiliated to the local associations.

**Figure 13** – Percentage of local people being affiliated to the local associations in Barracão dos Mendes micro-watershed



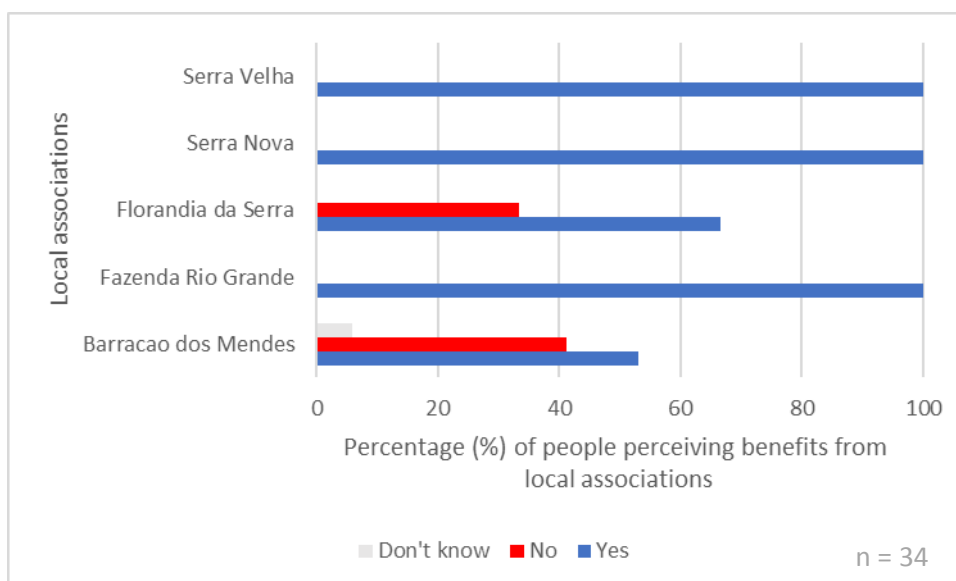
n = number of respondents

Source: own figure

The results presents that approximately 6% of the interviewees are not affiliated to a local association against approximately 94%.

When people were asked about the reasons for being part of the local associations, some differences appeared among the communities (**Figure 14**).

**Figure 14** – Percentage of local people’s perception of benefits of being associated for each community in Barracão dos Mendes micro-watershed



n = number of respondents

Source: own figure

All the interviewees pertaining to Serra Nova, Serra Velha and Fazenda Rio Grande local associations responded they feel benefited. For Barracão dos Mendes (APROBEM) local association, approximately 41% responded that they do not perceive any benefit of being affiliated to the association against approx. 53%; approx. 6% did not express their opinion. For Florândia da Serra, the numbers are approx. 67% and 33% respectively.

Historically, Fazenda Rio Grande was a big property owned by a single person. When the owner decided to sell his land, he firstly gave the opportunity to his employees, who were living in the area, to buy their parcels. To achieve this, the local people organized themselves into local associations – through government advice – which nowadays are Fazenda Rio Grande, Serra Nova and Serra Velha. The government bought the land parcels and the people pay annually the amount of the debt to the legal authorities, being part of the Brazilian agrarian reform agenda.

This historical fact may be of the reasons people feels benefited more for these associations than the others may. The benefits recognized by them always referred first



to this as a great benefit. The other perceptions were: **1) retirement issues** and; **2) access to market.**

Regarding access to market, the three aforementioned associations have established a partnership with the Federal government for the PAA (Program for Food Acquisition) and PNAE (National Program for Scholar Food) programs. PAA is a program which the government prioritize food grown by familiar agriculture and coming for agrarian reform – information surveyed with local people and local actors. The food bought is distributed to socio care institutions, popular restaurants, community kitchens, among other governmental institutions. PNAE also conforms a marketing partnership with the government, but the food acquired is destined to public schools throughout Nova Friburgo.

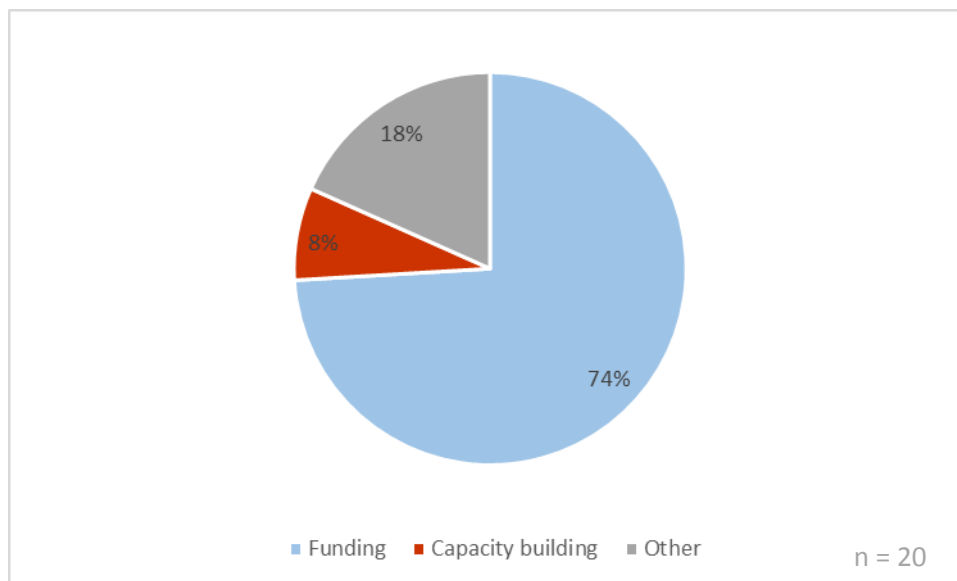
Indeed, in the DRP, one of the problems identified by the communities was the lack of security for the marketing process, once most of them depend on “atravessadores”<sup>7</sup> to sell their products. Actions proposed by local people in order to solve this problem were capacity building for PAA and PNAE and community organization for marketing procedures. Therefore, local people seems to agree on the positive potentials emerging from organizational skills.

People, who had a positive answer for benefits from the local associations, perceive them as follows.

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<sup>7</sup> “Atravessadores” are intermediate people in the crops marketing. They collect the farmers’ products without a fixed price; transport it to the vegetable markets (CEASA) – mainly in Rio de Janeiro and Niterói cities – selling them there. After the sell, they pay the farmers accordingly to the price they obtained for the products, keeping a percentage on that. This is a blind process for the farmers, once they do not know previously how much they are going to earn with their crops.

**Figure 15** – Percentage of local people’s perception on types of benefits coming from their respective associations in Barracão dos Mendes micro-watershed



n = number of respondents

Source: own figure

Most of answers pointed that funding support is the most important benefit they receive from the associations or through being part of the associations (approx. 74%). Some have answered capacity-building (approx. 76%). Benefits identified as others (approx. 18%) on the figure above were pointed, in importance order, as: **1) partnership with the government to buy their land (historical fact of the former Fazenda Rio Grande); 2) access to market through PAA and PNAE and; 3) retirement issues.**

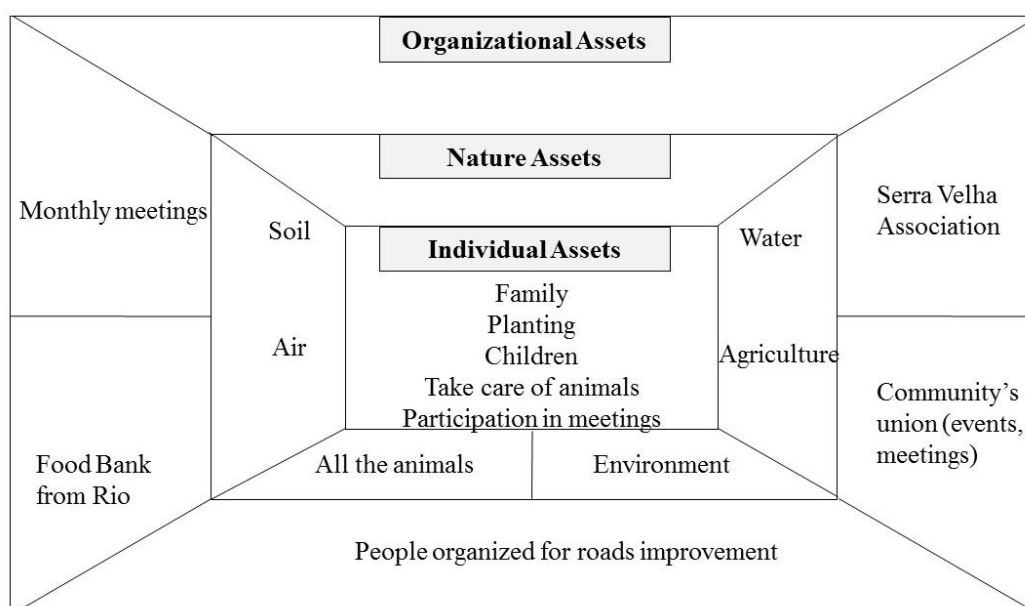
Through the presented results, it is interesting to remark that the organizational asset of Barracão dos Mendes micro-watershed are significant, once the area presents one local association for each community with the great majority of local inhabitants being associated to them, besides of perceiving benefits of being organized. However, funding support was highly valued as most important benefit, which may express the manner external actors are intervening, local associations acting just as facilitators, within the study area.

### 4.3.3 Nature and Individual Assets

Through the participatory meeting, assets regarding nature and individuals, besides organizational, were collected. I was the facilitator of the activity, and the information was completely provided by the participants.

As the communities rely mainly on agriculture activities, being surrounded by important natural resources, the map suggested by Kretzmann & Mcknight (1993) was adapted. The results of the given activity are showed in **Figure 16**. The original map and photos of the activity can be seen in the **Appendix 8.5**.

**Figure 16** – Participatory assets mapping of Barracão dos Mendes micro-watershed



Source: own figure

As the organizational assets were already presented in the previous section, they will be briefly commented. It is interesting to notice that people recognizes the value their associations have. As the participatory meeting was performed inside the Serra Velha community, this association was the one mentioned by the participants. Moreover, they identified the importance of the meetings being carried out to discuss the community's demands, referring to the positive aspect of being united as group, through which they can decide on the community's priorities – roads improvement was quoted. The map shows again the partnership for access to market with the government (PAA and PNAE programs, formers of the Rio Food Bank program, as labeled in the map).

The nature assets identified by people were **water, soil, agriculture, soil, the animals and environment**. Thus, Rio Rural campaign was a successful initiative in raising awareness on water resources. Locals now understand the importance water has for their livelihoods, linking it directly with agriculture, “*if there is no water, there is no crops production*”, they all agreed. They also mentioned the importance of the riparian forests for water spring protection, although they did not put it into the map. Soils were completely related to the crops production. Locals seemed proud to their agriculture performance.

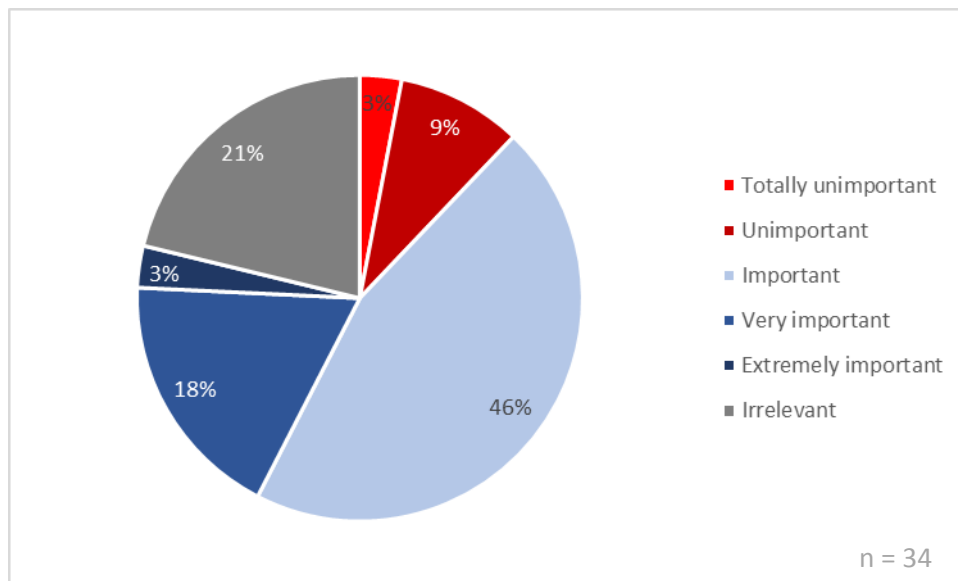
Amongst the individual assets, they were identified as **family, planting, and children, take care of animals and participation in meetings**. Interesting to quote is that they perceive the fact of knowing how to plant as an asset, as part of their natural gifts and livelihoods. As individuals, they declared again, the importance of their associations, labeled in the map as participation in meeting.

#### **4.3.4 Local Knowledge**

In this section, local knowledge refers to the perception locals have about their natural surroundings and how they behavior in relation to it; i.e., if they make use of the natural resources directly, if they know the ecosystem values from natural resources, etc. Moreover, data on forest remnants inside the local people’s properties is also here presented.

To approach the perception local people has on the natural resources, they were firstly asked about their feeling regarding the forest remnants inside their properties. The following figure shows the results.

**Figure 17** – Percentage of local people’s perception on the importance of forest remnants in Barracão dos Mendes micro-watershed



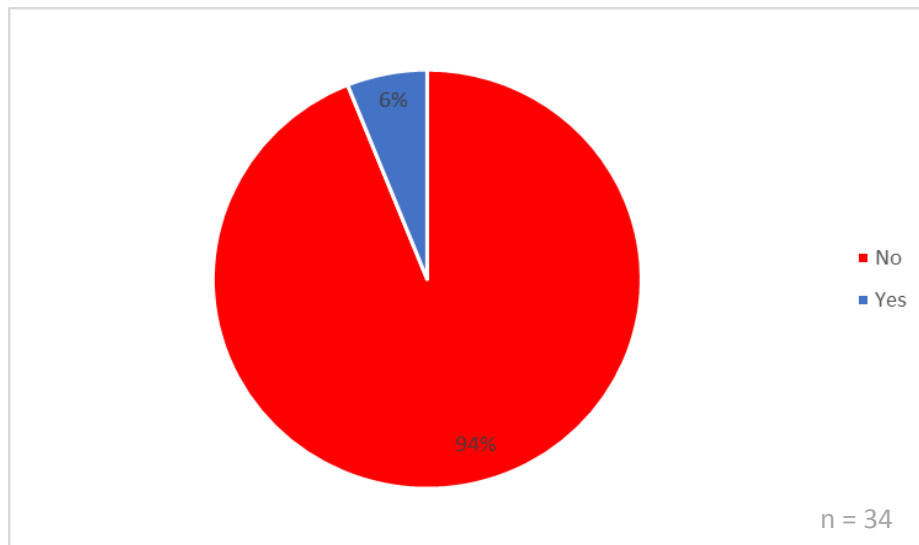
n = number of respondents

Source: own figure

The results show that almost half of the respondents (45%) considers the forest as important. The highest value is followed by 21% was of respondents not expressing their opinion on this topic; followed the value for people who believe the forests are very important (19%). Around 9% perceive the forest as unimportant and lowest values were found for the extreme perceptions, both extremely unimportant and extremely important (3%).

To found out endorsement for the given results, people were asked if they take direct benefit over forest resources. Thus, interviewees were asked if using direct products (**Figure 18**) from forest (forest resources).

**Figure 18** – Percentage of people using direct products from forests in Barracão dos Mendes micro-watershed

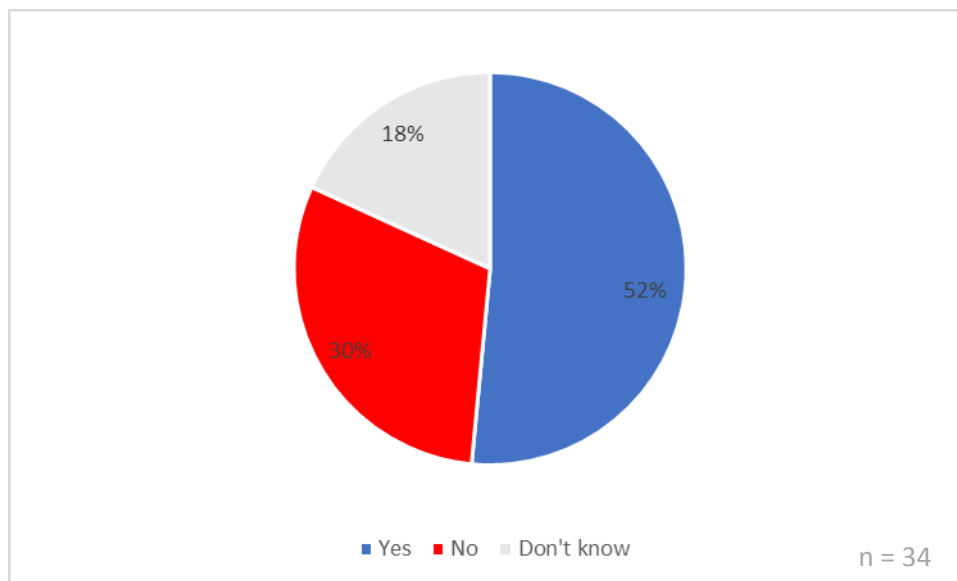


n = number of respondents

Source: own figure

The figure shows that the vast majority of farmers does not make any use of direct products coming from forests (94%), while only 6% use the forest resources directly. From these, the only mentioned product was **wood from dead trees**. Many of them have demonstrated fear regarding its usage. Subsequently, local people were asked why not using direct forest resources. As many of them have replied '*because they are prohibited to*', the next figure shows the relation between the percentage of interviewed people not using direct products from forests due to environmental regulation.

**Figure 19** – Percentage of people not using direct products from forests due to environmental regulation in Barracão dos Mendes micro-watershed



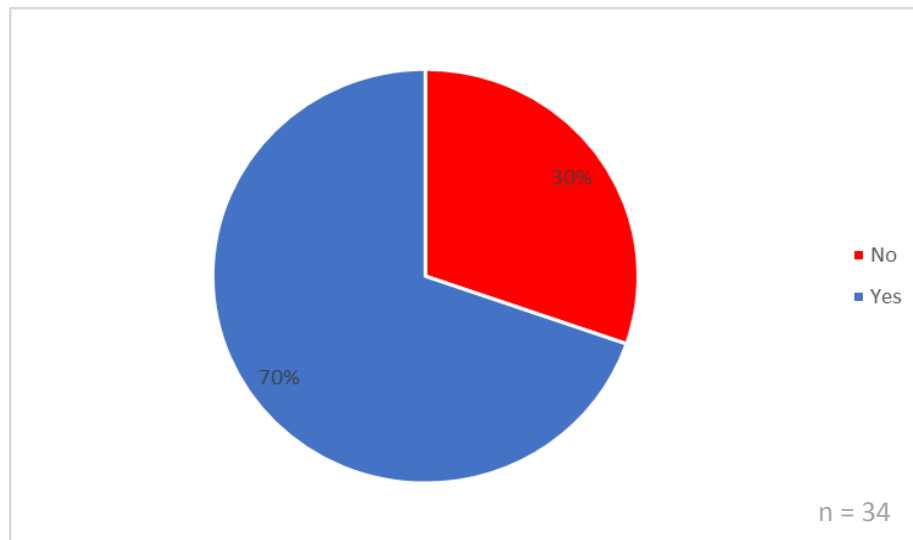
n = number of respondents

Source: own figure

Results show that approximately a half part (52%) of the interviewees have answered that they do not make any use of the forest products due to the punitive instruments engaged by the Brazilian environmental law. Many of them, indeed, had some local history to tell, or that happened to them or to some other person they knew. The witnesses expressed a feeling of injustice related to the exorbitant fines applied. The people who have asked “no” (30%) have mainly stated as reasons for not using the products such as: **1) no need to use them; 2) importance to keep the forest intact,** and; **3) because they did not want to change the landscape they were used to since their childhood.** Around 18% of people did not expressed any opinion.

For knowing whether local people make use of services for ecosystem regulation and maintenance (**Figure 20**). The results are presented as follows.

**Figure 20** – Percentage of people making use of services for ecosystem regulation and maintenance in Barracão dos Mendes micro-watershed



n = number of respondents

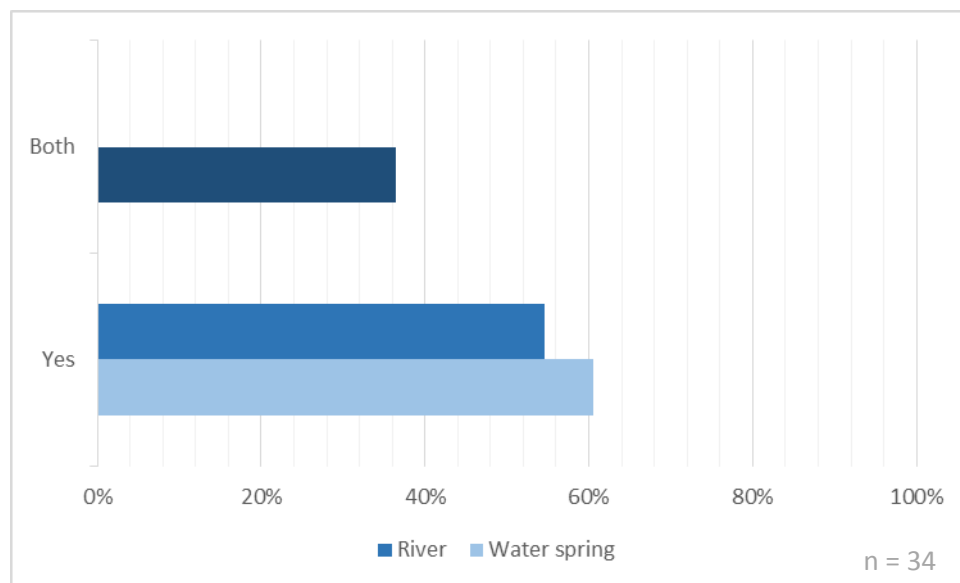
Source: own figure

The previous figure shows that 70% use ecosystem services (against 30%). The respondents have mentioned the following products, in order of importance: **1) water provision; 2) clean water; 3) clear air; 4) climate regulation; 5) disaster risk reduction, and; 6) soil conservation.** Water was mentioned twice among the six identified ecosystem services, which may represent a successful outcome of the Rio Rural campaign on water spring protection, previously discussed. Although these results are presented, it is unavoidable to say that they may not corroborate the local reality, once they are subjective questions, which need more involvement, demanding time for the interviewer to gain trust of the local people.

To understand how the forest fragments are distributed inside the farmers' properties, they were asked, firstly, if having river or water spring inside their properties (**Figure 21**); from these, who presented riparian forest or not around them (**Figure 22**); and, the percentage of forests patches being riparian forest or distributed in slopes or hill tops (places legally required to contain vegetation cover) (**Figure 23**).



**Figure 21** – Percentage of local people’s property presenting water spring or/and river in Barracão dos Mendes micro-watershed

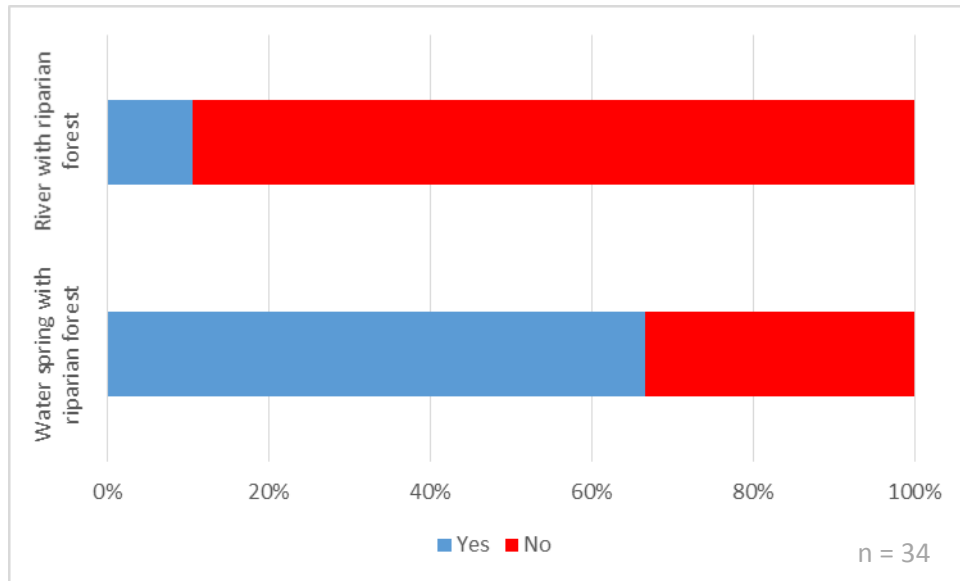


n = number of respondents

Source: own figure

More than 50% householders declared that their properties have water springs or rivers – Approximately 61% for water spring and approx. 55% for river. Around 36% of the respondents answered, the property has both. Thus, it may be seen that the study area is rich in water sources.

**Figure 22** – Percentage of people presenting riparian forest along or around the water bodies inside their properties in Barracão dos Mendes micro-watershed

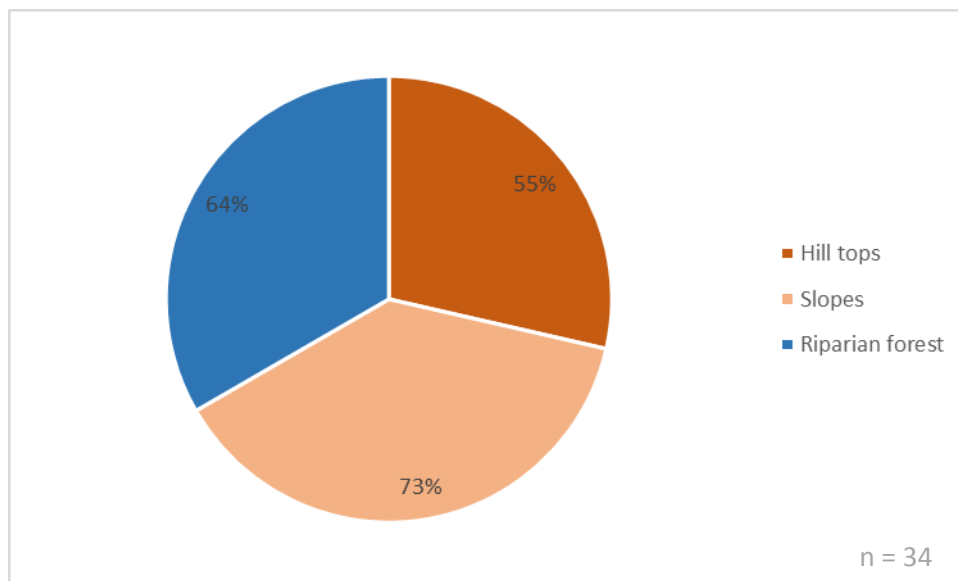


n = number of respondents

Source: own figure

Results show that 67% (against 23%) of the respondents have riparian forest around their water springs and only 11% (against 89%) along the river passing through their properties.

**Figure 23** – Percentage of the distribution of forest patches inside the respondents' properties in Barracão dos Mendes micro-watershed.



n = number of respondents

Source: own figure

The results show that 55% of forest remnants are mainly distributed on hill tops, 64% as riparian forest and 73% in the slopes. This data may not exactly represent the reality of the forest resources distribution, once many properties does not present river, slopes and hill tops, or present one or two or all of them. However, they can bring a tentative light on forest patches distribution in Barracão dos Mendes micro-watershed.

In summary, this section presents interesting results regarding the local knowledge people has on their nature surroundings, being mostly considered as important and presenting a great potential conservation protection, for example, for riparian forests around water springs and potential to conserve, once the rivers, mainly, have few riparian forest at their longside.

#### 4.3.5 Summary

In this section, issues regarding local skills were gathered. Notably, the communities presented interesting profile regarding the organizational aspect. Local actors are part of the organizational asset. In addition, local knowledge presents results on people's perception of its surroundings. The results together, represent the potentiality for further

development of the local skills and the natural profile as an important constituent of the region.

## 5 DISCUSSION

Natural resources conservation is an issue for which a number of panaceas have been widely promoted, starting from the creation of several legal instruments (Berkes, 2007). It is the case of the Brazilian environmental legislation. It accounts with innumerable instruments created along the time, being solved into another, broke up into two or three other again. It is a hard task to understand the instruments coordination, their responsibilities, their scope of application and their internal regulations. Indeed, the existence of several instruments, does not guarantee their effectivity or functionality (Medeiros, 2005). Although the efforts to systematize and integrate these instruments for nature conservation and management, such as SNUC, they do not cover the complete scope of environmental regulation. Moreover, different groups acting or having interest in the Brazilian natural areas make real pressure on their establishment and application (Medeiros, 2005). Indeed, the new version of the Forest Code, which represents one of this group disputes, may negatively influence the APPs and RLs establishment and restoration, two protected areas categories lacking of a concrete management instrument (EMBRAPA, 2012; Medeiros, 2005). Besides the failure in the engagement of long-term plans for APPs, for example, these protected areas present a complex ownership profile and face competing claims. Some are under state and federal ownership, some are under the control of communities, and some are privately owned (Borges et al., 2011), statement completely supported by the profile of the current study area. Therefore, the management of these areas require a multi-level and multi-scale system (Levin, 1998). If natural resources conservation was not a complex issue, it would solely need a simple system, thus, state control would be an appropriate low-cost solution (Berkes, 2007), moreover, the implementation of protected areas would not involve social and political controversy (Holt, 2005; Brechin et al., 2003). Ignoring these trends, the Brazilian legal framework on environmental conservation mainly relies on parks and protected areas controlled by central governments (Laschefski et al., 2012). The state control on natural resources may limit livelihood activities, if allowing them at all (Castro, 1991; Western & Wright, 1994; Manning, 1994; Freeman, 1994; Igoe, 2004). Environmental legislation mostly, preclude the continuation of local rural lifestyles (Laschefski et al., 2012). Rural communities have always challenged the claims of the state over their resources (Zerner, 2000), making conflicts likely to emerge often at the heart of protected-area establishment and maintenance (West et. al, 2006). It

is the case of Barracão dos Mendes, where natural livelihoods are very limited, but instead, more impacting activities are allowed to be carried out, such as pesticides use. Western & Wright (1994, p. 8) have established an important pillar on this topic, assuming that “*the coexistence of people and nature should be distinct from protectionism and the segregation of people and nature*”. These authors also give the seminal definition for community-based conservation that “*includes natural resources or biodiversity protection by, for, and with the local community*” (p. 7). In this sense, strategies being implemented in Barracão dos Mendes, fails in consider the already existing local assets and trends to improve forest conservation. According to Scotto & Limonicic (1997), the socio-environmental scope should be set taking into consideration natural resources management and the actors involved in decisive processes. Different collective actors, communities and individuals should discuss around the natural goods use and appropriation (Maia, 2008). Thus, external actors intervening inside the communities should encourage and support local actions (Kretzmann & Mcknight, 1996) in order to foster local natural resources conservation and management. Nonetheless, for this to occur, their role should not rely on top-down interventions (Green, 2001) nor represent the interest of park and state authorities (Paudel et. al, 2007). Instead they should encourage the proper use of forest resources by local communities, which, valuating them as important to their livelihoods, could be the most engaged ones in protect it, rather than seeing the nature resources as an alien for their ways of lives.

The main external actor inside Barracão dos Mendes is represented by the program Rio Rural-IBRD, presenting a theoretical agenda and setting objectives in order to promote “*capacity-building to encourage sustainable activities and conservation of Atlantic forest resources*” (Rio Rural, 2014). In its text, we can identify three components of community-based development and conservation: external help, promotion of local assets and capacity building.

For external help or technical assistance (UN-Habitat, 2008; Nagahata, 2010), their role mainly relies on funding support. Community-based theory has an extensive literature on factors that can undermine community development. One of the barriers, funding, can enable the perpetuation of economic dependency on external sources of funding, preventing the communities to raise their own untapped assets and resources (UN-Habitat, 2008). Concerning the remarkable impact of the project inside Barracão

dos Mendes communities, local actors' discourse state that after local people became aware of Rio Rural-IBRD program, the attendance to the local association's meetings has greatly increased, which may indicate the major interest of people on funding support. Indeed, the people's perception concerning benefits through their local associations (**Figure 15**) mainly relies on money as a valuable intervention. It should not be the way. Depending on the manner funding is provided, it may be translated into the extent of local people's problems and the value of services as the answer (Kretzmann & Mcknight, 1993). Local people starts to behavior as clients of external funding which will remediate their needs, becoming consumer of services with no incentive to be producers (Kretzmann & Mcknight, 1996). Naturally, external help as funding support can exist; however, it must engage actions along with the community, allowing them to build up the process side-by-side with the external actors in order to avoid communities' dependency (Hadidy & Mathie, 2005).

Regarding the mobilization of local assets, credits must be given to the efforts of the program. The encouragement for local people to organize themselves into associations, as COGEM is a noticeable attitude. It may be a pathway through which communities can be mobilized into cross-scale and cross-level linkages and networks, preventing communities to the situation of marginality (Berkes, 2007; Goldsmith, 1979; Kretzmann & Mcknight, 1996; UN-Habitat, 2008). Through organizations, they are more likely to bond social capital, for seeking and bringing external help (Hoole, 2010). In addition, COGEM may be seen as an arm of the local associations (local assets) already established, being the channel through which information flows from inside to outside. It is the bridge that may connect locals to externals. However, it is important to understand if true acknowledgement to COGEM as a representative instrument is given by the external actors. The committee enables local's voice to be heard or does the local people take the back seat when dialoguing with the external actors? Due to time limitation of the current thesis, only one meeting gathering COGEM and EMATER/Rio Rural was experienced, not enough to infer on how local people are allowed to behave. Rio Rural-IBRD partial results sheet, accounts with successful rates for participatory development, which specifically refers to issues regarding COGEM establishment and strengthening – 30 to 50% of accomplishment. In addition, DRPs are totally elaborated through participatory meetings (99% of accomplishment). However, this diagnosis tends to be more as a collector of local people's anxieties and needs once issues pointed

out as important in DRP elaboration are not included in the management plan for the micro-watershed (PEM). Moreover, participatory research in collaboration with Pesagro-Rio and EMBRAPA has already achieved good results (95% of accomplishment); processes through which each local person gets involved and learns, being, thus, a win-win relation. Citizen participation can lead to citizen empowerment (Peterman, 2000), which in turn may lead to progressive control of local people over resources (Green, 2001). In addition, the ownership transference from external agents to local people for PID realization is an action that should be encouraged in order to foster, step by step, a locally-driven instead of top-down development (IIED, 2011). According to Chhatre & Agrawal (2009), local ownership and autonomy over decision processes may positively impact outcomes regarding forest dynamics.

As a capacity-builder, Rio Rural-IBRD presents an unsuccessful performance. Analyzing the partial results sheet of the program, expected activities regarding capacity building were poorly achieved. The number of certified farmers for good agriculture practices remains in the zero (0) mark, and farmers adopting good agriculture practices still accounts with only 1% of accomplishment. For knowledge dissemination at local level, the number of local assistance is also as few as 1%. For rural extension capacity – capacity building of EMATER actors – only 13% of the planned goal was achieved. For number of expected plans on capacity building for leadership, a better result is presented (28% of accomplishment), however, it is just a planning procedure and no reference is made for their execution. According to the interviewed EMATER technician, the knowledge transferred from them to local farmers still mostly remains on intensive agricultural practices, not suitable to foster sustainable practices for familiar agriculture. EMATER actor also declared that they have few or any input to advisor and assist the implementation of forest restoration practices – activity envisaged in the program list, being the only directly related to conservation of forest remnants. Capacity-building plays an important role on community development, once it can stimulate assets, such as social and human capital to emerge or form partnerships with external resources in an horizontal way, strengthening the opportunities of poor communities (UN-Habitat, 2008). Thus, as an actor for capacity building and knowledge transference, Rio Rural-IBRD is far from the desired role. Nevertheless, worth to say is that Rio Rural itself promoted a positive campaign on raising awareness for water springs protection (**Figure 19** and **Figure 22**), which may be accounted as a positive lesson-learned.



Barracão dos Mendes micro-watershed accounts with several local assets, which may be drivers of their development. The associational asset – represented by the five local associations and COGEM – is important for networking and organizational issues (UN-Habitat, 2008). Through them, intervening actors may involve the local groups as necessary tools for the development, being full contributors to their own process of community development (Hadidy & Mathie, 2005; Kretzmann & Mcknight, 1996). Moreover, the local associations generally act as a vehicle through which the community can solve their problems and share common interests and activities (Kretzmann & Mcknight, 1993). Although some local association have different histories leading to different outcomes nowadays, – some were more successful in establishing positive partnerships with the government, e.g. PAA and PNAE – all represent local people’s interest and through them communities’ issues are identified and discussed. In addition, several individual assets were identified, which closely refers to their livelihood, besides of their positive feeling for attachment to place. Once local people perceive their talents and qualities, as well as a place belongingness feeling, they feel more confident to become problem-solvers, changing the sense of marginalization that in-need communities may present (Poole, 2005; UN-Habitat, 2008).

Further, the data surveyed demonstrates that households present a property mean size of 13.5 ha and a forest cover mean size of 6.0 ha, a ratio of 1:2.25 and agriculture field mean size of 4.6 ha (**Figure 6**). The forest fragments are mainly distributed into areas defined by law (Forest Code) as APPs. 45% of the respondents declared that the forest as being “important”, a medium ranking punctuation (**Figure 17**) from where come the indirect product used by them (70% make use of indirect products from forests) (**Figure 20**). Although the potential of local people from Barracão dos Mendes to conserve their nature surroundings, all of the respondents engage indiscriminate use of pesticides in their crops.

Thus, instead of precluding the use of natural resources by small communities who does not effectively harm the environment (Laschefski et al., 2012) through a legislation mainly constructed as a punitive instrument (Pieve et al., 2008), strategies based on maximizing the direct income of communities from nature and its proper use are fundamental to the sustainability of such systems (Sachedina & Nelson, 2010). For this to occur, government and other external actors must understand that small communities

living embedded into nature should account with incentives, in order to not be enforced by the capitalist cycle for the engagement of aggressive agriculture practices affecting the environment (Laschefski et al., 2012).

Thus, regarding the already good established local associations and additional assets, the tendency in protect forest patches along with some sort of external help – which may be reorganized and refocused – community-development of Barracão dos Mendes micro-watershed and nature conservation may be both served. If external actors engage on practices for conservation; leveraging the local assets and knowledge already existing; and taking into consideration the natural surroundings of the study area, a positive outcome for both may be achieved. However, whether external actors continue to implement palliative measures, which do not deeply support the transformation of farmer's practices into more sustainable ones, local activities such as uncontrolled use of pesticides will continue to be deployed. According to BCN (1997), if communities can benefit economically from by making proper use of the biological resources that they manage or control, then they will take action to counter internal and external threats to these resources.

For instance, in the north region of Rio de Janeiro, an economic incentive is delivered for people who establishes RPPNs inside their properties (Rio Rural, not published data). The RPPNs present a great ecological value for species conservation, and potential for connection of forest patches (Oliveira et al., 2010). Once, as few as around 2% to 3% of Atlantic Forest biome occurs inside state control protected areas (Chiarello, 2000; Paglia et al., 2004; Pinto et al., 2004); RPPNs can play a great role in Atlantic Forest protection. Thus, this initiative may be also feasible for Barracão dos Mendes micro-watershed. Indeed, forests managed and conserved by local people, besides of delivering social and development improvement at the local level, can be justified through the conservation optic. Andam et al. (2008) proved that the protectionist conservation performed by state protected areas does not diminish deforestation rates as previously expected; however, community-based forest management for provision of goods and services can be as effective as (in some cases even more) the protection uniquely based on protected areas (Bray et al., 2008, Ellis & Porter-Bolland, 2008; Porter-Bolland et al., 2012).

Other alternative is based on the recent recognition that management plans for protected areas should take into consideration livelihoods performed in buffer zone

areas (Budhathoki, 2004; Paudel et al., 2007; Porter-Bolland et al., 2012). The PETP management plan shows theoretical aperture to local people intervention within its buffer zone (INEA, 2013). Some opportunities there found points out that organized civil society might participate in the park good management, seeking for more institutional cooperation among communities and government. The latter figures also as objectives, being that the PETP plans to build an articulation with local associations and governmental institutions for research and extension, namely EMBRAPA and EMATER, to support sustainable agriculture for people occupying the PETP buffer zone.

Thus, if the process for community-based development could gather more actors interested to build, along with local people, a concrete plan for transforming the local actions into more sustainable ones – alternative agriculture, agroforestry and maybe even organic cropping – as a mean to likely increase the added value for their products and avoiding environmental negative impacts, by one side. On the other side, mobilization of local assets and knowledge for restoration and conservation of the innumerable forest remnants inside the community. The income generation for the park activities should flow to the communities and local people should engage workforce. It could rather improve social and economic aspects of these poor communities, besides of accomplish with conservation goals. Examples on this topic are found in buffer zones of protected areas in Nepal. The country adopted a community-based approach to conservation management with local people around protected areas. The program has built avenues through which dialogue between protected areas authorities and local people, besides of sharing revenue, opening a space for local participation in conservation initiatives (Budhathoki, 2004; Paudel et al., 2007).

## 6 CONCLUSION AND RECOMMENDATION

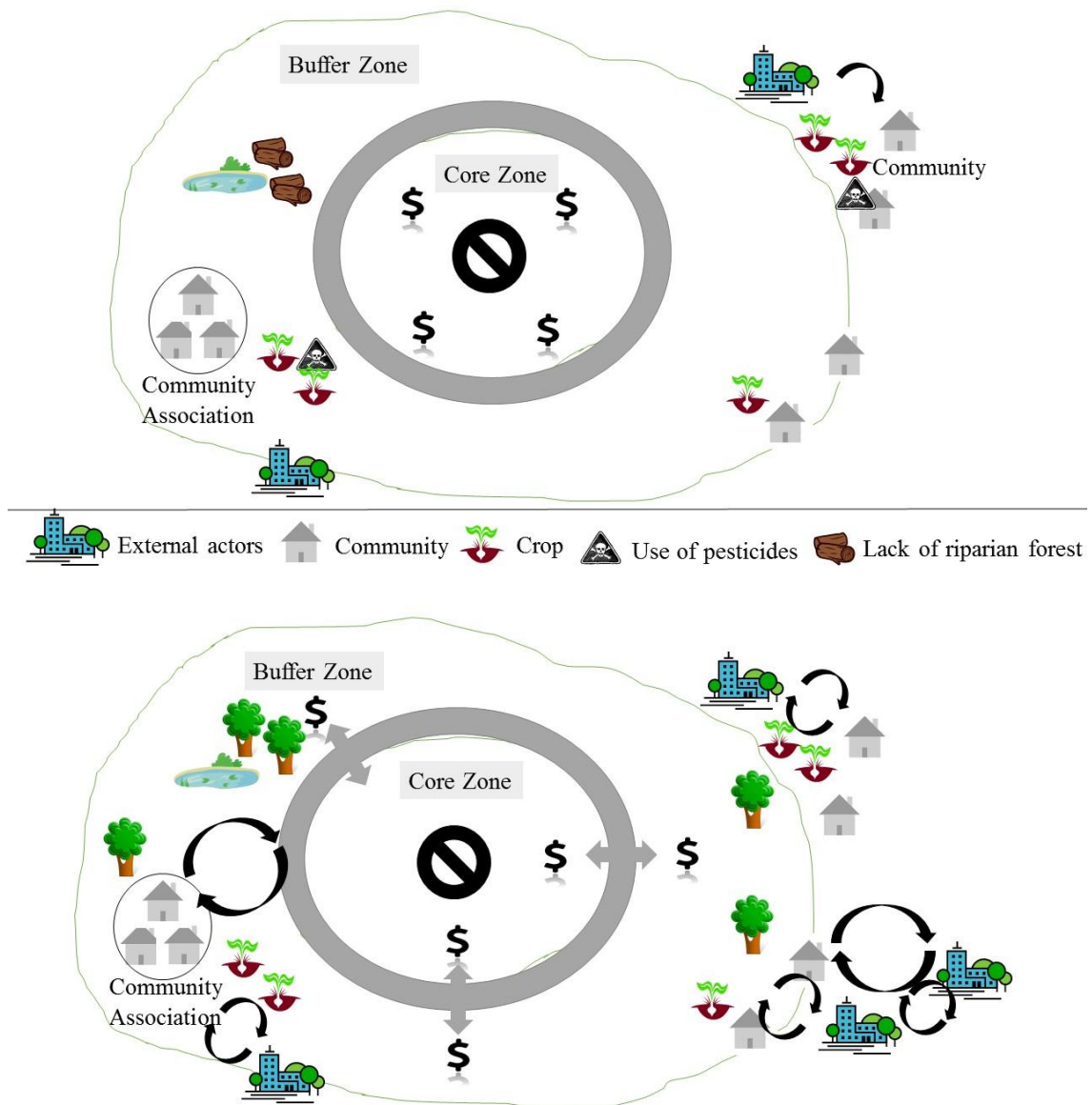
In summary, Barracão dos Mendes micro-watershed presents a great potential in the achievement of community development and conservation of natural resources. It may be justified by: 1) the study area is embedded into Atlantic forest remnants; 2) external support has already identified the micro-watershed as a potential area to develop more sustainable practices; and, 3) the communities account with relevant local skills and local knowledge as a kickoff for a positive change to occur.

The external actors, indeed, already recognize – at least theoretically – the need to achieve local development taking into account local people, stating in their agenda processes as capacity-building, participation and sustainable practices implementation. Moreover, it has been widely accepted that state centralized control over protected areas does not suit to the current claim on social issues; and that better strategies to account with local people living in the surroundings should arise. The buffer zone of the management park (PETP) where Barracão dos Mendes is located, points out in its text, opportunities to these processes to occur. Thus, instead of allowing impacting and intensive activities in the surroundings of this protected area, and, at the same, prohibiting rural livelihoods, local people should be fostered to use the forest resources properly, as well as, contributing to the nature conservation.

Regarding the entire process for community-development approach, firstly, for the communities to have their status of marginalization changed and achieve development, local voices should be heard. Rather, their local assets – associational, individual, local knowledge, attachment to place, among others likely to exist – should be mobilized and strengthened. Later, capacity building should be one of the pathways to transfer ownership to the local become producers of their well-being. Thus, the role of the external actors must be oriented for a bottom-up construction leading, throughout time, to a locally driven development. It is important to emphasize that communities will be not supported forever. This is one of the reasons why external support should not cause dependency. Nonetheless, the community-based approach requires a deep understanding of many social and human elements – such as human and social capital – not possible to measure in a sojourn, as it has occurred for the current research. In addition, although there are several studies demonstrating that forest cover should be equally or better conserved by communities rather than strict protected areas, it may be local-specific.

Thus, the following figures schematically suggest how Barracão dos Mendes currently is concerning its surroundings, external actors and activities performed by local farmers – cropping and uses of pesticides – and how it may become, in the future.

**Figure 24** – Schematic view of the current profile of Barracão dos Mendes micro-watershed compared with a possible outlook



Source: Own figure

The first figure shows the study area with few capital for bonding and bridging external actors, in addition to no avenues between the local communities and the protected area. The second figure presents more relations intra, inter-actors, and avenues through which revenues can be shared. Nevertheless, the schematic figures are only a representative model. Due to time limitation, the specific components regarding the suggested outcome were not deeply studied, remaining as a recommendation for further investigations.

Nonetheless, the current research provides relevant data on local assets and local activities regarding the nature surroundings showing potential for a community-based conservation. Both nature and social profiles of the region could be improved if external support engage local people's inclusion in nature conservation processes.

Therefore, more studies focused on this important area should be carried on in order to deeply understand the relationships between local and external actors, the established partnerships and network, besides of measurements of the local biological richness and vegetation cover, cross-linking it to the legal requirements for APPs and RLs establishment, for example.

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## 8 APPENDIX

### 8.1 SNUC protected areas categories and description.

Group	IUCN Category	SNUC Category	Short description
<b>Integral</b>	Ia	Ecological Station	Nature preservation and scientific research. Indirect use of natural resources. Not opened to public visits, only for educational purposes. Modifications only for natural restoration. Subjected to ICMBio management.
		Biological Reserve	Integral conservation of biota and other natural attributes without direct human interference, except for natural restoration. Not opened to public visits, only for educational purposes. Modifications only for natural restoration. Subjected to ICMBio management.
	II	National/State Park	More popular and older UC category. Preserve ecosystems of great ecological relevance and scenic beauty. It is allowed scientific research, educational activities and recreation and ecotourism. Subjected to ICMBio management.
	III	Natural Monument	To preserve rare, unique or for great scenic beauty natural areas. It can

<b>Protection</b>			be composed by private properties that are subject to the UC purposes. Visits are allowed and research investigation is subjected to ICMBio approval.
		Wildlife Refuge	To protect natural areas relevant for species existence and reproduction or endemic resident or migratory fauna and flora.
<b>Sustainable</b>	IV	Relevant Area for Ecological Interest	Small area with few human occupations, unique natural features with rare local biota species.
		Private Reserve of Natural Heritage (RPPN)	Protected areas established on private land, registered in perpetuity, aiming to conserve the local biological diversity. In addition, it aims to engage the citizen on the ecosystem protection who may be benefited by incentives or tax exemption. Sustainable use of this category are only scientific research and public visitation with educational, recreational and touristic purpose.
	V	Area for Environmental Protection (APA)	Large area, with some human occupations, with biotic, abiotic, esthetic or cultural attributes important to life quality and well-fare of human populations. Aims to protect biological diversity, discipline occupations and assure sustainable use of resources. ICMBio defines research and

<b>Use</b>			public visits requirements.
	VI	National Forest	Area with predominant native natural cover. Its purposes are multiple use of forest natural resources and scientific research. It is allowed the permanence of human populations if they were already there at its creation. Public visits are allowed, but subjected to ICMBio requirements.
		Reserve for Sustainable Development	Natural area for traditional human populations living basically from exploitation sustainable systems of natural resources. The area is considered public domain.
		Fauna Reserve	Natural areas with native animal species, terrestrial or aquatic, resident or migratory. Suitable for technical-scientific studies for economic sustainable management of fauna resources. Public visits are allowed. Amateur or professional hunting is prohibited, but products and sub-products from research can be commercialized. Any UC under this category was already created by ICMBio.
Extractive Reserve		Area used for traditional extractive human populations, with extraction as income along with familiar agriculture and small livestock. Aims to protect the objectives of these populations and the sustainable use of	

			resources. Public visits are allowed, only when compatible with local interests. Scientific research is allowed and encouraged, subjected to previous permission of ICMBio.
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Source: based on Medeiros, 2005; Rylands & Brandon, 2005; ICMBio, 2014.

## 8.2 Brazilian Environmental Laws

<b>LAWS</b>	<b>PURPOSES</b>
<b>Law 23793/1934</b>	Establishes de Forest Code
<b>Law 4771/1965</b>	Establishes the New Forest Code
<b>Law 5106/1966</b>	Establishes the tax incentives given to forest enterprises
<b>Law 5868/1972</b>	Establishes the New Rural Register among others
<b>Law 6938/1981</b>	Establishes the National Policy for Environment, its purposes and mechanisms for application and formulation, among others
<b>Law 7551/1986</b>	Change the established in the Law 4771/1965 of the New Forest Code
<b>Law 7754/1989</b>	Establishes measures to protect riparian forests around water sources among others
<b>Law 9605/1998</b>	Law for Environmental Crimes
<b>Law 9795/1999</b>	Law for Environmental Education
<b>Law 10165/2000</b>	Tax for Control and Environmental Supervision
<b>Law 9985/2000</b>	Regulates the article 225, § 1, items I, I, III and VII of the Brazilian Constitution, establishes de SNUC, among others
<b>Law 11284/2006</b>	Establishes the management of public forests for sustainable production; establishes, within the Ministry for Environment, the Forest Service BrasilLawro – SFB; creates the National Forest Development Fund – FNDF, among others
<b>Law 11428/2006</b>	<b>Establishes the use and protection of the native Atlantic Forest native</b>
<b>DECREES</b>	<b>PURPOSES</b>
<b>Decree 99274/1990</b>	Regulates de Law 6902/1981 and Law 6938/1981 that established, respectively, about creation of Ecological Stations and Environmental Protection Area and about the Environment National Policy, among others.
<b>Decree 750/1993</b>	<b>Establishes about logging, exploitation and suppression of primary or of more advanced status vegetation and restorations means of Atlantic Forest, among others</b>
<b>Decree 1298/1994</b>	Approve the Regulation for National Forests, among others
<b>Decree 1922/1996</b>	Establishes the recognition of Private Reserves of Natural Heritage (RPPNs), among others
<b>Decree 2661/1998</b>	Regulates the unique paragraph of Article 27 from New Forest Code, establishing norms for precaution on firing for agro pastoral and forests, among others
<b>Decree 3179/1999</b>	Regulates the Law for Environmental Crimes – establishes the specifications of penalties applicable to behaviors and activities harmful to the environment, among others
<b>Decree 4339/2002</b>	Establishes principles for the implementation of Biodiversity

	National Policy
<b><u>Decree 4340/2002</u></b>	Regulates the articles of SNUC law, among others.
<b><u>Decree 4703/2003</u></b>	Establishes the National Program for Biological Diversity – PRONABIO and the National Commission for Biodiversity
<b><u>Decree 5092/2004</u></b>	Define rules for the identification of priority areas for conservation, sustainable use and share of biodiversity benefits, in the scope of Ministry for Environment attributions.
<b><u>Decree 6792/2009</u></b>	Changes and adds devices to Decree 99274/1990 for composition and functioning of National Council for Environment - CONAMA
<b><u>Ordinance 357/2006</u></b>	Establishes, in the scope of the Ministry for Environment the Permanent Commission in order to suggest articulation and integrative procedures for actions and issues connected to the CONAMA and others.

Source: based on MA (2014) & ICMBio (2014)

### 8.3 Semi-Structured Interviews in Barracão dos Mendes micro-watershed (April/2014)

#### HOUSEHOLDER INTERVIEW/ GUIDELINES

<b>I. GENERAL DATA</b>			
Interview n°		Date	
GPS Coordinates		Altitude	
<b>A. HOUSEHOLD IDENTIFICATION</b>			
<b>Name of respondent</b>			
Gender ( ) M ( ) F		Age	
Relation status	Single __ Married __ Widow__	Number of children	
Did you migrate to the current area? _Y _N	When? _____	Did your parents/grandparents migrate to the current area?	When? _____
<b>Name of householder</b>			
<b>Spouse name</b>			

Gender ( ) M ( ) F		Age	
<b>B. EDUCATION &amp; INCOME</b>			
<b>Total number of members</b>			
<b>Members' names</b>	<b>Education</b>	<b>Age</b>	<b>Profession</b>
M1_____			
M2_____			
M3_____			
M4_____			
M5_____			
M6_____			
<b>Total monthly income</b>		<b>Income source</b>	
<p><b>1=</b> Incomplete primary school; <b>2=</b> Complete primary school; <b>3=</b> Incomplete Secondary school; <b>4=</b> Complete secondary school; <b>5=</b> Incomplete High School; <b>6=</b> Complete high school; <b>7=</b> Incomplete tertiary school; <b>8=</b> Complete tertiary school; <b>9=</b> Incomplete post tertiary school; <b>10=</b> Complete post tertiary school; <b>11=</b> EJA; <b>99=</b> Other (specify)</p>			
Other relevant information on this topic:			
<b>C. PROPERTY STRUCTURE</b>			
Is the property registered (CAR)? _Y _N			
Size (in ha)			
Owner? __Y __N If not, specify _____	<p><b>1=</b> Leased; <b>2=</b> Rented; <b>3=</b>Communal ownership <b>99=</b> Other (specify)</p>		
If Y, do you lease your property?_Y _N			



Explain contractual aspects		
<b>Cover Types (in <i>he</i> and/or %)</b>		
Agricultural fields		
Forest		
Pasture		
Others		
-		
-		
<b>Crops Information</b>		
Crops for income generation		Income share/order of importance
1.	7.	1.
2.	8.	2.
3.	9.	3.
4.	10.	4.
5.	11.	5.
6.	12.	6.
Crops used for subsistence		
Cultivation type ( )	<b>1= Traditional; 2= Agroforestry; 3= Organic; 99= Other (specify)</b>	
Types of crop management	( ) ( ) ( ) ( ) ( ) ( ) Observations:	
<b>1= Plantio em nível; 2= Consórcio de culturas; 3= Culturas intercaladas; 4= Descanso do solo; 5= Rotação de culturas 99=Other (specify)</b>		
Use of pesticides? _Y _N		
Types/names of pesticides		

Use of adubos? _Y _N				
Type/names of adubos				
Use of other inputs?				
Specify				
Source of water for irrigation				
<i>Relate to SECTION D. LOCAL SKILLS</i>				
From where did this knowledge come?				
Did some transition occur from one management type to another? Why and How?				
Other relevant information on this topic				
<b>D. FOREST MANAGEMENT</b>				
<b>Regarding the forest fragments inside the property</b>				
Is there forest fragments in?	Encosta _Y _N	Topo de morro _Y _N	Mata ciliar _Y _N	Other (specify)
Is there any 'nascente' inside the property? _Y _N		Is there mata ciliar around? _Y _N How many meters?		
Is there any river inside the property? _Y _N		Is there mata ciliar around? _Y _N How many meters?		
<b>Legal aspects</b>				
The forest fragments in the area are existent due to legal requirements. _Y _N				

Do you know legal obligations regarding forests? _Y _N			
If Y, which ones:			
.....			
.....			
.....			
Do you receive payment/support for forest fragments maintenance? _Y _N			
If Y, which kind of support? ( )	<b>1= RPPN; 2= Funding; 3= Training; 99= Other (specify)</b>		
Details			
Have you lately planted some trees inside the forest patch? _Y _N	If Y, which species and for what reason		
Have you ever been fined due to forest clearance? _Y _N			
Explain the situation			
How do you think government could support forest maintenance?			
<b>Use of direct forest products</b>			
Use of forest products? _Y _N	For income generation/marketing? _Y _N	Products income	1. R\$____ 2. R\$____ 3. R\$____
	For subsistence _Y _N	Products	
<b>Other aspects</b>			
Do you share or somebody else share the forest fragments with you to meet legal requirements? Explain			

What are the uses for the forest permitted by law?	
Do you know the tree species present in the area? _Y _N.	
Specify	
Do you see wild animals around? _Y _N.	
Which ones	
How do you deal with them? Explain	
Are you planning to reforest some area inside the property? _Y _N	
Why?	
Is there any institution supporting this measure? _Y _N	
If Y, specify __	
1= Seeds donation; 2= Education; 3= Training; 4= Reward; 99= Other (specify)	
Other relevant information on this topic:	
<b>E. AWARENESS ON FOREST INDIRECT VALUES</b>	
How important do you think to have natural vegetation in your property? __	

<p><b>5= Extremely important; 4= Very important; 3= Important; 2= Unnecessary; 1= Very unnecessary; 0= Totally unnecessary; 99= Other (specify)</b></p>			
<p>Do you think forest brings some kind of benefits? <u>  </u>Y <u>  </u>N</p> <p>If Yes, which ones?</p>			
<p>Do you make use of any indirect products from forest? <u>  </u>Y <u>  </u>N</p>			
<p>How important do you think forest may be for</p>			
Clear air <u>  </u>	Clean Water <u>  </u>	Climate regulation <u>  </u>	Rainfall pattern <u>  </u>
Soil conservation <u>  </u>	Disaster Risk Reduction <u>  </u>	Fruits provision <u>  </u>	Wood provision <u>  </u>
Others <u>  </u>			
<p><b>3=Important; 2= Indifferent; 1=Unimportant; 99= Other (specify)</b></p>			
<p>Do you know some program for payment for ecosystem services? <u>  </u>Y <u>  </u>N</p> <p>If Yes, have you ever made use of PES? <u>  </u>Y <u>  </u>N</p> <p>Which ones?</p>			
Other relevant information on this topic:			
<p><b>F. LOCAL SKILLS</b></p>			
<p>Are you part of any association? <u>  </u>Y <u>  </u>N</p>			
If Y, which one			

Since when	
List of local associations/organizations you know	
Have you ever been benefited by the association? _Y _N	
Benefits received by the association	

**LOCAL ACTORS INTERVIEW/  
GUIDELINES**

<b>Characteristics of the association/organization</b>			
Association 1		Association 2	
Year of foundation:		Year of foundation:	
Number of members:		Number of members:	
Are you part of the association? _Y _N		Are you part of the association? _Y _N	
If not, why?		If not, why?	
Historically marginalized people are present (ask for presence of poor, disable people, women)		Historically marginalized people are present (ask for presence of poor, disable people, women)	
Periodicity of meetings		Periodicity of meetings	
<b>1= More than once a week; 2= Once a week; 3=Once in two weeks; 4= Once a month; 5= Once every two months; 6=Less than once in two months; 7=Other _____</b>			
Issues discussed		Issues discussed	

Current projects		Current projects			
Existent partnerships	NGOs	Government	Private Companies	Other local association	Other (specify)
Name					
1					
2					
Funding					
1					
2					
Capacity building					
1					
2					
Support					
1					
2					

Non-support					
1					
2					
Horizontal relation?					
1					
2					
Seek for external help					
1					
2					
Ownership					
1					
2					
Existent local leaderships					
Other relevant information on this topic:					





#### 8.4 IBRD-Rio Rural Practices (27.03.2014)

<b>Modalidade (Individual ou Grupal)</b>	<b>PRÁTICAS</b>	<b>Valor da Prática</b>	<b>AF</b>	<b>Demais</b>	<b>Referências com Itens Passíveis de Apoio</b>
<b>Modalidade de</b>	<b>PRÁTICAS PRODUTIVAS SUSTENTÁVEIS</b>	Valor Total da Prática	AF (80%)	Demais (40%)	Referências com itens passíveis de apoio
<b>Individual</b>	Adensamento de Cafezal	2.500	2.000	1.000	Mudas, fertilizante orgânico, fosfato natural, calcário.
<b>Individual</b>	Alevinos (aquisição)	300	240	120	Aq. de 01 milheiro de alevinos fase 2
<b>Individual</b>	Animais de tração e apetrechos (aquisição)	2.800	2.240	1.120	Aquisição de muar + apetrechos para transporte de produtos agropecuários.
<b>Individual</b>	Aquaponia	6.000	4.800	2.400	Cimento, tela de stuck, folha de zinco, arame, areia, aerador, madeira, tela de nylon, filme plástico, mangote, registro, mudas, vergalhão, tubo, motobomba, alevinos, ração.
<b>Individual</b>	Aquisição de Equipamento para geração de energia	4.000	3.200	1.600	Aquisição de gerador de energia
<b>Individual</b>	Aquisição de material para pesca artesanal	3.000	2.400	1.200	Material para barco à remo, madeira, linha.
<b>Individual</b>	Aquisição de matrizes caprinas - 03 p/beneficiário	4.500	3.600	1.800	Aquisição de matrizes (O valor máximo por animal deve ser igual ao valor da prática dividido por 3)
<b>Individual</b>	Aquisição de reprodutor caprino (01 animal/Beneficiários)	1.500	1.200	600	Aquisição reprodutor caprino (01 animal)

<b>Individual</b>	Aquisição Equipamento de irrigação ( Para culturas perenes e pastagem)	6.000	4.800	2.400	Tubulação, aspersores, bomba, filtros, material elétrico, material eletrônico, material hidráulico ( Necessário apresentação de projeto técnico).
<b>Individual</b>	Aquisição Kit Apicultura	3.000	2.400	1.200	Materiais (caixa de melgueiras, quadro de melgueiras, cera, caixa de ninho,quadro de ninho, alimentador,fundo de caixa,tampa de caixa,tela excludora,alimentador,tela para transporte,arame liso,cavaletes,fumigador,macacão, esticador de arame,luvas,caixa de captura).
<b>Individual</b>	Aquisição Kit Galinha Caipira	3.800	3.040	1.520	Tela de Arame de 2", Mourões de eucalipto tratado de 3m (8 x 10 cm), Mourões de eucalipto tratado de 2,5m (8 x 10 cm), peças de madeira de 5 x 7 cm, Peças de madeira de 5 x 7 cm, Peças de ripão de 3 x 7 cm, Grampo de cerca, Arame farpado 250m, Tijolo 20 x 20 cm, Mourões de eucalipto tratado de 2,20 cm (6-8 cm), Telha Ondulada 0,5 x 2,44 m, Tábua de 7 x 2 cm, Areia, Cimento, Brita, Comedouro 10l, Bebedouro 5l, Prego 20 x 30 cm, Dobradiças médias, Fêmeas poedeiras com 30 dias, Ração.
<b>Individual</b>	Aquisição material complementar para irrigação ( uso em culturas temporárias)	4.000	3.200	1.600	Tubulação, aspersores, fita gotejadora,gotejadores, filtros microaspersores,bomba,material elétrico/eletrônico,material hidráulico. ( Necessário apenas apresentação de identificação da cultura , visita prévia e orçamento)
<b>Individual</b>	Barragem subterrânea	5.000	4.000	3.000	Lona plástica 4m de largura e espessura de 150 microns,tela de arame, cimento, areia, hora máquina
<b>Individual</b>	Canais de Contenção	4.000	3.200	2.400	Materiais e serviços ( hora máquina )para a construção de canais, construção caixa captação, lona plástica
<b>Individual</b>	Construção de Terreiro de pedra revestido para secagem de café	4.000	3.200	1.600	Materiais para construção de terreiro revestido/suspensão para secagem de café (cimento, tijolo, areia, ferragem, sombrite, madeira)
<b>Individual</b>	Embalagem / rotulagem	3.000	2.400	1.200	Aquisição de embalagens adequadas, desenvolvimento de rótulos e etiquetas
<b>Individual</b>	Empreendedorismo do jovem rural	4.500	3.600	1.800	Notebook com apresentação de projeto produtivo sustentável e/ou agroecológico

Modalidade	PRÁTICAS PRODUTIVAS SUSTENTÁVEIS	Valor Total da Prática	AF (80%)	Demais (40%)	Referências com itens passíveis de apoio
<b>Individual</b>	Empreendimentos artesanais de pequena escala	500	400	200	Produção de sabão (Aquisição de pá, tacho, luva, máscara de proteção, formas)
<b>Individual</b>	Estrutura para seleção/processamento/beneficiamento/secagem/armazenagem	5.500	4.400	2.200	Mesa de seleção, embaladora, lavadora, balança, material de construção
<b>Individual</b>	Estufas p/ produção de mudas de nativas, olerícolas, secagem de café e cultivo protegido, 120m <sup>2</sup>	6600	5280	2640	Tubeite, bandejas, sacos, telas, tricapa, filme plástico, material de alvenaria e metálico para estrutura
<b>Individual</b>	Formação de Pastagem ( 1,0 ha)	3.500	2.800	1.400	Aração, gradagem, semente, calcário, fosfato de rocha, fertilizante orgânico (cama de frango, húmus e composto orgânico).
<b>Individual</b>	Implantação de Cultivo consorciado ( 1,0 ha )	2.300	1.840	920	Mudas, sementes, fertilizante orgânico (exceto esterco de curral), corretivo, adubo mineral. Identificar as culturas utilizadas para o consórcio.
<b>Individual</b>	Implantação de Cultivo mínimo/Plantio direto ( 1,0 ha )	1.800	1.440	720	Preparo de solo, semente, mudas, fertilizante orgânico (exceto esterco de curral) e mineral, corretivo.
<b>Individual</b>	Implantação de nova atividade diversificada (1,0 ha)	5.000	4.000	2.000	Aquisição de mudas, sementes, fertilizantes orgânicos (húmus, cama de frango e composto orgânico), corretivos ( Identificar as culturas usadas na diversificação/áreas
<b>Individual</b>	Implantação de Rotação de Cultura (1,0 ha)	1.600	1.280	640	Preparo do solo ( aração, gradagem), fertilizante orgânico, corretivos, semente, mudas
<b>Individual</b>	Implantação de Sistema Agroflorestal (1,0 ha)	5.750	4.600	2.300	Composto orgânico, húmus, cama de frango( exceto esterco de curral), corretivos, mudas, material de cerca.
<b>Individual</b>	Implantação de Sistemas Silvopastoris (1,0 ha)	5.750	4.600	3.450	Composto orgânico, Húmos, cama de frango( exceto esterco de curral), corretivos, mudas, material de cerca.
<b>Individual</b>	Implantação em curva de nível (1,0 ha)	1.600	1280	640	Preparo de solo (horas máq ou dias trabalho animal), semente.

<b>Individual</b>	Implementos agrícolas c/ tração motorizada	2.000	1.600	800	Aquisição de roçadeira motorizada, motopoda ou pulverizador motorizado para aplicação de insumos agroecológicos.
<b>Individual</b>	Implementos agrícolas p/ tração animal	1.700	1.360	680	Aquisição de arado, grade, cultivador.
<b>Individual</b>	Instalação para Tratamento de efluentes - café/aquicultura	5.000	4.000	3.000	Construção de tanque de decantação, construção de tanque biológico, material hidráulico e elétrico ou equipamentos ou materiais de instalações para tratamento de efluentes de aquicultura
<b>Individual</b>	Máquinas e equipamentos agrícolas com tração motorizada c/ou sem acoplagem a microtrator	5000	4.000	2.000	Grade aradora, plantadeira convencional, motocultivador, cultivador p/plantio direto
<b>Individual</b>	Motopicadeira	3.750	3.000	1.500	Aquisição de motopicadeira nº 2 para triturar alimento para o rebanho.
<b>Individual</b>	Mudas de qualidade ( Plantio de 1,0 ha )	3.800	3.040	1.520	Aquisição de mudas de qualidade ( apenas mudas).
<b>Individual</b>	Ordeneira mecânica para bovinos de leite ( conjunto com 2 ou 4 teteiras)	6.500	5.200	2.600	Aquisição de equipamento para retirada higiênica do leite
<b>Individual</b>	Pastoreio rotacionado. ( 1,0 ha)	6.500	5.200	2.600	Madeira (eucalipto tratado com altura máxima de 1,70m e diâmetro de 6 a 10cm), material para eletrificação, isoladores, pararraio, material hidráulico, bebedouros e fertilizantes orgânicos(exceto esterco de bovinos).
<b>Individual</b>	Plantio de cana forrageira ( 1,0 ha)	6.000	4.800	2.400	Material de cerca (madeira, arame, grampo), cana planta, aração, gradagem, sulcagem, fertilizantes orgânicos (exceto esterco de bovino).
<b>Individual</b>	Prevenção e controle de zoonoses/parasitos	800	640	320	Exames brucelose, tuberculose, controle de ecto e endoparasitos.
<b>Individual</b>	Pulverizador manual p/ aplicação de insumos agroecológicos	450	360	180	Aquisição de equipamento para aplicação de caldas alternativas e biofertilizante
<b>Individual</b>	Sêmen bovino para inseminação artificial (até 30 palhetes)	510	408	204	Aquisição de sêmen de bovinos para melhoramento genético

<b>Individual</b>	Terraceamento c/tração animal ( 1,0 ha)	3.500	2.800	1.400	Serviço de tração animal para implantação de terraços.
<b>Individual</b>	Terraceamento c/tração mecanizada ( 1,0 ha)	4.000	3.200	1.600	Serviço de tração mecânica para implantação de terraços.
<b>Individual</b>	Viveiro para peixes ( 1000 m²) (Instalação)	3.500	2.800	2.100	Serviço de máquina, material de construção ( areia,cimento,brita,tijolo,tubo de PVC). ( Apenas nos municípios onde SMMA possui convênio com INEA para licenciamento de baixo impacto).
<b>Modalidade</b>	<b>PRÁTICAS PRODUTIVAS SUSTENTÁVEIS</b>	Valor Total da Prática	AF (80% )	Demais (60%)	Referências com itens passíves de apoio
<b>Grupal</b>	Animais de tração p/ preparo do solo+ implementos.	10.000	8.000	6.000	Aquisição de animais ( bovinos) + arado, grade cultivadora, plantadeira
<b>Grupal</b>	Carreta tracionada/simples com acoplagem p/ Microtrator.	4.500	3.600	2.700	Aquisição de carreta de madeira para acoplar ao microtrator
<b>Grupal</b>	Carreta tracionada/simples com acoplagem p/ trator.	14.000	11.200	8.400	Aquisição de carreta de madeira para acoplar ao trator
<b>Grupal</b>	Distribuidor de calcário.	6.000	4.800	3.600	Equipamento para distribuição de calcário
<b>Grupal</b>	Distribuidor de esterco líquido.	18.500	14.800	11.100	Equipamento para distribuição de esterco líquido
<b>Grupal</b>	Equipamento para geração de energia.	10.000	8.000	6.000	Aquisição de gerador de energia para suprir falta nos tanques de resfriamento de leite e/ou câmaras frias de Fruticultura, Olericultura e Floricultura

<b>Grupal</b>	Estufas p/ produção de mudas de nativas, olerícolas, secagem de café e cultivo protegido até 360m².	28.800	23.04 0	17.280	Tube, bandejas, sacos, telas, tricapa, filme plástico, sombrite, material de alvenaria e metálico para estrutura, tubos e sistema de irrigação ( bomba, aspersores, registros,)
<b>Grupal</b>	Instalação para Tratamento de efluentes - café/aquicultura	15.000	12.00 0	9.000	Construção de tanque de decantação, construção de tanque biológico, material hidráulico e elétrico ou equipamentos ou materiais de instalações para tratamento de efluentes de aquicultura
<b>Grupal</b>	Microtrator.	24.000	19.20 0	14.400	Aquisição de microtrator para preparo, conservação do solo e transporte da produção
<b>Grupal</b>	Reforma/Readequação de Centro Comunitário	30.000	24.00 0	18.000	Melhoria com ampliação estrutural, readequação do centro comunitário ( execução de obras)
<b>Grupal</b>	Trator 4x4.	100.000	80.00 0	60.000	Trator 4x4 para serviços de preparo e conservação do solo e transporte da produção (grupal)
<b>Modalidade</b>	PRÁTICAS PRODUTIVAS SUSTENTÁVEIS DE AGREGAÇÃO DE VALOR	Valor da Prática	AF (80%)	Demais (60%)	Referências com itens passíveis de apoio
<b>Grupal</b>	Antena para monitoramento do projeto, acesso a comunicação e inclusão digital.	90.000	72.00 0	54.000	Aquisição e instalação de equipamentos de para telecomunicação , transmissão de dados e informações.
<b>Grupal</b>	Equipamentos p/apicultura.	30.800	24.64 0	18.480	Centrífuga, mesa desoperculadora e outros equipamentos
<b>Grupal</b>	Tanques de resfriamento.	15.500	12.40 0	9.300	Aquisição de tanque para resfriamento do leite ( mínimo 1000 lts).
<b>Grupal</b>	Botijão de sêmen.	5.000	4.000	3.000	Aquisição de botijão de sêmen

<b>Grupal</b>	Câmara de espera p/ pescado.	18.000	14.400	10.800	Construção /aquisição de equipamentos para a conservação de pescado fresco
<b>Grupal</b>	Câmara fria.	48.000	38.400	28.800	Aquisição de câmara fria p/ estocagem de pescado, Floricultura, Fruticultura
<b>Grupal</b>	Colheitadeira-piloto de cana para a agricultura familiar.	65.000	52.000	39.000	Aquisição de colheitadeira de cana de pequeno porte adaptada para a agricultura familiar
<b>Modalidade</b>	PRÁTICAS PRODUTIVAS SUSTENTÁVEIS DE AGREGAÇÃO DE VALOR	Valor da Prática	AF (80%)	Demais (60%)	Referências com itens passíves de apoio
<b>Grupal</b>	Equipamento p/ conservação, processamento e beneficiamento de pescado.	10.700	8.560	6.420	Equipamento e materiais para processamento de pescado: Picador de carne, Balança, ensacadeira, embutidora, facas, placas lisas, freezer horizontal e vertical, embalagens, botas plásticas, bandeja, isopor
<b>Grupal</b>	Equipamento para geração de energia.	10.000	8.000	6.000	Aquisição de gerador de energia para suprir falta nos tanques de resfriamento de leite e/ou câmaras frias de Fruticultura, Olericultura e Floricultura
<b>Grupal</b>	Equipamento para seleção/processamento/beneficiamento/ secagem.	70.000	56.000	42.000	Despolpador, secador, mesa de seleção, balança, moinho, silo, moinho, misturadores, e equipamentos para agroindústria familiar (tachos, fornos, fogão, freezer, desidratador, embaladora, balança, rotuladora,despolpador, peneira, centrífuga, câmara fria, exaustor).
<b>Grupal</b>	Equipamentos e matéria prima para artesanato.	15.000	12.000	9.000	Maquina de costura e bordado, linhas, lã, tear, argila,madeira, tinta, verniz. Aquisição de pá, tacho, luva, mascara de proteção, formas para fabricação de sabão caseiro
<b>Grupal</b>	Estrutura de entrepostos de pesca.	15.000	12.000	9.000	Materiais e equipamentos para estruturação de entreposto para pescadores artesanais



<b>Grupal</b>	Estrutura para processamento e/ou armazenamento.	50.000	40.000	30.000	Equipamentos e materiais de construção
<b>Grupal</b>	Fábrica de gelo.	35.000	28.000	21.000	Equipamentos de fabricação de gelo para transporte e armazenagem de pescado
<b>Grupal</b>	Laboratório para análise e classificação de café.	25.000	20.000	15.000	Aquisição de materiais e equipamentos para estruturação de laboratório de classificação (mesa de prova, torrador, moinho e demais equipamentos)
<b>Grupal</b>	Material para embalagem e comercialização de produtos agrícolas.	21.000	16.800	12.600	Caixas plásticas para transporte , embalagem e comercialização de produtos agrícolas
<b>Grupal</b>	Melhoria de acesso à informação de mercado, meteorológico e de risco a desastres ambientais.	15.000	12.000	9.000	Equipamentos de informática, equipamentos de escritório , aparelho para transmissão de dados ( fax).
<b>Grupal</b>	Veículo porte médio c/ baú isotérmico ou carroceria de madeira.	110.000	88.000	66.000	Aquisição de veículo para incentivo a comercialização de hortaliças, pescado e outros produtos agropecuários
<b>Modalidade</b>	<b>PRÁTICAS AMBIENTAIS</b>	Valor da Prática	AF (80% )	Demais (80%)	Referências com itens passíves de apoio
<b>Indiv</b>	Adubação verde ( 1,0 ha )	3.000	2.400	2.400	Análise de solo, preparo do solo( hora máquina), semente, calcário, fertilizantes minerais( Adubos fosfatados)
<b>Indiv</b>	Apoio à regularização ambiental da propriedade.	7.000	5.600	5.600	Serviço topográfico (georreferenciamento de propriedade rural) para elaboração do mapa de uso do solo e localização dos fragmentos florestais e áreas de preservação permanentes; elaboração de documentos e ART p/ averbação de reserva legal e RPPN

<b>Indiv</b>	Caldas alternativas (produção)	1.500	1.200	1.200	Ingredientes e equipamentos para produção de calda sulfocálica:: tonéis de ferro de 50 l, 1 aerômetro de baumê, enxofre em pó e cal pura. - CALDA BORDALEZA - Sulfato de cobre e cal pura. Outras caldas
<b>Indiv</b>	Compostagem e vermicompostagem	3.800	3.040	3.040	Material: cimento, areia, brita, sombrite, bambu, tela de arame, enxada, enxada, enxada ou pá em tridente, carrinho de mão, mangueira, vara de cano PVC esgoto 50 mm, telha fibra opaca, minhoca e triturador mecânico
<b>Indiv</b>	Controle biológico de pragas e doenças	700	560	560	Lupa, caldas agroecológicas, prancheta e produtos biológicos registrados pelo MAPA.
<b>Indiv</b>	Cordão Vegetal ( 1,0 ha)	1.800	1.440	1.440	Preparo do solo (Tração animal), calcário e fertilizantes orgânicos, sementes de leguminosa ( guandu,etc) ou mudas de capim cidreira ou vetiver
<b>Modalidade</b>	<b>PRÁTICAS AMBIENTAIS</b>	Valor da Prática	AF (80% )	Demais (80%)	Referências com itens passíves de apoio
<b>Indiv</b>	Instalação de esterqueira	5.000	4.000	4.000	Ferragem,tijolos, cimento, brita, arame,material hidráulico
<b>Indiv</b>	Manejo integrado de pragas - MIP	1.000	800	800	Isca armadilha, prancheta, bloco, lupa, ferormônios
<b>Indiv</b>	Manutenção de restaurações florestais (até 2000 mudas) (Ano 3) ( 1,0 ha)	1.200	960	960	Mão de Obra: roçadas, capinas, coveamento, adubações de cova ( fertilizante orgânico) e cobertura e replantios
<b>Indiv</b>	Manutenção de restaurações florestais ( até 2000 mudas) (Ano 1) ( 1,0 ha)	1.600	1.280	1.280	Mão de Obra: roçadas, capinas, coveamento, adubações de cova ( fertilizante orgânico) e cobertura e replantios

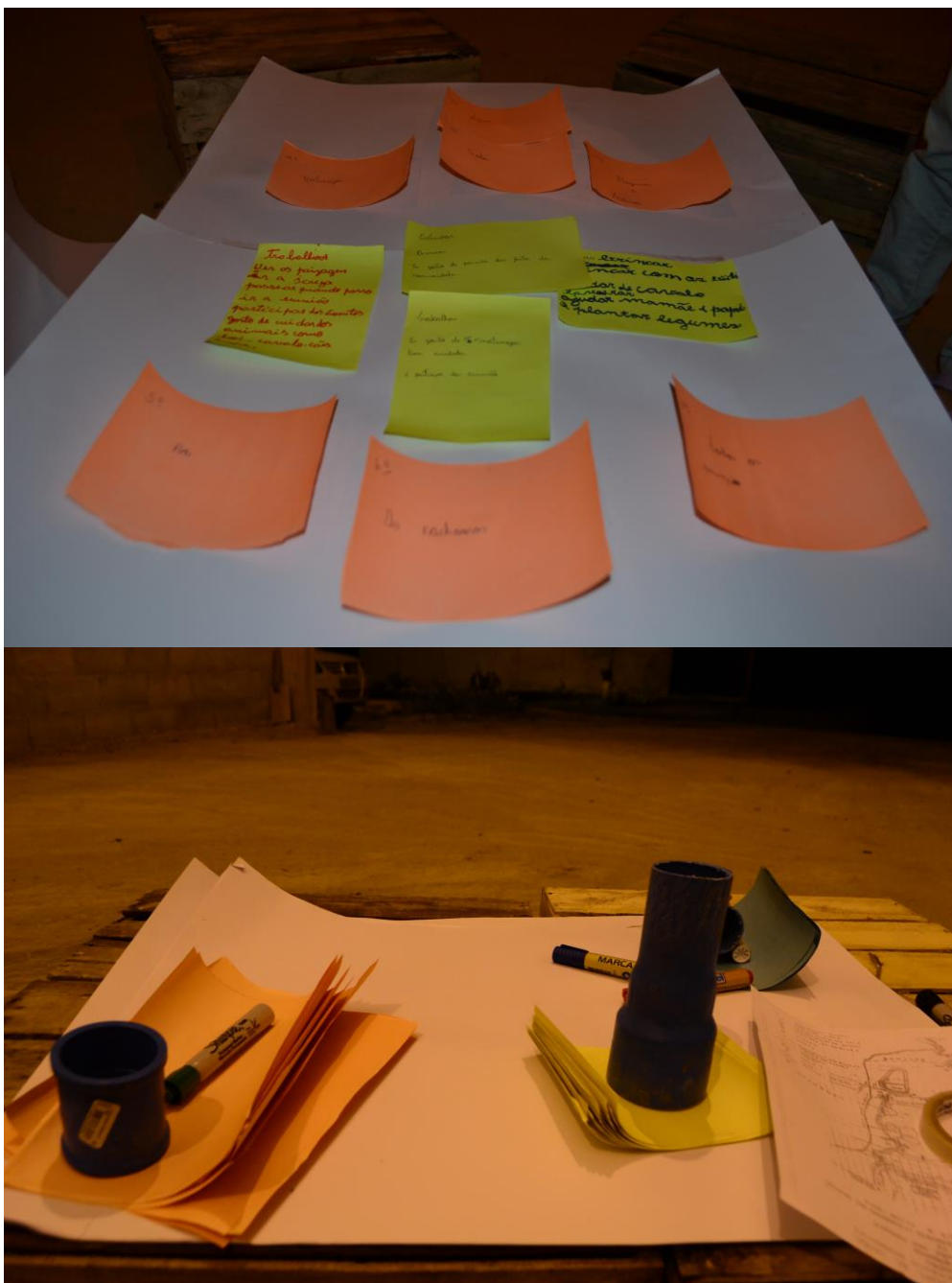
<b>Indiv</b>	Manutenção de restaurações florestais (até 2000 mudas) (Ano 2) ( 1,0 ha)	1.200	960	960	Mão de Obra: roçadas, capinas, coveamento, adubações de cova ( fertilizante orgânico) e cobertura e replantios
<b>Indiv</b>	Proteção de área de recarga - (Isolamento com cerca) ( 1,0 ha)	3.500	2.800	2.800	Material de cerca (mourão, arame farpado e grampo)
<b>Indiv</b>	Proteção de nascentes - (isolamento com cerca) ( 1,0 ha)	3.500	2.800	2.800	Material de cerca (mourão, arame farpado e grampo)
<b>Indiv</b>	Recuperação da mata ciliar c/ cercamento e plantio. ( 1,0 ha)	6.000	4.800	4.800	Material de cerca (mourão, arame farpado e grampo), mudas de nativas da mata atlântica e frutíferas, fertilizantes orgânicos e minerais fosfatados)
<b>Indiv</b>	Recuperação de área de recarga c/cercamento e plantio. ( 1,0 ha)	6.500	5.200	5.200	Material de cerca (mourão, arame farpado e grampo), Mudas de nativas e frutíferas nativas da mata atlântica, fertilizantes orgânicos e minerais fosfatados)
<b>Indiv</b>	Saneamento individual	2.100	1.680	1.680	Fossa séptica (sistema Embrapa): caixa d'água, materila hidráulico, caixa de passagem ou caixa de gordura e outros
<b>Grupal</b>	Caldas alternativas (produção)	5.000	4.000	4.000	Ingredientes e equipamentos para produção de calda sulfocácica: barril de ferro de 200 l, fogão industrial de 1 boca, bujões de gás, 1 aerómetro de baumê, enxofre em pó e cal pura. - CALDA BORDALEZA - Sulfato de cobre e cal pura. Outras caldas
<b>Grupal</b>	Captação e distribuição de água potável	25.000	20.000	15.000	Instalação de depósito e cisterna elevada, aquisição de bomba, tubulação e conexões
<b>Grupal</b>	Compostagem e vermicompostagem	16.000	12.800	12.800	Material: cimento, areia, brita, sombrite, bambu, tela de arame, enxada, enxadão, enxada ou pá em tridente, carrinho de mão, mangueira, vara de cano PVC esgoto 50 mm, telha fibra opaca, minhoca e triturador mecânico
<b>Grupal</b>	Incentivo à educação ambiental	2.500			Materiais diversos de papelaria e compatíveis para uso em processos de reciclagem, mudas, sementes, insumos agrícolas, ferramentas e utensílios, máquina fotográfica (limitado a R\$700,00).

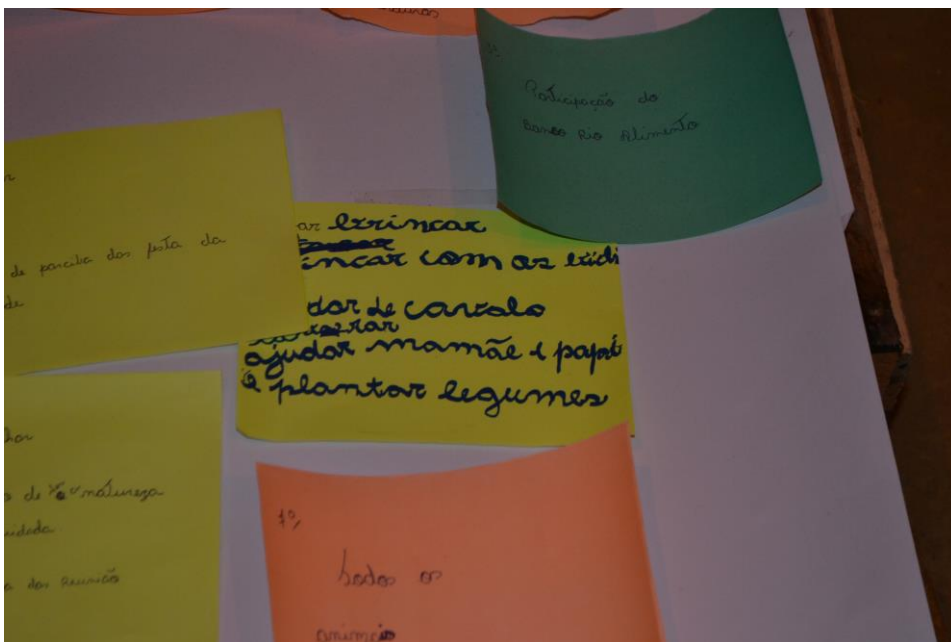
<b>Grupal</b>	Produção de Biofertilizantes	1.500	1.200	1.200	Bombonas de 200 litros ou caixas d'água de 250 litros, mangueira, pás, carinho de mão, sombrite ou malha para peneira fina
<b>Grupal</b>	Viveiro para produção de mudas de espécies florestais nativas. (400m <sup>2</sup> )	14.400	11.520	11.520	Construção de galpão, telado de sombrite, canteiros, filme plástico, saquinhos, tubetes, substrato, areia, argila, fertilizantes orgânicos (exceto de bovinos), sementes

Source: EMATER not-published data

## 8.5 Participatory mapping photos







Source: Own photos