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**REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD+) IN THE
MUNICIPALITY OF CACHOEIRAS DE MACACU, RJ-BRAZIL: FEASIBILITY DETERMINATION THROUGH AN
ENVIRONMENTAL GOVERNANCE ANALYSIS**

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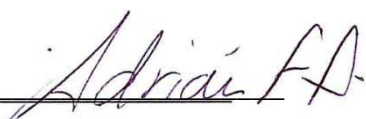
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To my family

To my friends, family away from home

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ABBREVIATIONS

APA	– Área de Proteção Ambiental –Environmental Protection Area
APP	– Area de Preservação Permanente –Permanent Protection Area
BM&F	– Bolsa de Mercadorias e Futuros - Brazilian Securities, Commodities and Futures Exchange
BNDES	– Banco Nacional de Desenvolvimento Econômico e Social – National Bank of Economic and Social Development
CBD	– Convention on Biological Diversity
CDM	– Clean Development Mechanism
CEDAE	– Companhia Estadual de Águas e Esgotos – State Company of Water and Waste Water
CI	– Conservation International
CIFOR	– Center for International Forestry Research
CIM	– Comitê Interministerial sobre Mudança do Clima – Interministerial Committee on Climate Change
CMEMC	– Comissão Mista Especial de Mudanças Climáticas – Special Commission on Climate Change
CODEMA	– Conselho Municipal de Defesa do Meio Ambiente – Municipal Council of Environmental Defense
COMPERJ	– Complexo Petroquímico do Rio de Janeiro – Petrochemical Complex of Rio de Janeiro
CONAFLOR	– Comissão Coordenadora do Programa Nacional de Florestas – Coordinating Commission of the National Forest Program
CONAMA	– Conselho Nacional do Meio Ambiente – National Council of Environment
COP	– Conference of the Parts
DAF	– Development Adjustment Factor
DINARIO	– Climate change, landscape dynamics, land-use, and natural resources in the Atlantic Forest of Rio de Janeiro
DNIT	– Departamento Nacional de Infra-Estrutura e de Transportes – National Department of Infrastructure and Transport
EMATER	– Empresa de Assistência Técnica e Extensão Rural do Estado do Rio de Janeiro - Organization for Technical Assistance and Rural Expansion of the Rio de Janeiro State
EMBRAPA	– Empresa Brasileira de Pesquisa Agropecuária - Brazilian Agricultural Research Corporation

EU-ETS	– European Union Emission Trading Scheme
FAO	– Food and Agriculture Organization of the United Nations
FECAM	– Fundo Estadual de Conservação Ambiental e Desenvolvimento Urbano – State Fund of Environmental Conservation and Urban Development
FUMMA	– Fundo Municipal de Meio Ambiente – Municipal Environment Fund
GHG	– Greenhouse Gas
HFHD	– High forest cover, high rate of deforestation
HFLD	– Highest forest cover, low rate of deforestation
HFMD	– High forest cover, medium rate of deforestation
IBAMA	– Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – Brazilian Environmental and Natural Renewable Resources Institute
IBGE	– Instituto Brasileiro de Geografia e Estatística – Brazilian Institute of Geography and Statistics
IBIO	– Instituto Bioatlântica
ICMS	– Imposto sobre circulação de mercadorias e prestação de serviços – Tax on Merchandises and Services Provision Circulation
ICMS-E	– Imposto sobre circulação de mercadorias e prestação de serviços ecológico - Ecological Tax on Merchandises and Services Provision Circulation
INEA	– Instituto Estadual do Ambiente – State Institute of Environment
INPE	– Instituto Nacional de Pesquisas Espaciais – National Institute of Spatial Research
ITTO	– International Timber Trade Organization
IUCN	– International Union For Conservation Of Nature
LULUCF	– Land Use, Land Use Change and Forestry
MAPA	– Ministério da Agricultura, Pecuária e Abastecimento – Ministry of Agriculture, Livestock and Supply
MBRE	– Mercado Brasileiro de Carbono – Brazilian Carbon Market
MCT	– Ministério da Ciência e Tecnologia – Ministry of Science and Technology
MDIC	– Ministério do Desenvolvimento, Indústria E Comércio Exterior – Ministry of Development, Industry and Foreign Trade
MFMD	– Medium forest cover, medium rate of deforestation
MJ	– Ministério da Justiça – Justice Ministry
MMA	– Ministério do Meio Ambiente – Ministry of Environment
MT	– Ministério dos Transportes – Transport Ministry
NGO	– Non-Governmental Organization
PEMC-RJ	– Política Estadual de Mudanças Climáticas – State Policy on Climate Change
PETP	– Parque Estadual Três Picos- Três Picos State Park
PES	– Payment for Ecosystem Services
PETROBRAS	– Petróleo Brasileiro – Brazilian Oil
PMC	– Plano Nacional Sobre Mudança do Clima – National Plan on Climate Change

PMC-RJ	– Plano Estadual de Mudanças Climáticas – State Plan on Climate Change
PNMC	– Política Nacional das Mudanças Climáticas – National Policy on Climate Change
RBMA	– Reserva da Biosfera da Mata Atlântica – Biosphere Reserve of the Mata Atlântica
REDD+	– Reducing Emissions from Deforestation and Forest Degradation
REGUA	– Reserva Ecológica de Guapiaçu - Guapiaçu's Ecological Reserve
RL	– Reserva Legal – Legal Reserve
RPPN	– Reserva Particular do Patrimônio Natural – Private Reserve of Natural Wealth
SEA	– Secretaria de Estado do Ambiente – State Secretary of Environment
SEOBRAS	– Secretaria de Estado de Obras – State Secretary of Infrastructure
SEIVA	– Sede Ecologia Interior Vila Indiana
SEAPA	– Secretaria Municipal de Agricultura, Pecuária e Abastecimento – Municipal Agriculture, Livestock and Supply Secretary
SEPED	– Secretaria de Políticas e Programas de Pesquisa e Desenvolvimento – Secretary of Research Policies and Programs and Development
SMA	– Secretaria Municipal do Meio Ambiente – Municipal Environment Secretary
SFB	– Serviço Florestal Brasileiro – Brazilian Forestry Service
SISMA	– Sistema Municipal de Meio Ambiente – Municipal Environment System
SISNAMA	– Sistema Nacional do Meio Ambiente – National Environmental Service
SNUC	– Sistema Nacional de Unidades de Conservação – National System of Conservation Units
SOSMA	– SOS Mata Atlântica
TNC	– The Nature Conservancy
UC	– Unidades de Conservação – Conservation Unit
UNCCD	– United Nations Convention To Combat Desertification
UNCED	– Conference on Environment and Development
UNDRIP	– United Nations Declaration on the Rights of Indigenous People
UNEP	– United Nations Environment Programme
UNESCO	– United Nations Educational, Scientific And Cultural Organization
UNFCCC	– United Nations Framework Convention on Climate Change
WWF	– World Wildlife Fund

ABSTRACT

Reducing Emissions from Deforestation and Forest Degradation (REDD+) developed under the United Nations Framework Convention on Climate Change (UNFCCC), constitutes one mechanism that could help address both the reduction of the share of the Greenhouse gas (GHG) emissions and the forest management issues that occur in the Brazilian Mata Atlântica. The current research analyses the feasibility of the incorporation of REDD+ in the municipality of Cachoeiras de Macacu, Rio de Janeiro Brazil. In order to do so, a strategic analysis of the elements of the REDD+ Framework (i.e. baseline, scope, funding instruments and, distribution mechanisms) and the elements of the Brazilian multi-scalar environmental frameworks was done.

The hereditary landownership system, intensive industrial and urban growth, lack of knowledge of REDD+ by authorities, and inconsistencies in the law, represent some of the major obstacles to incorporate the mechanism into the study area. Nevertheless, the existence of public and private initiatives such as the “Reservas Particulares do Patrimônio Natural” (RPPN), the “Plano de Areas Verdes,” and the creation of “Monumentos Naturales,” open a window of opportunity for the incorporation of REDD+. Civil society’s participation is also an important factor present in the area of study. Actors like the “Reserva Ecológica de Guapiaçu” (REGUA), “Ecologia Interior” (ECOIN), consist of valuable allies for potential REDD+ developments. Other instruments like the ICMS-ecológico, “Mercado Brasileiro de Reduções de Emissões” (MBRE), and several multi-scalar funding instruments, should be analyzed in order to determine their compatibility with REDD+.

KEY WORDS

Mata Atlântica, REDD+, Feasibility, Cachoeiras de Macacu, SWOT, Environmental governance, Readiness.

RESUMEN

Reducción de Emisiones de Carbono causadas por la Deforestación y la Degradación de los Bosques (REDD+) desarrollado bajo el marco de la Convención Marco de las Naciones Unidas sobre el Cambio Climático (CMNUCC), representa un mecanismo que podría ayudar a enfrentar tanto la carga emisiones de Gases de efecto invernadero (GEI) como los problemas con el manejo de los bosques en la Selva Atlántica Brasileña. La presente investigación analiza la viabilidad de la incorporación de REDD+ en la municipalidad de Cachoeiras de Macacu, Rio de Janeiro Brasil. Con tal de realizar esta labor, fue hecho un análisis estratégico tanto de los elementos del Marco REDD+ (i.e. Nivel de referencia, Ámbito, Mecanismos de financiamiento y, Mecanismos de distribución) como de los elementos del Marco ambiental multi-escala Brasileño.

El sistema hereditario de tenencia de la tierra, el crecimiento urbano e industrial intensivo, la falta de conocimiento acerca de REDD+ por parte de las autoridades, así como las inconsistencias legales, representan algunos de los obstáculos más importantes para la incorporación del mecanismo en el área de estudio. Sin embargo, la existencia de Iniciativas públicas y privadas como las “Reservas Particulares do Patrimônio Natural” (RPPN) y el “Plano de Areas Verdes,” abren una ventana de oportunidades para la incorporación de REDD+. La participación de la sociedad civil es un factor importante también en el área de estudio. Actores como la “Reserva Ecológica de Guapiaçu” (REGUA), “Ecologia Interior” (ECOIN), consisten en aliados valiosos para potenciales proyectos REDD+. Otros instrumentos, como por ejemplo el ICMS-ecológico, “Mercado Brasileiro de Reduções de Emissões” (MBRE) y otros instrumentos de financiamiento multi-escala, deberían ser analizados para determinar su compatibilidad con REDD+.

PALABRAS CLAVE

Selva Atlántica, REDD+, Viabilidad, Cachoeiras de Macacu, FODA, Gobernanza ambiental, Preparación.

ZUSAMMENFASSUNG

Das unter dem “Rahmenübereinkommen der Vereinten Nationen über Klimaänderungen” (UNFCCC) entwickelte Modell “Verringerung von Emissionen aus Entwaldung und zerstörerischer Waldnutzung” (REDD+) bezeichnet einen Mechanismus, der helfen könnte sowohl die Reduzierung der Treibhausgase als auch die Problematik des Waldmanagements anzugehen, die im brasilianischen atlantischen Regenwald auftreten. Die vorliegende Arbeit analysiert die Durchführbarkeit der Integrierbarkeit der REDD+ in die Gemeinde Cachoeiras de Macacu in Rio de Janeiro, Brasilien. Dafür wurden sowohl die Elemente der Rahmenbedingungen der REDD+ (i.e. baseline, scope, Gründungsinstrumente und Vertriebsmechanismen) analysiert als auch die multi-scalaren Elemente der brasilianischen umweltlichen Rahmenbedingungen.

Das Erbrecht den Grundbesitz betreffend, intensiver industrieller Wachstum und Städtewachstum, mangelndes Wissen über REDD+ seitens der Zuständigkeiten und Unbeständigkeiten des Rechtssystems sind dabei einige der größten Hindernisse, das Modell in der untersuchten Region zu integrieren. Dennoch schaffen öffentliche und private Initiativen wie “Reservas Particulares do Patrimônio Natural” (RPPN), “Plano de Areas Verdes,” und die Errichtung von “Monumentos Naturales” Gelegenheiten für die Integration der REDD+. Die Partizipation der zivilen Gesellschaft ist ebenfalls ein wichtiger Faktor in der untersuchten Region. Akteure wie “Reserva Ecológica de Guapiaçu” (REGUA) und “Ecologia Interior” (ECOIN) sind wertvolle Alliierte für eine potenzielle Integration der REDD+. Weitere Instrumente wie ICMS-ecológico, “Mercado Brasileiro de Reduções de Emissões” (MBRE) und mehrere andere multi-scalare Gründungsinstrumente sollten analysiert werden, um deren Kompatibilität mit den REDD+ zu bestimmen.

SCHLÜSSELWORTE

Atlantischer Regenwald, REDD+, Durchführbarkeit, Cachoeiras de Macacu, SWOT, Umwelt-Governance, Bereitschaft.

PART I: INTRODUCTION

The global deforestation rate of 13 million hectares (ha) per year threatens the maintenance of the most important biomes, such as the ones contained in Brazil, and associated livelihood of their inhabitants. Additionally, it is known that the land-use, land-use change, and forestry (LULUCF) activities account for the emission of about 1.6 gigatons of carbon (GtC) per year, which correspond to 17% of global greenhouse emissions (GEG) (TFD, 2008).

The driving forces of these activities can vary depending on the region where they occur. In tropical forests of Latin America, this phenomenon is directly linked to the conversion of forests into large-scale permanent agriculture areas and cattle pastures¹. In African countries, the manifestation is different; small-scale agriculture is the predominant land-use system. Added to these two drivers can be mentioned the mining activity, infrastructure development, and urban growth as causes of forest removal (TFD, 2008).

In the case of Brazil, the history of deforestation and forest degradation dates back 500 years during the colonization times². Human settlements and support infrastructure for the mining sector were responsible for most of the forest diminution. Nowadays, statistics show that in Brazil, LULUCF activities have a share in the national GHG emissions more elevated than the global average, accounting for up to 75% of total emissions. Even if the true effects of this phenomenon over the national biodiversity and society are still to be determined, it is already known that the level of exposure of ecosystems and the land-use systems is magnified in the economic, social, and environmental level (TORRICO, *et al.*, 2009; MAY, *et al.*, 2011).

This situation is relevant due to the importance of Brazilian forest to the world's climatic stability. With more than 8.5 million Km², the country counts with the biggest extension of forest cover in the world. It hosts six of the major biomes on Earth: the Amazon, Caatinga, Cerrado, Pantanal, Pampa, and Mata Atlântica.

¹ According to PACHECO, *et al.* (2010) there are five dominant trends occurring in Latin American countries with implications for land use change: rapid growth of agribusiness, expansion and modernization of traditional cattle ranching, slow growth of small-scale agriculture, logging and timber production in forest frontiers and, resurgence of traditional agro-extractive economies.

² As detailed by NEHREN (2008), the forest exploitation in the study area can be understood as part of the development cycles of the coastal plains of Rio de Janeiro. These cycles date back to pre-historical colonization of the *Sambaqui* and *Tupi* Societies in Southeast Brazil.

With an approximate area of 1.110.000 Km² –13.04% of the national surface– the Mata Atlântica is the third biggest biome of the country, just behind the Amazon and the Cerrado. However, as the general tendency dictates, the historical degradation processes have affected the health of the biome. The currently forested area of the Mata Atlântica conserves less than 10% of its original extent, most concentrated in the Biodiversity Corridor do Serra do Mar (IBGE, 2004).

The municipality of Cachoeiras de Macacu, study area of the current research, is located in the Biodiversity Corridor do Serra do Mar. Together with the municipalities of Guapimirim and Itaboraí, the study area forms the Guapi-Macacu Watershed. The geographical importance of this area transcends its boundaries. Its rivers supply water to more than 2 million inhabitants of the eastern part of the Guanabara Bay.

The study area is under many different protection legal figures. The most important is the “Área de Proteção Ambiental da Bacia do Rio Macacu,” shared with the municipalities of Itaboraí on the south and Guapimirim on the east. It also forms part of the “Parque Estadual Três Picos” (PETP), containing more than 70% of the total extent, together with the municipalities of Petrópolis, Teresópolis, Guapimirim, and Nova Friburgo (IBIO, 2009).

The municipality has suffered from a constant environmental and social degradation caused in some part to processes that took place in the general context of natural landscape transformation of the Mata Atlântica. Until today, less than 43% of the forested lands remain. This historical process of degradation has resulted in a forest fragmentation process that now presents agriculture lands, pastures, urban areas and protected areas (GRANELL, 2004; SOSMA, 2011).

In Brazil, the relation between the size of its biomes and the share of their GHG emissions is proportional. Forest degradation processes occurred in the Mata Atlântica, are ranked third with more than 6% of the total emissions. This situation needs to be attended by the authorities and stakeholders if the social and environmental balance wants to be preserved.

Adopting new mechanisms for the management and preservation/recuperation of forests in the context of climate change awareness has been a task that the international community has identified as a top priority. The creation of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and its

consolidation with the elaboration of the Kyoto Protocol in 1997 led to a breaking point that brought together the establishment of a new regime.

Reducing Emissions from Deforestation and Forest Degradation (REDD+) is one of the potential alternatives to solve both the climate change and LULUCF issues worldwide. This mechanism was part of the Bali Action Plan and dates back to the 13th session of the Conference of the Parties (COP-13) of the UNFCCC in Bali, Indonesia in 2007.

In raw words, REDD+ is a mechanism that creates incentives for developing countries to protect, improve management, and wisely use their forest resources. The REDD+ strategies aim at making forests more valuable standing than deforested, by assigning a financial value for the carbon stored in them. It takes into consideration five main activities: (1) reducing emissions from deforestation, (2) reducing forest degradation, (3) sustainable forest management, (4) enhancement of forest carbon stocks and (5) forest conservation. Even if there are no fixed methodologies for the implementation of the mechanism, three general phases have been identified as part of what has been called “the REDD+ framework”: (1) phase of preparation and readiness; (2) policies and measures phase and; (3) phase for performance-based payments (CP, 2009; HIROKI & TAKEUCHI, 2011).

Since the definition of the final REDD+ parameters still part of the international agenda, Brazil, and all the countries working towards the application of the mechanism, remain in the phase of preparation. More in detail, this stage consists of the establishment of the first dialogues between stakeholders, the adaptation of the legal framework, and the creation of plans and policies to support the incorporation of the mechanism. Actions of phase 1 take into consideration four main elements or indicators: the scope of the project, the emissions reduction reference level, funding mechanisms, and benefit distribution schemes (IUCN, 2011).

In the context of finding solutions for sustainable land-use management in the municipality of Cachoeiras de Macacu, it was conceived the project “Climate Change, Landscape dynamics, Land-use, and Natural Resources in the Atlantic Forest of Rio de Janeiro” (DINARIO). It constitutes a research effort to address the environmental and socioeconomic issues of the municipalities of Petrópolis, Teresópolis, Gapimirim, Cachoeiras de Macacu, Nova Friburgo, and Bom Jardim. One of the main objectives of the project is to assess ecological and socio-

ecologically viable concepts to establish forest connectivity in dynamic rural landscapes in the Atlantic Forest of Rio de Janeiro. DINARIO Module IV, on “Participative research in rural development,” aims at involving farmers in carbon markets and environmental services activities. Both the objective and the module can be closely matched with the objectives of REDD+. For that reason, the mechanism has been considered as a potential alternative for the area.

This research attends to the demands of the mentioned objective. The general goal of this research was to determine the feasibility of REDD+ as a solution to the land and forest management and forest degradation issues in the municipality of Cachoeiras de Macacu. In order to pursuit achievement of this goal, a characterization of the environmental governance was made. This effort included the identification of the major stakeholders, legal and planning frameworks, and policies in the national, regional, and local scales. The elements of the environmental governance were contrasted with the elements of the REDD+ framework in order to identify the strengths, weaknesses, opportunities, and threats for the incorporation of the mechanism in the study area. This analytical exercise allowed drawing conclusions about the major challenges that the incorporation of the mechanisms face in the study area. The analysis was made through the Political Ecology’s approach, which helped to identify the main elements of the environmental governance, and their particular relations.

OBJECTIVES

General objective

Determine the feasibility of REDD+ as a solution to the land-use management and forest degradation issues in the municipality of Cachoeiras de Macacu, Rio de Janeiro, Brazil.

Specific objectives

1. Characterize the components of the local environmental governance, understood as the multi-scalar stakeholders and related legal framework,

plans and policies that determine the feasibility of REDD+ in the municipality of Cachoeiras de Macacu, Rio de Janeiro, Brazil.

2. Characterize REDD+ as a mechanism to address the forest management issues and related sociopolitical complexity in the municipality of Cachoeiras de Macacu with a special focus on its elements of project scope, the emissions reference level, funding, and benefit distribution.
3. Analyze the strengths, weaknesses, opportunities and threats for the incorporation of REDD+ that result from the contrast between its elements and the environmental governance dynamics in the municipality of Cachoeiras de Macacu.

PREVIOUS RESEARCH

Despite the existence of previous scientific work and the concrete contextual and conceptual inputs they provide, specific contributions focused in the local environmental governance dynamics of the specific study area have not yet been deployed. Even more, an investigation from the Political Ecology's perspective has not yet been carried out³.

The topic of environmental governance in Brazil has been deeply worked by the Center for International Forestry Research (CIFOR). It has made a series of scientific investigations to identify the Brazilian environmental framework for the implementation of REDD+ projects in the Amazon. The work of MAY, *et al.* (2011) "The context of REDD+ in Brazil: Drivers, agents and institutions," helped to identify the main governance components of the Brazilian national reality. These elements, however, differ in many cases to the particular context of the Mata Atlântica; therefore the contributions of the present research are innovative.

Through DINARIO, a series of investigations for the characterization of the municipality have been carried out. Its contribution has been important; it has helped to characterize the land-use systems, as well as the different environmental, social, and political processes surrounding forest degradation on the municipality of Cachoeiras de Macacu. The work "Evaluation of forest fragmentation and land use change patterns using remote sensing techniques and field methods," by NAEGELI

³ For further information in relation to the study area, refer to VIEIRA et al., 2008; GAESE et al., 2009 (chapter 1); LOAIZA, 2010; and BECKER & EDDA, 2011.

(2010) made valuable contributions to the characterization of the forest fragmentation in the municipality of Cachoeiras de Macacu. Her work focused on the forest fragmentation in the Guapi-Macacu watershed. As result of the landscape parameters analysis, the localization and measuring/surveying of the fragments were achieved. This research contributed also to make a proposal for the possible introduction of new forest conservation areas and to enhance the connectivity with the existing ones.

The investigation of LOAIZA (2010), “Potential assessment of land use, land use change and forestry (LULUCF) projects under the clean development mechanism (CDM) in the Mata Atlântica, municipality of Cachoeiras de Macacu, RJ – Brazil”, gave inputs by analyzing the potential areas, stakeholders, and barriers for the development of LULUCF projects under the Clean Development Mechanisms (CDM) mechanism of the Kyoto Protocol. This investigation keeps a close relation to the main objective of this one since the LULUCF activities suppose land-use change activities, just as REDD+ does. The identification of stakeholders made by LOAIZA represented a first approach to the socio-political environment that the current investigation aimed to characterize.

In relation to the theoretical approach of the current research, the works developed by BRENNER and VARGAS DEL RIO (2010) and BRENNER and JOB, (2011) contributed to the understanding of the local environmental governance dynamics through a Political Ecology’s perspective. They brought together the focus intended in this investigation by analyzing the political and social dimension of forest degradation. Even if they worked in different contexts with different drivers for change and different manifestation of the environmental issues, the contextual and methodological tools that they developed were of great importance for the consecution of the objectives of this research.

JUSTIFICATION

The elaboration of the current research is justified by three main arguments:

A. Need for a community based forest management mechanism in the study area

As mentioned in the introduction, the municipality of Cachoeiras de Macacu is located in an area of great environmental and social importance/vulnerability⁴. The study area presents outstanding natural geographical and environmental characteristics and a state of advanced environmental degradation reflected in biodiversity loss, soil erosion, water quality degradation, and water shortage issues (TORRICO, *et al.*, 2009). All these forms of environmental degradation represent a threat to the livelihood of the individuals that depend directly from the land and water resources. In this sense, it is important to provide solutions that consider the inclusion of environmental and socioeconomic sectors.

REDD+ provides an opportunity for communities to manage land, preserve forests and to assure their basic living conditions. For the study area, the suitable lands for the incorporation of REDD+ have not yet been determined, nevertheless, the possible application of it as a community-based forest management mechanism is of particular relevance in the context of fostering and improving the protected areas and their surroundings.

B. Diversification of forest management mechanisms in the Mata Atlântica

In Brazil, most of the forest management initiatives are not being developed precisely in the Mata Atlântica. According to MAY (2011), there are currently 33 projects related to Payment for Ecosystem Services (PES) in the Mata Atlântica, most of them (25%) are located in São Paulo state. The majority of these projects are related to Afforestation/Reforestation (63%) and Sustainable Forest Management (13%). REDD+ projects have not yet been developed at all in the study area. In Brazil, they presently account only for 17% of the PES-related projects, most of them developed in the Amazons. The characteristics of the different land uses in the municipality of Cachoeiras de Macacu and their resulting forest degradation processes require the inclusion of initiatives that could help to

⁴ . Its closeness to Rio de Janeiro city and its historical relevance as communication way between Minas Gerais and Rio de Janeiro state justify this condition. For more details see MAYER (2003) and NEHREN, *et al.* (2009).

alleviate the pressure over natural and human ecosystems. As mentioned in the previous sections, PES and REDD+ projects could be beneficial in areas where continuous pressure on forests remnants exists.

C. Multi-scalar approach to the environmental and socioeconomic issues in the Mata Atlântica

According to the REDD+ framework, the incorporation of the mechanism supposes the synchronization of a series of multi-scalar efforts. This meant that the application of REDD+ required the understanding of the endogenous and exogenous processes that play an influential role in the study area. These processes correspond to the political dynamics that the stakeholders, legal framework, plans, and policies concretize in the national, regional, and local scales. For the case of the municipality of Cachoeiras de Macacu, the political dynamics is defined by the elements of local environmental governance. However, since the study area is not a sociopolitical bubble, when identifying the factors that affect the incorporation of REDD+, it is important to pay close attention to the national and regional EG elements.

RESEARCH QUESTIONS

In response to the three main justification arguments defined in the previous section, two main research questions were defined:

If feasible, is REDD+ a solution to the land-use management and forest degradation issues in the municipality of Cachoeiras de Macacu, Rio de Janeiro, Brazil?

Furthermore, do the characteristics of the municipality of Cachoeiras de Macacu's local environmental governance, understood as the multi-scalar stakeholder, legal framework, plans, and policies, render REDD+ feasible?

THEORETICAL APPROACH

POLITICAL ECOLOGY

This investigation was conducted through the Political Ecology's perspective. BRENNER & VARGAS DEL RÍO (2010, p. 122) affirm that through the Political Ecology it is possible "to emphasize the relations between social, economic, and political structures, as well as the different forms of environmental appropriation, and at the same time take into consideration the differences and inequities between the wide spectrum of stakeholders. It implies the possibility to make an analysis of the power relations and the strategies of the stakeholders in their attempts to control territory and how this context is reflected in the environment."

The Political Ecology's analysis will be developed following the "Actor's Approach," as defined by BRYANT and BAILEY (1997)⁵. It focuses on the interests, characteristics, and actions of the actors, in the understanding of political ecological conflicts and alliances; it seeks to understand both as an outcome of the interaction of different actors pursuing often quite distinctive aims and interests. This approach will allow deepening in the local environmental governance analysis through the characterization of the multi-scalar arenas (i.e. national, regional, and local). Thus, the stakeholders' activities will show how the environmental local reality synthesizes a dynamic balance between multi-scalar processes (BRYANT & BAILEY, 1997).

As previously stated, the actors or stakeholders nourish the political dynamics in the Political Ecology's perspective. These concepts refer to the individuals or groups of them that in social terms do not constitute homogeneous units. They can be divided into governmental institutions, multilateral institutions, business organizations, non-governmental organizations (NGOs), and local actors. This typology was followed to categorize the multi-scalar network of actors of the research (BRENNER & VARGAS DEL RIO, 2010). It is important to make the explanation since the concept is going to be used extensively.

⁵ BRYANT & BAILEY (1997) summarized the main approaches used by researchers in the field of Political Ecology to illustrate the different ways in which research has been conducted in the field. These approaches are not rigid and can be mixed. The approaches are: (i) environmental problems, (ii) regional political ecology, (iii) concepts, (iv) actors and, (v) socioeconomic characteristics.

ENVIRONMENTAL GOVERNANCE

Environmental governance is defined by BRENNER & VARGAS DEL RIO (2010) as the process of power execution based on consensus and negotiation with the objective of mitigating environmental conflicts between stakeholders. The concept can have as many dimensions as the definition of scale analysis allows it. For the stakeholder analysis in the municipality of Cachoeiras de Macacu, four main scales were defined: the global, national, regional, and local. Local environmental governance is an adaptation of the general concept to the dynamics present in the lowest scale of administration. The local scale can be perceived as the structuration of the socio-spatial organization within a specific geographical arena. Structuration refers to the duality of actor interventions, on the one hand; and the institutionalization of social practices, on the other (ARTS, 2004). The local environmental governance takes into consideration the elements of the upper scales (i.e. regional and national). In that sense, it is not possible to understand the dynamics of the local environmental governance without approaching the upper scales.

The multi-scalar dimensions of analysis of this project reflect the natural dynamics of the Global Environmental Governance. It supersedes the paradigm that is used to deal with the environmental issues as policy elements separated from socioeconomic matters (SANWAL, 2007). It influences the local scale through a series of policy and regulatory elements, executed by specific multi-scalar actors that, at the same time, are involved in some other multi-scalar dynamics (e.g. Kyoto Protocol). There are several interpretations of this concept, as BULKELEY (2005, p. 5) states: “for some, global environmental governance entails the creation of global institutions through which to manage global commons, while for others it relates to the emergence of transnational networks and new forms of civil society.” For the purposes of this thesis, the former interpretation is the more adequate. The end of the Global Climate Change Regime⁶ in 1997 with the creation of the Kyoto Protocol marked the entrance of a new set of binding rules, targets, and timetables

⁶ The Climate Change Regime occurred in the period between the late decade of 1980 and early decade of 1990. It began in 1987 with the discovery of the stratospheric “Ozone hole” and the publication of the Brundtland Commission report, “Our Common Future” by the World Commission on Environment and Development, 1987, and had its highest point at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro (BODANSKY, 2001).

for all actors of the international community participating in the UNFCCC. Even if REDD+ was conceived in the context of Kyoto Protocol discussions, it represents one of the principal efforts of a post Kyoto Protocol Regime (BODANSKY, 2001).

HYPOTHESIS

Based on the problem description, the theoretical approach and as a tentative answer to the research question, the following hypothesis was defined:

The local environmental governance dynamics in the municipality of Cachoeiras de Macacu, which synthesizes a dynamic balance between multi-scalar processes and stakeholders and involves interest conflicts, land use frictions, and opposing actors' strategies, renders the instrumentation of REDD+ feasible, but the local complex situation should be properly taken into account from the onset by its executors.

METHODOLOGICAL APPROACH

The methodological approach was based in the operationalization of the two main variables of the hypothesis (Figure 1):

- a) **Independent variable:** *“The local environmental governance dynamics in the municipality of Cachoeiras de Macacu, which synthesizes a dynamic balance between multi-scalar processes and stakeholders and involves interest conflicts, land use frictions, and opposing actors' strategies.”*

This variable expresses the existence of a particular sociopolitical dynamic in the study area. Even if this dynamic is influenced by a wide diversity of exogenous processes, a specific context can be defined. This context counts with specific components and characteristics that can be extracted independently from the general environment in which they exist.

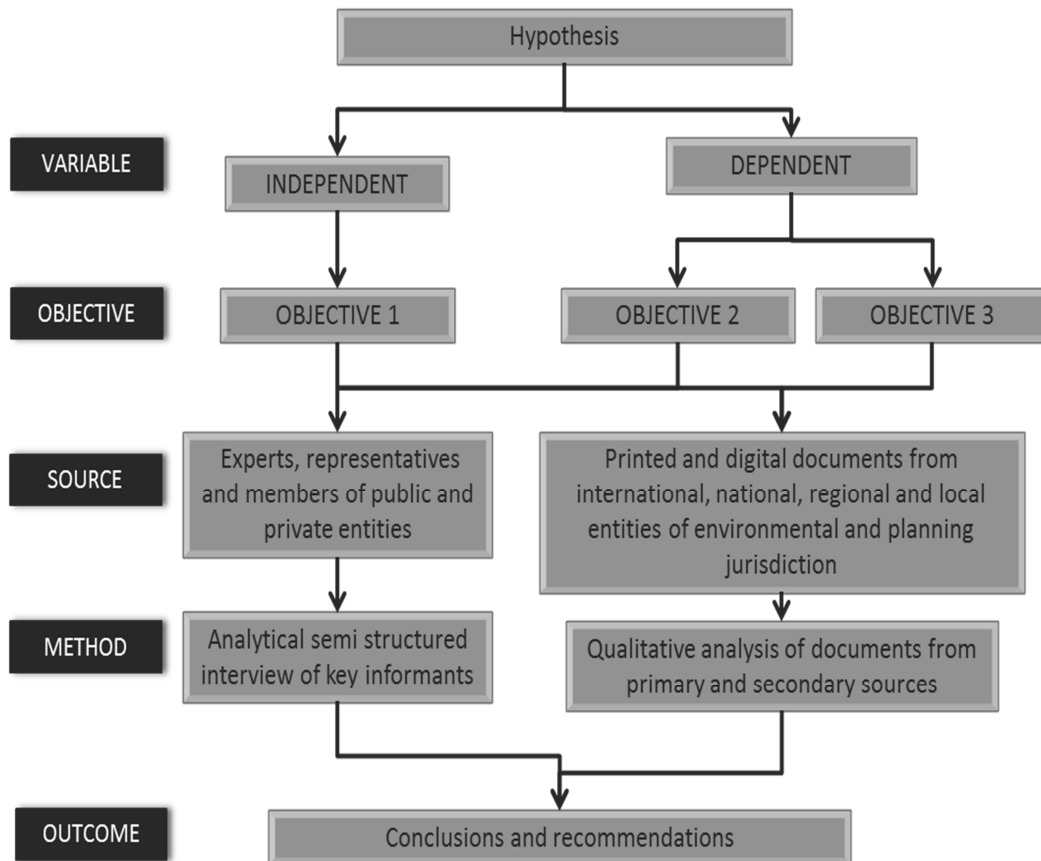


Figure 1: Methodological approach of the research

Source: The author (2012).

- b) Dependent variable:** “(...) renders the instrumentation of REDD+ feasible but the local complex situation should be properly taken into account from the onset by its executors.”

This variable refers to the willingness, disposition, and general adaptability of the elements of the LEG for the incorporation of the REDD+ framework elements. This fact depends directly from the characteristics of the processes in the national and regional scales and its relation to the political dynamic in the local scale.

The objectives were elaborated in order to attend the analytical requirements of the two main variables. Consequently, they represent a part of the tasks that the general objective demands. Figure 1 shows the methodological approach that was developed.

Specific objective 1. Characterize the components of the local environmental governance, understood as the multi-scalar stakeholders and related legal framework, plans and policies that determine the feasibility of REDD+ in the municipality of Cachoeiras de Macacu

A network analysis was developed in order to establish the characteristics of the LEG and its relation to their environment⁷. This exercise intended to determine the compatibility of the LEG elements with the requirements of the REDD+ framework elements.

The methodology in this objective consists of two parallel-developed stages. One stage corresponds to the qualitative analysis of documents from primary and secondary sources for the identification of the LEG elements. The sources of this section consist of printed and digital documents from international, national, regional, and local entities of environmental and planning jurisdiction. The result is the identification of particular legal frameworks. The search for the legal frameworks is made using the multi-scalar approach. The second stage consists of the analytical semi structured interview to experts, representatives, and members of public/private entities. It permits to identify the same type of elements as in the previous stage and particularly to locate more stakeholders. This methodology is of particular relevance when identifying the opposing stakeholders.

In the case of the stakeholders, they are classified according to categorization made by BRYANT and BAILEY (2007) in multilateral institutions, state actors, non-governmental organizations, local actors, and business organizations. The elements of the local environmental governance are analyzed based on three mains aspects:

- a) Organizational Proposal: it corresponds to the identification of the institutional mission, values, vision, legal framework, plans, and policies responsible for defining their functions. These characteristics allow defining their institutional profile.
- b) Political role: Once the particular profile of the actor is defined, their contextual characteristics are determined. These characteristics correspond to: (i) alliances, (ii) conflicts, (iii) common interests, (iv) opposing interests, and (v) power resources. The fifth point is determined through the

⁷ The network analysis was based on the work of LAZEGA (1997).

qualitative categorization by UPHOFF (2005). The author affirms that power types can be summarized in terms of six categories of resources or assets that can be accumulated and utilized: economic, social, political, informational, moral, or physical⁸.

- c) Role in socioeconomic development and forest management: This characteristic corresponds to a detailed explanation of the role of each stakeholder in three main activities: (i) relation to community engagement and forest resources management initiatives; (ii) fostering of REDD+ or related mechanisms and risk management, (iii) fostering of traditional uses of forest resources.

For the stakeholders, point a, b and c were accounted. The stakeholder's network was visually represented as shown in Figure 2. The graphical representation reflects the affinity of actors to foster REDD+ in the study area. It is based in the work widely developed by BRENNER & VARGAS DEL RIO (2010). For the legal framework, plans, and policies only point b and c were looked upon. The results were tabulated according to their characteristics.

⁸ According to UPHOFF (2005), economic resources refer to the control over land, labor, and/or capital as well as the goods and services produced therefrom. Social resources refer to the social status or standing, based on social roles and/or on meeting criteria considered worthy of respect, esteem and deference. Political resources come primarily as a consequence of occupying authority roles entitling people to claim that they are speaking in the name of the state and can employ whatever resources that state institutions possess to enforce decisions. Informational resources are linked to knowledge that is productive or beneficial for others and thus desired by them, reflecting the adage that "knowledge is power." Moral resources are related to the legitimacy accorded to decision-makers, decisions, their roles or the system of governance that leads people to defer to and accept others' decisions as right and proper. Finally, physical resources refers to the physical force that people are willing and able to exert against others to compel cooperation or compliance.

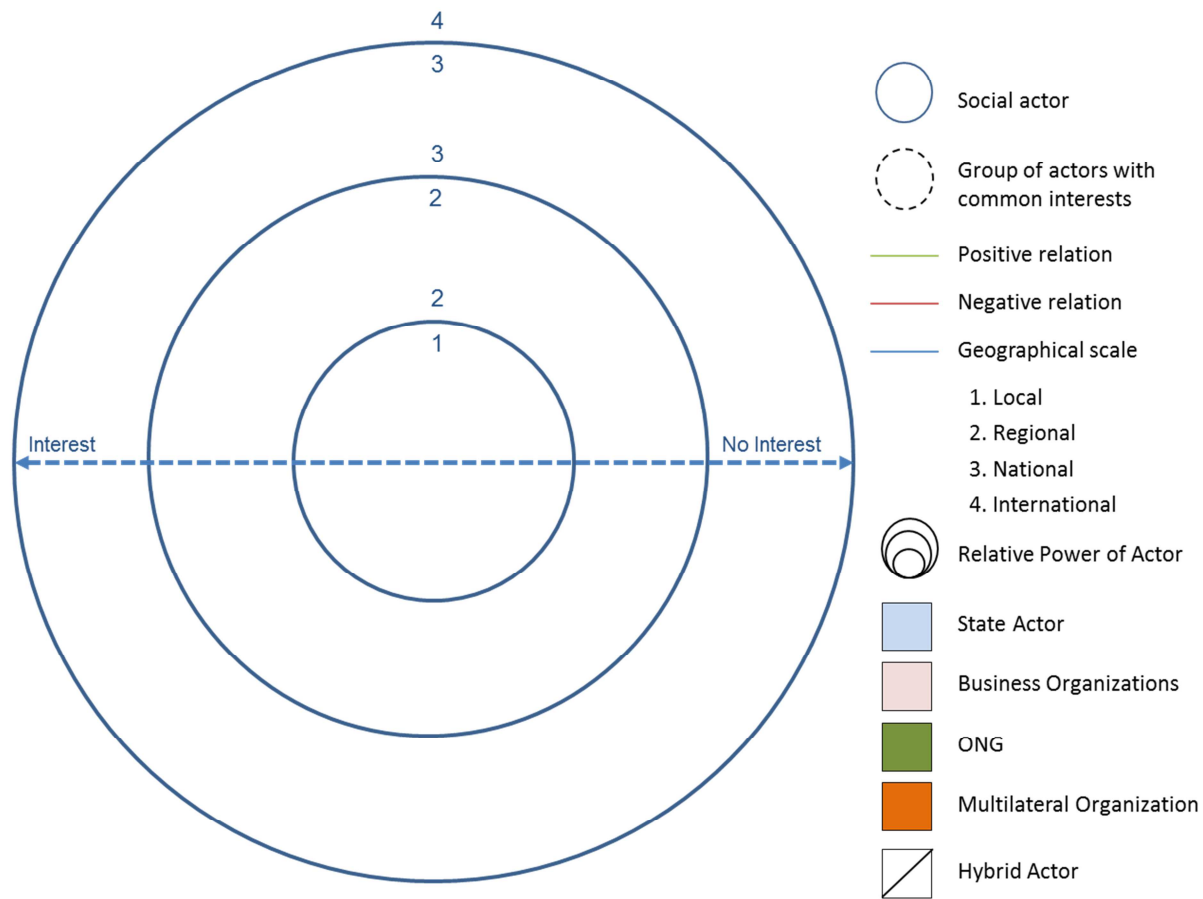


Figure 2: Graphical representation of the stakeholder’s network

Source: The author based on BRENNER & VARGAS DEL RIO (2010).

Specific objective 2 Characterize REDD+ as mechanism to address the forest management issues and related sociopolitical complexity in municipality of Cachoeiras de Macacu with special focus on its elements of project scope, the emissions reference level, funding, and benefit distribution.

The characterization of REDD+ is based on a historical description and a qualitative analysis of the main elements of its framework. The mechanism was contextualized as part of the development of alternatives in the international community for the management of forests (i.e. payment for ecosystem services). The description of the ecosystem services (ES), carbon markets (CMA), and related elements helped to locate REDD+ in a more general dynamics.

The qualitative analysis was made based on the REDD+ framework. As mentioned in the introduction, REDD+ methodologies have not been developed yet. Nevertheless, in the context of the phase 1 of REDD+ framework, five main indicators for the discussion have been identified:

- a) Scope: refers to the different possibilities projects could consist of, the possibilities of including emissions from deforestation, from degradation, sustainable management of forests, forest conservation, and enhancement of forest carbon stocks.
- b) Reference level: this indicator is divided into two sub-indicators: scale, divided into global, national, sub-national; and reference period or baseline, which could be historical, historical adjusted or projected.
- c) Distribution: for the distribution of the benefits of REDD+, the redistribution and additional funding/mechanism methods have not been identified.
- d) Financing: it refers to the financial source the REDD+ projects could have. The options could consist of funds, markets or markets-linked.

These indicators were widely explained and characterized in order to determine which options exist for each one and which can be suitable for the study area. The selected methodology was the qualitative analysis of documents from primary and secondary sources. This task helped to identify and analyze the REDD+ elements based on experiences on other parts of Brazil or the world. The documents, as for

objective one, consist of printed and digital media resources from international, national, regional, and local entities. For the characterization of REDD+ in the Brazilian context, analytical semi-structured interview to experts, representatives, and members of public or private entities were carried out. The main goal of this objective was to define the requirements for the establishment of REDD+ and to determine where Brazil, and in specific the MCM, stand in terms of the fulfillment of these requirements.

Specific objective 3. Analyze the strengths, weaknesses, opportunities and threats for the incorporation of REDD+ that result from the contrast between its elements and the environmental governance dynamics in the Municipality de Cachoeiras de Macacu.

The identification of strengths, weaknesses, opportunities, and threats was determined according to conditions of the LEG and the specific demands that the indicators of the REDD+ framework supposed. This objective represented the strategic task of the research. For this objective two main methods were used: the realization of analytical semi-structured interviews of key informant and the qualitative analysis of documents from primary and secondary sources. The sources for the first method were experts, representatives, and members of public and private entities that kept an important relation to the area of study. For the qualitative analysis of documents, the information was obtained through the consultation of printed and digital documents from primary and secondary sources. Through this strategic approach, the determination of the feasibility for the incorporation of REDD+ in the study area was made. This allowed to reach conclusions and to elaborate recommendations. The main results were tabulated (Table 1) to provide a more appropriate and strategic comprehension of them. This analysis corresponds to a similar exercise as the one deployed by LOAIZA (2010) based on the methodology of WEIHRICH (1982).

Table 1: Strengths, Weaknesses, Opportunities, and Threats

	Strengths	Weaknesses	Opportunities	Threats
Scope	Special capacities that cause a favorable position	Scarce resources, lack of capacities that cause an unfavorable position	Factors that result on favorable situations	Factors that result on unfavorable situations
Reference level				
Funding mechanisms	Referred to the internal environment (local scale) Can be categorized in: <ul style="list-style-type: none"> a) Management b) Operations c) Organization d) Finance 		Referred to the external environment (national and regional scales) Can be categorized in: <ul style="list-style-type: none"> a) Economic b) Political c) Technological d) Social e) Demographic f) Competition 	
Benefit distribution				

Source: WEIHRICH (1982), modified by the author.

PART II: STUDY AREA

THE GENERAL CONTEXT: THE MATA ATLÂNTICA

The study area is located in the state of Rio de Janeiro, which belongs to the Mata Atlântica biome. The latter covers an area of 1.1 million km², approximately 13% of the total Brazilian territory (Figure 1). It is the third biggest biome in Brazil after the Amazon and the Cerrado. It encompasses 17 Brazilian states from the northern region of Ceará to Rio Grande do Sul in the south (LEITÃO, 2009).



Figure 1: Brazilian biomes

Source: IBGE (2004).

This rich body of ecosystems contains around 20.000 plant species, with an endemism index close to 40% (BROOKS, *et al.*, 2002). Especially the trees count with a high endemism, with 476 species the index rounds the 70% (GENTRY, 1992). The regional fauna also counts with outstanding numbers: it is known that the Mata Atlântica concentrates 171 of the total 201 endangered species in Brazil. Due to its biodiversity characteristics and the high levels of natural habitat and biodiversity loss, the biome is considered as one of the biodiversity Hotspots of the world (MYERS, *et al.*, 2000).

The history of environmental degradation of the Mata Atlântica is directly linked to national specific exploitation cycles. It has been documented that the first anthropic changes in the region were caused by the occupation of the coastal region for the extraction of brazil wood (*Caesalpinia echinata*). During the colonization times, the area was the center for the movement of goods from the coastal area of Rio de Janeiro to the inland states, mainly the Minas Gerais. Later on, intense exploration of gold and other minerals, as well as the first cultivation of sugarcane and coffee in the state of Minas Gerais, intensified the pressure over the forest ecosystems. Over the last 50 years, nonstop industrialization and urbanization processes have played their part in the degradation and consequent fragmentation of the Biome (DEAN 1995; DANTAS & COELHO NETTO, 1995; NEHREN, 2008). Today, the estimations about the remnants of the forest say that only about 11.4-16.0% of the forest ecosystems are still standing (RIBEIRO, *et al.*, 2009).

The portion of the Mata Atlântica located in Rio de Janeiro state illustrates clearly the general tendency of environmental degradation. By 1911, this portion had 35.980 km² of forested area, 85% of the total land surface, percentage that changed by 1947 when only 3.480 km² remained (PRUTSCH, 1996). Historical data shows that 305 km² were destroyed over the period 1985-1990, and that in between 1990-1995 and 1995-2000, the loss accounted for 1.403 km² and 37,000 km², respectively. The actual remnants round between 5-8% of the original forest remain, from which only 14.4% are protected (LEITÃO, 2009).

The Rio de Janeiro state contains the major percentage of forest remnants of the whole biome, around 900.000 ha, an estimated value of 20.33% of the total. According to GUAGLIARDI (2009), until the beginning of 2009, Rio de Janeiro state contained 270 units of conservation (UC), which corresponded to approximately 735.000 ha. As the author explains, from this total, 53% represented federative UCs, 15% municipal UCs and 1% “Reservas Particulares do Patrimônio Natural” (GUAGLIARDI, 2009).

According to data from the 2010 Population Census by the Instituto Brasileiro de Geografia e Estatística (IBGE), over 120 million inhabitants reside in the Mata Atlântica, 60% of the Brazilian population. The population is distributed in over 3,400 municipalities, 61% of Brazil's total. The specific section of the biome in the Rio de Janeiro state undergoes the pressure exerted by more than 15 million inhabitants, 8% of Brazil's total population.

In terms of GHG emissions, the Mata Atlântica has been increasing its net annual anthropic emissions share, more than 6% for the year 2005. Even if the regional emissions cannot be compared to the Amazon and the Cerrado, it emits more than the rest of the biomes summed. In addition, as Table 1 shows, the net annual anthropic GHG emissions of the Mata Atlântica have increased almost 267% from the period 1990-2005 (FIP, 2012).

BIODIVERSITY CORRIDOR DA SERRA DO MAR

The most preserved section of the Mata Atlântica in the Rio de Janeiro state is the Biodiversity Corridor da Serra do Mar. With a total surface of 132.564 km², the corridor preserves around 50.547 km² of forest fragments, from which 3.524 km² are conservation units (GUAGLIARDI, 2009). The area is geographically divided in three main sections: (i) the central mountain range or Serra dos Órgãos; (ii) the fragmented foothills and coastal area in the municipalities of Guapimirim and Cachoeiras de Macacu, or Guapi-Macacu watershed and; (iii) the mountainous hinterland of Petrópolis, Teresópolis, Nova Friburgo, and Bom Jardim (Figure 2) (NEHREN, 2008).

Table 1: Anthropic CO₂ emissions of the Brazilian biomes for the period 1990-2005

Biomes	1990	1994	2000	2005	Share 2005	Variation 1990-2005
	(Tg)					
Amazonia	460,53	521,05	814,11	842,97	67,4	83,0
Cerrado	233,00	233,00	302,71	275,38	22,0	18,2
Atlantic Forest	22,17	22,17	79,11	79,11	6,3	256,9
Caatinga	27,97	27,97	37,63	37,63	3,0	34,6
Pantanal	17,83	17,83	16,17	16,17	1,3	-9,3
Pampa	(0,10)	(0,10)	(0,10)	(0,10)	0,0	0,0
Total	761,39	821,92	1.249,63	1.251,15	100,0	64,3

Source: FIP (2012).



Figure 2: Biodiversity Corridor do Serra do Mar

Source: The author based on CIDE (2001).

As already mentioned in the previous paragraph, the study area is located in domain of the Guapi-Macacu watershed. The upper part of the latter hosts large areas of preserved forest, mainly sub-montane and montane rainforests of altitudes between 100-200 and 2,000 meters (m) above sea level. In the lower parts, pastures and agricultural land predominate; forest fragments are limited to small fragments mainly located on cone-shaped hills, also known as “half oranges” (NEHREN, 2008). The pastures dominate the transition from the lower mountain range to the lowlands (Figure 3) (NAEGELI, 2010).

SPECIFIC STUDY AREA: MUNICIPALITY OF CACHOEIRAS DE MACACU

The municipality of Cachoeiras de Macacu is one of the 92 municipalities distributed in the eight regions of the Rio de Janeiro state. It belongs to the “Região das Baixadas Litorâneas,” more specifically to the “Microrregião Macacu-Caceribu.” It is administrated by the “Prefeitura Municipal de Cachoeiras de

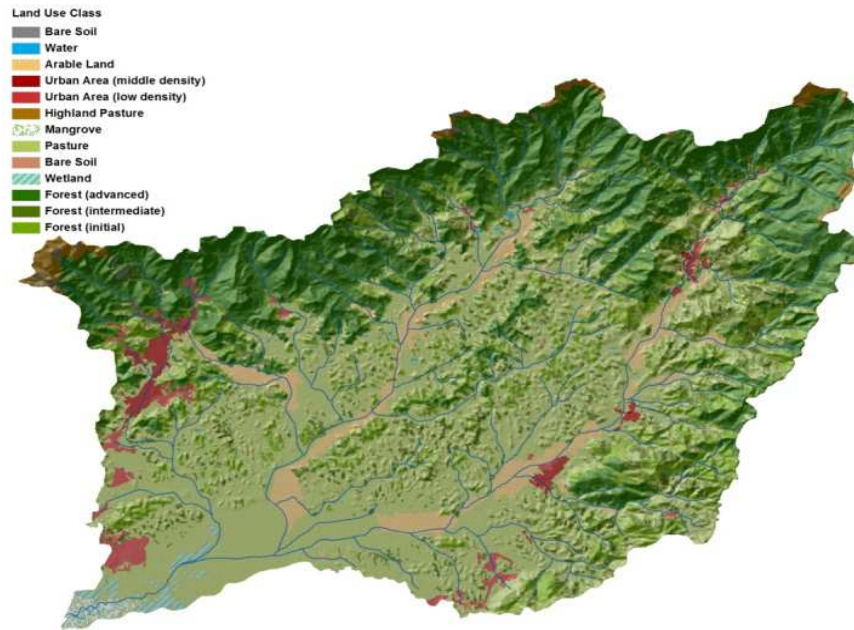


Figure 3: Land-use in the Guapi-Macacu Watershed

Source: PENEDO, et al. (2011).

Macacu” and its Secretaries. It is located in the fragmented foothills of the Biodiversity Corridor do Serra do Mar, 97 km from Rio de Janeiro city. It has a territorial extension of 954 km², once totally covered in forest⁹. The territory is politically divided in three districts: (i) Cachoeiras de Macacu, (ii) Japuíba, and (iii) Subaio (Figure 4) (COMPERJ, 2011).

Most of the forest-related areas in the municipality correspond to the conservation units (UC). By 2007, 27.4% of the municipality’s territory constituted UC’s, for example the “Parque Estadual dos Três Picos” and the “Estação Ecológica Estadual Paraíso.”¹⁰ The former has an area of 46.350 ha, from which 70% is located in the study area; the rest is located in the municipalities of Nova Friburgo, Teresópolis, Silva Jardim and Guapimirim. The later has an area of 4.920 ha distributed in municipalities of Guapimirim, Teresópolis, extending to the foothills of the “Serra dos Órgãos”¹¹ (SOSMA, 2011; INEA, 2012).

⁹The current total forest cover is of 414 km² (43% of the original extent). The area presents also gains, which are located in the sub-montane zone where former forest gaps closed, due to natural forest succession on abandoned pastures and agricultural fields (NAEGELI, 2010).

¹⁰ The “Parque Estadual dos Três Picos” was created through the Law-Decree N° 31.343/2002, while the “Estação Ecológica Estadual Paraíso” was instituted through the Decree N° 9.803/1987.

¹¹ The Serra dos Órgãos is the northernmost branch of the Biodiversity Corridor do Serra do Mar mountain range (NEHREN, et al., 2009).

The region presents eight different land-use classes: (i) agricultural areas without a vegetation cover; (ii) agricultural areas with a vegetation cover including citrus and guave; (iii) bare soil; (iv) initial forest; (v) intermediate/advanced forest; (vi) areas used for pasture showing a vegetation cover; (vii) areas used for pasture without or a very light vegetation cover, and; (viii) water (Figure 3) (FIDALGO, 2008).

According to the 2010 population census (IBGE, 2010), 86, 4% from the total population (54.370 inhabitants) live in urban areas, and only 13.5% in rural settlements. From the total inhabitants, 41.5% live below the poverty line.



Figure 4: Specific study area, the municipality of Cachoeiras de Macacu

Source: IBIO (2012).

Over the last ten years, the study area presented a growth of more than 12% in the total urban settlements in relation to the beginning of the decade. In the commercial sector, the census showed that the presence of companies in the area increased by 11.1%. (Table 2) (IBGE, 2010).

Table 2: Demographic indicators of the municipality of Cachoeiras de Macacu

Indicator	Value
Total population	54.370
Urban population	47.015
Rural population	7.355
Urbanization rate (%)	86,4
Demographic density (inhabitants/km²)	50,73

Source: The author based on data from IBGE (2010).

The municipality has a medium human development index of 0,752, occupying position 55 of Rio de Janeiro state. It has a Gross Domestic Product of R\$ 779.078.000 (R\$ 16.133 per capita). The majority of the population works in the commerce and service sectors. From the total jobs, 36% corresponds to the formal sector, followed by the public administration with 18%, commerce with 16,3%, industry 15,7%, and agricultural/livestock 10,2% (AGENDA 21, 2012; IBIO, 2012).

The main activities contributing to the economy of the area are the agricultural production of coco, guava, yam, manioc, banana, corn, and other crops. Cattle breeding for the production of meat and milk are also relevant. The touristic sector is also important. The locality shows a constant increase in the establishment of ecotourism and leisure facilities potentiated by spots such as “Pedra do Faraó,” “Pedra do Oratório,” “Pedra da Mariquita” and, “Pedra do Colégio.” The industrial activity is mainly represented by the bottling group Schincariol, and other minor water-bottling companies¹² (COMPERJ, 2011)

¹² The relative representative of the different economic sectors show that agricultural and livestock activities correspond to 5% of the GDP, industry 52% and services (i.e. tourism) 43% (IBIO, 2012).

PART III: CONCEPTUAL FRAMEWORK

REDD+ BACKGROUND

ASSIGNING VALUE TO NATURE: PAYMENT FOR ECOSYSTEM SERVICES

The Kyoto Protocol (1997) highlighted the necessity to carry out specific actions to face the climate change threat whilst achieving the principles of sustainable development. The agreement came into force in 2005 and since then many things have changed in the ideas of the political and scientific communities around the globe. One good example of this affirmation is the Millennium Ecosystem Assessment, which came to ratify the statement that there is an urgent necessity to change the relation between economic development and environment. It was also an effort to assess “the consequences of ecosystem change for human well-being” and to establish “a scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems” (MA, 2005). It presented two main dimensions of analysis, the first confirming the fact that human actions over the environment affect their livelihoods, principally of the poor, and the second, that there is an imminent necessity to find alternatives to solve both the environmental and socioeconomic issues that threaten the human well-being¹³. The message of the document reached governments, markets, and societies in general, pushing them to look out for quick and sustainable alternatives to manage ecosystemic resources (MA, 2005).

The solution of excellence was the “Payment for Ecosystem Services” (PES). This innovative perspective legitimated itself as the new paradigm from which ecosystem resources management will be driven in the years to come.

The 1992 Convention on Biological Diversity (CBD), defines “diversity” as “the variability among living organisms from all sources including, terrestrial, marine, ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (CBD, 1992). The diverse species or biotic components share complex interactions between them and

¹³ Well-being is constituted by the elements of security, basic material for good life, health, good social relations, and freedom of choice and action. These elements define what it is describe as “a good life.” (TEEB, 2010).

with the abiotic component (e.g. climate). The interaction between biotic and abiotic components consists of what is known as ecosystems. Biotic-abiotic interactions that occur in ecosystems are of great importance for humans as they are directly linked to their livelihood; the benefits people obtain from ecosystems are called Ecosystem Services. The Ecosystem Services are directly linked to the component of human well-being and are influenced by the “drivers of change.” They were classified by the Millennium Ecosystem Assessment in four different types: Provisioning, Regulating, Cultural and, Supporting (Figure 1) (MA, 2005).

Figure 1: Types and definitions of the Ecosystem Services according the Millennium Ecosystem Assessment

PROVISIONING	•Capacity of ecosystems to provide goods, for example food, wood, genetic resources, etc.
REGULATING	•Benefits obtained from natural processes which regulate the environmental conditions that sustain human life, for example climate regulation, water purification, etc.
CULTURAL	•Capacity of ecosystems to provide benefits in recreation, education aesthetical and spiritual.
SUPPORTING	•Natural processes that are necessary for the existence of other processes, for example nutrients cycle, primary production etc.

Source: MA, 2005.

From an economic perspective, Ecosystem Services can be defined as “(...) the flow of value to human societies as result from the state and quantity of natural capital” (TEEB, 2010, p. 7)¹⁴. The market’s dynamic allows the ecosystem services to be provided with a value for its tradability as goods or services. This perspective emphasizes the importance of markets in the definition of Ecosystem Services that can be or not recognized by societies. This definition dynamic has historically enhanced the importance of market values over non-market values. The former are

¹⁴ TEEB (2010) defines natural capital as “an economic metaphor for the limited stocks of physical and biological resources found on earth, and of the limited capacity of ecosystems to provide ecosystem services.”

often more valuable than the market values, but represent a market niche that is still too young, unexplored, and/or ignored (MA, 2005).

This valuation dynamic in the markets allows the development of a PES Scheme. The PES has been seen as an economic instrument to deal with the lack of interest and/or tendency of sub-offer of some ecosystem services in the context of a buyer-seller relation. The importance of the PES lies in the fact that through markets the right signals about the sustainable use of resources can be sent. The commercialization of ecosystem services follows the economic notion that they are able to optimize the utilities and satisfaction of people, affirmation supported by the fact that “agents” perceive ecosystem services in different ways, depending on the subjective valuation agents make on the particular ecosystem services. Hence, three different values can be given to the ES: (i) the intrinsic, (ii) the use value and, (iii) the non-use value (TEEB, 2010). Only the last two valuations are subject of economic practices in our current markets (EDDA & PREM, 2011)¹⁵. The quantity of markets of PES can be as large as the variety of ecosystem services provided with a value (MA, 2005):

The role of forests in the PES scheme is of great importance. According to the Millennium Ecosystem Assessment, “forest ecosystems occupy about one-third of the Earth’s land surface and are estimated to contain more than half of all terrestrial species, mainly in the tropics.” Additionally, forests account for over two-thirds of net primary production on land (i.e. the conversion of solar energy into biomass through photosynthesis) making them a key component of the global carbon cycle and climate (MA, 2005). Traditionally forest ecosystems have suffered from the “economy of degradation,” that is the prioritization of the direct use value of ecosystems. This old perception of forest ecosystem services in the form of public goods has changed. Today, the possibilities to provide them with a monetary value

¹⁵ Intrinsic value refers to the capacity of biodiversity or ecosystems to contribute keeping the health and integrity of biodiversity or ecosystems per se, independently of human satisfaction. Use value is given when agents benefit directly from the use of the resource. Divided in: (i) Direct use value: benefit directly the economic agents (e.g. wood, water); (ii) Indirect use value: benefit indirectly the economic agents (e.g. carbon storage, scenic beauty) and; (iii) Option value refers to the action of leaving an option to be used in the future (e.g. habitat preservation). Non Use value is given when agents do not necessarily benefit directly from the use of the resource. Two types: (i) Existence value: this value is attributed to some resources so they can exist independently of their direct use; (ii) Legacy value: Referred to the act of preserving a resource to be used by future generations (EDDA & PREM, 2011).

have evolved notably, potentiating their immense value for mitigation of environmental and social problems.

The overall services that forest ecosystems provide are among the widest from all the types of ecosystem services. The most important ecosystem services provided by forests are the regulating services (e.g., ground water recharge, pollination, climate regulation, water regulation, etc). Climate regulation through sequestration of Carbon Dioxide is one of the most discussed ecosystem services by the international community as it has a direct impact on the struggle against global warming. (MA, 2005; TEEB, 2010). In the case of tropical forests, they can stock up to 638 gigatonnes of carbon (Gt/C) in their ecosystems, from which 44% is stored in aboveground biomass, while 46% is stored in belowground biomass, 6% in dead wood, and 4% in litter. (Table 1) (LEITÃO, Methodology for monitoring the reduction of emissions for the increase in carbon sequestering applicable to the projects of the Atlantic Forest Conservation Fund Program, 2009)

Table 1: Carbon Stocks in the vegetation and soil up to a depth of 1 m

Biome	Area (109 ha)	Vegetation (Gt C)	Soil (Gt C)	Total (Gt C)
Tropical Forests	1,76	212	216	428
Temperate Forests	1,04	59	100	159
Boreal Forests	1,37	88	471	559
Tropical Savannas	2,25	66	264	330
Temperate Fields	1,25	9	295	304
Deserts and semi-deserts	4,55	8	191	199
Tundra	0,95	6	121	127
Flooded grasslands	0,35	15	225	240
Plantations	1,60	3	128	131
Total	15,12	466	2011	2477

Source: LEITÃO, 2009.

UNFCCC REGIME: KYOTO PROTOCOL AND THE CARBON MARKETS

The adoption of alternatives to fight forest degradation, as well as to mitigate the effects of climate change is a topic that the international community has attended

over the last 20 years¹⁶. With the creation of the UNFCCC at the Conference on Environment and Development in 1992, a new set of rules and actors for the attendance of the climate change issues was born: the Climate Change Regime. In February 16, 2005, with the enforcement of the Kyoto Protocol, the most important piece of international legislation developed by the UNFCCC so far, a new era in the development and implementation of actions that recognized the potential of forests to mitigate climate change and to improve the livelihood of people who inhabit them began (KYOTO PROTOCOL, 1998; UNEP, 2000).

The Kyoto Protocol corresponds to an international agreement linked to the UNFCCC with the major feature of setting binding targets for 37 industrialized countries and the European Union for reducing GHG emissions¹⁷. Article 2 of Kyoto Protocol states that every country of the Annex I “should implement the and/or further elaborate policies and measures in accordance with its national circumstances.” The absolute goal of actions under the Kyoto Protocol is to keep the global temperature warming below 2°C in comparison to preindustrial levels (KYOTO PROTOCOL, 1998; UNEP, 2000).

The potential of the carbon storage capacities of tropical forests is identified as one of the pillars to fight climate change¹⁸. The Marrakesh Accords (2001), elaborated during the COP-7 in Morocco, defined the rules for the implementation of the Kyoto Protocol. It demarcated first specific activities related LULUCF that could be subject of the PES scheme (Table 2).

The Kyoto Protocol defined three specific market-based mechanisms for countries to meet their targets primarily through national measures. The first of these so called “flexibility mechanisms” corresponds to the emissions trading scheme, commonly known as “carbon market.” According to Article 17 of the Kyoto Protocol, this mechanism allows countries that have emission units to spare, to sell them to countries that are over their targets. The trading unit of carbon credit is called “assigned amount unit,” equivalent to one tonne of CO₂.

¹⁶ Since the establishment of the Montreal Protocol (1987) on “Substances that Deplete the Ozone Layer,” the topic was suggested as part of the international agenda.

¹⁷ The Kyoto Protocol classified its parties in three categories: (i) annex I countries: industrialized countries and economies in transition; (ii) annex II countries: developed countries, which pay for costs of developing countries and, (iii) non-annex I countries: developing countries (KYOTO PROTOCOL, 1998).

¹⁸ Together with the promotion of sustainable production activities, enhancement of energy efficiency in relevant sectors of the national economy (KYOTO PROTOCOL, 1998).

Table 2: Definitions, activities, rules and guidelines relating to land use, land-use change and forestry activities under the Kyoto Protocol

Mechanism	Definition
Afforestation	Direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources
Reforestation	Direct human-induced conversion of non-forested land to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land
Deforestation	Direct human-induced conversion of forested land to non-forested land
Revegetation	Direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 ha and does not meet the definitions of afforestation/reforestation contained in the Marrakesh Accords
Forest management	System of practices for stewardship and use of forestland aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner.
Cropland management	System of practices on land on which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production
Grazing land management	System of practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced

Source: UNFCCC, 2001.

The second mechanism is the Joint Implementation, defined in Article 6 of the Kyoto Protocol. It consists of the allowance to countries with an emission reduction or limitation commitment under the Kyoto Protocol (Annex B Party) to earn “emission reduction units” from an emission-reduction or emission removal project in another Annex II Party¹⁹ (KYOTO PROTOCOL, 1998).

The last of these mechanisms are the CDM. The Article 12 of the Kyoto Protocol defines the CDM as a mechanism that “allows a country with an emission-reduction or emission-limitation commitment (Annex II Party) to implement an emission-reduction project in developing countries. The trading units are the certified “emission reduction credits,” equivalent to one tonne of CO₂ (KYOTO PROTOCOL, 1998).

¹⁹ Equivalent to one tonne of CO₂ (KYOTO PROTOCOL, 1998).

The scenario selected by the Kyoto Protocol to developed CDM projects, and lately REDD+, is the one provided by Carbon Markets. They consist of one of the most rapidly growing markets related to ecosystem services. Currently there are two different types of carbon markets: (i) the Voluntary Markets and; (ii) the Compliance Markets. The former provide for the necessities of entities to decide voluntarily to reduce their CO₂ footprint using offsets. One of the motivations to get involved in the voluntary markets is the regulatory vacuum and the anticipation of imminent legislation on GHG emissions. The voluntary markets are currently very useful in the context of application of REDD+ pilot projects all over the world, due to the absence of a global REDD+ compliance market²⁰. On the other hand, the compliance markets are regulated by mandatory supra-entities in the regional, national, and international scales. The best example of this kind of market is the European Union Emission Trading Scheme (EU-ETS) (ANTON & SHELDON, 2011; WB, 2011).

Within the global carbon market, forestry projects only play a minor role, measured by market share and economic benchmarks. Projects related to the energy industry lead the market with about 67% of all projects while the certified emission reductions under the Kyoto Protocol only account for 1-2 % of all certificates, and afforestation and reforestation projects represent less than 1% of all CDM projects (WB, 2011). The main reason for the low acceptance of this alternative is the difficult procedure and high implementation costs of around US\$ 150.000 per project, in the case of Brazil. (MAY, 2011).

POLITICAL DEVELOPMENT OF REDD+

The Stern Review did one of the major recognitions of the importance of the REDD+- activities as large opportunities for cost-effective and immediate reductions of CO₂ emissions²¹. The wide spectra of benefits that these activities

²⁰A good example of voluntary markets fostering REDD+ related projects is developed in Mexico by PRONATURA. It is a Mexican NGO dedicated to the conservation flora, fauna and priority ecosystems, while promoting society's development in harmony with nature. Since 2009 they have developed the program "Mercado Voluntario de Carbono Forestal en México" with the intention to integrate civil society and the private sector in the mitigation of climate change effects (PRONATURA, 2012).

²¹ The Stern Review on the Economics of Climate Change was developed by Sir Nicholas Stern, Head of the Government Economic Service and Adviser to the Government of the United Kingdom

bring out, which go from fight against poverty, conserving biodiversity and sustaining vital ecosystem services, called up for the attention of the international forums for climate change discussion. Since then, REDD+ has suffered from an evolution characterized by an immense debate from the international community related to the definition of its main operative elements.

REDD+ was first suggested by Papua New Guinea and Costa Rica, in representation of “The Coalition for Rainforest Nations,” in the COP-11, in Montreal (2005)²². The request for the agenda item “Reducing emissions from deforestation in developing countries” was based on the Articles 2 and 3 of the Kyoto Protocol and was justified at the time by the confusion over the role LULUCF activities should play in achieving commitments for Annex 1 and Annex 2 countries. One year later, in the context of the 24th session of the Subsidiary Body for Scientific and Technological Advice in Bonn, 2006, REDD was considered as one of the main elements of the agenda. This entity agreed to discuss scientific, socio-economic, technical, and methodological issues, including the role of forests, particularly tropical forests, in the global carbon cycle (HOLLOWAY & GIANDOMENICO, 2009).

In 2007, during the COP-13 in Bali, the inclusion of forest in the international UNFCCC regime made important advances, as the Bali Road Map, which includes the Bali Action Plan, was created. It established a process for dialogue to further the implementation of the Kyoto Protocol beyond 2012 and helped to define methodological directives to provide incentive for the development of pilot REDD initiatives²³ (HOLLOWAY & GIANDOMENICO, 2009).

REDD+ was first introduced at the Poznan Climate Change Conference (2008), as recognition that the role of reducing emissions from deforestation and forest degradation in developing countries should be complemented with the activities

on the economics of climate change and development. It assessed the impact of climate change in the world economy (STERN, 2007).

²² The first example of a project with the characteristics of REDD+ took place in 1997 in Bolivia: The Noel Kempff Mercado Climate Action Project. It consisted of an initiative from The Nature Conservancy and “Fundación Amigos de la Naturaleza” to mitigate climate change effects by protecting 1.5 million ha that were endangered by degradation from timber harvesting and deforestation from agricultural expansion. The project was designed following the standards of Afforestation/Reforestation of the CDM (HOLLOWAY & GIANDOMENICO, 2009; FCP, 2012).

²³ In order to reach effective outcome of the KP the Bali Action Plan considered (Decision 1/CP-13 Para 1 (b) (iii)): Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

related to conservation, sustainable management of forests and enhancement of forest carbon stocks. In the following year, during the UNFCCC meetings in Bonn, the negotiating text of REDD+ was introduced by the chair of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. During this meeting, more attention was given to the participation of local communities and indigenous peoples in REDD/REDD+ activities. Later in the same year in Bangkok during the same entity, a discussion in relation to the safeguards against the conversion of natural forests to forest plantations took place (HOLLOWAY & GIANDOMENICO, 2009).

The COP-15 in Copenhagen (2009) resulted in the elaboration of the Copenhagen Accord, a document that confirmed the crucial role of REDD+ and agreed to provide positive incentives through the establishment of a mechanism to enable the mobilization of financial resources from developed countries. During the COP-16 in Cancún, 2010, the guidance on REDD+ readiness was provided to developing countries. During the COP-17 in Durban, the first incentive framework for REDD+ was created, and it was recognized that multiple sources and channels, including market-based approaches, may support the results-based actions (HOLLOWAY & GIANDOMENICO, 2009; REDD Desk, 2011).

REDD+ FRAMEWORK

ELEMENTS OF THE REDD+ FRAMEWORK

The evolution of REDD+ has been characterized by the constant efforts of the international community to define sets of steps and rules to guide the incorporation of the mechanism according to the particular contexts worldwide. The discussion has resulted in the definition of a REDD+ framework (Figure 2). It does not correspond to a methodology but to a guideline that could be adapted no matter the context and scale of the project (IUCN, 2011).

Worldwide efforts to incorporate REDD+ remain in Phase 1 of preparation of readiness, a stage that consists of the creation of a national dialogue among the stakeholders and the development of REDD+ related activities. The first task demands the adaptation of the national and subnational LULUCF and related

frameworks to the REDD+ requirements. The national dialogue is equal to the identification of the stakeholders in order to clarify the main governance gaps/challenges. The last task of this phase is the development of REDD+ pilot projects that should be supported by a proper definition of four main elements: (i) Scope; (ii) Reference level; (iii) Distribution and; (iv) Financing. All these elements will determine the overall effectiveness, efficiency and equity of the REDD+ projects (IUCN, 2011; REDD Desk, 2011).

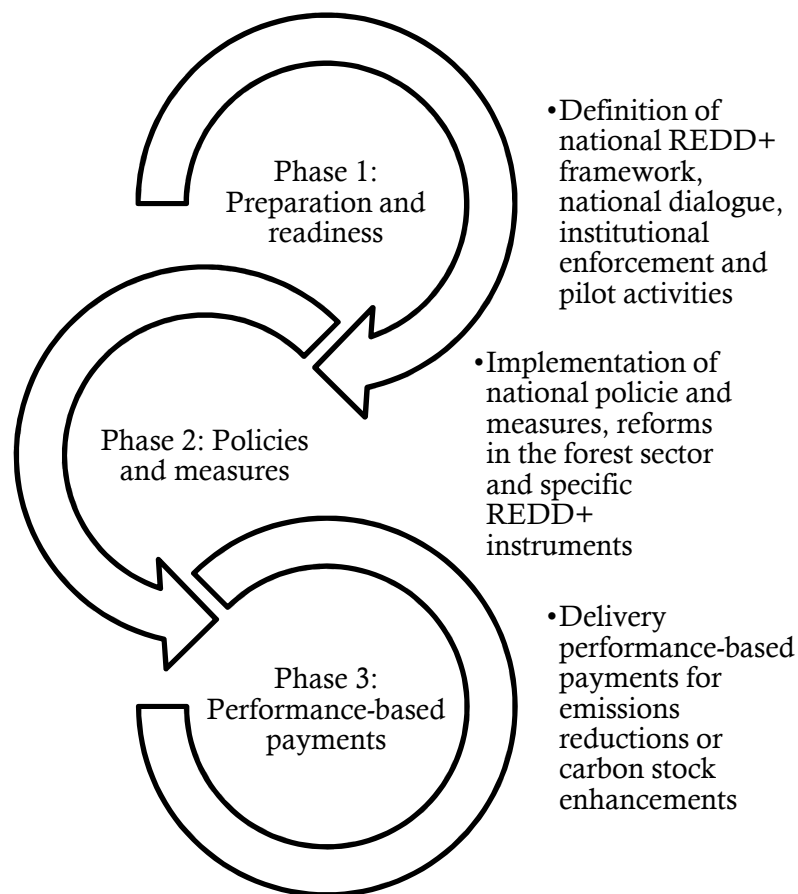


Figure 2: REDD+ Regime phases

Source: The author based on ANGELSEN, et al. (2009).

1. Scope

The scope refers to the activities that are considered eligible for generating emission reductions under REDD+. It includes five different activities: (i) reducing emissions from deforestation, (ii) reducing emissions from degradation, (iii)

sustainable forests management (+), (iv) forest conservation and, (v) enhancement of forest carbon stocks (+). REDD activities involve land-use change activities, while REDD+ activities relate to carbon stock changes and GHG emissions within managed land use. The activities included in REDD decrease additions of CO₂ into the atmosphere, while the REDD+ activities remove it from the atmosphere (GOFC/GOLD, 2010).

2. Reference level

REDD+ activities must specify the way in which emission reductions will be measured. The reference level establishes the period and scale in which REDD+ activities are measured. The scale of REDD+ projects can be national or sub-national. The importance of the definition of the reference level is that it will determine the success in facing the leakage, the permanence and the additionally (REDD Desk, 2011). “Leakage” is defined as the net change of anthropogenic emissions by sources of GHG that occurs outside the project limits, and which is measurable and attributable to the project activity. “Permanence” refers to whether carbon-gains achieved through REDD+ activities are long and lasting. Lastly, “additionally” refers to the need for countries to show that achieved rates in reductions of carbon emissions would have not occurred in the absence of REDD+ activities (COLINI, *et al.*, 2009).

The national approach to REDD+ projects supposes the commitment of governments in securing/distributing of resources, as well as in the implementation of the projects. The main advantage of this approach consists of its capacity to control leakage, permanence and, additionally. The subnational approach works in the same way as projects under CDM, allow superior efficiency in fundraising and implementation, nevertheless, they lack control over leakage²⁴. Both approaches converge in what is called “the nested approach.” In this approach the implementation of subnational projects are accounted and monitored in the national scale. It demands a robust and trustworthy accountability for the transactions at the subnational scale to be tracked and to avoid double counting.

²⁴ Other reasons for the selection of the subnational approach are: (a) To allow developing countries who do not have the capacity to create national carbon accounting mechanisms to participate at some level in REDD; (b) To provide an incentive for both project level and national level activities, as proposed in the “nested approach” and; (c) As a transitional mechanism in which a country may start with a sub-national reference level, and move to a national reference level in the long term (REDD Desk, 2011).

Subnational activities can be carried out by governments, regional or local authorities, as well as NGOs or private entities. This kind of initiatives can be inserted in national or international market mechanisms (e.g. voluntary markets) (COLINI, *et al.*, 2009; PARKER, *et al.*, 2009).

The reference period or baseline defines a benchmark scenario against which future emissions will be measured, they also help to determine additionally. Three reference levels have been identified: (i) the historical, (ii) projected and, (iii) historical adjusted.

The historical reference level is based on rates of the past and a patron for future behavior. It ensures that the reference levels are not based on hypothetical assumptions or future developments. These reference levels have some limitations; first, they require a minimum quality and availability of data to be implemented, a situation that is not possible for many countries; second, they are based on old deforestation driving forces and do not consider the potential of future emissions reductions. That way, if a country deforested for example one million ha of forest, equivalent to 1 GtCO₂/year, between 1990 and 2005, the baseline will be 1 GtCO₂/year (Figure 3).

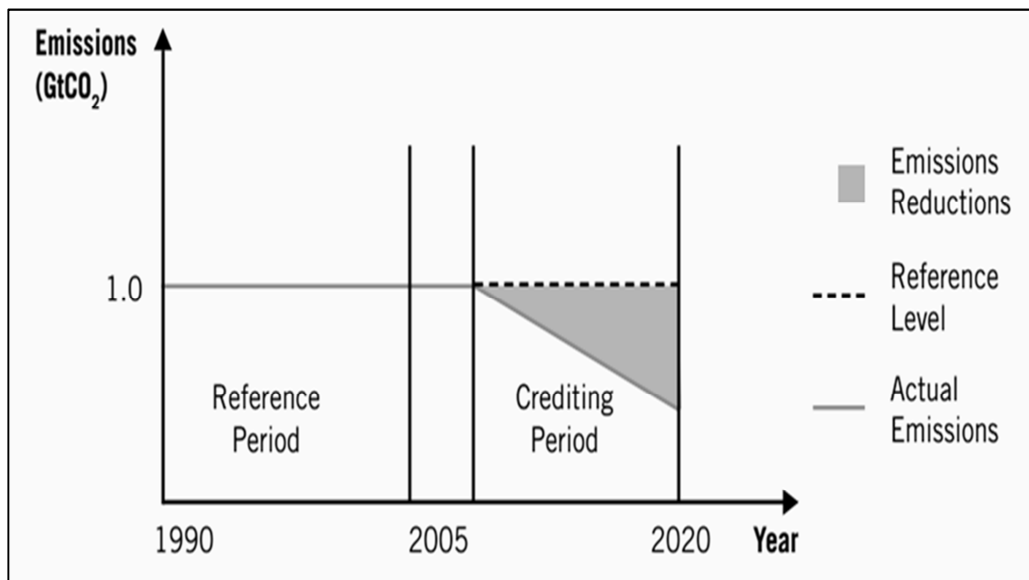


Figure 3: Historical Baseline

Source: REDD Desk (2011).

The projected baseline considers trends that can be implemented in the future, assuring a more complete knowledge of the driving forces of deforestation, and

improving the capacity to forecast. It takes into consideration present and future driving forces of deforestation (e.g. population growth, infrastructure construction, governance, policies). The baselines selected may be higher or lower than the historical levels, depending on the characteristics of the approach and the assumptions that are taken in the model. (COLINI, *et al.*, 2009; LEITÃO, 2009; REDD Desk, 2011)

The historical adjusted baseline incorporates a development adjustment factor (DAF), which can be applied to the historical baseline to reflect predicted changes in future drivers of deforestation. The main difference between the historical adjusted baseline and the projected baseline is merely methodological. Under the same terms of historical baseline's example, if a DAF of 10% is applied, the baseline will be 1.1 Gt CO₂/year, making necessary to calculate the emission reductions as anything below this level (Figure 4) (REDD Desk, 2011).

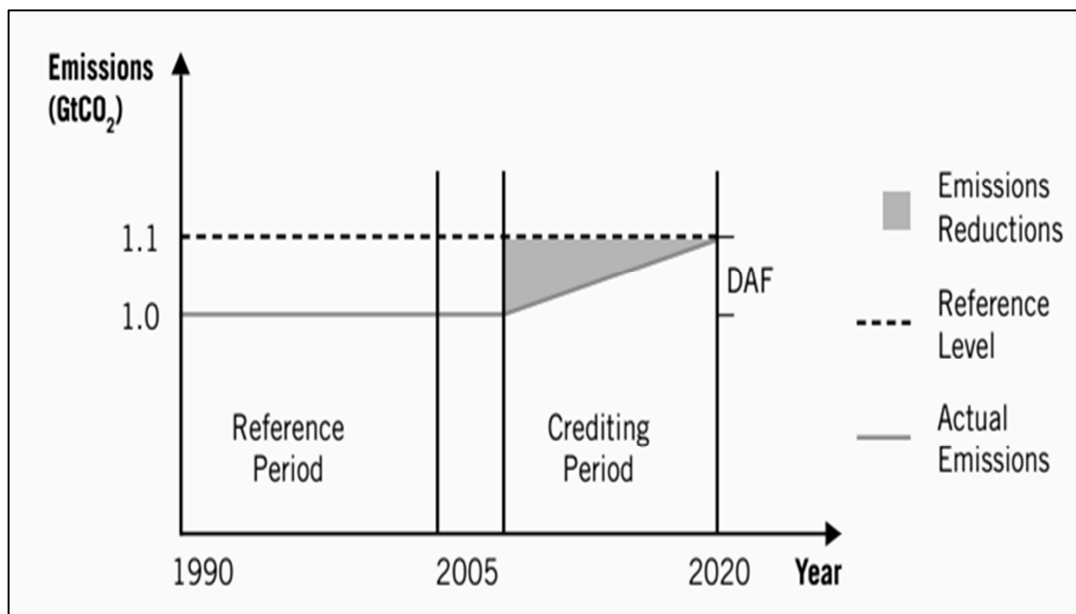


Figure 4: Historical adjusted Baseline

Source: REDD Desk (2011).

One of the main challenges concerning the definition of the reference levels is the avoidance of perverse incentives. For example, if a mechanism tends to benefit countries with large historic rates of deforestation, it could have an inverse effect, creating an incentive for those who deforested the most. In addition, the adoption of a historic baseline for countries with large forest cover and low deforestation rates could fail to reflect the pressure over their forests. The fact that historical

deforestation rates are low does not imply that the conservation of forests will be maintained (COLINI, *et al.*, 2009).

3. Distribution

The distribution mechanisms are important because they create positive incentives for the conservation of standing carbon stocks. The main challenge in this area is the creation of a mechanism that rewards countries consequently to their profile of forest cover (Table 3). There are two different options of distributing REDD+’s benefits: (i) redistribution and, (ii) additional funding/mechanism. The main objective of a redistribution mechanism is to prevent the international leakage and to address equity. The discussion, according to COLINI, *et al.* (2009) goes on the direction that if “HFLD countries are not rewarded to protect their current stocks there will be a perverse incentive to chop down their forests for more profitable ventures.”

Table 3: Country profile of forest cover

	Meaning	Forest cover	Annual rate of forest loss
HFLD	Highest forest cover, low rate of deforestation	85-100%	0-0.1%
HFMD	High forest cover, medium rate of deforestation	50-85%	0.4-0.8%
HFHD	High forest cover, high rate of deforestation	50-95%	0.8-1.5%
MFMD	Medium forest cover, medium rate of deforestation	35-50%	0.3-0.8%
LFLD	Low forest cover, low rate of deforestation	1-35%	0-0.3%

Source: COLINI, *et al.* (2009).

The redistribution of funds can function in a variety of ways, being the most popular: (i) the combined incentives and, (ii) incentive accounting. The justification of this approach is that doing the opposite provides incentives for HFLD countries whose rates of deforestation are below this global average. To generate revenue from this mechanism, countries with high deforestation rates (HFHD) should receive less under a tax on, later, this tax goes to a fund from which is paid to

countries in the form of a stock payment (COLINI, *et al.*, 2009; REDD Desk, 2011).

The additional financial mechanism works in the form of “stabilization funds” that are used to address leakage and equity concerns in the HFLD countries. In relation to the revenue, PARKER *et al.* (2009) argue that “it could come through a variety of sources including voluntary funds or innovative finance mechanisms such as the auctioning of allowances or levies on shipping or aviation.”

4. Funding instruments

Financing or funding schemes indicate the financial strategy that will be adopted to provide the sufficient economic resources to implement the projects. Among the most known modalities can be found: the official development assistance, markets, and Market-linked schemes (COLINI, *et al.*, 2009).

Under the alternative of official development assistance, non-Annex I countries can participate from initiatives from Annex I countries. Even if the investment for forest commonly comes from domestic sources (e.g. organized private sector and communities, landowners and farmers), the diversification of participation from foreign sources have grown considerably. The origin of official development assistance could be of public or private funds, bilateral grants, direct and portfolio investments, loans, credits, and multinational assistance (COLINI, *et al.*, 2009)..

The markets alternative refers to the adhesion to a voluntary market or regional market, as well as the creation of one. This modality allows the participation of the private sector, which rises up considerably the volume of available financial resources, which allows great flexibility in the capture of funds and consequently the implementation of projects. The market-linked alternative consists of a mixed approach of two stages, in the first, the public and private sector make the initial investments for readiness initiatives, in the second, the initiatives migrate to a market mechanisms (COLINI, *et al.*, 2009; REDD Desk, 2011).

PART IV: RESULTS

ANALYSIS OF THE MULTI-SCALAR ENVIRONMENTAL GOVERNANCE IN BRAZIL

The implementation of REDD+ initiatives/projects require the adaptation of specific governance elements in the different scales of administration to its own framework features. Each scale counts with particular frameworks that contain different laws, plans, policies, and entities, that are determinant for the incorporation of the mechanism. The general goal of this section is to describe the elements of the Brazilian multi-scalar environmental governance frameworks that keep a relation to REDD+ and play an influence to the study area.

NATIONAL ENVIRONMENTAL GOVERNANCE FRAMEWORK

The common responsibility to legislate the environment in Brazil is given by the Brazilian Constitution of 1988. This document as the major juridical element, in Chapter VI (Article 225), establishes the right of all Brazilians to have an ecologically equilibrated environment, as well as the responsibility of the citizens to protect and denounce any anomaly that could threat the natural equilibrium (Brazilian Constitution, 1988).

Under the fundamentals of the “Constituição,” the Brazilian government has adopted a series of international instruments that play an important support in the consecution of the environmental suppositions (Table 1)²⁵. The federal government of Brazil must support and supervise that the commitments obtained in the global scale are respected. In order to do so it must create an appropriate national framework that reproduces all the way down to the lowest level of administration.

²⁵ Additionally, in 2010, the government of Brazil signed an agreement with the United States of America, in which the countries compromise to meet at least once a year to define specific actions towards the development and implementation of pragmatic solutions and policies for reducing emissions, including carbon markets, research initiatives and technology transfer. Brazil has also been participating in the Governors’ Climate and Forests Task Force, initiated by the Governor of California (MAY, et al., 2011).

Table 1: International instruments of Brazil's national environmental governance

Instrument	Ratification year
Convention on International Trade in Endangered Species (CITES)	1975
Montreal Protocol on Substances that Deplete the Ozone Layer of the Vienna Convention for the Protection of the Ozone Layer	1990
Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)	1993
Convention on Biological Diversity (CBD)	1994
Adhesion to the International Timber Trade Organization (ITTO)	1994
United Nations Convention to Combat Desertification (UNCCD)	1997
Adhesion to the United Nations Forum on Forests (UNFF)	2000
United Nations Declaration on the Rights of Indigenous People (UNDRIP)	2008

Source: MAY, et al. (2011).

In the national scale, the “Ministério do Meio Ambiente” (MMA) is the entity in charge to propose, implement, and manage the national environmental plans and policies.²⁶ The MMA has several responsibilities in relation to the forest resources, they consist of: (i) application of the national policy on the environment and water resources; (ii) creation of policies on preservation, conservation and sustainable use of ecosystems, biodiversity and forests; (iii) creation of strategies, mechanisms and economic/social instruments for improving environmental quality and the sustainable use of natural resources; (iv) creation of policies for balancing the environment and production; (v) application of environmental policies and programs; and (vi) ecological and economic zoning (FIP, 2012).

The main normative piece that the MMA controls is the “Política Nacional do Meio Ambiente.” It is the main guideline for the preservation, improvement, and recuperation of the environment. It aims to assure the conditions for socio-economic development, national security, and protection of national dignity.

²⁶ The MMA is composed by the secretaries of “Biodiversidad y Florestas,” “Recursos Hídricos e Ambiente Humano,” “Mudanças Climáticas e Qualidade Ambiental,” “Articulação Institucional e Cidadania Ambiental,” and “Secretaria de Extrativismo e Desenvolvimento Rural Sustentável” (Law N° 10.683, 2003)

Article 1 institutes the “Sistema Nacional do Meio Ambiente” as the group of actors with differentiated roles to which the objectives are delegated (Table 2) (Law N° 6.938, 1981).

Table 2: Structure of the “Sistema Nacional do Meio Ambiente”

Function	Entity
Superior Organ	– Conselho de Governo
Consultative and deliberative Organ	– Conselho Nacional do Meio Ambiente
Central Organ	– MMA
Executor Organ	– Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) ²⁷
Sectional Organs	– State entities
Local Organs	– Municipal entities

Source: Law N° 6.938 (1981).

The study area counts with a particular relevance due to the social and natural processes that occur in the context of the Guapi-Macacu watershed. The National Law N° 9.433/1997 of the “Política Nacional de Recursos Hídricos,” is the most important framework element in defining the parameters for the management of the water resources in the national territory (Law N° 9.433, 1997).

Other relevant state entities are the “Ministério da Agricultura, Pecuária e Abastecimento” (MAPA) and the “Ministério da Ciência e Tecnologia” (MCT)²⁸. The former is responsible for public policies that aim at fostering agriculture, agribusiness, and promoting the regulation and standardization of services related to the agricultural sector (FIP, 2012)²⁹. While the latter, provides scientific and technological support to national initiatives. For the purposes of this investigation, the “Instituto Nacional de Pesquisas Espaciais” (INPE) is the most important sub-entity. It is responsible of developing new knowledge in the areas of forest cover gains/losses and climate change in general. The MCT also counts with the

²⁷ The main functions of IBAMA consist of: policing the environment; environmental licensing; control of environmental quality; authorizing the use of natural resources; zoning; environmental impact assessments; forest and environmental monitoring; levying administrative penalties;; and the establishment of criteria for managing the use of forest resources (FIP, 2012).

²⁸ The MCT has the main goals of formulating the national Policy for scientific and technological research and innovation (FIP, 2012).

²⁹ National Decree N° 7.127/2010 rules the “Empresa Brasileira de Pesquisa Agropecuária” (EMBRAPA), entity engaged in research, development and innovation with a view to finding solutions for sustainable agriculture.

“Secretaria de Políticas e Programas de Pesquisa e Desenvolvimento” (SEPED) as the entity is in charge of deploying innovation in the country in areas concerned to sustainable use of natural resources. It is also in charge of coordinating and implementing the actions and policies of the country under the UNFCCC (Decree N° 5.445, 2005).

In relation with planning instruments, the “Plano Nacional sobre Mudança do Clima (PMC),” represents the main instrument to orientate the national efforts against climate change. The elaboration and implementation of the PMC is in charge of the “Comitê Interministerial sobre Mudança do Clima” (CIM) entity that brings together a series of federal ministries and other relevant stakeholders (Decree N° 6.263, 2007). The establishment of responsibilities under the PMC for the entities of public administration is instituted through the “Política Nacional das Mudanças Climáticas” (PNMC) (Law N° 12.187, 2009). Among the main aims of the PNMC are (Article 4):

- a) Combine the economic and social development with the climatic system;
- b) Reduce the anthropic emissions of GHG in relation to the different sources;
- c) Strengthen the anthropic removal of GHG in the national territory;
- d) Preserve the conservation and recuperation of the environmental resources with particular attention to the biomes declared National Patrimony.
- e) Consolidate and expand the areas legally protected and to incentive the reforestation and re-composition of the vegetal cover in degraded areas, and;
- f) Stimulate the development of the “Mercado Brasileiro de Redução de Emissões” (MBRE).

The PNMC represents the guidelines to adopt the commitments of Brazil in the UNFCCC; it establishes the voluntary national emission reductions of GHG of 36.1% to 38.9% until 2020 in relation to the levels emitted in 2005. Additionally, as part of the goals of Brazil for 2020, the PNMC creates the sectorial plans to the mitigation actions for land-use, agriculture, energy, industry, and generation of solid waste. The first two are directly involved in the efforts to contribute to reduction emissions, the last three can be object of plans but their emissions reductions will not be counted. The emission reduction efforts for land-use change are disaggregated into the different biomes as follows: 68% Amazon, 23% Cerrado,

and the remaining 9% to the Mata Atlântica, Caatinga, and Pantanal (SEROA DA MOTTA, 2011)³⁰.

The “Código Florestal” is the main instrument for the legislation of the forest ecosystem management in Brazil. It states that forests are a common good of all the inhabitants of the country (Law N° 4.771. Art 1, 1965). It introduces two main types of areas that are important for any reforestation effort (i) the “Área de Preservação Permanente” (APP) and (ii) the “Reserva Legal” (RL) (Law N° 4.771. Art 1, 1965)³¹. The APPs comprehend the areas along riverbanks and water bodies, the tops of hills and slopes with a declination greater than 30 degrees. RL is the area located in the interior of a property, excluded from the APP, and necessary for the sustainable use of natural resources, conservation, and rehabilitation of ecological processes and protection of the native flora and fauna (SILVA, *et al.*, 2011)³².

The national categorization for forest management and conservation is defined by the “Sistema Nacional de Unidades de Conservação” (SNUC)³³. The SNUC is supported by the “Plano Estratégico Nacional de Áreas Protegidas” (Decree N° 5.758, 2006). Both are considered a step forward in the creation and management of a typology of the “Unidades de Conservação” (UC) in the three scales of government (national, regional, local) (Table 3) (Law 9.985, 2000).

Among the national governmental entities in charge of the management of forest ecosystems can be found the “Serviço Florestal Brasileiro” (SFB) and the “Comissão Coordenadora do Programa Nacional de Florestas” (CONAFLO). The former is the main national entity in charge of the management forest ecosystems (Law N° 11.284, 2006). While the latter, is in charge of the articulation

³⁰ The definition of sectorial percentages of mitigation is absent in the PNMC; nevertheless, they were estimated by Brazil for the purposes of the Copenhagen Accord. According to the weights defined, from the maximum emission reductions goal of 38.9%, deforestation would contribute to 34.7%; the 15.2% remaining would be covered by the energy sector, agricultural sector, and others (SEROA DA MOTTA, 2011).

³¹ The “Código Florestal” is being subject of reforms, which include changes in the characteristics of the APP and the RL (SILVA, *et al.*, 2011).

³² In order to improve the land use practices and the compliance with these two figures, in 2009 the federal government launched the “Programa Mais Ambiente” (Federal Program of Support to the Environmental Regularization of Rural Properties). This program is an opportunity for landowners and squatters to regularize the legal status of their properties in the case of having deforested land over and above the size of areas permitted by law, or of failing to maintain their RL or APPs (FIP, 2012).

³³ Established through National Law 9.985/ 2000.

and participation of the diverse interest groups in the development of Brazilian's forestry (Decree N° 3.420, 2000).

Table 3: Typology of the “Unidades de Conservação”

Group	Category SNUC
Unidades de Uso Sustentável (USS)	– Área de Proteção Ambiental
	– Área de Relevante Interesse Ecológico
	– Floresta Nacional
	– Reserva Extrativista
	– Reserva de Fauna
	– Reserva de Desenvolvimento Sustentável
	– Reserva Particular do Patrimônio Natural
Unidades de Proteção Integral (UPI)	– Estação Ecológica
	– Reserva Biológica
	– Parque Nacional
	– Monumento Natural
	– Refúgio de Vida Silvestre

Source: Law 9.985 (2000).

The government of Brazil has developed a series of other programs to support the sustainable forest management in the national, regional, and local scales (Table 4).

Table 4: Forestry-related instruments, characteristics and support entities

Program	Characteristics	Support entities
Programa Nacional de Florestas	Recognizes the Mata Atlântica priority biome	– Ministério do Meio Ambiente
Programa Federal de Manejo Florestal Comunitário e Familiar	The main instrument to organize and support actions for sustainable forest management by local communities	– Ministério do Meio Ambiente – Ministério do Desenvolvimento Agrário
Programa Nacional de Gestão Ambiental em Terras Indígenas	It has the aim to build strategies to secure protection and support for indigenous people and their lands focusing on concerns for sustainable development	– Ministério da Justiça – Ministério do Meio Ambiente

Source: Law N° 11.284 (2006), Decree N° 6.874 (2009), MAY, *et al.* (2011), FIP (2012).

The incorporation of a REDD+ specific framework is not a new goal in Brazil³⁴. There have been several attempts to generate the correspondent legislation to support REDD+ initiatives. The first attempt was the Law Project N° 5.586/2009, which aimed to establish the National REDD+ System. The project was archived; nevertheless, the idea was resumed through the Law Project N° 195/2011. Until March 2010, the Law Project was being discussed in the “Comissão de Agricultura, Pecuária, Abastecimento e Desenvolvimento Rural” of the Brazilian National Congress³⁵. The project establishes that the national REDD+ system should be implemented in consonance with the PMC. Additionally it proposes the creation of a “Comissão Nacional para REDD+” (Law Project N° 195, 2011).

In terms of funding mechanisms for the national climate change and forestry initiatives, the Brazilian environmental framework defines several options. The main funding options can be typified in markets, funds, and taxes (Table 5).

Figure 1 shows the national stakeholders relations. It reflects a well-organized set of actors for the compliance of national environmental framework. In terms of the governmental actors, entities from diverse sectors of the administration are present (e.g. MMA, MCT, MAPA, and MDIC). These entities are in most cases united in groups like CIM, CONAFLOR, and SISNAMA. The Congress counts also with representation: the CMEMC. The governmental initiatives are also supported by international organizations such as the UNFCCC, ITTO and, UNFF. The financial sector is mainly represented by the BM&F and the BNDES; both with support instruments for climate change fight related projects. The negative relations of the figure are intended to reflect that even if inter-ministerial cooperation is present, the foundation objectives of the ministries could be contradictory in some cases.

³⁴ Example of this position is the membership of Brazil in the Interim REDD+ Partnership, in March 2010. This partnership represent a common front for the UNFCCC negotiations and for the common actions (MAY, et al., 2011; FCP, 2012).

³⁵ In the legislative, branch the “Comissão Mista Especial de Mudanças Climáticas do Congresso Nacional” (CEMC) represents another of the main instrument to face the national climate change challenges (Ato Cojunta N° 1, 2007).

Table 5: Funding mechanisms defined by the Brazilian environmental framework

Funding mechanism	Type	Description
Mercado Brasileiro de Redução de Emissões (MBRE)	Market	<ul style="list-style-type: none"> – Defined by the PNMC (Article 8) – It is a joint initiative of the “Ministério do Desenvolvimento, Indústria e Comércio Exterior” and the “Bolsa de Mercadorias e Futuros” (BM&F)
Fundo Nacional sobre Mudança do Clima	Fund	– It is coordinated by the “Comité Gestor” linked to the MMA and has as one of its major economic agents the BNDES.
Imposto sobre Circulação de Mercadorias e Serviços- Ecológico” (ICMS-E)³⁶	Tax	– The allocations of the resources of the ICMS-E are made according to the municipalities’ performance in five main categories: 45% UCs, 30% water quality and, 25% solid waste management
Fundo Nacional de Desenvolvimento Florestal	Fund	– Aimed to finance sustainable activities and technological innovation in the forestry sector of Brazil
Fundo Amazônia	Fund	– Support the development of systems to monitor and control deforestation in other Brazilian biomes
Fundo Nacional do Meio Ambiente	Fund	– Aims to develop projects that seek to the rational and sustainable use of natural resources, including maintenance and recuperation of the environmental quality

Source: The author based on MBRE, 2012; BM&FBOVESPA, 2012; Laws N° 7.797 (1989), 11.284 (2006), 5.100 (2007), 12.114(2009); Decree 6,527 (2008).

³⁶ The ICMS-E is an allocation of the “Imposto sobre Circulação de Mercadorias e Serviços” (ICMS). The ICMS is an imposition to the circulation of goods, services, energy, and communications. The results of this kind of incentive have brought significant benefits. Since the implementation of the ICMS-E, the protected area of the Mata Atlântica has doubled from 101.000 in 2009 ha to 209.000 ha in 2011. It generated R\$ 111.5 million for the 78 municipalities of the state (ICMS-E, 2012).

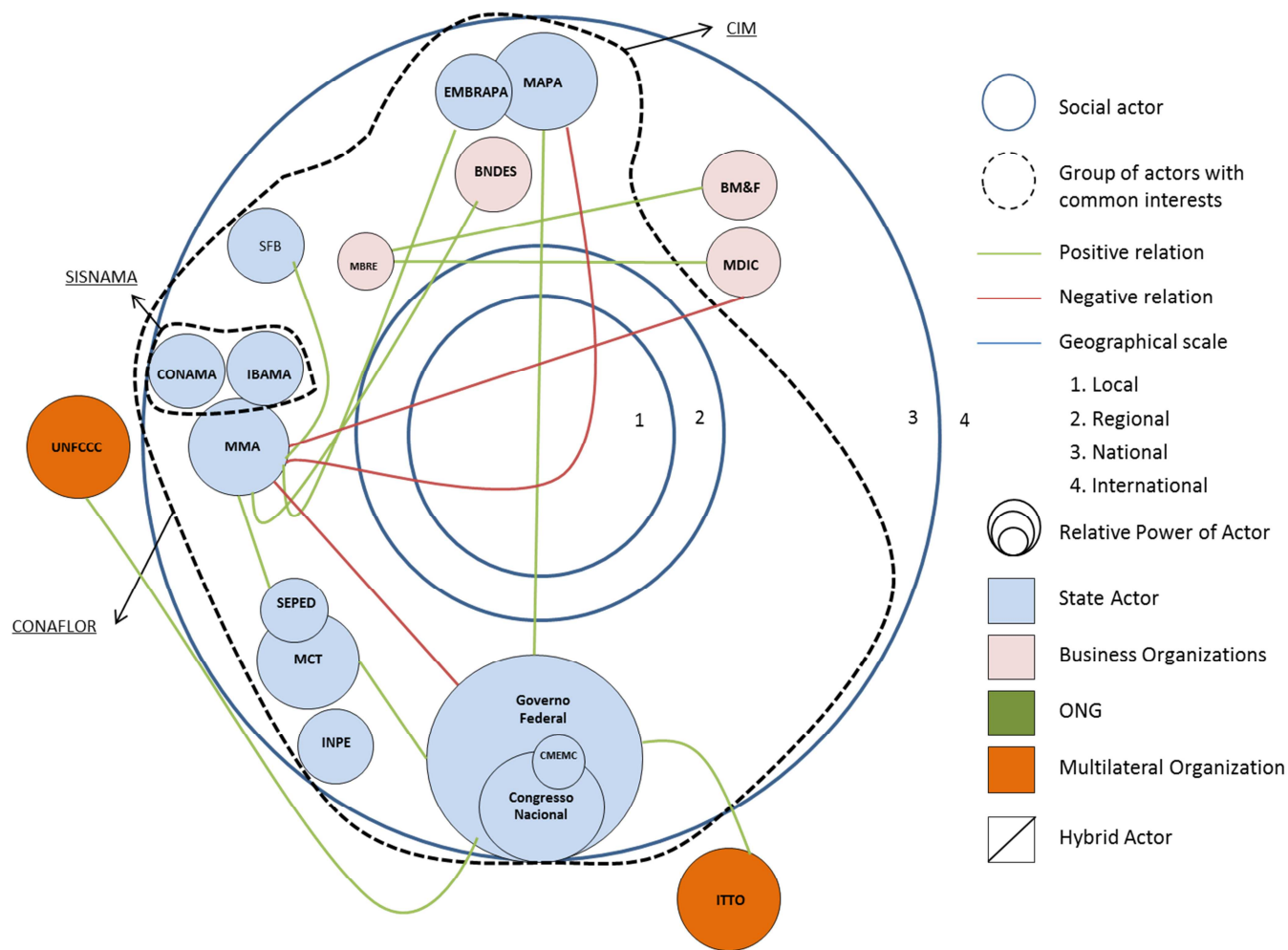


Figure 1: National Environmental Governance stakeholders and their relations

Source: The author.

REGIONAL ENVIRONMENTAL GOVERNANCE

The Mata Atlântica biome was recognized by UNESCO as part of their “Man and the Biosphere Programme” in 1992. This program “develops the basis within the natural and social sciences for the rational and sustainable use and conservation of the resources of the biosphere and for the improvement of the overall relationship between people and their environment” (UNESCO, 2011). The “Reserva da Biosfera da Mata Atlântica” (RBMA) has as its main planning instrument the “Plano de Ação Para a Mata Atlântica” (RBMA, 2012).

The “Pacto pela restauração da Mata Atlântica” is another non-governmental initiative to attend the environmental problematic present in the biome. Its main goal is to articulate the public and private institutions, business, and landowners of the 17 states contained in the biome in order to generate actions for the conservation of biodiversity, inclusion of PES, legal adaptation of agricultural activities, among others (Pacto Pela Restauração da Mata Atlântica, 2009).

In Rio de Janeiro State the “Instituto Estadual do Ambiente” (INEA) is the most important environmental institution³⁷. It has the goal to coordinate the different policies related to protection, conservation, and recuperation of the environment and to promote sustainable development (INEA, 2012).

Similar to the pattern in the national level, the Government of Rio de Janeiro State has created two main figures to face climate change challenges: (i) the “Fórum, Rio de Janeiro de Mudanças Climáticas” and; (ii) the “Política Estadual de Mudanças Climáticas” (PEMC-RJ) (ROMEIRO & PARENTE, 2011).

The “Fórum, Rio de Janeiro de Mudanças Climáticas” was established by the state Decree N° 40.780 (2007) with the intention to promote discussion and to support the global climate change phenomenon (Decree N° 40.780, 2007)³⁸.

The PEMC-RJ was created through the state Law N° 5.690/2010. It is in charge of the elaboration of the “Plano Estadual sobre Mudança do Clima” (PMC-RJ), as well as of the programs, projects and actions related to climate change. It proposes the creation of

³⁷ INEA was officially created through the state law N° 5.1010/2007. It resulted from the fusion of “Secretaria de Estado do Ambiente, the “Fundação Estadual de Engenharia e Meio Ambiente,” the “Superintendência Estadual de Rios e Lagoas” and the “Instituto Estadual de Florestas”

³⁸ Other objectives are: (i) to propose sustainable production and consumption patterns; (ii) to foster research and multi-scalar cooperation, and; (iii) to suggest the adoption of policies, practices and, technologies for GHG emission reductions (Decree N° 40.780, 2007)³⁸.

instruments such as carbon markets and defines the emission reductions goals, which will consist of 8% for 2012, 16% for 2016, and 20% for 2020 (Law N° 5.690, 2010)³⁹.

The operationalization of the PEMC-RJ is in charge of the PMC-RJ (Articles 1 and 7). The PMC-RJ highlights the importance of the state for the economic and social development of the country beyond the GDP perspective. The PMC-RJ makes a differentiation between the mitigation measures and the adaptation measures. The former are focused in the sectors of transportation, energy, and residuals. The latter are focused on efforts in the direction of an extension of vegetation, areas of flood control and environmental recuperation of watersheds. The entity in charge of the supervision of the PMC-RJ is the “Conselho Estadual de Mudanças Climáticas.” It concentrates diverse state secretaries as well as representatives from the municipalities and the civil society (Law N° 5.690, 2010).

The main legal instrument for LULUCF in the regional scale is “Lei Mata Atlântica.” It has the main objective of supporting the duties defined by the CF with the finality to preserve the forest remnants and to assure the well-being of the population dependent of the biome (Law N° 11.428, 2006).

Similar to the national scale’s case, the regional scale counts with a series of funding sources to support forestry and climate change efforts. These financial instruments are exclusive for Rio de Janeiro state or the Mata Atlântica biome (Table 6).

In terms of programs, the “Programa Estadual de Pagamento por Serviços Ambientais” is one of the most important state initiatives. It is intended to support the maintenance and regeneration of the forest resources in the state with the finality to assure the preservation of the wide spectra of environmental services they provide, specially water (Decree N° 42.029, 2011).

In relation to NGO representation, there are many of them working towards the preservation of the Mata Atlântica biome. They act in particular projects and/or in alliances such as: (i) the “Pacto pela restauração da Mata Atlântica” (SOSMA-TNC), and; the “Aliança para a Conservação da Mata Atlântica” (SOSMA-CI). In the context of the latter was developed the “Programa de Incentivo às Reservas Particulares do Patrimônio Natural da Mata Atlântica.” It has the objective to support the landowners in the creation and management RPPNs (Aliança para a Conservação da Mata Atlântica , 2012).

³⁹ Established by the Law “Institui a Política Estadual sobre Mudança Global do clima e desenvolvimento sustentável e dá outras providências” (N° 5.690/2010).

Table 6: Funding mechanisms defined by the Rio de Janeiro's environmental framework

Funding mechanism	Type	Description
Fundo Estadual de Conservação Ambiental e Desenvolvimento Urbano	Fund	– Supports environmental projects related to reforestation, recuperation of degraded areas, introduction of new technologies and environmental education
Fundo de Restauração do Bioma Mata Atlântica	Fund	– Defines credit incentives for the landowners who possess primary or secondary vegetation in advanced or intermediate stages of regeneration

Source: The author based on State Laws N° 1.060 (1986) and N° 11.428 (2006).

One of the major contributions by NGOs in the study area is the “Plano de Manejo APA da Bacia do Rio Macacu,” developed by IBIO. This plan consisted in an effort to create a participative management strategy to UCs. It had the finality to identify the possibilities to create agro ecological corridors. This strategy pursued to facilitate the compatibility between biodiversity conservation and the sustainable use of natural resources, respecting the agricultural vocation of the productive units that exist in the APA. The program created categories of land-use management to illustrate the possible areas to carry out forest restoration projects⁴⁰ (Figure 2).

Until now, only the framework elements of the regional environmental governance have been detailed. Nevertheless, this scale of analysis counts also with a series of actors and initiatives that could affect the inclusion of a mechanism with the characteristics of REDD+.

The Companhia Estadual de Águas e Esgotos” (CEDAE) develops a series of these projects to guarantee the consecution of its objectives. One of those projects will be the dam on the Rio Guapiaçu (CEDAE, 2012)⁴¹. Located in the “bacia Guapi-Macacu” (1250.78 Km²), the project will have a cost of R\$ 200.000 and will help satisfy the water

⁴⁰ The zoning made by IBIO (2009) divides the possible uses in 7 categories: (i) Wildlife preservation zone, (ii) Wild life conservation zone (ZCVS), (iii) Agricultural use zone, (iv) Agricultural use zone, (v) Controlled occupied zones, (vi) Special use Zone, (vii) Conflictive-use area.

⁴¹ The CEDAE is the regional entity in charge of the capture, treatment, conduction, and distribution of the water networks and of the collection, transport, and disposal of the wastewater generated by the municipalities of the state of Rio de Janeiro.

demands of the “complex,” the “Estação de Tratamento de Agua Imunana-Laranjal,” and the municipalities of São Gonçalo, Niterói and Paquetá. This project will suppose the removal of around 500 families that live and work in the area.

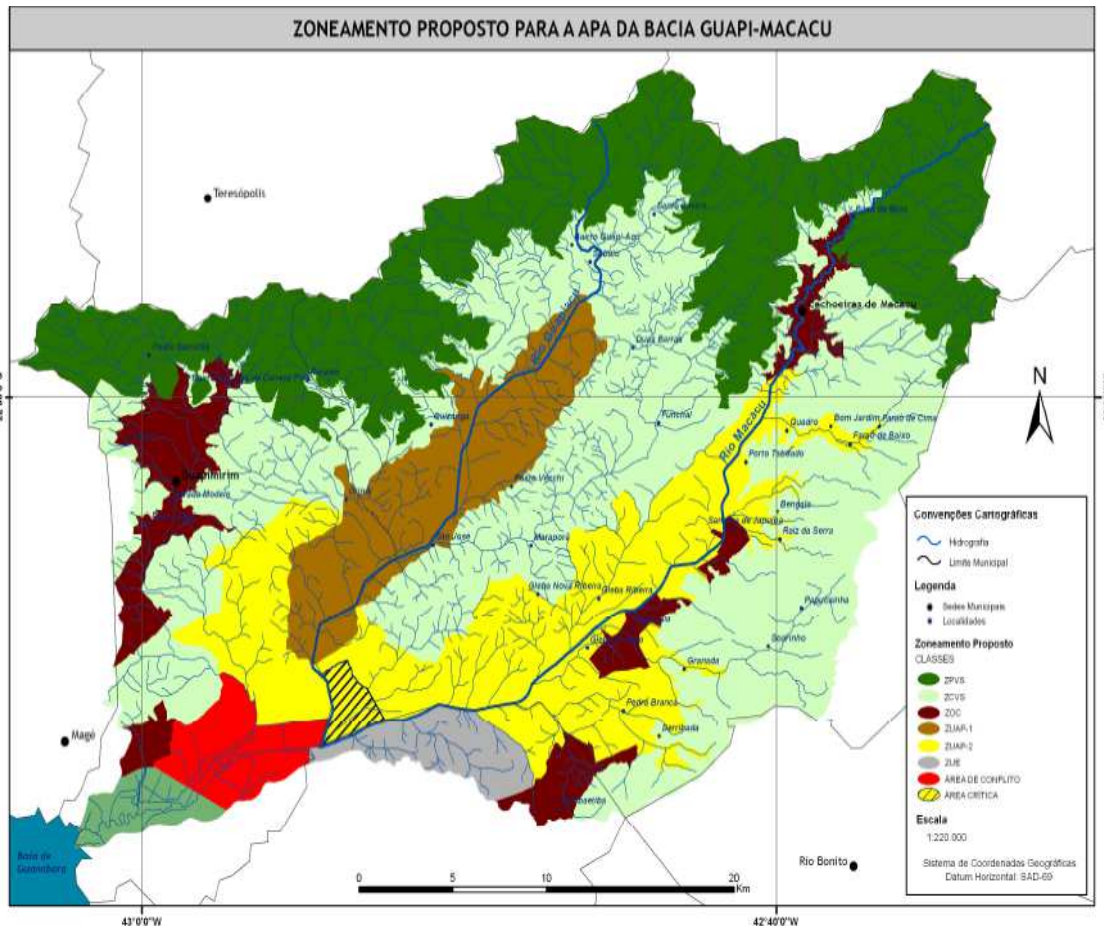


Figure 2: Proposed zones of the Bacia do Rio Macacu

Source: IBIO (2009).

In the industrial sector, “Petróleo Brasileiro” (PETROBRAS) is one of the biggest companies with political and economic incidence in the area. Its area of action is the extraction, refinery, and distribution of oil and gases as well as the manufacturing of other petrochemical substances. One of the main projects of PETROBRAS is the “Complexo Petroquímico do Rio de Janeiro” (COMPERJ) in the municipality of Itaboraí (Figure 3). It is scheduled to run in 2014 and it will bring more than 200 thousand direct and indirect job positions (COMPERJ, 2011). This situation is expected to create a big real estate speculation in the municipality of Cachoeiras de Macacu, situation that will affect directly the environmentally related initiatives (IBIO, 2009).

With the development of the Agenda 21, COMPERJ has played an important role in the organization and consultation of the communities affected directly and indirectly by their installation. The main goal of the Agenda 21 was to establish a community vision for an environmentally and socially sustainable future. An Agenda 21 took part in the municipality of Cachoeiras de Macacu in 2007. It brought together diverse social groups from a wide variety of sectors and attended topics in the environmental, economic, physic (infrastructure, sanity, housing, and security) and implementation means (COMPERJ, 2011).

The “Ministério dos Transportes” (MT), through the “Departamento Nacional de Infra-Estrutura de Transportes” and the “Secretaria de Estado de Obras” (SEOBRAS) represent also stakeholders with an important degree of influence. The biggest project being developed right now by this entity is the motorway ring road “BR-493 Arco Rodoviário.” It is intended to create a transportation corridor from the urban ways of the capital to the “Porto de Itaguaí” removing the traffic of big trucks from the center of the city (MT, 2012).

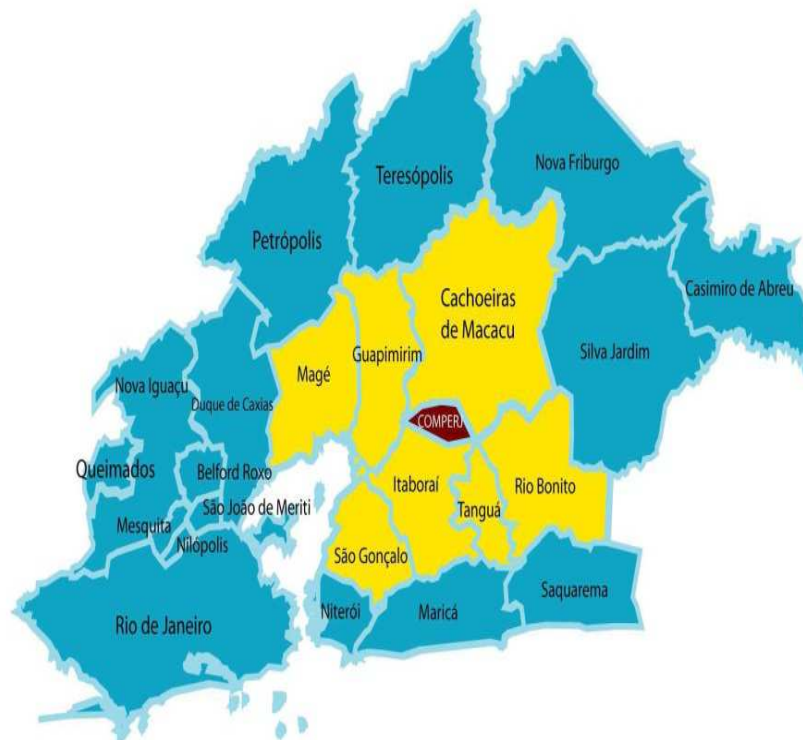


Figure 3: Localization of the “Complexo Petroquímico do Rio de Janeiro”

Source: COMPERJ (2011).

Finally the “Secretaria de Estado de Agricultura e Pecuária” also plays an important role, mainly through the “Empresa de Assistência Técnica e Extensão Rural do Estado do Rio de Janeiro” (EMATER-RJ). It seeks to coordinate and execute projects for the increase of agricultural productivity and to improve the livelihood conditions of the rural areas. EMATER-RJ defends the principle of ecological equilibrium between nature and society (EMATER-RJ, 2012).

Figure 4 summarizes the main governance relations present in the regional scale. It shows a considerable presence of NGOs, focused in tasks of conservation of the Mata Atlântica biome. The degree of influence on the regional scale has reached the municipality directly, this due to the importance of the Guapi-Macacu watershed. In the governmental sector, the INEA represents the main political authority. Other figures of representation such as the PETP are important since they concentrate the interest of many municipalities. The unity that they represent could be important in the context of regional forest management initiatives. In the industrial sector, COMPERJ represents a stakeholder with big political and economic influence in the region. It reflects industrial pressure that the city of Rio de Janeiro, and the whole country, exerts to the surrounding municipalities. Since its actions are of national interest, its relative power is of a considerable big magnitude. Besides the negative impact that the activities of PETROBRAS could have to the environment, it plays an important role in the establishment of participation and consultation platforms for the communities and local authorities (e.g. Agenda 21). The developments of the MT reflect too the urban and industrial pressure over the municipality and the importance of the state for the economy and social development of the country.

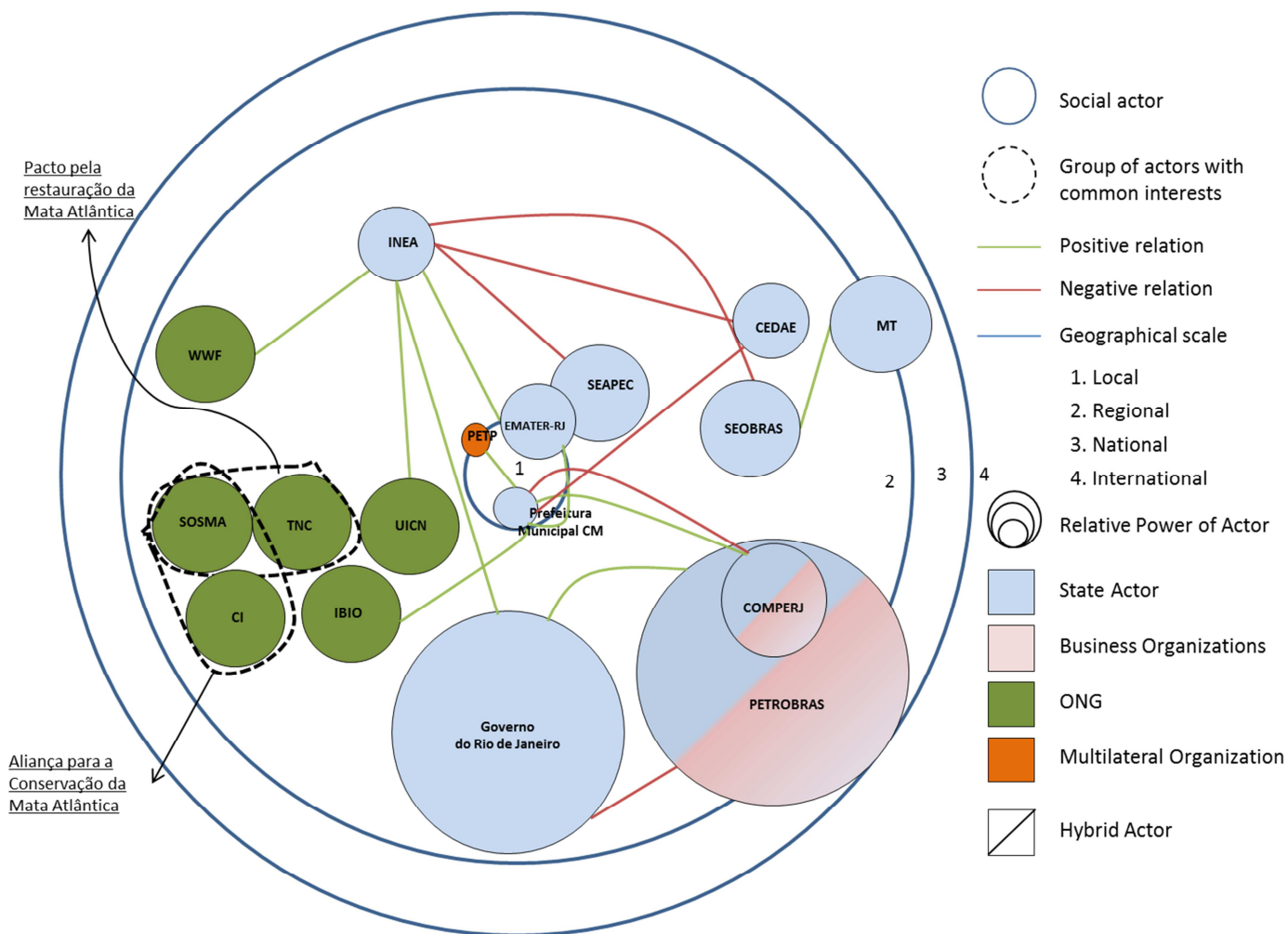


Figure 4: Regional Environmental Governance stakeholders and their relations

Source: The author..

LOCAL ENVIRONMENTAL GOVERNANCE

The “Lei Orgânica do município de Cachoeiras de Macacu” is the superior environmental framework element of the study area. It highlights the conservation of nature and sustainable development as the main principles from which the municipality will be directed. These principles are attributed to specific actions and entities by the “Plano Diretor.” The main contribution of this document is that it recognizes the municipal UCs and promotes the recuperation of the forest fragments (Organic Law of the municipality of Cachoeiras de Macacu, 1988).

The main environmental framework of the municipality is the “Codigo Municipal do Meio Ambiente.” The “Codigo” defines the “Política Conselho Municipal de Defesa do Meio Ambiente” (CODEMA), which has the objectives, to protect, preserve, and recuperate the degraded national resources, includes forests. It also defines the “Sistema Municipal de Meio Ambiente” (SISMA), as an instrument to integrate the mechanisms of the “Política Municipal de Meio Ambiente” through the organs and entities that compose it (Table 7). The financial support of the SISMA is given by the Fundo Municipal de Meio Ambiente” (FUMMA).

Table 7: Composition of the “Sistema Municipal de Meio Ambiente” (SISMA)

Function	Entity
Collegiate Organ	CODEMA
Central Organ	Secretaria Municipal de meio Ambiente
Collaborative Organ	Private of public entities contracted by the Municipality to act in the environmental area
Sectional Organs	Other entities instituted by the municipal public power

Source: Law N° 1.338 (2001).

The determination of the UCs is also supported by the “Codigo,” Article 17 institutes the “Sistema Municipal de Unidades de Conservação” as the main instrument to assure that the existent UCs in the municipality are preserved and if possible, expanded. This system brings the typology defined by the law of creation of the SNUC to the local scale (Law N° 1.338 2001).

The “Prefeitura Municipal de Cachoeiras de Macacu” is the governmental entity in charge of the creation and execution of programs that pursue the consecution of the objectives of the legal framework. Inserted in the “Prefeitura Municipal de Cachoeiras de Macacu” is the “Secretaria do Meio Ambiente” (SMA). It is divided in three main fields of action: (i) green spaces, (ii) solid waste and environmental education and, (iii) control and licensing (Thabta Matos da Mata personal communication, 08.03.2012).

The “Secretaria de Agricultura, Pecuária e Abastecimento” is another actor with political relevance in the area. Their work is concentrated in the technical assistance for the breeding of cattle and the promotion of support programs for agricultural producers. Both, the secretaries work very close with EMATER-RJ and INEA in the transfer of the inputs that come from the national and regional scale. Additionally, the “Prefeitura Municipal de Cachoeiras de Macacu” counts with a Geoprocessing Center that cooperates directly with all the secretaries, especially with the SMA and the SEAPA, in the manipulation of geo statistical data, as well as with remote sensing images (Pablo Juan de Azevedo Ferraz personal communication, 08.03.2012).

From the non-governmental side, the Reserva Ecológica de Guapiaçu (REGUA) is one of the most important stakeholders in the municipality. REGUA manages more than 4.500 ha of primary and secondary forest in the upper part of the Guapi-Macacu watershed. It develops a wide labor of forest conservation, restoration, and environmental education that is recognized by the public and private authorities of the area (REGUA, 2011). The role of REGUA permeates all the levels of organization in the municipality, being an important and recurrent actor in the CODEMA.

General manager Nicholas Locke (personal communication, 10.03.2012), has manifested his concern about the environmental issues of the region and has supported the identification of long-term conservation solutions. Based on their particular experience and knowledge about REDD+, they consider that only the “plus side” of the mechanism is feasible in the region⁴².

Another relevant actor is the NGO “Ecologia interior” (ECOIN). It is the effort of a landowner family in “Boca do Mato” area to recover the forest corridor existent among their private property. Their headquarters named “Sede Ecologia Interior Vila Indiana” (SEIVA), located close to the PETP, seeks to develop new socio-productive techniques,

⁴² According to Nicholas Locke, the protection status of the forested land does not allow to profit from them. He manifested that only through the extension of forested lands, profit from a mechanism like REDD+ could be obtained (personal communication, 10.03.2012).

based in research and agro-ecological actions, with the intention to develop sustainable spaces. They share a close relation to the civil society in the surroundings, principally through environmental education (ECOIN, 2009). In a personal communication with its founder Solange Bandeira (09.04.2012), she manifested limited knowledge on the REDD+. Nevertheless, she expressed the necessity to protect the forested areas of the municipality and to look for the connectivity of PETP with the surrounding private properties.

The PETP corresponds to an area designated to scientific, cultural, educative, spiritual, and recreational means. It has the main objective to preserve the natural ecosystems against any alteration (PETP, 2012). As observed in the session of the Conselho Municipal de Meio Ambiente (24.04.2012), the representatives of the PETP are active members of the environmentally concerned community of the municipality.

The municipality does not present a considerable concentration of industries inside its physical and legal boundaries. However, a series of medium and small companies, primarily bottling, play an important role in economic and political dynamics of the area⁴³. The bottling giant Schincariol is the biggest company established in the area. With a factory located in the urban area of the municipality, it is in charge of the production and bottling of beverages (SCHINCARIOL, 2012).

The factory counts with a “fazenda,” next to REGUA’s property, where they collect the water they use for their industrial activities. The company counts with a social and Environmental Responsibility Department. This department is in charge of carrying out initiatives that foster the improvement of the social and environmental conditions of the surroundings. Many of these initiatives form part of a general national strategy of the national Schincariol headquarters in São Paulo⁴⁴. For the area, there are not similar programs or alliances planned, most of the efforts go to the environmental area designated to the treatment of residual water from the industrial processes. The factory does not have short nor medium term plans related to sustainable use of forested lands (Ana Dias, personal communication, 12.04.2012).

According to Pablo Juan de Azevedo Ferraz from the “Secretaria de Agricultura, Pecuária e Abastecimento” (SEAPA) (personal communication, 08.03.2012), these

⁴³ According to Pablo Juan de Azevedo Ferraz from the “Secretaria de Agricultura, Pecuária e Abastecimento” (personal communication, 08.03.2012), most of them operating without any particular identification sign and they are responsible of capturing and distributing the resource into local supermarkets.

⁴⁴ One example of the efforts developed by the company is a reforestation program developed in cooperation with SOSMA, but only in the state of São Paulo (SCHINCARIOL, 2012).

companies are perceived as resource-users with partial responsibility over them, especially water. It is important to mention that the company is not billed for this resource since its price has not yet been defined by the “Prefeitura Municipal de Cachoeiras de Macacu.” The introduction of reforestation programs could be a good alternative for the social and environmental responsibility of these companies, since the supply of quality water for the factory depends on the water sources, which are directly dependent from the surrounding forests.

Figure 5 summarizes graphically the local environmental governance relations. The local scale shows an intense participation of the “Prefeitura” and its secretaries in the attention of the local matters. There is a proper representation and institutional structure that supports the productive and the environmental activities related to LULUCF. There is also a good representation of the regional institution such as INEA and EMATER-RJ. In terms of civil society participation, the CODEMA provides a proper arena for deliberation and proposition of ideas.

REGUA is the main civil society actor, with an active participation in forums, meetings, and general decision-making. On the other side, ECOIN has its presence and its incidence but more directed to the contact with local people; its political participation is not as proactive as REGUA.

An important role is played by the PETP since it encompasses most of the forested lands in the study area and in the border municipalities. In this sense, forest management decisions, which include the forested lands of the park, need to be part of a joint initiative of all the involved municipalities. On the one hand, it represents a challenge to coordinate the different positions of the municipal authorities. On the other hand, to conquer results in the whole extension of the park means bigger positive impacts over the forested lands of the region.

The industrial sector is mainly focused in the bottling business. Schincariol is the major holder; however, the groups of small and medium companies represent also a considerable focus of power. Even if they are direct users of the water resources the Mata Atlântica provides, neither have they participated in the conservation initiatives nor play a proactive role in the proposition of sustainable forest management alternatives.

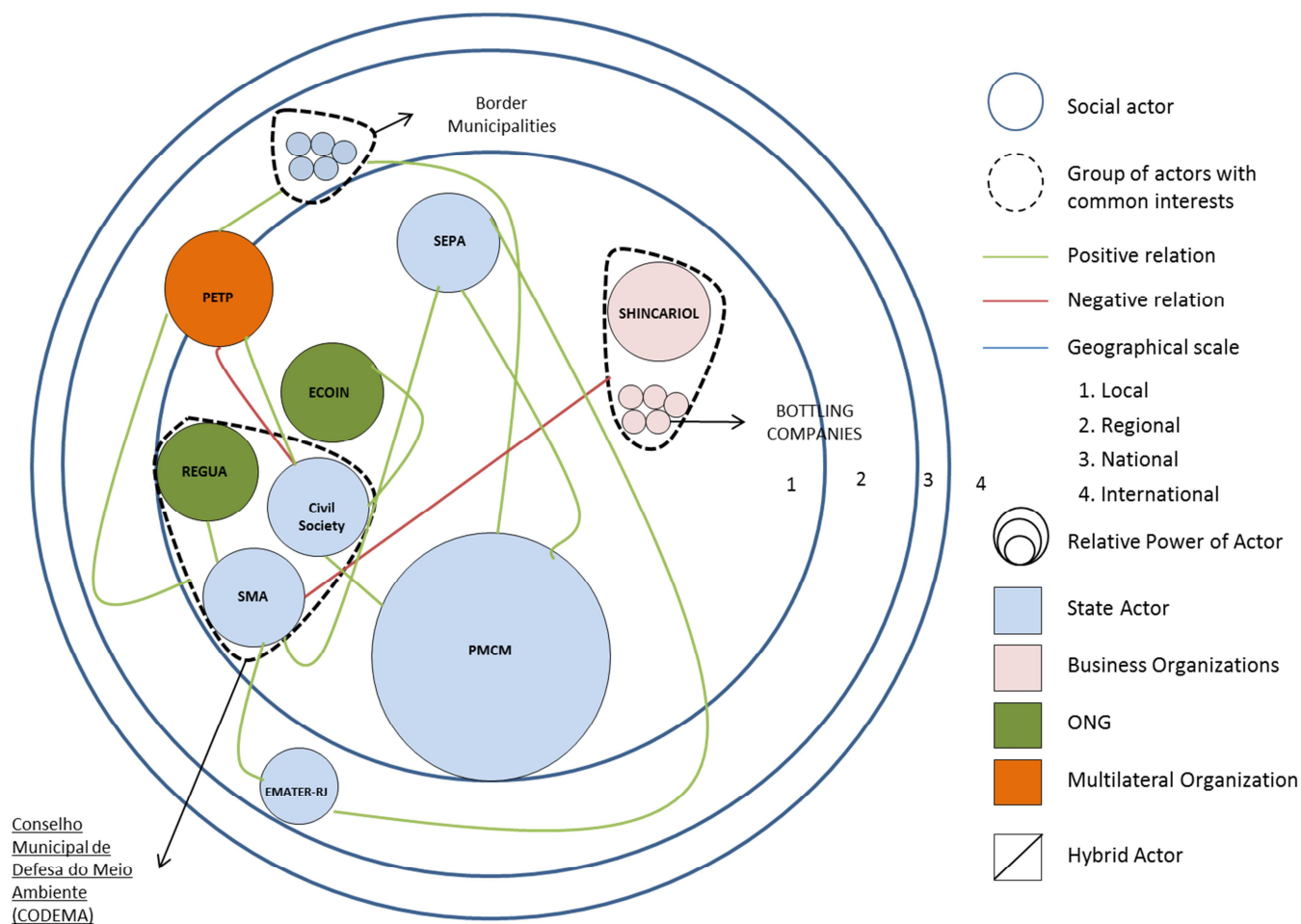


Figure 5: Local Environmental Governance Environmental Governance stakeholders and their relations

Source: The author.

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS FOR THE INCORPORATION OF REDD+ IN THE MUNICIPALITY OF CACHOEIRAS DE MACACU

STRENGTHS

A. Well-defined multi-scalar instruments

The major strength for the incorporation of a mechanism with the characteristics of REDD+ in the study area, are the well-defined multi-scalar governance instruments. It is important to state that not all the elements of REDD+ are explicitly contemplated in the Brazilian multi-scalar frameworks, nevertheless the country seems to have enough instruments to face the challenge to incorporate the mechanism. These instruments share principles such as sustainable development, the promotion of participation, the technological innovation, and international cooperation that are compatible with the characteristics of REDD+.

The general environmental frameworks define clearly a structure containing the entities in charge of the specific tasks in the consecution of the environmental goals. These structures are called “sistemas” and are present in the national and local scale (i.e. SISNAMA and SISMA). They are important because in the potential case of the application of a REDD+ project, the delimitation of duties in the different scales is a great advantage. These structures contain as well representation entities called “Conselhos” (CONAMA, CODEMA). They consist of very valuable structures that allow external actors to supervise and propose specific actions in the context of projects and programs.

As mentioned in Part IV, Brazil has already defined emission reduction goals and a baseline reference date for them. The Article 12 of the PNMC specified, for the COP-15 in Copenhagen, a voluntary national GHG emission reduction of 36.1% to 38.9% until 2020 in relation to the levels emitted in 2005 (Law N° 12.187, 2009). This is an important first step to carry on actions in the national and subnational level. However, it must be followed by precise actions in order to be more than just a political statement.

In relation to funding, according to Nicholas Locke from REGUA (personal communication, 10.03.2012), the Brazilian legislation is also very competent when defining funding instruments to support environmentally directed projects. This tendency is evident from the upper scale to the lower scale, with the presences of

funds, taxes, and markets. In terms of technical entities, institutions such as the INPE, and SFB, present a very positive scenario for multi-scalar cooperation. On that sense, any effort carried on by the Geoprocessing Center of the Secretaria do Meio Ambiente from the “Prefeitura Municipal de Cachoeiras de Macacu” can be properly supported in higher scales.

B. Municipal projects: “Monumentos Naturales” and “Plano de Areas Verdes”

According to official representatives (Paulo Schiavo Jr. personal communication, 02.04.2012 and Rodrigo Oliveira Aguilar, personal communication, 19.04.2012) the “Prefeitura Municipal de Cachoeiras de Macacu” has no planned short/medium term REDD+ projects/initiatives nor cooperation with the “Programa Estadual de Pagamento por Serviços Ambientais.” Nevertheless, it has started a process of land recuperation all over the municipality. This process aims to change the legal status of vast areas of multiple properties in order to promote sustainable and alternative uses of the natural resources. The creation of the “Monumento Natural Pedra do Colegio” and the current initiative to create the “Monumento Natural do Soarinho” represent two of the main actions in this direction.

Another related initiative that can be an opportunity window for the incorporation of REDD+ is the “Plano de Areas Verdes.” This initiative is intended to help create natural corridors among the fragments of the municipality. In that sense, any activity that increases the amount of reforested area of the municipality can be seen as a complementary effort to REDD+ (Paulo Schiavo Jr. personal communication, 02.04.2012).

The “Monumentos Naturales” as well as the “Plano de Areas Verdes” beyond the relation they could have with REDD+, represent a good example of the environmental vocation of the municipality, which is compatible to the main principles of REDD+. This point can also be seen as an opportunity in the sense that in the future the “Prefeitura Municipal de Cachoeiras de Macacu” can look for the merge of initiatives.

WEAKNESSES

A. Lack of defined REDD+ methodologies

The main barrier that Brazil and the international community face is the stage of development of national and subnational instrumentation for REDD+. The lack of definitive and consensual methodologies obligates the authorities to execute pilot programs, which most of the times do not count with the necessary financial and technical inputs to be properly carried out.

Even if there are many REDD+ projects all around the world, the different contexts represent different challenges to the executors. On that sense, the definition of standard methodologies could be valuable because they can concentrate the experiences of each country or region in relation to a common set of actions and rules.

B. Relative low relevance of the area

The project concentration in other biomes, in particular in the Amazon is one of the most important barriers. Even if the area is of great importance due to its special characteristics, other biomes capture all the human, logistic, and financial resources. To illustrate this affirmation, according to the document “Iniciativas de PSA de Carbono Forestal na Mata Atlantica” (MAY, 2011) most of PES-related projects in Brazil are located in the Amazon. Furthermore, the projects located in the Mata Atlântica are located in the state of Sao Paulo. The density of projects is reduced in states of Rio de Janeiro, Paraná, Bahía, Santa Catarina, and Porto Alegre. It is important to mention that from these 33 projects, by 2010 less than half were in a stage of implementation. This data is no related to REDD+ projects but can be a valuable clue of the general tendency.

C. Land tenure issues

The area presents a hereditary land distribution system that difficults the official control over lands. According to the local system, the head of the families' property is divided in equal parts in relation to the number of children. This intergenerational fragmentation of the land obligates new owners to do the registration of the lands, a process that is not very accessible for most of the landowners. For that reason, most of the physically divided properties are not

legally under registry. The gap between physical and legal division of the land turns any kind of REDD+ related initiative very difficult because the mechanism requires a well-defined land tenure context in order to assure the control over the delegation of responsibilities and distribution of benefits (Nicholas Locke personal communication, 10.03.2012).

D. Legal inconsistencies and related weak law enforcement

Even if the legislation is very competent, some inconsistencies reflect that the frameworks are not completely ready to move towards REDD+. One specific inconsistency is present in the definition of the APA in the Macacu river basin in Law N° 4.018/2002. As defined by Article 15 of the SNUC, the APAs are areas with certain degree of human occupation, which count with particular attributes, especially important for human well-being. The APAs have the main objective to protect the biological diversity and to assure the sustainability in the occupation and use of natural resources. The problem arises because the Law N° 4.018/2002 contradicts itself by affirming in Article 2, that the APA is an area of 150 meters and in Article 3 as a 50 m area. This situation causes that the control over potential conservation areas is more difficult (Law N° 4.018, 2002).

Another example on this direction occurs with the figures of the APP and the RL of the “Código Florestal.” These special areas are difficult to supervise and to control due to the lack of human and logistic resources. To make compatible the requirements of the law with the land uses traditions of the region, where exploitation of the riparian forest and of the hilltops is present, is a big challenge still not achieved by authorities. Added to this point, the future of these figures in the new version of the Código Florestal places is still very uncertain and controversial (Nicholas Locke personal communication, 10.03.2012 and Paulo Schiavo Jr. personal communication, 02.04.2012)

OPPORTUNITIES

A. Regional and local NGOs: Technical and logistic expertise

Due to its natural and geographical importance, the Mata Atlântica counts with a considerable presence of all kind of NGOs, many of them working in particular

and/or joined initiatives. Even if the NGOs are not working directly with the REDD+ mechanism, the simple support of them is vital for future developments. Their importance stems from their expertise in organizational and technical topics, as well as in the social and environmental knowledge.

Organizations like REGUA or ECOIN show great disposition to experiment with programs like REDD+ in their own properties, even if the knowledge on the mechanism is still incipient. In the particular case of REGUA, there is an interest to incorporate the “plus side” of REDD, since they count already with great preserved areas and they think this effort could be recognized. The possibility to bring REDD+ activities to the area will depend on their capability to obtain new lands and to plant more forests (Nicholas Locke personal communication, 10.03.2012). On the other side, ECOIN has great interest in developing agro-ecological activities in their property that could be somehow merged with REDD+ activities. Their property is not as big as the REGUA’s but they are also strategically connected to the PETP, situation that can be seen as an opportunity (Solange Bandeira. personal communication, 09.04.2012)

NGOs such as CI, WWF, SOSMA, and IUCN are important because their organizational capabilities and political relevance could push forward the incorporation of REDD+ in the national and subnational agendas. The mentioned NGOs do not have punctual plans to bring REDD+ to the region, however, their lines of actions are generally compatible with the mechanism.

B. Reservas Particulares do Patrimônio Natural

The RPPNs consist of private lands that, after a registration, are used to preserve the natural resources. Even if no relation between REDD+ and the RPPNs exists, the potential to merge both activities is immense. The RPPNs count with great support from governmental and private entities. Projects like the “Programa de Incentivo às Reservas Particulares do Patrimônio Natural da Mata Atlântica,” could be one opportunity to set the field for REDD+ initiatives (Nicholas Locke personal communication, 10.03.2012).

C. Abandonment of agriculture: new scenario for REDD+ activities

The area presents an important decrease of the agricultural activities accompanied by an increase in urban and industrial developments. This phenomenon is caused because many of landowners are moving to the surrounding big urban concentrations due to the new work opportunities. These situation means, in most of the cases an abandonment of the traditional land use activities (Evaldo Rui de Souza Lima personal communication, 19.04.2012).

The possibility to bring a mechanism like REDD+ could allow the local landowners to remain in their land and to obtain revenue from its sustainable use. This could be also an opportunity to create new communitarian organizations (Jaci Souza da Silva personal communication, 24.04.2012). As expressed in the Public Consultation for the creation of the “Monumento Natural Cerro do Soarinho,” (11.04.2012)⁴⁵ most of the local people do not want to renounce to their land, their intention is to look for new alternatives, which include the participation of their neighborhoods and the “Prefeitura Municipal.”

D. ICMS-E

One example that reflects the environmental vocation of the “Prefeitura Municipal” is the final assignation of resources from the ICMS-E. Together with the municipalities of Silva Jardim, Cachoeiras de Macacu has had a growing performance in the ranking since the establishment of the specific assignations. Since the incorporation of the tax in 2009, the amount has doubled. This adequate environment for the accumulation of funds from ICMS-E is a good alternative to finance REDD+ projects in any of the stages of development (Figure 6).

⁴⁵ The inclusion of REDD+ was never directly suggested, nevertheless, the SEA” mentioned the PES and related mechanisms as new alternatives for sustainable land use (Public Consultation, 11.04.2012).

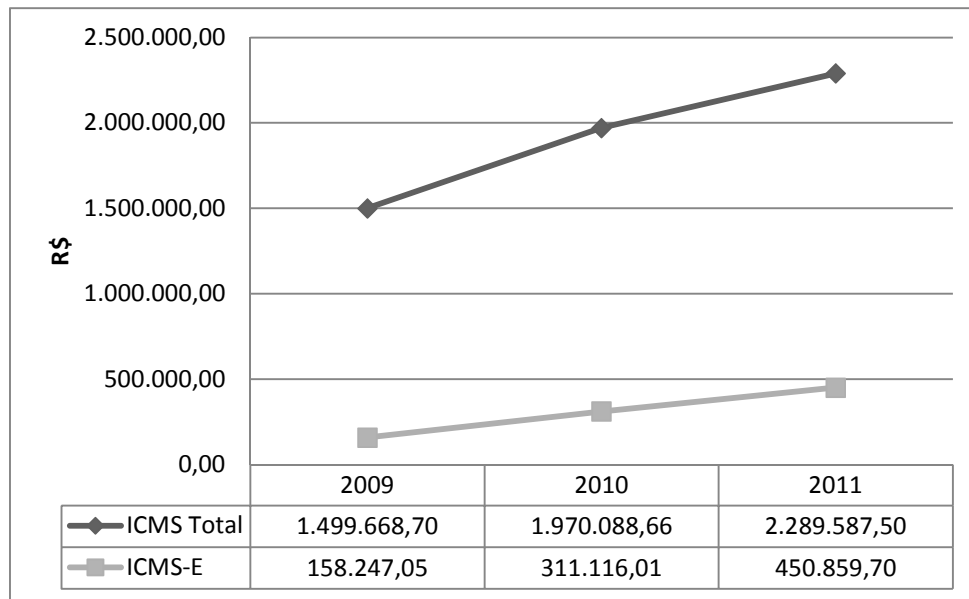


Figure 6: ICMS and ICMS-E distribution in Cachoeiras de Macacu 2009-2011

Source: The author based on ICMS-E (2012).

THREATS

A. Industrial and urban developments

The presence of the COMPERJ in the study area is a signal of the turn that the region is having in term of the development activities. The accelerated industrial and urban growth that Cachoeiras de Macacu is facing, represents a serious threat not only to the development of REDD+ projects, but to the incorporation of any similar environmental initiative. The installation of the COMPERJ supposes an increase on the demand of natural resources on the region, mainly water, situation that obligates the authorities to look for solutions in the short and medium term. One of these solutions is the mentioned construction of a dam in the surroundings of the *Río Guapiaçu*.

Another urban development that could play an influence in the availability of future project lands is the “Arco Metropolitano do Rio de Janeiro.” The construction of this highway supposes a better connection of the western part of Rio de Janeiro with the eastern part. This project will potentiate the expansion of urban settlements and increase the contradiction between urban growth and the environmental vocation of the municipality. The increase of urban and industrial developments is one of the main facts that explain the absence of REDD+ and PES related project

in the region. The pressure this processes represent, discourages the establishment of ambitious initiatives and causes a migration to other areas like the Amazon and the Cerrado.

B. REDD+ specific legislation

Brazil has not yet defined a specific REDD+ framework. The law project N° 195-A/2011 that creates the national REDD+ System has not yet been approved. Even if the PNMC corresponds to the main guidelines to accomplish the commitments of the country with the UNFCCC, it does not specify concretely how the REDD+ activities will be incorporated in the national strategy. The importance of having a REDD+ framework steams from the fact that in its absence the legal gap that will exist could leave the country and the people unprotected. The lack of protection could be reflected in the wariness of external collaborators in shifting/adapting to legislative terrain. Additionally, it could lead to “trial and error” mistakes from lawmakers and policymakers, since REDD+ schemes are methodologically complex (TAKACS, 2009).

C. Perception of the environmental initiatives versus the traditional economic activities

REDD+ and related instruments supported by law do not count with good reputation in the area. According to locals, since the law enforcement of Brazil is so strict, the population has a perception that new tools or mechanisms could bring more difficulties for the better use of their properties. The idea to change from familiar or traditional uses of land to new and complex activities has to be incorporated gradually to producers/land owners. For the mentioned stakeholders, adopting new commitments like the ones REDD+ requires, supposes a big educational and capacitation effort from the authorities to the involved population (Rodrigo Oliveira Aguilar, personal communication, 19.04.2012; Jaci Souza da Silva personal communication, 24.04.2012).

D. High financial cost of projects

The cost for related projects (i.e. PES, CDM) in the area can go as high as US\$ 150 mil per project in Brazil. The cost of the price depends on the size, opportunity cost in relation to the productive/extractive activity that is being replaced, and the

general characteristics of the project (OLSEN & BISHOP, 2009). These costs are divided in implementation and maintenance, which in most of the cases are too high to be considered by particular landowners or small and medium municipalities (MAY, 2011). This situation places an important threat because most of the landowners in the area are medium or small, and without the correct support and inputs cannot carry out one projects with the characteristics of REDD+. Even if tools such as the funds, taxes, and markets can serve as good backup instruments, they still lack definition of how they could collaborate with REDD+ initiatives

Table 8 summarizes the results of each of the SWOT analysis, as mentioned in the methodology, and how are they related to the main elements of the REDD+ Framework.

Table 8: SWOT summary

	Strengths	Weaknesses	Opportunities	Threats
Scope				
Reference level	Well-defined multi-scalar instruments	Lack of defined REDD+ methodologies	Reservas Particulares do Patrimônio Natural	
Funding mechanisms				
Benefit distribution		Legal inconsistencies and related weak law enforcement	Abandonment of agriculture: new scenario for REDD+ activities	
	Municipal projects: Monumentos naturais and Plano de áreas verdes		Regional and local NGOs: Technical and logistic expertise	
				Industrial and urban developments
				REDD+ specific legislation
				Perception of the environmental initiatives versus the traditional economic activities

Source: The author (2012).

PART V: DISCUSSION

MULTI-SCALAR ENVIRONMENTAL GOVERNANCE AND REDD+ FEASIBILITY IN THE STUDY AREA

In the case of Brazil, the structure of public and private entities is committed to both the political and technical aspects of the implementation of mechanisms with the characteristics of REDD+. However, as expressed by the “Investment Plan” of the Climate Investment Funds (FIP, 2012, p. 51) “these initiatives do not yet however constitute an integrated system.” “The initiatives underway are concentrated primarily on the Amazon biome and involve little participation of state and municipal technical entities.”

As mentioned in Part III, REDD+ mechanism counts with a specific framework that supports the development of national and subnational projects. In the Brazilian case, the efforts remain in the phase of preparation. Stage in which the country is encouraged to initiate the first stakeholder’s dialogues, the adaptation of the respective legislation and the execution of the first pilot projects. All these actions should be focused on the determination of the scope, the reference level, the benefit distribution schemes and, the funding instruments (IUCN, 2011).

Brazil is moving towards the incorporation of REDD+ into its national legislation. The current legislative discussion to approve the law project N° 195/2011 of the National REDD+ System is the best proof of this situation. Nevertheless, debates such as the one related to the reforms to the “Codigo Florestal,” and the contradiction in the law N° 4.018 (2002), send a bad signal to project developers about the reliability and readiness of Brazilian legislation. The alteration of the RL and APP figures affect the definition of suitable lands for PES and REDD+ projects. These two legal figures represent the most important obligations the landowners have to protect the forested lands in their properties. The reduction of these areas, how is intended by the reform, is definitely a considerable new obstacle for the incorporation of REDD+.

Even more, today, these figures represent a big problem for authorities, since the compliance to them is difficult to control. In the case of the study area, this situation is potentiated by the uncertainty in relation to the legal status and number

of properties (Jaci Souza da Lima personal communication, 24.04.2012). The role of entities such as EMATER and the CODEMA is important to bring landowners together and to provide logistic and technical support (Nicholas Locke personal communication, 10.03.2012).

In terms of the reference level, the country has already defined a GHG emission reduction goal of 36.1% to 38.9% until 2020 in relation to the levels emitted in 2005 (Law N° 12.187, 2009). Equally important to the determination of the reduction goals is the responsibility share among the different emitting activities and biomes. On this sense, the GHG emission reduction share of 9% from which the Mata Atlântica takes part, is realistic and consequent to the current national responsibilities (SEROA DA MOTTA, 2011).

This percentage should not be understood as a light task, on the contrary, the specific land-use characteristics of the region sets challenges that are not present in other biomes. These challenges are a result of the high contrast between the sustainable development posture and the strict economic development in region. Historically, Rio de Janeiro state, together with São Paulo and Minas Gerais, has been one of the most important centers in terms of concentration of population and contribution to the national economic development. This condition has resulted in the state of degradation with which the region counts today. Projects like COMPERJ, the “Arco Rodoviario Metropolitano,” and the dam on the Rio Guapiaçu are the best examples of how the economic development and urban growth keep playing an important role in the region.

In relation with the dialogue between stakeholders, the region, and the specific study area shows a big lack of knowledge on REDD+, fact that limits the ideas exchange. REDD+ seems to be excluded as one of the mechanisms that could help decrease the pressure over forest ecosystems and consequently of GHG emissions. In personal communications with representatives from regional and local authorities (Nicholas Locke, 10.03.2012; Paulo Schiavo Jr., 02.04.2012; Rodrigo Oliveira Aguilar, 19.04.2012; Jaci Souza da Lima, 24.04.2012), the topic was known in general terms, but was not considered as a feasible short term alternative. This situation, summed with the urban and industrial growth mentioned before represent a big limitation when carrying out projects like PES and REDD+. As mentioned in the “weaknesses” section, most of the related projects are

concentrated in other states with a share of the Mata Atlântica (i.e. São Paulo), or in the Amazon (MAY, 2011).

Even if the most important authorities do not consider REDD+ as a feasible option in the short or medium term, knowledge and interest over REDD+ are not completely absent in the study area. Stakeholders like REGUA are interested in taking such mechanism to the next level (Nicholas Locke personal communication, 10.03.2012). This situation opens a window of opportunity for private initiatives. These kinds of initiatives could be a good alternative since the autonomy over properties and its use, allows landowners to experiment with all type of projects and mechanisms. The creation of a regional voluntary market for REDD+, similar to the one developed by PRONATURA in Mexico, could be a good possibility to bring together the efforts of the multiple NGOs and of landowners in the study area.

These kinds of markets do not require necessarily the participation of governmental authorities; however, this situation does not close the possibility to access governmental funding sources. On this sense, the funding instruments defined in the multi-scalar environmental framework seem to have compatible principles with REDD+. One of the most valuable ones, which could have an impact in the local scale, is the ICMS-E. This tax provides an economic input to environmental projects, and differently to other type of financial instruments, it goes directly to the local authorities for its use (ICMS-E, 2012). It is important since currently there is a lack of financial sources being the Brazilian National Development Bank (BNDES) one of the only providers (CASTRO & MICHAELWA, 2008). A further analysis of the compatibility between the funding instruments and REDD+ needs to be done once the scope is defined.

The definition of the scope is one of most immediate challenges the stakeholders interested in REDD+ in the study area have. First, it is necessary to define the reach of the project. As mentioned previously, the local voluntary markets appear like the best option for the municipality of Cachoeiras de Macacu. Furthermore, an alliance with the other municipalities that form part of the PETP could be pursued. The definition of the included REDD+ activities depends on the availability of suitable lands. Two initiatives carried out by the local authorities that could help establish suitable lands for REDD+ are the “Monumentos Naturales” and RPPNs. The possibility to bring together the properties and interests of landowners into UCs

could save time in the search for consensus and of resources in the finding of suitable lands for projects. In the case of the first typology, the “Monumento Natural Pedra do Colegio” and the future “Monumento Natural do Soarinho,” are the main conquests of the local authorities in the search for sustainable management alternatives for the municipal lands. The RPPNs go through a different situation since they consist of private efforts. Even if they could be a good alternative, the costs to convert a private property into a RPPN are too high for medium and small owners (Nicholas Locke personal communication, 10.03.2012). Programs like the “Pograma de Incentivo às Reservas Particulares do Patrimônio Natural da Mata Atlântica” could be a good alternative to support the landowners in the conversion of their properties into RPPNs.

In terms of distribution, the scope of the mechanism needs to be defined first. The possibility to create a voluntary market could help to implement redistributions mechanisms that will help assure “permanence” and avoid “leakage.” Other additional funding instruments could be valuable when dealing with multiple landowners’ organization structures (COLINI, *et al.*, 2009). The selection of the distribution scheme will depend directly from the number and characteristic of the parts (e.g. size and legal status of the property).

It is important to highlight the role of the local and regional NGOs in the support of REDD+ related projects. Even if the NGOs that currently work in the area, do not have the immediate intention to implement REDD+, their technical expertise, and their knowledge of the characteristics of the biome and of the municipality, could be an important resource in a hypothetical incorporation of REDD+. The inclusion of projects with the complexity of the one in question requires the participation of the widest range of stakeholders. In addition, the landownership characteristics of the study area demand technical and political intervention of entities with a higher degree of expertise.

One advantage with which Brazil counts for the incorporation of REDD+ projects is the relative broad experience in all scales for the development of related mechanisms, especially CDM. As mentioned by TAKACS (2009), Brazil counts with the preference and a high credibility from carbon credit buyers due to the complete legal frameworks deployed in the national, regional, and local scales.

As a summary, the incorporation of REDD+ in the study area seems to be a monumental task. Its landownership characteristics, the urban and industrial

pressure, as well as the relative low attention given to the region, threatens the incorporation of the mechanism. The lack of REDD+ methodologies is also a big threat, nevertheless, it can be also seen as an opportunity. The flexibility that not having defined methods and instruments represents, gives the study area the possibility to experiment and decide which can be the best way to follow. Naturally, this flexibility has a cost, but in the context of a project like REDD+, which has also the goal to be profitable, the expenses can be perfectly backed up by the national and international instruments.

CONCLUSIONS AND RECOMMENDATION

The main objective was to determine the feasibility of the mechanism in the study area. The general analysis made by this research focused on the main elements of the REDD+ framework, and in the multi-scalar environmental governance elements. This focus of analysis was chosen since these elements represent the primary considerations that governments, organization, or individuals interested should attend when developing REDD+ projects. The idea was to deploy a contrast of objectives and principles to determine common points and contradictions that could affect the incorporation of the mechanisms. The stated hypothesis argued that the incorporation of the mechanism was feasible but many contextual elements should be taken into consideration by the executors from the onset. Based on this hypothesis and the results of the research the following affirmations can be concluded:

- A. The immense pressure exerted by the urban and industrial development in the region, the land tenure characteristics, and the relative low relevance of the area, limit the field of action of the “Prefeitura municipal of Cachoeiras de Macacu” when adopting a mechanism like REDD+.
- B. The uncertainty in respect to the final specifications of the mechanism delay even more any possible application of it. Improvements referring the setting, measuring of the baseline emissions, safeguards need to be conquered by the international community.
- C. The possibility to identify the REDD+ framework variables in the different scales was very complicated. On one side, it was possible to extract the reference levels established by the PNMC and to identify possible sources of funds, but on the other side, the scope and the benefit distributions were impossible to identify.
- D. The feasibility of REDD+ is still not completely compromised in the medium and long term. The lack of readiness in the short term from the official entitles can be compensated with global and private efforts such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-

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- REDD), the Forest Carbon Partnership (FCPF), or the Forest Investment Programme (FIP). These kinds of global programs could help local stakeholders to guide the introduction and maintenance of REDD+.
- E. Voluntary markets can be another possibility to be considered by landowners, NGOs, and authorities. One example that could be emulated is the one developed in the Pacific coast of Mexico by PRONATURA.
 - F. The incorporation of REDD+ in such a small scale as the municipality of Cachoeiras de Macacu should not be accelerated. The particular scenario still counts with several essential uncertainties that need to be attended. Therefore, it is recommended that any project initiative take into consideration the general safeguards that the government of Brazil is discussing and if there is a particular one to the specific context, to take into consideration as well.
 - G. The “Prefeitura municipal” needs to take into consideration the introduction of PES and REDD+ initiatives as part of the justifiers for the creation of “Monumentos Naturales.”
 - H. The introduction of the mechanisms should be considered as an opportunity for landowners to create RPPNs. The establishment of this kind of categorization does not exclude the possibility to eventually profit from such mechanisms.
 - I. Special attention should be given the sustainable forest management activities and conservation of forests since they do not require major investments in the extension of forested lands.
 - J. In a hypothetical case of incorporation of REDD+ it is important for the regional and local authorities to define safeguards. The safeguards are important because they cover a wide range of topics beyond the sequestration of carbon. The adoption of the national safeguards could be a good start. The main safeguards identified by the government of Brazil consist of transparent and effective national forest governance structures, respect for the knowledge and rights of indigenous and local communities, and effective participation of all involved actors.
 - K. Before thinking on the incorporation the multi-scalar authorities should seek to enforce the law in a better way. The problems occurring with the “Código

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Florestal,” the Law N° 4.018/2002 need to be addressed before considering the incorporation of REDD+.

- L. It is recommended to consider the incorporation of REDD+ in the context of a regional conservation and land management strategy. The existence of the PETP and other considerable forest concentrations in the region, truly represents a big coordination challenge, nevertheless more substantial and immediate results can be obtained.
- M. The ICMS-ecológico, the MBRE, and the several multi-scalar funding instruments, should be analyzed in order to determine their compatibility with REDD+.

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ANNEXES

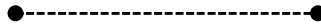
ANNEX I

INTERVIEW SEMI-STRUCTURED MODEL FOR EXPERT CONSULTATION

Format 1: Multilateral Institutions, State actors, NGOs and Business Organizations (Not at local level).

- 1) ¿Are you/ your institution involved to Payment for ecosystem services in the Mata Atlantica? ¿Which region in particular? If not ¿Would be of you/ your institution's interest?
- 2) ¿Are you/ your institution involved in projects related REDD+ in the Mata Atlantica? ¿Which region in particular? If not ¿Would be of you/ your institution's interest?
- 3) ¿Do you/ your institution consider REDD+ is important for the region? ¿Why/why not?
- 4) ¿Which benefits do you/ your institution considers REDD+ has in the area of forest management? And ¿for engaging the community? And ¿for disasters risk management? ¿Any other benefit?
- 5) ¿Do you/ your institution consider there are favorable conditions for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 6) ¿Do you/ your institution consider there are unfavorable conditions for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 7) ¿Which special qualities do you/ your institution consider exist in the area for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 8) ¿Which weaknesses do you/ your institution consider exist in the area for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?

- 9) ¿Do you/ your institution have alliances with other actors in any level, focused to foster your projects in the Mata Atlantica?
- 10) ¿What are your general considerations in relation to the environmental and socioeconomically situation in the Mata Atlantica?



Format 2: State actors, NGOs and Business Organizations (Local level).

- 1) What do you/your organization think about changing the way the land and the forest is used? ¿Can you think about an alternative?
- 2) ¿Are you/your organization related to any activity/project of with such goal? If not ¿Would you/your organization agree to do so?
- 3) ¿What do you/your organization's opinion of communities managing the forests?
- 4) ¿Do you/ your organization consider there are favorable conditions for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 5) ¿Do you/ your organization consider there are unfavorable conditions for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 6) ¿Which special qualities do you/ your organization consider exist in the area for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 7) ¿Which weaknesses do you/ your organization consider exist in the area for the incorporation of REDD+ in the Mata Atlantica? If yes ¿Which ones?
- 8) ¿Do you/ your organization have alliances with other actors in any level, focused to foster your projects in the Mata Atlantica?
- 9) ¿Do you/your organization know about REDD+? If yes ¿What is you/your organization's position/opinion in relation to it?
- 10) ¿In you/your organization's opinion/position what should be the best way to manage forests in the area? And ¿The best way to involve communities in the process? And ¿The best way to contribute to the development of the area/region?

ANNEX II

LIST OF INTERVIEWS

Date	Representative	Organization	Sector
02.03.2012	Joyce Monteiro	EMBRAPA SOLOS	Public/National
08.03.2012	Thabta Matos da Mata	SECRETARIA DE MEIO AMBIENTE	Public/local
08.03.2012	Pablo Juan de Azevedo Ferraz	SECRETARIA DE AGRICULTURA, PECUÁRIA E ABASTECIMIENTO	Public/local
09.03.2012	Andrea Godoy Herrera	SOS MATA ATLÂNTICA	ONG/Regional
10.03.2012	Nicholas Locke	RESERVA ECOLÓGICA DE GUAPIAÇU (REGUA)	ONG/Local
10.03.2012	George Bizarro	RESERVA ECOLÓGICA DE GUAPIAÇU (REGUA)	ONG/Local
02.04.2012	Paulo Schiavo Jr	SECRETARIA DO MEIO AMBIENTE PREFEITURA CACHOEIRAS DE MACACU	Public/local
05.04.2012	Gabriela Viana	PRIVATE CONSULTANT (INSTITUTO BIOATLANTICA)	ONG/Regional
09.04.2012	Solange Bandeira	SEIVA- ECOLOGIA INTERIOR	ONG/Local
11.04.2012	Consulta Publica	SECRETARIA DE MEIO AMBIENTE PREFEITURA CACHOEIRAS DE MACACU	Public/local
12.04.2012	Ana Dias	RESPONSABILIDAD EMPRESARIAL SCHINCARIOL	Bussinness/National
16.04.2012	Julio Roberto Pinto Ferreira da Costa	SOCIOLOGIST EMBRAPA SOLOS	Public/National
16.04.2012	Maria Regina Capdeville Laforet.	EMBRAPA SOLOS	Public/National
19.04.2012	Evaldo Rui de Souza Lima	EMATER-RJ	Public/Regional
19.04.2012	Rodrigo Oliveira Aguilar	SECRETARIA DE MEIO AMBIENTE PREFEITURA CACHOEIRAS DE MACACU	Public/local
24.04.2012	Alessandro Rifan	PARQUE ESTADUAL TRÊS PICOS	Public/regional
19.04.2012	Periandro José de Moura Neto	EMATER-RJ	Public/Regional
19.04.2012	Vitor Cesar Barcelos de A. Torrão	EMATER-RJ	Public/Regional
24.04.2012	Jacir Souza da Lima	INEA-CHEFE APA GUAPI-MACACU	Public/Regional
24.04.2012	Carlos Eduardo Silva Jascone	PARQUE ESTADUAL TRÊS PICOS	Public/regional
24.04.2012	Consehlo Municipal de Meio Ambiente	SECRETARIA DE MEIO AMBIENTE PREFEITURA CACHOEIRAS DE MACACU	Public/local

ANNEX III**INTERVIEW CONTACT FORMAT (E-MAIL)**

Estimadas Senhor(a),

Recebam meus cumprimentos e permita me apresentar, eu sou Adrian Flores da Costa Rica, estudante de Mestrado da Universidade de Ciências Aplicadas em Colônia, Alemanha. Agora estou no Rio de Janeiro desenvolvendo minha tese no tema: **'Avaliação da viabilidade de implantação de projeto de Redução da emissão de Gases de Efeito Estufa, devido ao desflorestamento e degradação florestal (Projetos REDD+) no município de Cachoeiras de Macacu, Rio de Janeiro – Brasil'**. Este trabalho está sendo desenvolvido no âmbito da cooperação Brasil-Alemanha, com a orientação da Dra. Joyce Monteiro da Embrapa Solos - RJ (joyce@cnps.embrapa.br).

O objetivo é caracterizar os fatores que influenciam a viabilidade da implantação de projetos REDD+, ou seja, avaliar a governança desses projetos, pelo levantamento das normas, programas, projetos, políticas e planos que interferem com as questões ambientais relacionadas à manutenção e ou conversação florestal.

Uma importante etapa do meu trabalho é o contato com os atores envolvidos no tema para coleta de opiniões, dados ou materiais. Para tanto, eu gostaria estabelecer um contato ou de agendar uma entrevista com a V.Sa., de acordo com o meio, dia, horário da Vossa maior conveniência, preferencialmente até o 26 de Abril de 2012 quando retornarei para Alemanha,.

Agradeço antecipadamente a Vossa atenção e apresento minhas cordiais saudações no aguardo de um breve retorno.

Atenciosamente,

Adrian Flores

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