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*Assessing the Financial Conditions of Sustainable Development  
Policies for Forest and Biodiversity Conservation in Brazil*

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# **Assessing the Financial Conditions of Sustainable Development Policies for Forest and Biodiversity Conservation in Brazil**

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## **Abstract**

This paper discusses the financial conditions for Brazilian governments (Federal and Subnational) to achieve the targets established by Sustainable Development Goal “Life on Earth” (SDG 15), directly related to forests and land biodiversity conservation. The study shows the difficult financial conditions to implement sustainable policies towards native forests and biodiversity conservation, including the evaluation of public budgets devoted to forest conservation, the role of overseas development aid and a discussion about the possibilities of alternative strategies of funding, such as payments for ecosystem services and other economic instruments for environmental management.

**Keywords:** sustainable development goals; conservation finance; forest conservation; biodiversity; Brazil

## **1. Introduction**

The expression “ecosystem services” refers to all free benefits generated by environmental resources, referring not only to goods (e.g. timber) but also to services (e.g. water conservation, leisure and biodiversity) that are freely provided by the environment to human societies. The Millennium Ecosystem Assessment (2005), an initiative of the United Nations, adopted this approach using the term ecosystem service to describe the environmental positive externalities associated with the maintenance of natural areas all around the world.

More recently, the United Nations has launched the concept of Sustainable Development Goals' as the continuation of the worldwide efforts to implement the 'Millennium Development Goals'. According to the UNDP website (<http://www.undp.org/content/undp/en/home/sustainable-development-goals.html>), the Sustainable Development Goals (SDGs), otherwise known as the Global Goals are:

“A universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.”

Among the vast list of priorities established, SDG 15 refers to “Life on Earth” and, more precisely, aims at sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. It establishes ambitious targets for protecting, restoring and promoting the sustainable use of terrestrial ecosystems, with special focus on biodiversity conservation (<http://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-15-life-on-land/targets/>):

- By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
- By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

- By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
- By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development
  - Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
  - Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed
  - Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products
  - By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species
  - By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts
  - Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
  - Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

- Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Even though SDG 15 covers a wide range of forest and biodiversity conservation goals, it has a specific interest in the extension and status of native habitats. The world's system of protected areas has grown exponentially over the last decades, particularly in developing countries rich in biodiversity. The mission of protected areas has expanded from biodiversity conservation to improving human welfare (Naughton-Treves et al, 2005) with the environmental services provided by nature. This also includes the expansion of protected areas in private or community land, considering the territorial limitation of public protected areas, such as national parks.

Brazil is a key country for the achievement of SDG 15. Brazil is the most biodiverse country in the world (OECD, 2015), with most of its 8.5 million square kilometers covered by native forests. However, deforestation remains a huge problem: in spite of a considerable reduction in the Brazilian Amazon in the last decade, deforestation has increased in the last few years.

Emissions from forest slash-and-burn remain one of the most important sources of greenhouse gases, and other ecosystem services, such as watershed conservation and soil protection, are also endangered by the massive loss of native forests. The objective of this paper is to discuss how Brazilian governments (Federal and Subnational) are performing in order to achieve the targets established by SDG 15.

More specifically, the paper focus on how public administrations are struggling with the difficult financial conditions in order to guarantee (or not) the necessary funding to implement sustainable policies towards native forests and biodiversity conservation, and some

alternative options to overcome this problem. For this, a bibliographical survey is be carried out on the sources of financing related to forest and biodiversity conservation.

Section 2 discusses the current situation of forest and biodiversity conservation in Brazil. Section 3 presents the crisis in financing the public environmental sector through an analysis of the public budget devoted to the issue. Section 4 analyzes the role of Overseas Development Aid (ODA) for biodiversity conservation and its limitation in the Brazilian case. Section 5 is devoted to the economic instruments for environmental management in Brazil, and it is divided in three subsections: (i) the Green ICMS tax redistribution scheme based on environmental criteria; (ii) an analysis of the experiences of Payments for Ecosystem Services already in place at the sub-national level; and (iii) the potential for a market of environmental reserve quotas (CRA) in Brazil, where a tradable rights system can be established among properties in order to fulfill the requirements of the Forest Code. Section 6 discusses the principles for a sustainable taxation and finance, with focus on the role of the Government finance agencies.

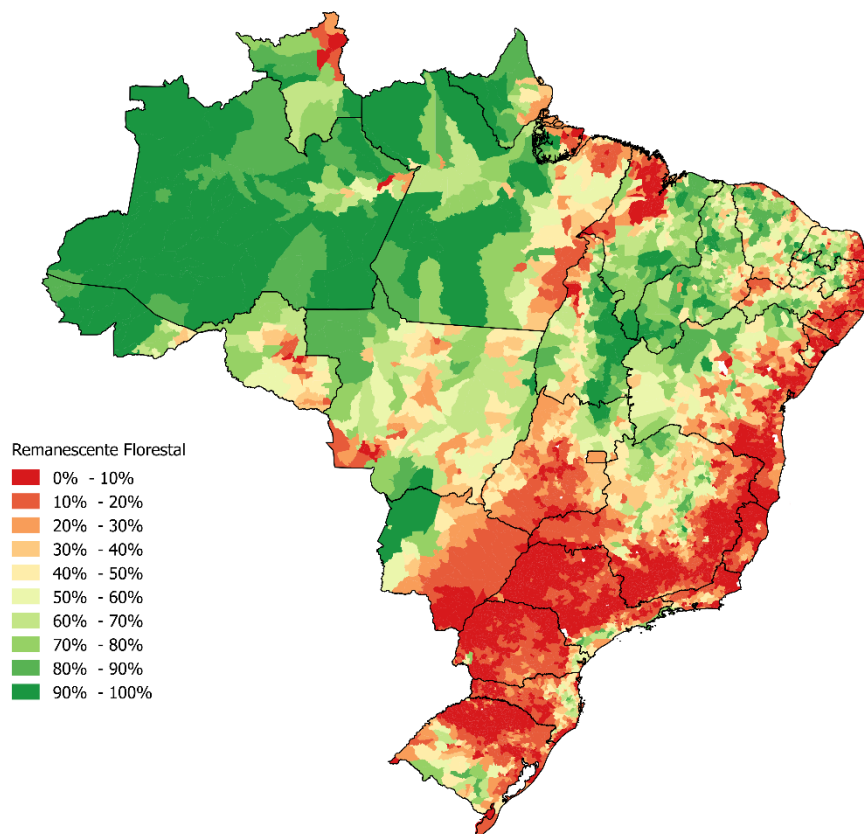
Finally, Section 6 presents the conclusions: to provide sustainability to the environmental policies, in particular to the specific targets within SDG 15, it is essential to seek alternative forms of financing. However, the current political and economic situation is very biased in favor of those who benefit from the current unsustainable system of production, and a reversal a green economy is very unlikely to happen. Therefore, it is expected in the business as usual scenario that there will not be significant funding sources to finance the desired targets associated to SDG 15 in Brazil, and the difficulties to implement effective forest and biodiversity conservation will probably remain, or even become worse, in opposition to the commitments assumed by the Brazilian government.

## **2. Forest and biodiversity conservation in Brazil**

Brazil is among the most biodiverse countries in the World, classified by the UNDP as a “biodiversity superpower” (UNDP 2010). It has the largest area of tropical rainforest in the Planet, divided in six biomes: Amazon, Cerrado, Pantanal, Atlantic Forest, Pampa and Caatinga. Even though there remain vast territories of wilderness areas of little human impact, mainly in the Amazon and Pantanal, other biomes face much a more critical situation. In particular, the Cerrado and Atlantic forest biomes were classified as ‘biodiversity hotspots’, a category created by Conservation International to identify Earth’s biologically richest and most endangered terrestrial ecoregions (Mittermeier et al. 2000). Indeed, the last study on the size of Atlantic Forest remnants indicate that less than 13% of the original area is now covered with native vegetation (Fundação SOS Mata Atlântica & INPE, 2017).

Figure 1 shows how heterogeneous is the situation of forest conservation in Brazil. In the map, divided by the 5,570 Brazilian ‘municipalities’ (local public administration unit, equivalent to the ‘counties’ in the US), the greener the more preserved, and the redder the worse preserved forest areas. It is clear that in the North part of Brazil (dense Amazon rainforest), western border with Bolivia and Paraguay (Pantanal marshlands) and in parts of the Center of the country (covered by Cerrado savannahs and Caatinga drylands), native vegetation remains at a high share of the original territory. However, in the Eastern and Southern parts of the country, there is much less remnants of native vegetation.

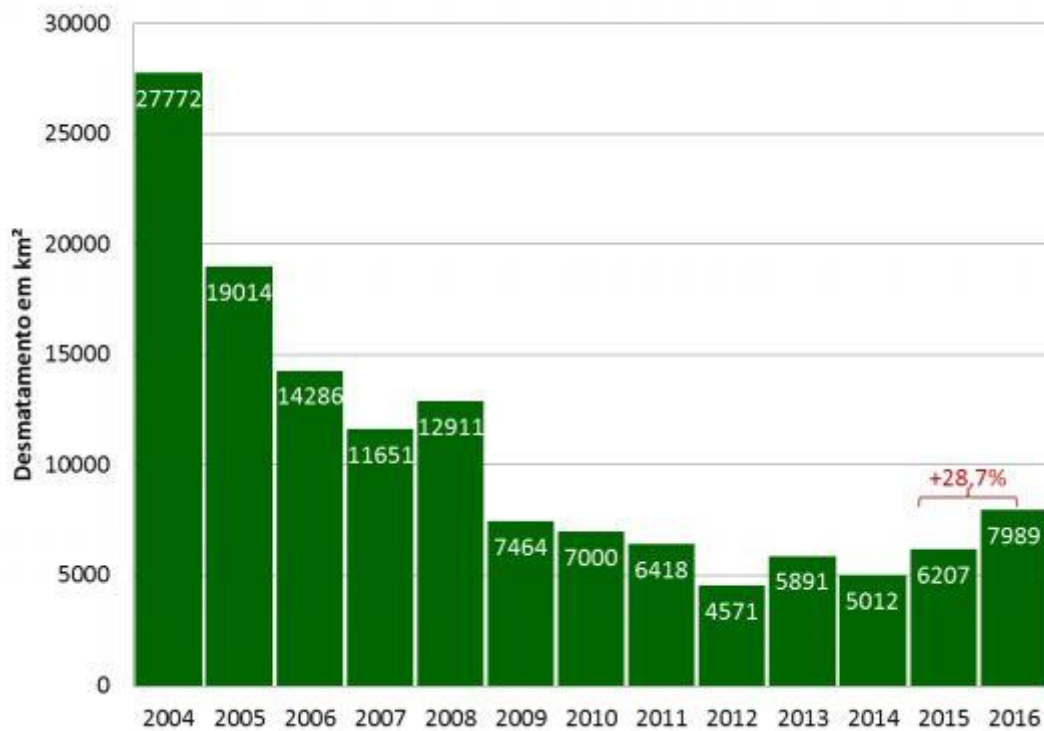
Figure 1. Remnants of natural vegetation in% of total area, per municipality, Brazil (Source: Young et al., 2016)



Even though there was a massive reduction of deforestation in the Amazon in the 2005-2010 period, in more recent years the problem has returned to grow again. Figure 2 shows the evolution of deforestation in the Amazon, with a clear change of pattern in the more recent years (Figure 2).



Figure 2. Deforestation in the Brazilian Amazon (Source: Azevedo et al. 2016)



Deforestation has also increased in the Atlantic Forest (marginally) and in Cerrado (extensively) biomes in recent years (Fundação SOS Mata Atlântica & INPE, 2017). This is due to the massive conversion of natural habitats to areas of pasture or cultivation persists.

The main policy instrument to forest and biodiversity conservation is the creation and maintenance of protected areas. Protected areas are territorial units that receive special treatment because of their recognized natural, ecological and/or cultural values in terms of on-site conservation of species, populations and ecosystems, including systems and traditional means of survival for human communities, having legal status and different administration regimes. There are several kinds of protected areas, each of them with specific rules for management and level of protection. In Brazil, protected areas created for environmental protection are designed “conservation units” and are legally regulated by Law no. 9.985 of 2000, which regulates the National System of Nature Conservation Areas (SNUC).

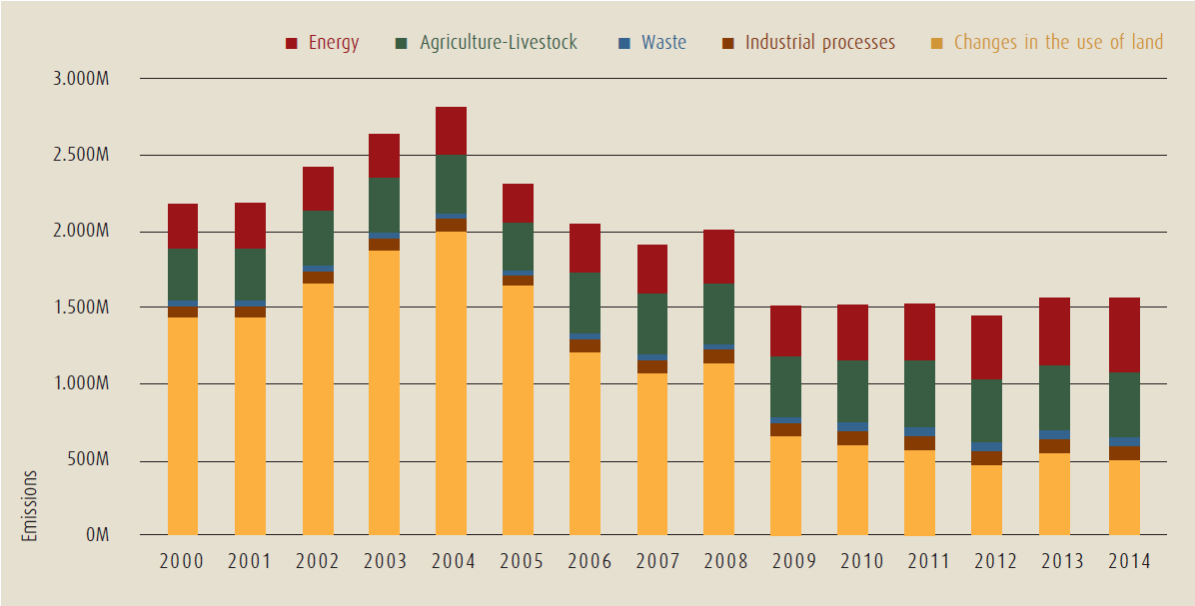
Being a biodiversity superpower (UNDP 2010), Brazil has promoted significant expansion of the land covered by conservation units – the total area devoted to conservation by the Federal and State governments reached 1,264 km<sup>2</sup> at the end of 2010, or 15% of the Brazilian territory (Medeiros et al. 2011).

But, similarly to forest remnants, there are important regional differences: in the Amazon biome, conservation units cover 24% of its total area, while in the drylands of Caatinga conservation units occupy only 8% of the territory.

These protected areas provide very important ecosystem services for the country and the entire planet. Nevertheless, they remain perceived by most politic groups and decision makers, at both the public and private sectors, as an “obstacle” to development because they would represent restrictions to economic activities, especially in the most remote areas where conservation units are larger. Because of this negative perception, the management of conservation units receive much less human and financial resources even if compared to developing countries standards: the following section shows that the expansion in the number and area of protected areas has not been followed by an equivalent increase in the budget dedicated to nature conservation, and that public funding for budget and personnel devoted to protect conservation units are much lower than what is being invested in other countries.

In addition to the threat to biodiversity, the persistence of deforestation increases the concentration of greenhouse gases, the most important factor responsible for global climate changes. Figure 3 shows that total emissions of greenhouse gases (GHGs) in Brazil present a slight uptrend in the current decade, mainly due to the increased emissions from the energy industries and agriculture and livestock.

Figure 3. Total emissions of greenhouse gases in Brazil (Estimates by SEEG/Climate Observatory), 2000-2014 (in million t CO2 GWP). Source: Young (2016)



There are serious social-environmental problems associated with the same pattern of specialization in high impact activities on natural resources. Recent changes in the Brazilian law reduced the minimum legal requirements for forest conservation on private properties in order to maximize the available area for cultivation and pastures (Young, 2016).

Currently, the political pressure is focused on the reduction of areas dedicated to conservation units and indigenous lands. This process of change in land usage is often violent, so that deforestation is statistically correlated with the increase in homicides (Sant’anna & Young, 2010).

Health problems are quite severe, given that the loss and degradation of the native vegetation increases the risk of the spread of disease (UNDP, 2010). Literature shows that deforestation contributes to the spread of infectious diseases such as malaria, dengue fever, Chagas disease, leishmaniosis and Hantavirus. This situation is made worse by climate change. Consequently, there is a direct rise in public expenditures because the costs of

mitigation and eradication strategies are higher than those of preventive actions. It is estimated that expenses to fight malaria in the Americas amounted to over USD500 million between 2004 and 2007 (UNDP, 2010).

In other words, deforestation is not only an environmental problem; it is also a mechanism for social exclusion. In light of this scenario, Sant'anna and Young (2014, p. 29) argue that:

“It is quite important to understand the role of institutions, especially with regards to property rights, in the advance of deforestation in Brazil and its consequences for development. The inadequate definition of land property rights is a key factor for deforestation and its perverse social and economic effects. In frontier areas there is no formal definition of land ownership. Additionally, Brazil follows a tradition in which land ownership can only be claimed based on the productive use of the land. In this context, land deforestation is almost considered mandatory to increase the chances of obtaining land ownership. (...) Usually the dispute between land appropriators and land-grabbers leads to intense conflicts: literature reveals that in municipalities where levels of deforestation are high, there is also more violence, as measured by the homicide rate (Sant'Anna and Young, 2010).”

Therefore, the implementation of SDG 15 is much more than a matter of purely environmental issues. It is important to halt the expansion of the agricultural frontier that inevitably leads to deforestation, violence and land concentration. On the other hand, the expansion of pasture lands and plantation areas has a devastating impact on native forests, while failing to produce a socially desirable situation: most of the poverty-stricken areas of the country are located in rural regions where deforestation is already consolidated.

Empirical studies demonstrate that deforestation is not associated with an increase in the Human Development Index (HDI): Young and Neves (2009) show that in the

municipalities in which the Atlantic Florest was more severely deforested in the period between 1985 and 1996 the HDI growth was lower than in most other cities. Celetano *et al.* (2009) also reveal that there is no relationship between the percentage of deforested areas in a municipality in the Amazon region and any increase in its HDI. Social instability and the absence of suitable infrastructure for basic services, such as education and health, are also consequences of an unbalanced expansion caused by the ‘production of property rights’ through deforestation (Sant’anna and Young, 2014). Forest conservation is, indeed, a development goal in many other dimensions than the protection of biodiversity and ecosystem services.

### **3. Public funding: the crisis of the environmental public budget**

The severity of the issues discussed in the previous sections seems not to attract attention neither from leaders in Brazil nor even from the general population. The national security policy to the environment was designed supported by instruments that require active participation of the State in controlling the actions of companies and individuals (Young, 2016).

Despite the increased social demand for environmental management measures, due to the significant increase in pressures on natural resources and the public awareness on the issue, the public budget for environmental management has grown at a much slower pace than total public expenditure. The literature on empirical assessments of “public green budgets” is relatively poor, especially in developing countries. But there are previous studies in Brazil showing that, in spite of the rhetorical concern with sustainability, there is a persistent trend for decreased participation in environmental expenditure in proportion to the public budget (Young and Roncisvalle, 2002; Young, 2005; Young et al. 2014; Young et al. 2015).

Young et al. (2015) analyzed the behavior of the discretionary spending (resources freely available for the public administration, not related to wages, interests and other ‘fix’ expenditures) on environmental management in the three spheres of government: Federal, State and Municipal. Their results showed that the problem is more serious in the Federal administration: while discretionary resources for the Ministry of the Environment represented 0,71% of the total Federal budget in 2003, this proportion has declined consistently until 2015, when it reached 0.36%. In contrast, the proportion of environmental spending over the total budget at the State and Municipal level was estimated at 0.8%, with a slightly increasing trend (Young et al., 2015).

These results indicate that sub-national administrations are increasingly important in the environmental management, at least in volume of resources. State governments are the sphere with greater expenditure on the subject. However, there is an enormous heterogeneity among subnational governments, indicating very strong disparities in the ability to deal with environmental problems. The current fiscal crisis in the states and municipalities is expected to accentuate this heterogeneity, with negative consequences for the people affected by negative environmental externalities.

It is also important to highlight that in the 2003-2013 there was a huge growth in budget for the infrastructure area, while the budget for the environmental area remained stagnated over the same period, with an average allocation between US\$ 100 and US\$150 Million per year. The ratio between environmental protection and infrastructure investment declined from 5.7% in 2003 to 1.7% in 2009-13. This shows that the “anti-green” growth strategy in Brazil, in the sense that activities that pressure the environment (especially infrastructure investment, such as dams and road building) are receiving more resources, while expenditure on environmental protection remains relatively stagnant.

Another negative consequence of this strategy is the worsening of environmental management of infrastructure projects in Brazil, since the implementation of new projects amplifies the demand for licensing and supervision from the environmental authorities, but these authorities do not have any increase on their budgets to enable the realization of this extra demand. Besides, it is important to point out that environmental authorities in Brazil already suffer from a lack of material and human resources.

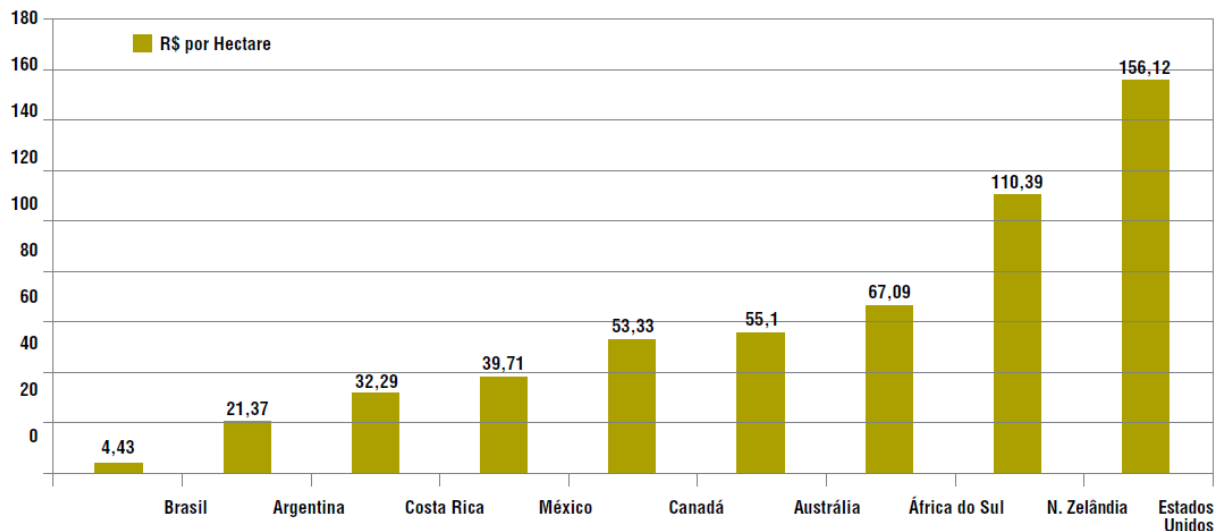
One of the most sensitive areas to these budget cutbacks is the National System of Conservation Units. Brazil mobilized major efforts over the past ten years to expand and strengthen its system of protected areas, adjusting its goals to the Work Program of the CBD:

“So as to achieve the targets established by the Convention. Since the creation of the National System of Nature Conservation Areas (SNUC) in 2000, the country has promoted significant expansion of the land covered by conservation units, especially in the Amazon - which at the end of 2010 covered 23.8% of its total area, equivalent to about 100 million hectares. Brazil was responsible for 74% of all protected areas created between 2003 and 2008, representing a significant contribution to the protection of natural environments worldwide.” (Medeiros et al. 2011, p.8).

Nevertheless, there was no expansion of financial and human resources to consolidate this considerable expansion in the size and number of protected areas. Medeiros et al. (2011) showed that the proportion between area included in the environmental conservation system and the number of official employees on supervision of the area in Brazil is one of the worst in the world. While in South Africa and the United States this proportion is, respectively, of one employee per each 1.176 ha and 2.125 ha, in Brazil the proportion is of one employee per 18.600 ha – an area that, in practical terms, corresponds to approximately the area of 20.000 official football fields per one person. Moreover, Brazil invests much less in protected area

than other developing countries: even nations with lower GDP per capita invest, per hectare protected, between 5 and 25 times more in the maintenance of their systems (Figure 4).

Figure 4. Expenditures in the maintenance of protected areas divided by the area of protected areas, in R\$ of 2010 (approximately R\$ 2 = 1 US\$). Source: Medeiros et al. (2011)



Hence, this section has shown that there are no financial resources available for the Brazilian public administrations to improve their action in order to achieve the targets described in SDG 15. Indeed, there are fewer resources at the Federal level, and no clear definition of expansion of public funding at the subnational level. As expected, the control over deforestation has declined and it is not surprising that the threat to Brazilian immensely rich native forests and biodiversity has increased in the last few years.

#### 4. The role of Overseas Development Aid (ODA) for biodiversity conservation

International funding is an important source of financing for biodiversity projects and, by extension, to the financing of protected areas. Young and Bakker (2016) analyzed the extent of international aid for projects with links to biodiversity conservation, through a literature review and an empirical assessment of overseas development assistance (ODA) aid



destined to biodiversity conservation using three sources of data: the AidData base for the 2000/11 period (most updated data available), the OECD StatExtracts (2004-2013), and the Global Environmental Facility (GEF) database.

The results showed that China, Brazil and Vietnam receive the largest volume of biodiversity ODA (Table 1). Young and Bakker (2016) estimated that Brazil has received, in total, US\$ 1.6 Billion in 2004-2013, with an average of US\$ 161 Million per year.

Table 1. Top receiving countries of biodiversity financing, 2004-2013, according to the OECD StatExtract database (Source: Young and Bakker, 2016)

<b>Recipient</b>	<b>Amount</b> (million dollars 2004-2013)	<b>%</b>
<b>Developing Countries</b>	<b>13,036.72</b>	<b>100</b>
China	2,207.54	17
Developing Countries Unspecified	1,658.8613	18
Brazil	1,613.71	12
Vietnam	1,481.63	11
South of Sahara, regional	609.38	5
Indonesia	556.87	4
Peru	435.31	3
Morocco	299.41	2
Congo Dem. Rep.	250.01	2
Phillipines	249.06	2
America, regional	225.21	2
Turkey	220.70	2

This value (US\$ 160 Million/year) is a significant amount of resource, equivalent to the total discretionary environmental spending of the Brazilian Federal government. But, alone, it is not capable to make a difference. Federal total environmental spending, including wages and other non-discretionary expenditures, is around US\$ 1 Billion per year (Young et al. 2015). Considering that the total spending of Brazilian states has approximately the same

size, as the Municipal environmental spending, ODA to biodiversity conservation is around 5%-10% of the total funding available for environmental protection (as previously estimated by Young 2005). This result is also consistent with Parker *et al.* (p. 35, 2012), which shows that the majority of biodiversity finance is raised through domestic government budget allocation in developed countries, an amount almost four times larger than the Official Development Assistance (ODA)

These results should be interpreted with caution since ODA statistics have many methodological problems, especially because of the conventional definitions used in their estimation. Roodman (2014) lists a series of problems related to ODA statistics, including criteria that make it too easy for developed countries to achieve the established benchmark of a minimum 0.7% ratio of ODA/Gross National Income, the opacity of data on bilateral non-ODA development loans and the difficulty to measure private charity. There were also problems because it is not possible to classify the type of funding (loan or aid, for example) in all databases used, and the identification of the managers of these resources (public, private or NGO) is also difficult.

The analysis by Young and Bakker (2016) also showed that there is no evidence that ODA destined to biodiversity conservation is growing over time worldwide: resources to biodiversity projects increased from 2000 up to 2008; then there was a sharp decline in 2008 (the beginning of the global financial crisis), followed by a growth recovery in the 2009-2011, and a new declining trend in 2012-2013. However, the analysis by biennial or triennial averages suggests a relative stagnation of the resources over time, indicating the limited capacity of ODA to finance the expansion of forest and biodiversity conservation in developing countries, including Brazil.

Almost half of the ODA funding for biodiversity projects in developing countries is concentrated in five countries: China (17%), Brazil (12%), Vietnam (11%), Indonesia (4%)

and Peru (3%). For recipient countries, ODA biodiversity values vary considerably over time, revealing a dynamic competition between the different countries and development sectors trying to attract ODA resources. In other words, there is a “competitive market” over development aid resources, and conservation projects that are linked to “general” human development objectives are more likely to obtain resources than projects that are strictly restricted to biodiversity conservation. This result is consistent with the findings of Miller (2014), who pointed out that “mixed” biodiversity aid projects (ie, projects with biodiversity goals combined with other development objectives) receive more resources than “strict” biodiversity aid.

There is a strong historical importance of multilateral institutions in financing biodiversity ODA. Multilateral agreements have been one of the most important source of biodiversity ODA. On the other hand, ODA values vary considerably over time, revealing a dynamic competition between the different development sectors trying to attract ODA resources and making it difficult to establish a specific trend.

The literature highlights that the interests and motivations are different between multilateral and bilateral ODA. Multilateral institutions are more sensitive to the broader aspects of development, and tend to prefer “mixed” biodiversity/development projects. On the other hand, bilateral agreements are more dependent upon geopolitical aspects and accept “strict” biodiversity projects more frequently. If bilateral agreements prevail in the future in the definition of biodiversity ODA, following the hypothesis of the multilateralism crisis, it is very likely that “case by case” negotiations will become more frequent in the future.

This is an indication that conservation projects that include PES or green supply chain components may become more attractive for potential donors from developed countries. However, it will be very unlikely that external funding will be available at the necessary scale for an effective implementation of SDG 15 targets in Brazil.

Finally, it is important to mention the bias toward priorities established abroad, which do not necessarily coincide or are not congruous with those of the Brazilian government or domestic counterparts (Young, 2005). Most external funding is directed to the Amazon region (the ‘Amazon Fund’, sponsored by Norway and Germany being the best example) whereas many fewer resources are dedicated to environmental challenges in other threatened biomes, such as Cerrado and Caatinga, with much less international appeal.<sup>1</sup>

## **5. Economic instruments for environmental management in Brazil**

### **Green ICMS**

The best known innovative economic instrument for financing conservation established in Brazil is the ‘Green ICMS’. It is the imposition by certain states of environmental criteria for tax redistribution among municipalities of the receipts obtained via a value added tax called ICMS. The ICMS is a value-added tax on the circulation of goods and services (ICMS) collected by state governments, and part of these revenues must be redistributed among the municipalities. Three quarters of this redistribution is defined by the Federal Constitution, but the remaining 25% is allocated according to each state’s legislation.

This scheme was first introduced in the State of Paraná in 1992 to reward municipalities for protected areas and watershed reserves within their boundaries to reserved areas of this sort. This has been very effective in encouraging the creation of new protected areas, and many other Brazilian states have already introduced similar laws for the allocation of ICMS resources, including São Paulo (1993), Minas Gerais (1995), Rondônia (1996), and

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<sup>1</sup> One example about the bias in favor of the Amazon against the other Brazilian biomes in terms of international perception is to present the extremely endangered Spix’s Macaw (*Cyanopsitta spixii*), the movie star of the ‘Rio’ and ‘Rio 2’ films, as a native of the Amazon rainforest, rather than the Caatinga drylands where is its true habitat.

Amapá (1996). Currently, there are 15 (out of 27) Brazilian States with specific Green ICMS legislation.

Medeiros et al. (2011) estimated a total of R\$ 402.7 Million (approximately US\$ 200 Million) in 2009 in payments to municipalities because of the existence of conservation units and other kind of protected areas using the Green ICMS. Among the 11 Brazilian states analyzed, Rondônia allocated the largest volume of the Ecological VAT by the “conservation units” criteria to municipalities, totaling R\$ 90.7 million in 2009. Rondônia was followed by the states of São Paulo and Mato Grosso, with R\$78 million and R\$ 68.4 million, respectively. Rondônia distributes a superior amount when compared to other states due to the fact that their coefficient for the “conservation units” has a bigger weight impact than in other states.

This is possibly one of the most important mechanisms already established that favor public municipal administrations in accordance to the objectives of SDG 15. It has two main problems: (i) since it is a redistribution mechanism, if one municipality improves its index, the others necessarily have to lose (there is no increase in the total amount to be redistributed if there is an overall improvement in environmental performance of the municipalities); and (ii) resources received using this mechanism cannot be earmarked for environmental action. But, nevertheless, it has presented successful results in the expansion of protected areas in the States where the legislation is enforced.

### **Payments for Ecosystem Services (PES)<sup>2</sup>**

Payment systems for environmental services (PES) emerged as an important mechanism arisen from the greater awareness from the society about the deterioration of the

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<sup>2</sup> This section is based on Castro et al. (2017).

environmental services, such as climate, water and flood regulations, support services (pollination, for example), provision of food and recreational services (Castro et al. 2017). PES systems represent a voluntary transaction in which a well-defined environmental service, or land usage that can guarantee the provision of this service, is acquired by at least one buyer, of at least one provider, under the condition that it ensures the provision of the service (Wunder, 2005).

Even though there is no legislation regulating PES systems, there are already a significant number of PES experiences at the state and municipal level in which the use of natural resources shall be charged even if they are in compliance with legal standards. Castro et al. (2017) surveyed the current status of these PES managed under the control of sub-national entities, related either to state or municipal/county governments. They found a very heterogeneous situation, with large number of laws and programs developed with the intention of using PES to enhance protection of different ecosystem services, related to climate, biodiversity and water resources.

Most PES state laws are very generic, without details about how the PES will operate. This regulatory gap is usually left for the state environmental agency or the project managers to fulfil. Therefore, there is a wide heterogeneity of PES experiences even within the same state. One ongoing debate is whether PES systems should be centralized by the Federal Government, while others argue that is preferable to allow flexibility in the system, avoiding very specific legislation.

There are arguments in favor and against PES laws being too specific. Given the wide diversity of environmental, social, economic and cultural situations in Brazil, laws that are more generic may assure more flexibility in law enforcement. Flexible laws allow the implementation of projects with different objectives, stakeholders and priorities within the same state. On the other hand, the more lax the laws, the more difficult to make the people

comply. The challenge for a national legislation on ecosystem services is to conciliate the flexibility required by a general framework that creates conditions for sub-national environmental agencies to introduce PES in accordance with their specific interests with measures of protection and compliance to ensure they are effectively enforced.

The identification of who is the ‘provider’ of the environmental service is a crucial issue. Some programs identify individuals as ES beneficiaries of the PES projects, while others refer to the properties. However, not all programs pay per hectare or property. In Acre and Amazonas, payments are per family, regardless of the number of hectares. The geographical and socioeconomic characteristics of the Amazonian biome impel these states to pay families who protect ecosystem services, rather than areas. In this region, family holdings are considerably larger than in the rest of the country: if the payments were done per hectare and not per family, the cost of the program would be much higher.

In all, excluding the Acre and Amazonas cases, Castro et al. (2017) estimated that PES state programs have preserved or restored more than 76,000 hectares. Most of this preserved area in PES programs is located in Minas Gerais (57,078 hectares). The statistics above are not applicable to the Acre and Amazonas because of the different logic of their programs. Instead of focusing on private properties, their programs aim at residents in protected areas, which are much bigger but have special characteristics under Brazilian legislation: protected areas are territorial spaces, legally instituted by the federal or state governments, which in some cases allow the sustainable use of resources, combining the human presence in the protected areas, and agriculture is allowed only for strict subsistence maintenance. Thus, it would not be appropriate to speak of hectares preserved since all the area of the conservation unit must be preserved, including where ES beneficiaries of the programs reside.

The cumulative amount spent on these programs until December 2015 was R\$89.8 million. This figure can be considered low and, despite the current economic crisis in Brazil, the total spending of the programs should increase, as well as the areas to protect.

Most projects focus on family farmers, and there are several difficulties making payments to this group of farmers. Many of them have no proper title to the land – they live on the land, but without proof of ownership. This is one of the great difficulties of the PES programs, because without a document proving official land ownership, the state has no legal basis to establish an agreement with the providers of ecosystem services. Some programs have relaxed this requirement, accepting other documents instead of land deeds, but this creates accountability and legal uncertainty about the validity of the payments, especially if public funds are used.

Similar problems relating to lack of documents, such as birth registration certificates, make it difficult to open bank accounts for the ES beneficiaries to receive payments for ecosystem services. These situations need to be considered beforehand by the program managers, especially in the poorest regions, because government transfers to individuals, as payment for ecosystem services, must meet the standards of accountability and transparency.

In general, the costs of monitoring and supervision of the areas are high, and in some cases more expensive than the direct payment to the ES beneficiaries. Periodical monitoring of the agreed activities is required, including the area to be preserved or restored. Given the territorial extent of the country, monitoring and enforcement are costly, as well as the effort for delivery and registration of documents, and other bureaucratic proceedings to validate the results, including the institutional relationship between the different agencies involved in the program. All these transaction costs and difficulties have to be considered in the project design and management.



Finally, programs require technical assistance, the costs of which should be included in the budget. This is particularly important when the targets are family farmers or extractive communities, since they have few resources by their own to implement the required changes in production and other activities.

At the pilot-project scale, PES systems have proved to be very effective in terms of forest conservation. The main challenge is to obtain large scale diffusion of the PES, in a way that it induces voluntary actions in favor of forest and ecosystem services conservation.

### **Market of environmental reserve quotas (CRA) in Brazil**

The New Brazilian Forest Code (NCFB), revised and sanctioned by Law 12.651/2012, has considerably altered the regulatory framework regarding the use and protection of native vegetation within private properties of Brazil. The new legislation has been strongly criticized for eliminating or reducing several protective measures provided in the Forestry Code previously in force (BRAZIL, 1965), such as cancelling the requirement for recovery of consolidated areas (that is, deforestation that occurred prior to 2008) in small properties (up to four fiscal modules), or decreasing the area of Permanent Preservation Areas (APPs).

On the other hand, it has established three possible forms of compliance with Law 12.651/2012 (BRAZIL, 2012):

- (I) Re-composition of RL areas by replanting of seedlings;
- (ii) Natural regeneration of vegetation within RL areas;
- (iii) or RL compensation.

One of the possible compensation measures stated in article 66 of Law 12.651/2012 is the acquisition of Environmental Reserve Quotas (CRAs). The CRA "is a registration title

representing an area with existing native vegetation or with native vegetation in the process of recovery" (BRAZIL, 2012). Also, according to article 48:

“(the) CRA may be transferred, onerously or free of charge, to an individual or legal entity governed by public or private law, upon an agreement signed by the CRA holder and the acquirer.”

This means that a landowner who does not meet the minimum percentage of RL can compensate for his deficit in the property of another, provided that the areas are equivalent in area and in the same biome. This creates the possibility for rural landowners who have “forest assets,” as defined by law, to negotiate with those who have “forest liabilities,” establishing a market for CRAs.

There is, currently, a great deal of debate between lawmakers, rural landowners, environmentalists and public administration bodies regarding the implications of the new legislation and the future potential of a CRA market. It is important to highlight that the operating rules of CRA transactions will have great effect on these final results. A system with very stringent rules, restricting the conditions for compensation of one property’s liabilities with forest assets from another, will result in a smaller volume of transactions with higher prices. A more flexible system, on the other hand, which is less restrictive, should induce a larger volume of transactions and lower prices. However, the geographical location and distribution of environmental assets will also be affected by these rules: a more flexible system will concentrate on regions of the country where land prices are cheaper, while systems with more rigorous rules may result in greater dispersal of native forest areas on private properties.

In any case, it is possibly one of the most feasible possibilities to finance forest conservation in private land, one of the main issues within SDG 15. However, this will

depend very much on the regulation of the law and the capacity of the governments, especially at the sub-national level, to enforce this legislation.

## **6. Sustainable taxation and finance<sup>3</sup>**

Another little exploited aspect in Brazil concerns the reduction of the tax burden to re-heat the economy. However, it is necessary to build tax instruments to charge externalities, which is an unpopular measure, especially in crisis times. The solution to the impasse is the replacement of conventional taxes by new collection schemes that consider the “ecological footprint” of the resource when setting rates. However, the tax authorities are quite conservative, and believe that such a move would be risky, since economic agents may have an opportunistic behavior in order to maximize the reduction of the conventional taxes and minimize the collection of new taxes.

The requirement of sustainability criteria in financing operations became increasingly frequent in order to avoid losses on transactions that may be blocked in the future for reasons of environmental policy or damaging corporate image even if legal. Internationally, the most important initiative in this regard is the Equator Principles (<http://www.equator-principles.com>), which establish minimum criteria for granting of credit, ensuring that the funded projects are developed in a socially and environmentally responsible manner. The Equator Principles establish a code of conduct, of voluntary membership, so that financial institutions assume their share of responsibility for the environmental impacts and damages caused by operations financed by them.

In practice, this means developing more selective credit assessment criteria, which take into account the externalities associated with the projects to be funded, especially in the granting of large enterprises financing. If the borrower fails to comply with one of the social

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<sup>3</sup> This section is based in Young (2016).

and environmental clauses, the lender will work with it to find solutions for this clause to be fulfilled.

In Brazil, public financial institutions have a predominant role, since most of the financing of gross capital formation is concentrated in the public funding agencies. Since it directly controls most of the financing for the productive investment, the government may impose improvements in the project approval system, including the strengthening of the induction policies, by providing greater benefits and more agility in raising funds for sustainable projects.

To encourage the financing of sustainable development, the federal government launched in 1995 the Green Protocol. Federal financial institutions – the National Economic and Social Development Bank of Brazil (BNDES), Banco do Brasil (BB), Caixa Econômica Federal (Caixa), Banco do Nordeste do Brasil (BNB), Banco da Amazônia (BASA) and the Funding Agency for Studies and Projects (Finep) - signed the document, committing to take into account environmental variables in the analysis of the credit concession. The goal was to incorporate environmental principles at all operational levels of these institutions, if possible exceeding the minimum legal requirements. In addition to requiring compliance with environmental legislation, the provision of credit should take into account environmental criteria beyond the legal procedures for licensing and operation, creating specific lines of credit with more favorable terms to projects that resulted in environmental benefits.

These principles were applied in a very unevenly manner by the institutions involved. There was not a great effectiveness in the implementation of the Green Protocol as an integrated program, since the implementation task was under the responsibility of each institution, individually.

Considering that forestry and other economic activities compatible with SDG 15 are characterized by long term benefits, a differentiated system of interest rates (which are very

high in Brazil) could encourage more sustainable use of land. Symmetrically, it is very important to stop the concession of subsidized credit to rural producers that are not in compliance with the Forest Legislation. Since the subsidized rural credit system is directly controlled by the Federal Government, it is possible to establish a system that benefits those associated with sustainable practices, and penalize the ones that go in the opposite way. The problem, again, is that the current political balance is very much biased in favor of the large scale agricultural production designed to maximize profits in the very short term: the political feasibility of this reversal of priorities in agricultural and land use towards sustainability and green economy principles is very low.

## **7. Conclusion**

This paper argued that, to provide sustainability to the environmental policies, in particular to the specific targets within SDG 15, it is essential to seek alternative forms of financing. The transition to a green economy creates a unique opportunity to redefine the direction of Brazilian development. Therefore, it is possible to design public policies to encourage this transition.

However, the current political and economic situation is very biased in favor of those who benefit from the current unsustainable system of production. A reversal of the political status would be crucial for the transition towards a green economy use of the immense forest and biodiversity potential of Brazil. But this reversal is very unlikely to happen.

Therefore, it is expected in the business as usual scenario that there will not be significant funding sources to finance the desired targets associated to SDG 15 in Brazil. Instead of looking towards improvement in the future, under the current economic and political crisis in the country, an optimistic perspective in the environmental agenda is not to

worsen the already difficult conditions in which the environmental policy is implemented, including forest and biodiversity conservation.

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