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Ecosystem protection and poverty alleviation in the tropics: Perspective from a historical evolution of policy-making in the Brazilian Amazon

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ABSTRACT

Despite increased intellectual and conceptual consideration of the linkages between ecosystem service (ES) provisions and poverty alleviation (PA) globally, there has been limited analysis of how these paradigms are used and framed in the regional context of policy-making. In this paper, we address this question by eliciting perspectives on the historical evolution of policies addressing the environment and poverty nexus in the Brazilian Amazon. Our analysis is twofold. First, through an analysis of policy *context*, we explore how multilateral and international programs have influenced and helped shape national and regional policy-making in the Amazon. Second, through our analysis of policy *content*, we provide an in-depth discussion of key ES and/or PA policies implemented in the Amazon. Furthermore, we analyze the operationalization of the policy, describe management options, and highlight their impacts on ES and PA. Our results show dichotomies between environmental programs and their social effectiveness, and between environmental and developmental agendas. More recently, however, some attempts have been made at delivering ES protection and PA jointly in policy-making. In conclusion, we provide a framework for policy analysis that can be applied to other tropical countries in the world. If Brazil is to keep its leading role in addressing the challenges of maintaining ecosystem service provision, while alleviating poverty in the Amazon, it must learn from its own experiences.

Contents

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1. Introduction

The Millennium Ecosystem Assessment (MEA) compellingly showed how the loss of services due to ecosystem degradation could lead to significant reductions in human well-being and intensification of poverty. In economies in transition and developing countries, the poor are often highly dependent on ecosystems for their livelihood. Such links between ecosystem services (ES) and poverty alleviation (PA) have been widely documented (MA, 2005; Poverty Environment Initiative, 2009). By quantifying the potential economic impact of ecosystem loss, both the MEA (2003) and The Economics of Ecosystems and Biodiversity (TEEB, 2010) brought increased policy attention to the importance of Ecosystem Services for Poverty Alleviation (ESPA). Since then, scholars have widely and critically engaged with this research agenda (Carpenter et al., 2009; Daw et al., 2011; Raudsepp-Hearne et al., 2010). The MEA in particular brings to the fore two key innovations: an anthropocentric perspective of ecosystems (by focusing on the services and benefits they provide to humankind) and a conceptualization of poverty that departs from a common singular, income-based notion of poverty.

While much attention has been given to the former (Costanza et al., 1997), it is only in recent years that attention has been paid to the latter. Poverty is interpreted as a profound deprivation of well-being, where well-being entails multiple constituents such as the basic material needed for life, freedom of choice, security, and health. This conceptualization draws upon the "voices of the poor" research by Narayan et al. (1999, 2000), which spanned 23 countries and highlighted commonalities of what poor people, across geographical regions and contexts, identify as constituting well-being (Narayan et al., 1999, 2000).

The close connection of forest ecosystems to "poor communities" provides a useful context to study linkages between ecosystem services and poverty alleviation. Statistics related to forests are compelling (FAO, 2009b). While 31% of the Earth's land surface area is covered by forests (MEA, 2003), net deforestation losses account for nearly 13 million hectares annually—roughly the size of England (FAO and ITTO, 2011). Meanwhile, "more than 1.6 billion people depend to varying degrees on forests for their livelihood" (World Bank, 2004, p.16). Although the empirical basis for this quote has been questioned (Angelsen and Wunder, 2003), the fact that many of the world's poor depend directly on forests for subsistence and as a dominant source of income is undisputed.

Globally, Brazil hosts about 30% of the world's highly diverse forests (Alho, 2008). Amazonia itself is recognized as the largest continuous expanse of tropical forest on Earth, serving as habitat to 25% of all recognized terrestrial plant species (Bermingham et al., 2005). The role of the Amazonian forests in regulating hydrological cycles (Nepstad et al., 2008; Veiga et al., 2004), water quality, nutrient cycling, and biodiversity, as well as in providing cultural services (Azevedo-Ramos et al., 2006; Lima, 1999; Menton et al., 2009; Merry et al., 2006) has also been widely recognized. At the same time, the Amazon hosts 29% of the indigenous population of Brazil (IBGE, 2006) and a rich diversity of other ethnic groups, including Afro-Brazilian communities, traditional inhabitants, and migrants from other regions of the country. While poverty in the Amazon may not be as acute as in some other parts of the world, the livelihoods of the poor residing in these areas are highly dependent upon, and sensitive to, changes in the provision of the prevailing ecosystem services. While 80% of the region (Hall, 2008; INPE, 2010; Ometto et al., 2011) remains relatively undisturbed, there is evidence that the provision of the services provided by these ecosystems may dwindle. Future projections suggest that up to 50% of Amazonian forests could disappear by 2050 in response to a possible secular change to a drier and hotter climate, the interaction between land use and climate, and increased anthropogenic activity (Davidson et al., 2012; Meir and Woodward, 2010; Ometto et al., 2011; Soares-Filho et al., 2006). Although land use change for food production has, in some cases, led to improved livelihood and poverty alleviation (Le Tourneau et al., 2013), the extensive change in forest cover in the Brazilian Amazon has not had a similar effect. Income-based poverty, as defined in IBGE (2010) affects 28.8% of the Brazilian population, while, in the Amazon, this percentage rises to 42% of the 25 million inhabitants (Aires, 2008; IBGE, 2010). The Human Development Index (HDI) further highlights this phenomenon. In the Amazon, the HDI for 2010 ranked 0.674, nearly 10% below that for São Paulo State (0.78) (PNUD, 2013).

Despite increased attention to the linkages between ecosystem service provision and poverty alleviation, there has been little analysis of how these paradigms are used and framed in the context of regional policy-making. Specifically, part of this study seeks to evaluate the influence of new paradigms (e.g.: ecosystem services) and their contextual incorporation into national policy.

In this paper, we attempt to address this question with two main objectives in mind: (1) to elicit perspectives on the historical evolution of how policy-making addressed both the environment and poverty, and (2) to analyze different policies, looking at their impact on ecosystem services (ES) for poverty alleviation (PA). In the next section, we present an overview of our research design that combines a review of the literature, an elicitation workshop, and analysis of policy content in the region. We then discuss our findings by looking at the international domains of policies that have converged with the evolution of national/regional policies addressing both the environment and poverty. The synergies and mismatches among the scales of these policies and their impact are taken into consideration in examining the implications that they have for the protection and maintenance of ES, and the reduction of poverty in the region.

2. Research design

The following section describes our research design and methodology. Three distinct sections are presented: (1) our data collection, (2) our analysis of policy context, and (3) our analysis of policy content.

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2.1. Data collection

We gained a contextual understanding of the historical evolution of policy-making with ecosystem protection and/or poverty alleviation objectives through a combination of focus groups, an expert elicitation workshop, and extensive literature review for the analysis of policy content.

More than 20 experts in the field, including from the natural and social sciences, local and national government bodies, NGOs representatives, and civil society organizations attended the workshop. Such a wide representation was sought to ensure a broad, multidisciplinary, and multifaceted coverage of the topic. The experts were selected based on their extensive knowledge of, and experience in, the Amazonian region, as well as based on their expertise in ecosystem management, poverty alleviation, and/or policy-making (the list of institutions represented is presented in Appendix 1.)

During the workshop, three focus groups were created, each composed of representatives of these various sectors represented. Each focus group was tasked to report on initiatives (formal policy or otherwise) that had attempted to address the combined objectives of environmental sustainability and poverty alleviation, any successes, lessons learned, and how these lessons could be applied to ES policy. The same exercise was undertaken to conceptualize the mainstream of ecosystem services for poverty alleviation (identified here as an "ESPA future"), to highlight the boundaries to this conceptualization (i.e.: the beneficiaries, providers, and the ES considered), and to identify the key components for the realization of this 'ESPA future'. Participants were then asked to think about the barriers to the 'ESPA future' they had conceptualized in the previous exercise and the social and environmental trade-offs involved, while highlighting mechanisms of change and the likelihood of change supporting these, based on case studies. All discussions were recorded and later transcribed.

Based on the results reported by the focus groups, a list of policies implemented since circa 1960 was advanced and selected for analysis, assessed on three criteria: (i) an overarching ES and/or PA objective, (ii) implementation in the Amazon, and (iii) sufficient documentation (i.e.: published data and relevant expert knowledge being available for the analysis). The focus group also categorized the policies as conservation and protection of forest ecosystems, territorial planning and agrarian reform, integration of local population in natural resource management, and poverty alleviation.

It is important to note that we define policy broadly to include programs and initiatives, as well as specific instruments (thereafter referred to as policies for simplicity) (Porro et al., 2008). While the workshop was used to gain a current, expert-led assessment of the policy contexts, literature syntheses were used to gain a more comprehensive and evidence-based assessment of approaches that espoused and/or led to environmental sustainability and poverty alleviation in the Amazon. The mixed methods were used sequentially: the workshop was used initially to inform and focus the selection of policies, and to inform the initial selection of literature. These, combined with our appraisal of the literature (within both the academic peer-reviewed and grey literature domains, published either in English or Portuguese), enabled the triangulation of our findings. Beyond listing policies, the focus groups, and literature appraisals provided insights into policy context and content. These components of our analyses are described below.

2.2. Analysis of policy context and content

We gave particular attention to the influence of the international environmental and poverty-oriented agenda on national and regional policies that affected the Amazon. To this end, we chronologically mapped the progression of the selected national policies and positioned these along a timeline against major international programs, initiatives, and instruments. This approach provided a framework to analyze the extent to which international domains collaborated with and/or supported the emergence of paradigms in this field in the Brazilian Amazon. It is also true that Brazil has been an international leader in advancing conservation targets to socio-economic outcomes (Schwartzman et al., 2013) and in signing agreements to curb carbon emissions for global climate regulation (May et al., 2011). The policy context analysis gave insight into the primary objective of selected policies. As described above, these were categorized as conservation and protection of forest ecosystems, territorial planning and agrarian reform, integration of the local population in natural resource management, and poverty alleviation. These objectives are not mutually exclusive as some policies may have the dual objective of conserving forests while alleviating poverty. PES schemes and Reducing Emissions from Deforestation and Forest Degradation (REDD+) provide examples. Yet, while potentially contributing to poverty alleviation, it has, above all, the prime goal of reducing GHG emissions arising from deforestation and forest degradation.

Once we identified its primary objective, we analyzed each selected policy by examining whether: (i) it was specifically designed for the Amazonian region, allowing us to assess the pertinence of policies to the ES and PA in the regional context; (ii) it made implicit or explicit reference to the ecosystem services concept, if it made clear reference to the 'benefits people obtain from ecosystems' (MA, 2005); and (iii) linked ES and PA. The benefits can be of a provisioning, supporting, cultural or regulating nature. The stated assumption that 'people benefit from the services that ecosystems provide' is key. If a policy focuses on forest protection purely for biodiversity conservation (without a clear reference to the benefits that biodiversity provides to humankind), then an implicit rather than explicit reference to ES is assumed. If clear causal relationships are stated among these domains, then the presence of linkages between ES and PA is assumed. A policy stating the importance of ecosystem integrity for the maintenance of local livelihoods would be included in this category. A policy promoting sustainable development through the management of natural resources – without further specifying how sustainable development is delivered – would fall into the category where "poorly stated" links are assumed. These criteria form the basis of the columns displayed in Table 1 (Section 3).

The selected policies were further analyzed to identify management options for operationalization, which refers to the general impacts of the policy on ES and impacts of the policy on poverty alleviation, as described below. The evaluation of the ES and PA policy impact applied in this paper was derived from published secondary data, a literature review, and case studies, based on expert responses from the workshop.

2.2.1. Management options for operationalization

Most policies related to natural resource management and conservation attempt to regulate and shape human behavior (Porro et al., 2008; Tomasella et al., 2012). To do so, policies depend on specific management options for their operationalization. Three categories of management options are defined: enablement, incentives, and disincentives. Enablement options provide the general conditions necessary to facilitate behavior change. These can be driven by either private or public initiatives. Examples of enablement policies include property rights transfer, credit, technology transfer, partnerships (e.g. public-private), and environmental education or awareness-building (Porro et al., 2008). Meanwhile, incentive options reward behavioral change.

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Table 1
List of selected policies, their generic description and targeted communities.

Year	Selected policy	Description of policy	Communities affected[a]	Categories
1960	Demarcation of indigenous land	Territorial demarcation of indigenous houseland	TI, CA	National/ public
1965	Brazil Forest Code	Federal Territorial planning delimiting areas for cultivation /agriculture and protected areas like: high mountain tops, stream lakes and riparian vegetation	CA, U	National/ public
1974	*Flonas* (National forests)	National Forests protected for State use—mainly timber in the Amazon	TI	National/ public
1980	Extractive Reserves (*Resex*)	Areas designed to sustainable use of forest products, e.g. rubber extraction in the Amazon	TI	National/ Public
1990	PPG7 *ProVarzea*, *ProManejo, Pro Ecotour*	Pilot Program to promote protection and sustainable use of floodplain ecosystem (*ProVarzea*) and upland forest(*Pro Manejo*) and ecotourism as a sustainable economic alternative (*Pro Ecotour*) in the Amazon	TI	National/ state/ public
1999	Sustainable Development Reserves	An innovative type of protected areas, where a mosaic of sustainable use and strictly protection of the ecosystem is implemented	TI	National/ state/ public
2000	National System for conservation units	Implementation of several protected areas as a government attempts to reduce deforestation and promote social inclusion	TI, CA	National/ public
2003	Program for Protected Areas of the Amazon (*ARPA*)	Program for the operationalization of the protected areas including sustainable economic alternatives and inclusion of traditional people in the Amazon	TI	National/ public
2004	*Proambiente* pilot program in Brazil	Program for the Socio-Environmental Development of Rural Family Production. Provides compensation to rural Brazilians for environmental services afforded by forests	TI	National/ public
2004	Plan of action for the prevention control of deforestation in the Amazon (*PPCDAM*)	Governament attempt to control and reduce deforestation in the Amazon, including: territorial planning, command and control, and sustainable economic alternatives	TI, CA, U	National/ public
2005	*Bolsa Familia* and *Fome Zero*	The largest direct conditional cash transfer for poverty reduction in the country	TI, CA, U	National/ public
2005	*Projeto de Assentamentos Agro-extractivists* (*PAEs*)	Government initiatives for territorial planning and socio-economic development through sustainable development	CA, U	National/ state/ public
	Sustainable development (*PDS*)			National/ state/ public
	Collective Settlements (*PAC*)			National/ state /public
2006	Soya Moratorium	Civil Society, NGO and private sector initiative that result in the “embargo” of soya products to both national and international markets from recently deforestated areas in the Amazon	CA, U	Private and public
2006	Management of public forests and protected areas	Government attempt to control and reduce deforestation in the Amazon, including: territorial planning, command and control, and sustainable economic alternatives	TI	State/ private
2007	*Bolsa Floresta*	Largest PES Schema in the world	TI	State/ public
2008	Plan for sustainable Amazonia (*Plano Amazonia Sustentável*)		TI, CA	National/ state /public
2009	Beef Moratorium	Civil Society, NGO and private sector initiative that result in the “embargo” of beef products to both national and international markets from recently deforestated areas in the Amazon	CA	Private and public
2009	National Policy on Climate Change PES REDD+	National policy to curb green gas emissions (mainly from Amazonia deforestation) by 30% in 2020	U	National/ state/ public
2011	*Brasil Sem Miseria* (*Bolsa Verde*)- PES	Continuation of the *Bolsa Familia*, but including an environmental component for families who lives in protected areas	TI, CA	National/ state/ public

[a] TI=traditional/indigenous; CA=colonists/agriculturalists; U=urban.

These include payments for ES, subsidies, tax exemptions, and certification. Finally, disincentives penalize poor behavior. Taxes and fees, regulations and fines, as well as cap-and-trade, would all be considered disincentive options (Porro et al. 2008).

2.2.2. Impacts on ES

This analysis qualitatively evaluates the extent to which a given policy has either promoted or undermined the protection of ecosystems. High impact implies success at achieving ecosystem conservation and protection. Clearly, for emerging policies, impacts remain to be evaluated (this includes the long-term impact on ES of the nascent *Bolsa Floresta*, PES, and Reducing Emissions from Deforestation and Forest Degradation (REDD) scheme. In such cases, unknown impact is indicated. Yet, for more consolidated policies, such as the *Demarcation of Indigenous Land* (an instrument aiming at the protection of specified forest lands), impacts were assessed by reviewing the success of the policy at limiting the expansion of agricultural frontiers, for instance (Zimmerman et al., 2001). Overall, the impact on ES in our evaluation was assessed qualitatively, mainly through examining forest cover maintenance and/or reduced deforestation rate at coarse spatial scale, as described in the literature.

2.2.3. Impacts on poverty alleviation

In a similar manner as described above, we also assessed the extent to which a policy has promoted or undermined social well-being. Well-being is understood as multi-dimensional. The numerous factors that affect well-being are distinguished, including

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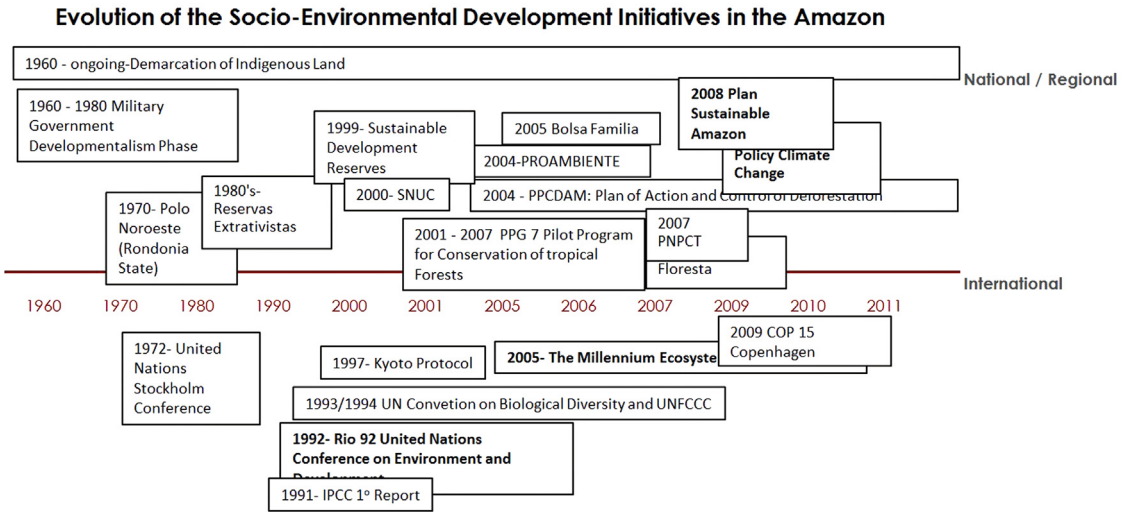

Fig. 1. Policy context in the Amazon. The figure shows the chronological progression of selected Brazilian Ecosystem Services and poverty alleviation policies against major international programs, initiatives and instruments.

satisfaction of the basic material needs (secure and adequate livelihoods, such as income and assets, sufficient food, adequate shelter, and access to goods), health, security (access to natural resources and security from natural and human-made disasters), and freedom of choice and action (ability of individuals to control their destiny and to achieve their values and goals) (MEA, 2003). Here, the impact of each policy on PA was evaluated as high when most of the aforementioned dimensions of well-being were addressed. An 'intermediate' impact represented the condition when only some of the elements were present, and low impact was when only one or two elements listed for well-being were achieved. In our assessment of policy impact, we also relied on secondary data providing indices and indicators such as HDI from the Brazilian Census and Statistical Bureau (IBGE), as well as a literature review.

3. Results and discussion

The results from focus group exercises informed the policies selected and the historical process analyzed in the paper. Table 1 provides a brief description of the policies selected by the Expert Elicitation workshop for analysis, according to the criteria described in the methodology session. In this table, we provide the date of the policy, name, generic description, and an indication of the targeted communities labeled as TI=traditional/indigenous, CA=Colonists/agriculturalists, and U=Urban.

Below, we present the results and a discussion arising from both our policy context and content analyses, based on the elicitation workshop and literature review.

3.1. Analysis of policy context

The key international initiatives and national process that were mentioned by the experts as influential in the context of the development of Brazil's regional and national policies are presented in Fig. 1 and are discussed below.

3.1.1. International initiatives: An overview

3.1.1.1. 1960s–1980s. From the early 1960s until 1984, Brazil was under a military regime. State control over the Amazon and national sovereignty through economic development was a top priority. The Special Secretariat of the Environment (SEMA) was created, primarily as a way to defuse harsh international criticism at the government's environmental performance (Schwartzman et al., 2013; Tomasella et al., 2012). The State was responsible for defining and presiding over the exploitation of the Amazon's natural resources. The policies implemented at this time were exempt from appraisal by the rest of Brazil's society (Lemos and Roberts, 2008).

Meanwhile, at the global level, issues of social and economic inequality in developing countries were emerging, notably after the Stockholm Conference (1972). In many developing countries, social movements materialized to challenge the then dominant paradigm of "protected areas without people" (May et al., 2011). In Brazil, and especially in the Amazon, social movements were joined by environmental ones, against the authoritarian military regime. These were critical at the dawn of the democratic transition in 1985 (Viola, 1987). It is worth noting the influence of the international scientific community at the time, which, by stressing the importance of linking ecosystem conservation to the welfare of local forest dwellers, contributed to these social movements in the Amazon (Balvanera et al., 2012; Egler, 2002). This phenomenon allowed the emergence, in the late 1980s, of novel conservation strategies linked with socioeconomic development goals in "International Conservation and Development Projects (ICDPs)" (Brooks et al., 2006; Browder, 2002).

3.1.1.2. 1990s–2000s. In 1991, the G-7 industrialized nations (Germany, UK, Japan, France, Italy, USA, and Canada) established the *Pilot Program to Conserve the Brazilian Rain Forest* in Brazil (PPG-7) (Table 1). The key aim of the programme was the promotion of sustainable development in tropical forests, with funding support from multilateral donors (World Bank and UNDP). In the Amazon, the successes of the program were manifold, and included the multiplication of local and small-scale projects and the promotion of civil society for tackling socio-environmental problems (Araujo and Léna, 2010). Perhaps most significantly, PPG-7 stimulated the development of two important programs in the Region: ProVarzea and Pro Manejo. This development was followed shortly by the 1992 Rio Summit. The summit promoted a broad dissemination of the sustainable development paradigm, and further stressed the need to eradicate poverty on a global scale. Of relevance in the context of the Amazon are two UN conventions created to facilitate the implementation of globally sustainable development goals. These focused on the conservation of biological diversity and on mitigating climate

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change (UNFCCC) (Fig. 1). For the Amazon, the ratification of the Convention on Biological Diversity was particularly significant. Beyond attempting to protect the rich diversity of life on Earth, it led to increased consideration of issues of equity and fairness and to the importance of engaging local communities in biodiversity management and protection. The United Nations Framework Convention on Climate Change (UNFCCC) also had a major influence on policy-making in the Amazon. As an expression of a global commitment to address global climate change (Schwartzman et al., 2013) and given the international recognition of the importance of the Amazon for regulating the global carbon cycle, the UNFCCC would have far-reaching influence on the design of policies for the Amazon (discussed below). While the Rio Summit and the resulting CBD and UNFCCC addressed mainly ES issues, the UN Millennium Declaration (Fig. 1) stressed the importance of social inclusiveness and poverty reduction of forest-dependent populations. The Rio Summit of 1992, the Convention on Biological Diversity, the UNFCCC, and the UN Millennium Declaration have all contributed to the generation of novel policies at the national scale. In parallel to these international commitments, have emerged such policies as the Extractive Reserves (Lima, 1999), the Sustainable Development Reserves, the Plan for Sustainable Amazonia (*Plano Amazônia Sustentável* – PAS) as a PES schema, and REDD+ (Table 1). The Millennium Declaration also spurred changes in Brazil and the Amazon through a boost to the *Bolsa Familia* program (Table 1). These are discussed in detail in our analysis of policy content. Below, a chronological perspective on the development of Brazilian national and regional policies is presented.

3.1.2. National and regional initiatives: An overview

3.1.2.1. 1960s–1980s. Under the military government, the region experienced what is known as a "Development phase". This phase was characterized by economic growth and prosperity, promoted by the depletion of natural resources and the marginalization of traditional communities (Alves, 2007; Araujo and Léna, 2010). The military government instituted a series of land use policies supported by specific management options, notably fiscal incentives, as well as subsidies to promote the expansion of the agricultural frontier. This approach encouraged significant investments for growth through the development of infrastructure and advancement in cattle ranching, and monocultures activities, and stimulated mass migration from poorer regions in Brazil to the Amazon for employment. Such mass migration movements significantly altered the Amazon landscape, imposed substantial pressure over natural resources, and had a significant impact on local livelihoods (Chernela, 2005). In Manaus, the population grew nearly threefold, from more than 340,000 inhabitants in the 1960s to approximately 925,000 in 1980 (Pinho et al., 2012). Overall, however, such rapid development contributed little to social development (Alves, 2007). Instead, it masked the state of poverty characteristic of the majority of "native" inhabitants in the region (Araujo and Léna, 2010; Pinho, 2007). Concomitant to this economic development phase, around the 1960s, environmental legislation began to regulate the use and access of, and mandate the protection of natural resources, starting with the National Forest Code. Different categories of protected areas, mainly in forested land, were created as National Parks and Forests, which influenced the actual configuration of the protected areas in Amazonia (Fig. 2). Yet, with the exception of the demarcation of indigenous lands (1960s), these instruments did not include social dimensions. Worse, the establishment of National Forests ('Flonas') in 1974, for instance, which aimed at the protection of forest ecosystems – mainly for timber exploitation – stimulated the forced displacement of traditional inhabitants. Such a lack of social focus in Flonas led to severe conflicts. The Catholic Church advocated strongly for social rights and inclusion to secure land use rights and entitlements for local communities, and called for agrarian reform in the Amazon. It spurred and helped organize social movements (Alves, 2007; Chernela, 2005). This development led to the emergence of many local community organizations, whose mission was to help communities gain rights to land, its use, and access to natural resources (Betts et al., 2008; Chernela, 2005; Futemma et al., 2002; McGrath et al., 1993). Such efforts led to noteworthy changes in policy-making towards the late 1980s, but the construction and articulation of environmental policies in Brazil remained dominated by the elite, technocratic interests, and the military government (Araujo and Léna, 2010; Tomasella et al., 2012).

3.1.2.2. 1990s–2000s. As a consequence of such social and political disputes, changes in rhetoric occurred towards the late 1980s. This period saw the establishment of the first Extractive Reserves (*RESEX*). These were specifically designed for the sustainable use of forest products (e.g.: rubber extraction) and, unlike previous programs, the *RESEX* were meant to ensure 'social inclusion within protected areas' (Table 2).

Soon after their establishment in the Amazon, the *RESEX* were further followed by the design of a "National System for Conservation Units", which are managed as mosaics of conservation units, divided into zones. These allow the sustainable use of resources, or emphasize strict ecosystem protection and/or the combination of both (Table 2). This shift in narratives is significant: from this period onwards, some of the concerns articulated through social movements were starting to be taken into consideration at higher levels (Araujo and Léna, 2010; Chernela, 2005; Pinho et al., 2012). While this shift represented a step forward, progress towards increased consideration of poverty alleviation in the region remained partial. The region remained under enormous economic and political pressure from centrally promoted initiatives such as the expansion of agricultural commodities, the development of hydropower dams, and the development of valuable mining prospects (Fearnside, 2008). It has only been since the late 1990s that a transition to a more participatory and socially inclusive process has genuinely taken place. Thanks to the sociopolitical struggle of forest dwellers in the Amazon and the influence of international programme and policies, progress in environmental policy since then has been significant. Today, smallholder settlements in the Brazilian Amazon cover approximately the same area as national forests—22 million ha (Merry et al., 2006). Meanwhile, 144 million ha are designed for community use only, based on a management plan, and 38 million ha for sustainable use. Of the remaining land, 44 million ha are strictly protected areas (SFB, 2009), as shown in Fig. 2. However, the assigned benefits generated from these distinct new categories of protected areas continue to pose a challenge for the social-economic development of local inhabitants. Recently, monetary rewarding to forest stewards is thought within the matrix of economic value assigned to distinctive categories of services that is provided by ecosystem (Muradian et al., 2010). Nonetheless, it have led to serious discussion about the implementation of PES schemes and REDD and REDD+ program for the Region (May et al., 2011). These schemes are discussed in the section on policy content analysis below.

3.2. Analysis of policy content

The next section presents our analysis of policy content. Table 2 highlights each policy's primary objective, its specificity to the Amazonian region, its level of reference to the ES concept, and the extent of its consideration for linkages between ES and PA. It further extends this analysis and presents each policy's predominant management options for operationalisation, as well as its overall impact on ES and PA.

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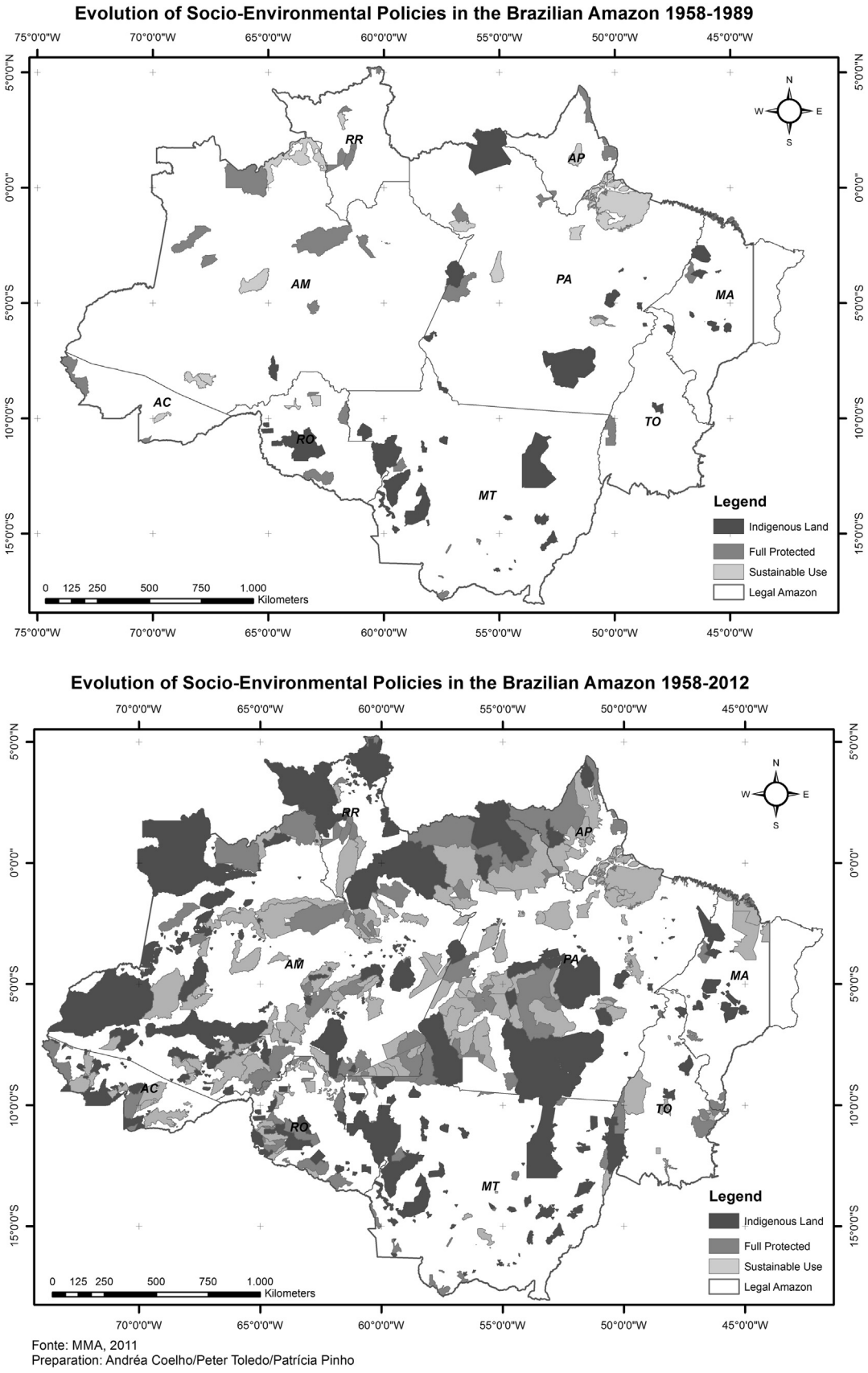

Fig. 2. Map of the Brazilian Amazon showing the evolution of Socio-Environmental Policies in the Brazilian Amazon 1958 to 2012.

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Table 2
The table highlights each policy's: primary objective, specificity to the Amazon, level of reference to ES concept, and extent of linkages between ES and PA and management options for operationalisation, and it's impacts on ES and PA.

	Selected policy	Primary Objective[a]	Amazon specific	ES Concept	ESPA Links[b]	Key management Options	Impact on ES	Impact on PA
1960	Demarcation of indigenous land	Forest conservation	No	Implicit	+	Enablements	High	Low
1965	Brazil Forest Code	Forest conservation	No	Implicit	–	Discentives	High	Low
1974	Flonas (National forests)	Forest conservation	Yes	Implicit	–	Discentives	Moderate	Low
1980	Extractive Reserves (Resex)	Local integration	Yes	Implicit	+	Enablements	High	Low
1990	PPG7 Pro Varzea and Pro Manejo	Local integration	Yes	Implicit	+	Enablements	Moderate	Moderate
1990	PPG7 Pro-poor Ecotour	Local integration	Yes	Implicit	+	Enablements	Moderate	Low
1999	Sustainable Development Reserves	Local integration	Yes	Explicit	+	Enablements	High	Moderate
2000	National System for conservation units	Local integration	No	Implicit	+	Discentive	High	Low
2003	Program for Protected Areas of the Amazon (ARPA)	Forest conservation	Yes	Explicit	–	Discentives	High	Low
2004	Proambiente pilot programme in Brazil	Forest conservation	No	Implicit	+	Incentives	Moderate	Moderate
2004	Plan of action for the prevention control of deforestation in the Amazon (PPCDAM)	Forest conservation	Yes	Implicit	–	Discentives	High	None
2005	Bolsa Familia and Fome Zero	Poverty alleviation	No	Absent	–	Incentives	Unknown	High
2005	Projecto de Assentamentos Agro-extractivists (PAEs) Sustainable development (PDS) Collective Settlements (PAC)	Territorial planning	Yes	Implicit	+	Enablement	Moderate	Moderate
2006	Soybean Moratorium	Forest conservation	Yes	Absent	–	Discentives	High	None
2006	Management of public forests and protected areas	Forest conservation	Yes	Explicit	+	Incentives	High	Low
2007	Bolsa Floresta	Forest conservation	Yes	Explicit	+	Incentives	Unknown	Moderate
2008	Plan for sustainable Amazonia (Plano Amazonia)	Forest conservation	Yes	Explicit	+	Incentives	Unknown	Low
2009	Beef Moratorium	Forest conservation	Yes	Implicit	–	Discentives	High	Low
2009	National Policy on Climate Change	Forest conservation	No	Implicit	–	Discentives	Unknown	Low
2011	Brasil Sem Miséra (Bolsa Verde)	Poverty alleviation and forest conservation	No	Implicit	+	Incentives	Unknown	Unknown

[a] Forest conservation = conservation and protection of forest ecosystems (includes climate change mitigation); territorial planning = territorial planning and agrarian reform; local integration = integration of local population in natural resource management; and finally, poverty alleviation.
[b] Presence of linkages = +; Absence of linkages = –.

Table 3
Qualitative analytical framework for ES and PA policies in tropical regions.

Components	Policy effectiveness	Grade (0–10)
1. Lead Objectives (ES and/or PA)	Success instruments of implementation*	Example, item **a** in this session
2. Specificity (general/targeted)	Focus on targeted social groups	Items **b, f in this session**
3. E.S. concept (weak/strong)	International Awareness	Items **c, d** in this session
4. Linkage ES/PA (weak/strong)	Scale oriented (local/regional)	Items **e** in this session
	Time frame of policy duration in years (short/long term)	Discussion

Not until the late 1980s, with the establishment of Extractive Reserves (*RESEX*), did policies for the Amazon make implicit reference to the concept of ES (Table 2). By stressing environmental and conservation goals and by presenting clear social inclusiveness components, the *RESEX* stressed an understanding of the direct links between PA and ES (Tables 2 and 3). Notably, one of the program's original objectives was to deliver improved socio-economic well-being to rubber tappers by allowing them access and control of natural resources.

RESEX were a direct consequence of grassroots movements, which advocated the eradication of land grabs for cattle ranching, logging, and rural settlements (Allegretti, 1990). It was also a strategy to reduce social inequality on land concentration and rights to access and control natural resources. An icon of this movement is Chico Mendes, a rubber tapper murdered by a large land-owner in the late 1980s. After his death, pressure mounted from the public at the national and international level. This pressure was so vigorous that it forced Brazil to create the first of four *RESEX* in the Amazon: the Chico Mendes Extractive Reserve, with 930,230 ha (Acre province). It was followed shortly by others in different States of the Brazilian Amazon (Millikan et al., 2002). From their inception, the impact of these RESEX on the protection of ecosystems has been important (Allegretti, 1990; Vadjunec and Rocheleau, 2009), but the impact has since faded in importance, following recent changes in land use practices by forest dwellers. The market price for latex being low, the poverty alleviation potential of the program has decreased (despite the high subsidization of the production). Hence, while *RESEX* makes implicit reference to social inclusiveness (and has forest dwellers at the center), many questions remain as to the program's long-term social and economic sustainability (Araujo, personal communication). Nowadays, the RESEX's forest dwellers claim alternative options of forest production, as well as means to reach the market, for their sustainable activities. In comparison with the first National Forest Code of 1965, the demarcation of indigenous land, and the design of National Forests, the *RESEX* program illustrates that the dual moral imperative of environmental protection and socio-economic well-being can both be addressed, which is a positive evolution. Not only were the former legal instruments not designed for the Amazon region specifically, but these lacked social inclusiveness and made no implicit linkages between ES and PA (Table 2).

Capitalizing on the legacy of UN Rio 92, various programs were created: PPG-7 ProManejo, ProVarzea, Pro-Poor Ecotour and the Mamirauá Sustainable Development Reserve (SDR) (Table 2). These were designed specifically to integrate the priorities of human development and the protection of the Amazon's natural capital with the international environmental agenda of Rio 92 and

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support from multilateral donors (such as PPG-7). Ecotourism and community-based natural resources management (CBM) were advocated as compatible with the protection of the ecosystem, and as being socially inclusive and economically viable. These program initiatives from PPG-7 were promoted by international NGOs working in the region, constructed to empower local communities, and crafted based on traditional common property regimes (Ostrom, 1990; Pinho et al., 2012). This development helped guarantee the effective application of international funding, but PPG-7 has not been successfully implemented in the region because of the failure to transform most of the programs into long-term public policies. Critiques of the program implemented in the PPG-7 phase are several. They range from criticism of the divergence between interest from multilateral donors and that of local government and the dialogue were mainly mediated by NGOs and not a direct expression of local's reality to the program (Sawyer, 2008).

On the other hand, since its establishment in 1999, the SDR Mamirauá has invested heavily in local -based community management options, namely: capacity building, the promotion of health and education, and the diversification of economic alternatives for the inhabitants of the reserve (Queiroz, 2005). Important elements that contribute to well-being are addressed, including access to natural resources, health, clean water, and empowerment, through participatory processes in the management of natural resources (Castello et al., 2009; Lima, 1999). Evidence of success is abundant in the literature and was highly spoken of by the experts during the workshop. For example, SDR Mamirauá led to the successful implementation of a co-management plan for endangered fish species such as Pirarucu (*Araipama gigas*) and was later spread throughout the basin (Almeida et al., 2009; Futemma et al., 2002; Lima, 1999). Today, only species from community-based managed lakes (certified by the Brazilian Environmental Agency, IBAMA) can be marketed in the region (Castello et al., 2009; Pinho et al., 2012). The dissemination and local uptake of these initiatives throughout the basin illustrates their success in fostering social well-being through ecologically compatible economic activities.

Despite the progress listed above, the 2000s were also characterized by increased tension between civil society and the government on the one hand, and between economic, social, and environmental interests, on the other. These tensions were originally fueled by dramatic increases in deforestation: from 18,000 km^2 deforested in 2000 (Prodes[1]), to more than 27,000 km^2 by 2005 (INPE, 2010). Moreover, new economic development initiatives (notably *Avança Brasil*[2] in 2000, and *Programa Aceleração do Crescimento*[3] in 2005) were further driving forest degradation. This trend helped fuel opposition. These economic development programs were designed to support investments in infrastructure (dams and ports, power lines, roads building, and modernization), as well as investments for the exploitation of natural gas and for the privatization of forests (Agrawal et al., 2008; Hall, 2008; Tomasella et al., 2012). These projects predominantly benefitted communities located outside the region (Lemos and Roberts, 2008). Hence, they faced persistent opposition from indigenous, traditional and environmental groups, as well as from the international community (Sandbrook et al., 2010). It is worth highlighting the example of the planned Belo Monte dam[4] on the Xingu River. The project aims at providing energy to mega-urban centers such as of Sao Paulo. Despite continuous opposition since its inception, the USD 11 billion project is still going ahead (Sandbrook et al., 2010).

The increase in deforestation rates and the impact of development programs on Amazon biodiversity, natural resources, and climate regulation (Agrawal et al., 2008) gave rise to further mobilization at the international and national levels, involving stakeholders from academia, NGOs, and civil society. Greenpeace launched an international campaign to lobby consumers not to purchase soy produced on recently cleared Amazonian forestland (Lemos and Roberts, 2008). This campaign resulted in a Soy Moratorium in 2006 and the design of disincentives to deforestation (Table 2). These developments slowed soybean expansion and, consequently, deforestation in the Amazon. The "beef moratorium" of 2009 implemented a similar strategy to oppose cattle ranching for beef production in the Amazon (Table 2). The moratorium took the form of an agreement between major beef producers not to raise cattle in recently deforested areas in the Amazon.

Additional governmental command-and-control measures aimed at reducing deforestation in the Amazon were established in the 2000s. Among these were the Amazon Region Protected Areas (ARPA) in 2003, the Plan of Action for the Prevention and Control of Deforestation in the Amazon (PPCDAM) in 2004, and the Management of public forests and protected areas in 2006 (Table 2). These measures have clear ES protection objectives, but have either weak or no social components. PPCDAM infers no relationship between ES and PA (Table 2). Meanwhile, the management of public forests and protected areas program provides concessions to private logging companies to exploit forested areas. The program further attempts to address social concerns, yet it has been challenged for lacking appropriate mechanisms for implementation and effectiveness on the ground. Its design was influenced by the MEA release in 2005. Hence, it makes an explicit reference to the ES concept, stresses social inclusion, and acknowledges the importance of ES for PA (Table 2). While local communities are encouraged to participate (Borner et al., 2010), few community-based forestry management practices are in place.

It is the Millennium Development Goal of reducing hunger and extreme poverty by 2015 that has provided the greatest incentive for Brazil to boost its social programs for poverty alleviation in 2005. Starting with "*Fome Zero*" (Zero Hunger), the "*Bolsa Familia*" (family grant), and recently the "*Brazil sem miséria*" (Brazil without poverty) program were launched. These provide regular supplies of food and cash to Brazil's estimated 44 million inhabitants living below the official poverty line (Hall, 2006). Starting in 2003, these programs have provided conditional cash transfers and are rooted in the social development policy of Brazil (Hall, 2006). They focus on education, nutrition, and the provision of subsidies for domestic natural gas (for cooking), and are the largest of such schemes worldwide (Hall, 2006). In the Amazon region, the *Bolsa Familia* reaches almost 2 million families (MDSCF, 2011).

The impact of the *Bolsa Familia* policy on poverty alleviation has been considerable: as many as 2 million Amazonian inhabitants are beneficiaries and have since moved above an income-based poverty line (MDSCF, 2011). Although the *Bolsa Familia* was not established specifically for the Amazon region (Table 2), its positive impact on the livelihood of poor communities living in the forest has been widely documented (MDSCF, 2011).

Nevertheless, questions remain as to the extent to which the *Bolsa Famılia* and all other direct cash transfer programs really

[1] Prodes is a system to monitor the deforestation rate in the Amazon, developed by the National Institute for Space Research (INPE), which directly collaborates with the Brazilian Environmental Agency (IBAMA) for command-control approaches.

[2] Forward Brazil (approximate translation by authors).

[3] Program to accelerate growth (approximate translation by authors).

[4] The Belo Monte dam is expected to flood 200 square miles of the Xingu River and at least one-third of Altamira city, displace around 12,000 indigenous people from their land, promote a high in-migration rate of workers into the region from other states of Brazil and relocate thousands of residents (Sandbrook et al., 2010).

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contribute to poverty alleviation (in its widest meaning). Hall (2006) contends that poverty reduction in the Amazon can only be achieved through robust job-creating economic growth, combined with equitable redistributive policies and social investment. Moreover, it has been argued that direct cash transfer programs for social development create greater dependency on governmental aid and political patronage. One further critique of the programs is that they are devoid of environmental components, limiting the potential for creating synergies between environmental matters and socio-economic development. In the Amazon, environmental and socio-economic development synergies were to be achieved through the creation of the *Proambiente* pilot program in 2004. The pioneer program relied on market-based instruments (payments for ecosystem services) and rewarded forest dwellers for safeguarding forested areas. The program owes its historical emergence to grassroots movements: forest dwellers seeking rural development, access and use of natural resources (Hall, 2008). Hence, the program was designed through partnership between those rural socio-environmental movements, NGOs, and the federal government (Hall, 2008). The program explicitly incorporated the concept of ES and social inclusiveness, but also acknowledged ecosystem services as an innovative paradigm for poverty alleviation in the Amazon (Table 2). Despite the accomplishments of the program, some flaws have been documented. In 2008, Hall concluded that lack of funding consistency and of compatibility with existing regional development policies has limited the performance and implementation capacity of the program. The Ministry of Environment closed the project down in 2010 without reaching conclusions as to its effectiveness. *Proambiente,* nevertheless, opened the path for other market-oriented program, such as *Bolsa Floresta* and the Plan for Sustainable Amazonia (*Plano Amazônia Sustentável* – PAS) (Tables 1 and 2).

Created in 2007, *Bolsa Floresta* is now the largest PES program worldwide. It is operational in 15 protected areas, covers 10 million hectares in the State of Amazonas, and caters to more than 35,000 individuals (Malhi et al., 2008). *Bolsa Floresta* falls under the umbrella of the Zona Franca Verde policy (Lei n.3.135), launched in 2003 by the Secretary of Sustainable Development (SDS) in Amazonas State. The policy aims to reduce deforestation, improve livelihood of forest dwellers, and mitigate climate change through market-based instruments (Malhi et al., 2008). Since 2009, the program has been managed by the *Fundação Amazônia Sustentável* (FAS) and operates by donations now approximating USD$ 30 million (from the Norwegian Government, Amazonas State, and private companies). This program could serve as a further learning platform for the design of REDD+.

REDD+ implementation in the Amazon region is in its infancy. Both Acre and Amazonas states are more advanced than others in implementing a REDD platform. Actually, FAS is currently testing a pilot project, *Projeto Juma* in Amazonas State. It is premature to assess its effect on ES and PA. Acre established in 2010 a state-level policy for payment for ecosystem services. As for the Amazonas state, it is premature to evaluate the benefits of the policy. It is important to note that Brazil has been a key player in REDD+ agreements at the Climate Change Convention in Copenhagen (May et al., 2011). Although no systematic analysis exists of the impact of REDD and REDD+ impact on ES and PA in the region, the overall expectation for these REDD and REDD+ instrument has been much assumed as a poverty reduction and sustainability instrument rather than an effective instrument to reduce deforestation as set up at the UNFCCC commitment (May et al., 2011; Schwartzman et al., 2013). In particular, the recent rounds of conversations between the State of California in the US and several governors of the Brazilian Amazon have culminated in the 'REDD+ Offsets Working Group'. This working group reached an understanding of the importance of the role played by the sub-government level in using the carbon market to increase public budgets and in implementing further conservation and social development policies at state-level.

Central to REDD+ effectiveness implementation in the region is the issue of land tenure and ownership status. It has been pointed out that private property ownership has been the main obstacle to command-and-control initiative (May et al., 2011) and that state control over REDD schemes could undermine local communal arrangements for forest management, which are crucial for maintenance of ES (Sandbrook et al., 2010).

As a policy instrument, REDD+ is really promising (Nepstad et al., 2008; Sandbrook et al., 2010) and Brazil has shown the capacity to reduce the Amazon deforestation rate over the past few years (INPE, 2010), thereby demonstrating the partial success of command-and-control mechanisms. Brazil is still faced the challenge of bringing social development that is rooted in equity and fairness to the majority of its inhabitants (Hall, 2008; Le Tourneau et al., 2013). For instance, in Latin America, both Mexico and Costa Rica have long-term experience with PES schemes that have been promoted as a natural resources management option, despite evidence that the poor still face discrimination, with very limited real benefits on the ground (Balvanera et al., 2012). Thus, the challenge is not unique to Brazil, but common to most developing countries, where the environmental and poverty reduction agenda are set in different secretaries and Ministries (Adams et al., 2004), and thus tacked separately. However, REDD and PES schemes for the Amazon have been promoted as offering an opportunity to bridge these agendas, and provide market biodiversity and ecosystem services. Analysis of the firsts REDD and PES projects shows that these initiatives will act upon different levels of management and coordination with a complexity of actors and stakeholders involved. This pattern of administrative scheme creates uncertainty in defining if they will cause positive or negative feedbacks in the PE and PA in the future. The conclusion drawn from our analysis and presented below will nevertheless be of value for further development of this nascent program in the Amazon.

4. Qualitative analytical method for ES and PA policy analysis

ES and PA policies are a reflection of societal needs and aspirations that have profound effects in land use change (Fig. 2), especially in the face of conservation awareness and developmental pressure. A model for analyzing integrated or correlated policies under the same territory is provided in this study (Table 3), which aims to construct a comparative database of similar patterns of governmental actions. Such a framework is important for studying and understanding historical environmental trends in conjunction with economic growth in tropical regions, as well as for helping more timely responses from decision-makers and stakeholders in times of rapid landscape transformation and eventual risks through global change. This paper provides a method of organizing different scales regarding the complexity in terms of time-frames and social dimensions of a large array of policies that may affect local or regional populations and threatened ecosystems. From our policy context and content analysis, several conclusions can be drawn about linking Ecosystem Services to poverty alleviation in Amazonian policy-making.

4.1. Successfully implemented instruments were those incorporating incentives and/or enabling management options

Among the policy instruments reviewed here, the most successful ones were those incorporating incentives or enabling management options. Enablement usually involves some degree of empowerment

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through the provision of land tenure rights and access. Such conditions are crucial for ensuring long-term forest protection and well-being.

However, since as early as 1965, disincentive approaches have prevailed (Table 3). More specifically, in the Amazon, command-and-control approaches have been dominant. These have also been designed in reaction to criticism from national and international environmental campaigns about heavy deforestation rates. Yet, command-and-control has had limited successes, as a result of lack of compliance and associated monitoring and enforcement systems. More recently, incentive-based management options have started to emerge in the policy-making landscape. Through the provision of access and control of resource uses, as well as by ensuring tenure to local inhabitants, the SDR Mamirauá and Proambiente strongly realized a relatively positive balance of outcomes between ES and PA. To ensure long term efficiency of PES schemes, lasting capacity-building and improved access to healthcare, education, and technology (see Hall, 2008) are needed. Lack of the above will simply lead to dependence on governmental assistance and international aid. Ideally, REDD+ schemes are likely to be hybrid instruments for a more robust ES and PA policy that promotes market-based incentives, but relies heavily on command-and-control mechanisms for compliance and implementation.

4.2. Policy instruments have focused on traditional/indigenous people. Limited attention has been given to colonists, agriculturists or the urban poor

The majority of the policy instruments in place in the Amazon have focused on traditional/indigenous people. Far less attention has been devoted to colonists, agriculturists and the urban poor. It is worth highlighting the linkages that exist between poverty alleviation in rural areas and poverty alleviation in urban areas. The lack of appropriate health and education in rural areas, as well as the difficulty in accessing markets, has led to migration movements towards urban centers. Hence, alleviating rural poverty may help relieve urban pressures. Poverty alleviation measures targeted specifically at urban migrants are, however, also needed. Consistent with global trends (Erb et al., 2009), the majority of the Amazonian population is now becoming urban. As cities rely heavily on non-urban regions for their provision of ES (forests, farming, and natural resources), there is an urgent need to design poverty alleviation instruments for urban settings as well. These groups are faced with significant and yet unique challenges. Beyond being poorly educated and poorly equipped for an urban job market, migrants face limited gap-filling or safety net options from ES in an urban context. Hence, while in an urban setting, the linkages of poverty alleviation with ES may be complex. These should not be disregarded but, instead, further investigated.

4.3. International fora have been critical in influencing regional policy making

As evidenced by the UN Rio 92, MEA, the Soy Moratorium Act and multilateral programs (such as PPG-7), international policies have played a critical role in influencing Brazil's policy of maintaining Amazonian ecosystem integrity and promoting social justice. Generally, and as demonstrated in this paper, Brazil has been taking action, as well as responding proactively to these international efforts. In some instances, the country has further set the scene for other developing countries' involvement in international agreements. Brazil's establishment of RESEX and Sustainable Development Reserves are unique examples in the world and its commitment to reducing its emissions from deforestation and forest degradation from the Amazon (of 80% by 2020) are only a few of such examples (Sandbrook et al., 2010).

4.4. International influences remain however outweighed by development interests

The effectiveness of socio-environmental international influences has been partly outweighed by development interests (Lemos and Roberts, 2008). The Amazon is prized for agricultural commodity expansion and falls under the direct economic influence of international markets. The prioritization of development interests is further exemplified in international environmental negotiations. There, Brazil has been highly protective of its Amazonian region (Sandbrook et al., 2010). This policy partly stems from the country's desire to retain full sovereignty and governance of its resources for development. Brazilian development interests in the Amazon persist and are continuously expanding into the Amazon region.

4.5. Policy instruments linking ecosystem services to poverty alleviation need to be regional and context-specific

Because the Amazon is heterogeneous socially and ecologically, no single policy will be efficient in tackling environmental conservation and socio-economic development. In particular, the Amazon region has historically been the locus of many violent disputes over access, control, and ownership of natural resources (Alves, 2007; Araujo and Léna, 2010). Hence, policy instruments that link ecosystem services to poverty alleviation need to be regional and context-specific, operating at multiple levels, and nested within other initiatives and sectors. This reality calls for polycentric governance systems that allow for institutional diversity and sufficient flexibility to adapt through an implementation process (Ostrom, 2005).

4.6. Local communities need secure rights and access to natural resources, as well as integration into markets

In order for ecosystem services to become a means of poverty alleviation, local communities must gain secure rights and access to natural resources, and must be well-integrated with market realities.

5. Concluding remarks

In conclusion, this article provides an analysis of the historical evolution of ecosystem protection and poverty alleviation policies in the Brazilian Amazon. The context within which these policies were created, and the analysis of their content, provided the backbone for this research, as displayed in the analytical framework. The Amazon has seen a wide range of policy implementation periods. The early 1960s were characterized by Brazil's militarization. At the time, it was advocated that growth be achieved through the exploitation of resources with limited consideration for ecosystem protection or poverty alleviation. This approach contrasts with the recent emergence and application of the ecosystem services paradigm, which has led to the design of novel initiatives, specifically aimed at addressing both ES and PA concerns. Payments for ecosystem services fall within this latter category. This historical overview provides a wide- ranging perspective on the context within which policies in the Amazon are implemented. It also provides a useful portrayal of successes and failures. If Brazil is serious about addressing the challenge of maintaining ecosystem service provision while alleviating poverty, it must learn from its own experiences. This paper contributes towards this goal, and also provides a framework for policy analysis, with which tropical countries can analyze the impact of

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their policies for ES and PA, which will certainly be crucial for long term sustainability under environmental change.

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