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Ecological-economic zoning in the Legal Amazon in light of the literature on the implementation of public policies and institutional arrangements

O zoneamento ecológico-econômico na Amazônia Legal à luz da literatura sobre implementação de políticas públicas e arranjos institucionais

Arilson FAVARETO^{1,2}, Allan RAZERA^{3*}

¹ Federal University of ABC (UFABC), Santo André, SP, Brasil.

² Centro Brasileiro de Análise e Planejamento (CEBRAP), São Paulo, SP, Brasil.

³ Ministério do Desenvolvimento Agrário e Agricultura Familiar (MDA), Brasília, DF, Brasil.

* Contact email: allanrazera@yahoo.com.br

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ABSTRACT: This article aims to analyze aspects related to the trajectory and milestones that guide the elaboration of the Ecological-Economic Zoning (ZEE) in the Legal Amazon. The hypothesis that we intend to demonstrate is that two characteristics of the institutional arrangement that involves the elaboration of ZEEs influence their results. First, it is an instrument with limited enforcement power. The effective application of the guidelines produced depends on the effective commitment and interest of public and private actors. As a result, political disputes end up determining whether or not a dynamic of data and guidelines production is maintained and whether they are turned into laws and other public management mechanisms. Second, the ZEE is also characterized by coordination problems that condition its applicability – there are problems of vertical coordination, as processes conducted on a state scale have a good deal of autonomy in relation to what is defined and conducted at the federal scale; and there are problems of horizontal coordination, since a good part of the guidelines produced in the ZEEs involve the competencies of other areas of government in addition to the environmental one, and it does not foresee mechanisms for harmonizing these conflicts. Even with these reservations and in addition to the heterogeneity mentioned here regarding the results achieved, over the years an impressive mass of data and maps has been produced and a significant technical and institutional capacity has been formed for the treatment of this type of information. This constitutes an expressive institutional heritage, dispersed in a set of organizations, but which can be reactivated in order to qualify the public debate and decision-making processes, provided there is a favorable environment for its use.

Keywords: ecological-economic zoning; Amazon; territorial planning.

RESUMO: Este artigo tem como objetivo analisar aspectos relativos à trajetória e aos marcos que orientam a elaboração do Zoneamento Ecológico-Econômico na Amazônia Legal. A hipótese que se pretende demonstrar é que duas características do arranjo institucional que envolve a elaboração dos ZEEs influenciam seus resultados. Primeiro, trata-se de um instrumento com limitado poder de *enforcement*. A aplicação efetiva das indicações produzidas depende do efetivo compromisso e interesse dos atores públicos e privados. Com isso, disputas políticas acabam determinando a manutenção ou não de uma dinâmica de produção de dados e diretrizes e de sua transformação em leis e outros mecanismos de gestão pública. Segundo, o ZEE é caracterizado também por problemas de coordenação que condicionam sua aplicabilidade – há problemas de coordenação vertical, à medida que os processos conduzidos em escala estadual têm boa dose de autonomia em relação ao que é definido e conduzido na escala federal; e há problemas de coordenação horizontal, pois boa parte das indicações produzidas nos ZEEs envolvem as competências de outras áreas de governo para além da ambiental e ele não prevê mecanismos de harmonização entre estes conflitos. Mesmo com as ressalvas e para além da heterogeneidade aqui apontada quanto aos resultados alcançados, ao longo destes anos se produziu uma massa impressionante de dados e mapas e se formou uma capacidade técnica e institucional significativa para o tratamento deste tipo de informações. Isso constitui um patrimônio institucional expressivo, disperso em um conjunto de organizações, mas que pode ser reativado, de forma a qualificar o debate público e os processos de tomada de decisões, havendo um ambiente favorável a seu uso.

Palavras-chave: zoneamento ecológico-econômico; Amazônia; planejamento territorial.

1. Introduction¹

The Ecological-Economic Zoning (ZEE) is a legal zoning and diagnostic tool that has many potential uses. In the Legal Amazon, and depending on the circumstances, this instrument has already been used for different and sometimes antagonistic purposes, such as, for example, allowing the creation of conservation units or reducing legal requirements related to legal reserves, strengthening public administration and its ability to act in territorial planning or enable the construction of infrastructure works. In a less tangible way, the ZEE elaboration process also provides a public space for debates on land use, encouraging the mobilization of different groups interested in the subject and the training of public and private teams to produce information and evaluations on the various dimensions of the territories: their natural resources, their uses and

its inhabitants and the corresponding ways of life (Favareto & Razera, 2020).

The origin of the ZEE is the result of an attempt to combine two previous traditions of similar instruments:

(a) Instruments aimed at regulating the use of urban land, of a normative nature (that is, they define which activities and types of construction are permitted and which are prohibited in a given territory); and

(b) rural planning, generally marked by an indicative character (according to this tradition, the documents compile technical data on soil quality, water availability, available infrastructure and other variables so that public and private actors can make better informed decisions about which crops have greater or lesser chance of success in a given location).

¹ This article is a summarized and modified version of a research report produced for the 2030 Amazon Project.

In an attempt to combine these two approaches, the ZEE acquired a technical and political character. However, the available literature usually treats these two dimensions separately. There is a tradition of studies and research focused on methodological debates that involve socioeconomic and environmental analysis and diagnosis (Ab'Saber, 1989; Vasconcelos *et al.*, 2013; Sadecket *et al.*, 2017). There are also those that emphasize aspects associated with politics and power relations (Acselrad, 2004; Tovar *et al.*, 2021). On the other hand, recent literature on the implementation of public policies (Lotta, 2019) and on the sociology of public action (Porto de Oliveira & Hassenteufel, 2021) has attempted to unify these two domains, emphasizing both the design of policies and programs and, above all, the processes through which results are produced that are often not foreseen by laws and formal normative instructions.

This article summarizes the experience of the ZEE in the Brazilian Legal Amazon, with the following main objectives:

(a) describe the main aspects related to the conception and the milestones that guide this instrument;

(b) provide a picture of what has been done within the scope of the Legal Amazon and in the states comprised by this area; and

(c) present some of the main results and consequences derived from the zoning elaboration processes in the different states. Each of these objectives corresponds to one of the sections of the article.

The hypothesis to be demonstrated is that:

i) the results obtained with the ZEE are very heterogeneous, varying significantly in the different states;

ii) the determinants of this diversity of situations result from characteristics of the institutional arrangement (Lotta & Favareto, 2016) that involves its elaboration – its limited enforcement power, which makes the dynamics of effective involvement of agents dependent on the commitments, interests, conceptions and practices of political actors affected by the scope of this instrument; the lack of sound horizontal coordination mechanisms (between areas and sectors of government) and vertical coordination (between the different levels of the federative structure), aspects that are especially important, since the guidelines derived from the ZEE involve this multiplicity of spaces and intragovernmental actors;

iii) Despite these limits, the ZEE experience produced an impressive mass of data and maps and formed a significant technical and institutional capacity for the treatment of this type of information; this translates into an outstanding institutional heritage, dispersed across a group of people and organizations, but which can be reactivated in order to qualify the public debate and decision-making processes, provided there is a favorable environment for its use.

2. Conception and trajectory

The idea of ecological-economic zoning was already present in laws and decrees at the time of the Land Statute (Law No 4,504/1964) (Brazil, 1964). However, its implementation only began to have practical effects between the end of the 1970s and the beginning of the 1980s, thanks to the growing concern with the environmental impacts of human action. The expression “ecological-economic zoning” appears for the first time in a report made by the working group established by Decree No.

83,518/1979 (Brasil, 1979), aimed at preparing measures for a forestry policy for the Brazilian Amazon (Schubart, 1996). It was at this time, after the adoption of the National Environmental Policy (Law No. 6,938/1981) (Brazil, 1981), that zoning began to emerge as an instrument for planning and land use in Brazil.

In the Amazon, the occupation process driven by the Federal Government had been taking place at an accelerated pace since the 1970s, which made the region the focus of growing socio-environmental concerns. The ZEE emerges as an attempt to order the use of the territory, combining multiple criteria, associated with the various dimensions of space: criteria of an economic nature (functions and uses for the installation of economic activities) and criteria of an environmental nature (functions and uses for the environmental conservation and maintenance of ecosystem attributes). Since then, the federal government has created a series of bodies, normative guidelines, practices and attributions that, as a whole, constitute a “national system of ZEEs”.

The landmark of this process of institutional creation is the Federal Constitution of 1988 (Brasil, 1988a), which strengthened the national system for the defense of the environment, defining the role of federative entities and expanding the role of states and municipalities in territorial management (Art. 21, paragraph XI). One week after the enactment of the Constitution, the federal government created the Our Nature Program, the trade name of the Legal Amazon Ecosystem Complex Defense Program (Decree No. 96,944/1988) (Brasil, 1988b). This program was the first interministerial government initiative aimed at curbing deforestation in the Legal Amazon. The next piece of the “national system

of ZEEs” was created by Decree No. 99.540/1990 (Brasil, 1990). In this decree, the Legal Amazon is reaffirmed as a priority area for planning via ZEEs, the Coordinating Commission for the Ecological-Economic Zoning of the National Territory (CCZEE) is created, and the Department for Strategic Affairs (SAE) becomes the coordinating body of the Commission. Finally, in 1991, the federal government created the Ecological-Economic Zoning Program (PZEEAL), initially directed only to the Legal Amazon.

Such initiatives had an immediate impact on the states. In 1991 and 1992, the states of the Legal Amazon signed agreements with the federal government and created state commissions to prepare their respective zoning. The states received support from multiple organizations and initiatives, both national and international. For example, the National Institute for Space Research (INPE) offered training to the states through an agreement signed with SAE. At the same time, the Agricultural and Forestry Plan of Rondônia (Planaflo) and the Agricultural Development Program of the State of Mato Grosso (Prodeagro) were negotiated and implemented, both financed by the World Bank. Both Planaflo (RO) and Prodeagro (MT) provided for large investments in infrastructure, but also required the local state governments to carry out the ZEE.

As of 1994, the Pilot Program for the Conservation of Tropical Forests (PPG7) started to support the states of the Amazon region in the formulation of Integrated Environmental Management Projects (PGAIs), in which the ZEE was one of the components. Finally, the member countries of the Amazon Cooperation Treaty (TCA) committed themselves to coordinating a regional project, with Brazil respon-

sible for preparing a methodological proposal for the ZEE and monitoring changes in land use. The projects carried out covered border areas in Brazil, Colombia, Peru and Venezuela.

The elaboration of ZEEs gained greater urgency in 1996, when INPE announced what would be the highest annual rate of deforestation in the Legal Amazon until today. A total of 29,000 km² were deforested in 1995. National and international pressure was significant and during this period a Provisional Measure was issued, increasing the legal reserve from 50% to 80% on rural properties located in the Amazon Biome. However, some institutional strengthening initiatives did not generate the expected results. For example, in 1997, and after two years of discussions, the Territorial Management Laboratory of the Federal University of Rio de Janeiro (LAGET/UFRJ) published, at the behest of SAE, the document “Detailing the Methodology for Executing Ecological-Economic Zoning by States of the Legal Amazon”. This methodology faced resistance and its guidelines were followed only by the State of Amapá and, even so, partially (Souza, 2008).

In 1999, Brazil’s President extinguished the SAE (MP no 1.795/1999) (Brasil, 1999) and transferred the attributions related to territorial organization and the ZEE to the Ministries of National Integration and the Environment (MMA). At the MMA, the Department for Policies for Sustainable Development (SDS) started to coordinate ZEE projects and manage the PZEEAL, inserted in the Multiannual Plan (PPA) 2000-2003. In 2001, the President created the ZEE-Brasil Consortium (Decree of December 28, 2001, unnumbered) (Brasil, 2001), which is managed by the SDS/MMA. This consortium aimed to facilitate inter-institutional

cooperation and thus maximize the use of human and financial resources in the bodies responsible for preparing ZEEs. Finally, in 2002, the federal government published a decree establishing minimum criteria for a ZEE to be considered valid. These criteria include aspects related to format, content, construction process and ways in which the ZEE should be stored and distributed.

From 2002 to 2004, deforestation in the Amazon reached, according to INPE data, an impressive 74,818 km². In response, the federal government created the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAM). The PPCDAM includes the ZEE as one of the key instruments in land and territorial planning.

With this institutional base in place and with the sharp drop in deforestation that occurred from 2004 onwards, the new initiatives were dedicated to disseminating the results and improving the preparation of ZEEs. For example, in 2006 the SDS/MMA launched the Integrated Map of the ZEEs of the States of the Legal Amazon, made available in digital media and published the third (and current) version of the “Guidelines of the ZEE of the National Territory”. In 2007, the federal government updated Decree No. 4,297/2002 (Brasil, 2002), which defines the minimum criteria for a ZEE to be considered valid by the federal government. Among the alterations carried out, the incorporation in the normative text of the products, scales, competences and functions of the different ZEEs stands out. In 2008, the federal government created the National Infrastructure for Spatial Data (INDE). INDE provides geographic information and data, helping different levels of government to prepare and integrate ZEEs. An important moment in the evolution of the ZEE in Brazil occurred in the 2008-2010

period, with the Ecological-Economic Macrozonning of the Legal Amazon and its institution by Decree No 7,378/2010 (Brasil, 2010b).

In addition, on May 25, 2012, Law No. 12,651 (Brasil, 2012) was published, which instituted the new Forest Code. According to MMA (2016) this law was an important milestone for the ZEE Brasil Program, as it compels Brazilian States to prepare and approve their ZEEs according to a unified methodology, going beyond the minimum criteria established in a previous decree, from 2002. On the other hand, the new Forest Code increased the possibility of the ZEE indicating the reduction of the Legal Reserve of rural properties located in areas of the Amazon Biome, from 80% to 50% of the property area.

Between 2016 and 2018, the priority that had been given to ZEEs decreased, but the CCZEE is operating. During this period, the federal government published a summary document on the situation of the ZEE in the Legal Amazon (MMA, 2016). The government also anticipated the spread of the use of this instrument in other parts of the country. In the 2016-2019 PPA, the ZEE Brazil Program provided for the Macro ZEE of the Midwest region and the MacroZEE of the São Francisco River Basin.

As of 2019, the sphere of influence of the rural producers segment expands, extending its domain to the high echelon of bodies typically interested and involved in the ZEE, such as MMA, FUNAI and INCRA. Decree No. 10,087/2019 (Brazil, 2019) was published during this period. It dismantled several stages in the formulation and implementation of social and environmental policies, including CCZEE and the ZEE-Brasil Consortium. These initiatives placed the National ZEE Program in a sort

of institutional limbo. Figure 1 presents a timeline of the main landmarks of ZEE in the Legal Amazon.

3. ZEE initiatives in the Legal Amazon

The Legal Amazon is the scene of a chronic conflict between those groups that perceive it as a frontier of occupation and a source of opportunities for private accumulation and those that give greater priority to its socio-environmental importance. Both the process of creation, elaboration and implementation of ZEEs and the products generated by them aim to mediate these interests and, in this condition, become objects of dispute.

3.1. Environmental diagnosis of the Legal Amazon

The Legal Amazon Ecological-Economic Zoning Program (PZEEAL) was created by the federal government in 1991, with the primary objective of preparing an environmental diagnosis of the region. In 1993, the program published a Technical Note detailing its action strategy (IEA, 1993; Schubart, 1996, Becker & Egler, 1997) and determining that this diagnosis would be carried out in three stages. The plan was as follows: In the first stage, two inventories would be drawn up, na inventory on nature (geology, climatology, biology, hydrology) and another of society (demography, health, economic activities, existing infrastructure). In the second stage, three thematic analyzes would be elaborated, with the following focuses (a) ecological, (b) spatial and (c) institutional. Finally, in the third stage, integrative analyzes would be elaborated under the heading of Environmental Quality.

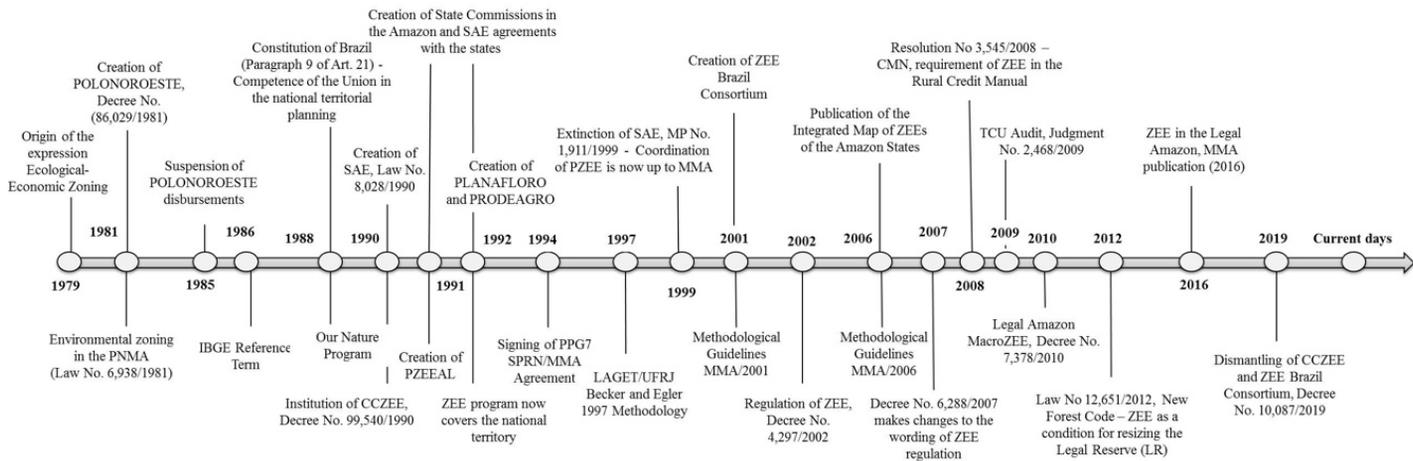


FIGURE 1 – Timeline of the Ecological-Economic Zoning, with emphasis on the Legal Amazon
 SOURCE: Elaborated by the authors.

Initially, the results of this diagnosis should serve as a basis for states to prepare ZEEs on a regional scale. In practice, the diagnosis was only concluded in 1995, but the SAE guided the states to define the priority zones for zoning from 1993 onwards, as the agreements between the federal and state government levels were ready, the states had already created its state commissions, both Planaflo (RO) and Prodeagro (MT) were under way and TCA negotiations were at an advanced stage. The PPG7 would start the following year. The urgency was evident.

The Legal Amazon Environmental Diagnosis was presented to the public in 1995, but the CCZEE classified the results as incomplete. This decision led to a sort of impasse in the trajectory of the ZEE in Brazil. The efforts that culminated in this version of the Diagnosis and its macro-regional scale were put aside, and the CCZEE opted to support with greater emphasis the elaboration of state ZEEs. However, in 2004 and 2005 there was a new shift in this emphasis. The Diagnosis was retrieved and served as a basis for the elaboration of the “Integrated Map of the Ecological-Economic Zoning of the States of the Legal Amazon”. This map proposes a unified classification system for the entire region and, by extension, a unified management proposal. The Map recognizes three usage categories, each with two subcategories:

- a) Consolidated Uses / To be consolidated (Areas with defined production structure / to be defined; and Areas to recover and/or reorganize);
- b) Controlled Uses (Fragile Areas; and Areas with sustainable management); and
- c) Special uses (Proposed Protected Areas; and Created Protected Areas).

After publishing the abovementioned Diagnosis and Map, the federal government started to prepare the MacroZEE of the Legal Amazon. This process was carried out between 2008 and 2010, as part of the broader strategy expressed by the Sustainable Amazon Plan (PAS). An important step in this process was the creation of a Working Group (Ordinance MMA no 414/2009) (MMA, 2009) composed of representatives from CCZEE, the ZEE Brasil Consortium and the nine states of the Legal Amazon. This Working Group designed a process for preparing the Legal Amazon MacroZEE in five phases:

- a) Phase 1: Theoretical-Conceptual Framework;
- b) Phase 2: Data Collection and Integration;
- c) Phase 3: Sector Consultations through Dialogue Tables;
- d) Phase 4: Strategies through Workshops; and
- e) Phase 5: Public Consultation, with analysis and incorporation of the suggestions sent.

During the workshops (Phase 4), the concepts of the different scales of work and the mechanisms of compatibility between the MacroZEE and the state ZEEs were consolidated, and in the last stage, the public consultation, the characterization and strategies were reviewed for each Territorial Unit. The MacroZEE document was approved by the CCZEE and made available for public consultation in January 2010, and the final document was approved on March 23, 2010. On December 1, 2010, Decree No. 7,378 (Brazil, 2010b) approved the MacroZEE of the Legal Amazon as a guidance instrument for the formulation and spatialization of public policies for development, territorial planning

and the environment, as well as for the decisions of the private agents. The final document contains 104 strategies for the three types of territories and ten established territorial units:

a) Territories-Zone: Defense of the forest heart based on productive activities; and Defense of the Pantanal by valuing local culture, traditional activities and tourism;

b) Border-Territories: Containment of Expansion Fronts with Protected Areas and Alternative Uses; and Diversification of Agroforestry and Livestock Frontiers; and

c) Territories-Network: Organization and Consolidation of the Logistic Pole for Integration with the Pacific; Regulation and Innovation to Implement the Agroindustrial Complex; Readjustment of the Araguaia-Tocantins Productive Systems; Strengthening Polycentrism at the Pará-Tocantins-Maranhão junction; Strengthening Coastal Capitals, Mining Regulation and Supporting Diversification; and Strengthening the Amazon-Caribbean Integration Corridor.

4. Status of state initiatives for ecological-economic zoning

As the federal government advanced with the MacroZEE throughout the Amazon, the states of the region also invested in the elaboration of their respective ZEEs. In total, in the 1991-2018 period, the nine states of the Amazon conducted or are conducting 25 processes for the preparation of ZEEs, at different scales (typically 1:250,000 and 1:1,000,000) and with different amplitudes of territorial coverage (total or partial). Of these 25 processes, 17 have already been fully prepared by those in charge, 13 were prepared and later standar-

dized (that is, instituted through state legislation), and 7 were prepared, standardized and validated by CCZEE.

On a scale of 1:1,000,000, virtually all states completed the ZEEs or Macrodiagnoses, except for Tocantins and Roraima. In Tocantins, a ZEE on a scale of 1:250,000 is under way; but, like Roraima, a ZEE has not been completed at 1:1,000,000 scale. Of the completed ZEEs, most were not validated by the CCZEE. Only Amazonas, Pará and Maranhão had their ZEEs on a 1:1,000,000 scale completed and validated for the entire state area. In Table 1, the compiled general data and the percentage of the area of the states of the Amazon covered by ZEEs on a scale of 1:1,000,000 can be seen.

A little over 90% of the area of the nine states had ZEEs designed and completed (4,586,944 km²), with 61.7% having ZEEs completed and validated (3,139,050 km²) and 28.5% having ZEEs completed but not validated by CCZEE (1,447,894 km²). Tocantins and Roraima represent almost 10% of the area of the states of the Amazon without coverage by ZEEs. In this scale, no ongoing elaboration processes were identified.

All states have advanced to 1:250,000 scale detailing, but few have been completed and validated. The current status of coverage, completion and validation of ZEEs at this more detailed scale can be summarized as follows:

Group 1 – ZEEs completed on a scale of 1:250,000 for the total area of the states (Acre and Rondônia – have been completed and validated; Mato Grosso and Roraima (the latter, under review) – have been completed, but without validation);

Group 2 – ZEEs in progress on a scale of 1:250,000 for the total area of the states (Amapá,

Maranhão (part corresponding to the Amazon Biome) and Tocantins);

Group 3 – Completed ZEEs at scale 1:250,000 for specific regions of the states: (Amazonas (Purus), Pará (West, East/Calha Norte) – Completed and validated; Amapá (South Area) and Tocantins (Bico do Papagaio) – Completed but not validated); and

Group 4 – ZEEs in progress at a scale of 1:250,000 for specific regions of the states (Amazonas (Madeira, Baixo Amazonas); Pará (Coastal Zone, no definition of area)).

Table 2 below indicates the percentage of area in the states of the Amazon that have ZEEs on a scale of 1:250,000 completed and validated (35.6%), completed but not validated, in progress, and still without coverage.

TABLE 1 – Percentage of the area of the states of the Amazon covered by ZEEs on a scale of 1:1,000,000.

State	Completed and Validated		Completed and not Validated		Not yet Covered	
	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%
Acre	0	0.0%	164,123	100.0%	0	0.0%
Amapá	0	0.0%	142,815	100.0%	0	0.0%
Amazonas	1,559,159	100.0%	0	0.0%	0	0.0%
Maranhão	331,937	100.0%	0	0.0%	0	0.0%
Mato Grosso	0	0.0%	903,366	100.0%	0	0.0%
Pará	1,247,954	100.0%	0	0.0%	0	0.0%
Rondônia	0	0.0%	237,590	100.0%	0	0.0%
Roraima	0	0.0%	0	0.0%	224,300	100.0%
Tocantins	0	0.0%	0	0.0%	277,720	100.0%
Total	3,139,050	61.7%	1,447,894	28.5%	502,0220	9.9%

SOURCE: Elaborated by the authors based on information of the MMA (2018).

TABLE 2 – Percentage of the area of the states of the Amazon covered by ZEEs at a scale of 1:250,000.

State	Completed/Validated		Completed/Not Validated		In Progress		Still without Coverage	
	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%
Acre	164,123	100.0%	0	0.0%	0	0.0%	0	0.0%
Amapá	0	0.0%	25,346	17.7%	142,815	100.0%	0	0.0%
Amazonas	252,985	16.2%	0	0.0%	330,971	21.2%	975,203	62.5%
Maranhão	0	0.0%	0	0.0%	131,526	39.6%	200,411	60.4%
Mato Grosso	0	0.0%	903,366	100.0%	0	0.0%	0	0.0%
Pará	1,155,166	92.6%	0	0.0%	0	0.0%	92,788	7.4%
Rondônia	237,590	100.0%	0	0.0%	0	0.0%	0	0.0%
Roraima	0	0.0%	224,300	100.0%	0	0.0%	0	0.0%
Tocantins	0	0.0%	33,434	12.0%	277,720	100.0%	0	0.0%
Total	1,809,864	35.6%	1,186,446	23.3%	883,032	17.4%	1,268,402	24.9%

SOURCE: Elaborated by the authors based on information of the MMA (2018).

5. Political, budgetary and administrative aspects in the preparation of state ZEEs

The states of the Legal Amazon have been managing their ZEE elaboration and implementation processes through State Commissions. Some states also have Technical or Executive Commissions to support the State Commission. These committees are very active during the periods of elaboration of the ZEEs and lose importance after the work is completed. They may remain for long periods without having an effective action.

The states adopt different arrangements and formats in the elaboration of their ZEEs, involving different actors and institutions. In general, coordination is carried out by the team of the State Department of Planning or State Department of Environment, through the hiring of technical consultants and consulting companies. The states also have the support of institutions specialized in certain themes. In addition, the strategies and tools that sought to ensure society's participation in the ZEE elaboration processes have also varied a lot.

Although the technical and political discussion about the ZEE is concentrated in the State Commissions, its approval and homologation has a political importance that invariably involves other stages. In some states, the State Environmental Councils participate in the discussion and approval of the ZEE. Almost always, higher political levels of the state government and, sometimes, the State Legislative Assemblies participate in the analysis and propose adjustments.

The elaboration of the ZEE can be financed by the State, with its own resources, or in agreement with the federal government, or by external

institutions such as the World Bank. In general, processes involving the transfer of external resources are followed by the hiring of private consulting firms or consortiums of companies. When the resource comes mostly from the state government and agreements with the federal government, state technical teams, hiring individual consultants and partnerships are preferred.

The costs of developing ZEEs vary enormously. An analysis at the aggregate level does not reveal a direct correlation between development costs and the results generated. Table 3 shows some of the costs identified in the survey carried out, considering the process/project, the scale and the area.

It is possible that these different financing mechanisms and their different approaches regarding the elaboration of the ZEE have a different impact on the incorporation of the learning and results obtained in the technical teams, bases and systems of the state government. Similarly, a better understanding of the impact of different arrangements on the implementation of ZEEs would be desirable. However, this requires efforts that could not be contemplated by this study.

Creating a ZEE is a time-consuming process. In the Legal Amazon, the preparation period ranged from 2 to 12 years of work, with an average of 4.7 years, not counting breaks. Interestingly, the scale (1:250,000 and 1:1,000,000) and the territorial scope do not seem to correlate with the development time. The factors that seem to determine the different performances between the states are the policy of the state governments, the availability of resources, the methodology used, and the technical capacity of the states. Table 4 presents the temporal evolution of the elaboration process of the 17 ZEEs already concluded by the states of the Amazon.

TABLE 3 – Estimated costs per ZEE elaboration process, considering the scale and area in km².

Project	Scale	Area (km²)	Costs	Cost/km²
MacroZEE of Mato Grosso	1:1.000.000	903,366	US\$ 18,678,272.00	US\$ 20.68
MacroZEE of Amazonas	1:1.000.000	1,559,159	US\$ 1,726,518.00	US\$ 1.11
ZEE of Acre (Phase I)	1:1.000.000	164,123	BRL 1,350,000.00	BRL 8.23
MacroZEE of Maranhão	1:1.000.000	331,937	BRL 944,600.00	BRL 2.85
MacroZEE of Pará	1:1.000.000	1,247,954	BRL 617,000.00	BRL 0.49
Macrodiagnosis of Amapá	1:1.000.000	142,815	BRL 300,000.00	BRL 2.10
ZEE Rondônia - 1st Approach	1:1.000.000	237,590	US\$ 50,000.00	US\$ 0.21
ZEE Rondônia – 2nd Approach	1:250.000	237,590	US\$ 20.000.000,00	US\$ 84.18
ZEE Roraima	1:250.000	224,300	BRL 3,955,771.58	BRL 17.64
ZEE Acre (Phase II)	1:250.000	164,123	BRL 2,400,000.00	BRL 14.62
North Tocantins ZEE	1:250.000	33,434	US\$ 610,000.00	US\$ 18.24
ZEE of the South Area of Amapá	1:250.000	25,346	BRL 473,735.00	BRL 18.69

SOURCE: Elaborated by the authors based on Souza (2008), MMA (2016) and others

TABLE 4 – Time evolution in the elaboration of ZEE in the states of the Legal Amazon.

Projects Elaborated	Beginning	Pause	End	Calendar years	Working years
ZEE of Acre (Phase I)	1999	n/a	2001	3	3
ZEE of Acre (Phase II)	2003	n/a	2007	5	5
Macrodiagnosis of Amapá	1991	1992-1994	1995	5	2
ZEE of the South Area of Amapá	1997	n/a	2000	4	4
MacroZEE of Amazonas	1998	1999-2007	2009	12	3
ZEE of the Purus Sub-region (AM)	2009	n/a	2011	3	3
MacroZEE of Maranhão	2000	2003-2013	2014	15	4
MacroZEE of Mato Grosso	1991	n/a	1992	2	2
ZSEE of Mato Grosso	1994	2004-2008	2011	17	12
ZSEE of Mato Grosso (Review)	2016	n/a	2018*	3	3
MacroZEE of Pará	1992	1993-1999	2005	14	7
ZEE of the West Zone of Pará	2005	n/a	2008	4	4
ZEE of the East Zone and Calha Norte (PA)	2009	n/a	2010	2	2
ZEE of Rondônia – 1st Approach	1987	n/a	1991	5	5
ZEE of Rondônia – 2nd Approach	1993	n/a	2000	8	8
ZEE of Roraima	1998	n/a	2002	5	5
North Tocantins ZEE	1997	n/a	2004	8	8

*Estimated completion date, not available in official documents.

SOURCE: Elaborated by the authors.

Among the variables mentioned, the policy in force in the state governments is perhaps the factor that most helps to explain the performance of the zoning elaboration process. Different governments give greater or lesser priority to the ZEE as a territorial planning instrument, either because of its potential role in reducing environmental impacts or, conversely, as a way of justifying the reduction of the legal reserve area of rural properties. Changes in political arrangements in support of each of these goals can generate the observed discontinuities.

A question that has not yet been answered is why so many states seem to have difficulty in observing the legislation and methodological guidelines imposed by the federal government for the elaboration of ZEEs. Indeed, many of the elaboration processes have been delayed due to methodological issues, and as a result, some still lack legal recognition. One hypothesis is the lack of financial resources or technical capacity. Another hypothesis is the lack of adequate communication between state and federal agencies. A third hypothesis concerns the perception of risk in disregarding the minimum required methodological rite. Finally, a fourth hypothesis involves the political configurations in each State and the interest of important groups in conducting, standardizing, validating and implementing the different aspects of the ZEE.

6. Results and consequences of ZEEs

ZEEs typically generate four types of tangible results:

- (a) creation of conservation units;
- (b) reduction of requirements concerning the legal reserve on private properties, from 80% to

50% of the area, as authorized by the 12th reissue of MP No. 1,511 of June 27, 1997 (Brasil, 1997);

(c) facilitating the feasibility of licenses for the construction of infrastructure works such as roads;

(d) serve as a reference and legitimation base for territorial planning, which was evidenced by references to the ZEE in other normative instruments such as laws and decrees.

It is also possible that the ZEE elaboration process generates less tangible results, such as better knowledge of the territory by public and private agents, in addition to training public and private agents in the use of georeferenced databases. However, due to their nature, it is more difficult to systematize or report how these types of results are achieved.

Finally, the elaboration process provides for the creation of a public space for debates and deliberations, with concrete influence on the participants' contact networks and on their perception of the dynamics of interests and ambitions of those involved. Table 5 shows a list of results found in official documents and in the literature available on the subject. Acts attributed to the process of elaboration of ZEEs or that were based on these instruments as justification are mentioned there.

7. Final considerations

The present article sought to describe the aspects related to the trajectory and milestones that guide the elaboration of the ZEEs, to provide a picture of what was done in the Legal Amazon, and to present some of the main results produced by this experience.

TABLE 5 – Results and consequences of Initiatives of ZEEs in the states of Legal Amazon.

Types of Results	Description of Results / Identified Consequences
Creation of conservation units	<p>State parks, extractive reserves and state forests (Acre);</p> <p>State production forests (Amapá);</p> <p>Transfer of federal lands to the state (Amapá);</p> <p>Biodiversity corridor (Amapá);</p> <p>Creation of eight Full Protection Conservation Units (Rondônia), including three State Parks, three Ecological Stations and two Biological Reserves, in addition to Extractive Reserves and State Forests of Sustainable Yield;</p> <p>Creation of the largest block of Conservation Units in the tropical world (15 million hectares of Conservation Units created in December 2006 in Pará);</p> <p>Full Protection Conservation Units (Tocantins)</p>
Reduction of legal reserve (from 80% to 50%, for recomposition purposes)	<p>Acre – Federal Decree No 6,469/2008 (Brasil, 2008), which adopted Conama Recommendation No 007/2008 (CONAMA, 2008) (properties located in Zone 1 of ZEE);</p> <p>Amazonas (Purus sub-region) – Reduction was indicated in properties located in Sub-zone 1.1. The reduction was approved by CCZEE in 2012 but has not yet been analyzed by Conama and regulated by a Federal Decree.</p> <p>Mato Grosso – Pursuant to art. 24 of Law No 9,523/2011 (Mato Grosso, 2011), a reduction was indicated in properties located in forest areas. The reduction was not approved by federal authorities.</p> <p>Pará (West Zone) – properties located in Consolidation and Expansion Zones, established in art. 5, item I, of State Law No 7,243/2009 (Pará, 2009). Federal Decree No 7,130/2010 (Brazil, 2010a), which adopted Conama Recommendation No 010/2009 (CONAMA, 2009).</p> <p>Pará (East Zone and North Calha) – rural properties located in Consolidation Zones I, II and III, established according to State Law 7,398/2010 (Pará, 2010). Federal Decree of April 24, 2013, unnumbered (Brazil, 2013).</p> <p>Rondônia – Federal Decree No 5,875/2006 (Brazil, 2006) that adopted Recommendation No 003/2006 of Conama (CONAMA, 2006), authorizing reduction in properties located in Zone I.</p> <p>Roraima – According to State Complementary Law No 144/2009 (Roraima, 2009), the possibility of reduction in properties located in Unit II – Forests was foreseen. This possibility was not ratified in a Federal Decree.</p>
Creation of socio-environmental and development programs and policies	<p>Sustainable Development Program (Acre)</p> <p>Support Program for Indigenous Lands (Acre)</p> <p>Riparian Forest Recovery Program (Rondônia)</p> <p>Integrated Socioeconomic and Environmental Development Program (Rondônia)</p> <p>State Forest Policy (Amapá)</p> <p>Elaboration of the Agricultural Development Plan (Amapá)</p> <p>Water Resources Policy (Acre)</p> <p>State Program for Agrarian Reform (Acre)</p>

Institutional strengthening of government planning and creation of management, licensing and monitoring systems	<p>Environmental licensing project for rural properties and monitoring system for rural properties (Rondônia).</p> <p>Vegetation cover and land use monitoring system (Tocantins).</p> <p>State Integrated Territorial Management System (Amapá).</p> <p>Integrated Environmental Management Project (Acre).</p> <p>System of Sustainability Indicators of Municipalities of Acre (ISMAC) for ZEE monitoring and control</p> <p>State Multiannual Plan, of the Budget Guidelines Law, the Annual Budget Laws and administrative procedures of bodies and entities of the Direct and Indirect State Administration (Maranhão).</p> <p>Remote sensing and geoprocessing laboratory (Amapá).</p> <p>Territorial Planning Center (Amapá).</p> <p>Georeferenced database (Acre).</p> <p>Structure of geoprocessing and trained technical resources and creation of a socioenvironmental database (Tocantins)</p>
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SOURCE: Elaborated by the authors.

The ZEEs result in complex documents, usually with multiple volumes, georeferenced databases, diagnoses and maps that cover different dimensions, with identification of specific spatial units or zones with the corresponding guidelines for the use and conservation of existing natural resources.

After a period of successive regulations and attempts to harmonize efforts at the federal and state levels, it became clear that these initiatives are currently in an undefined institutional situation, given that some structures and competencies were dismantled by recent guidelines, making the future of this type of instrument uncertain. Nevertheless, it is significant that almost the entire area of the states that make up the Legal Amazon has prepared ZEEs, at least on a scale of 1:1,000,000. It is also significant that all states have made efforts to prepare ZEEs at 1:250,000 scale.

As for the current state of these efforts and the results generated, it is clear that while some ZEEs had more direct and objective impacts, others

generated ineffective or less visible results. However, undeniably, a large set of actions that appears in official documents or in the literature refers to the ZEEs, sometimes presenting themselves as a development of them, sometimes using them as a source of justification and legitimation of certain measures. It was also clear that these actions and developments can, at times, have opposite directions: in some cases, strengthening environmental conservation, and in others, enabling the easing of restrictions that resulted in degradation.

The differences observed in the pace of elaboration of the ZEEs and in the results produced cannot be attributed to formal aspects such as the size of the areas involved, the time taken to prepare the instrument or the scale adopted for detailing. All of this is quite variable, and there is no clear pattern. The explanation for this heterogeneity would require further study. However, as a hypothesis, two characteristics of the institutional arrangement that involve the elaboration of ZEEs that influence the dynamics portrayed here can be mentioned. First, it

is a document with limited enforcement power. The effective application of the indications produced therein depends on the effective involvement, commitment and interest of public and private actors. Thus, political disputes end up directly influencing the maintenance or not of a zoning production dynamic, the details of the elaboration process of each ZEE and the results and consequences that derive from the ZEEs. Second, the ZEE is also characterized by coordination problems that condition its applicability – there are vertical coordination problems, as the processes conducted on a state scale have a good deal of autonomy in relation to what is defined and conducted on a federal scale; and there are horizontal coordination problems, since a considerable part of the indications produced in the ZEEs involve the competences of other areas of government in addition to the environmental competence, and there are no foreseen mechanisms of harmonization between these conflicts.

Despite all these remarks, and beyond the heterogeneity pointed out here in terms of the actual results achieved, over the years the federal and state governments have produced results that deserve to be valued. Currently there is a considerable amount of information organized in the form of databases and maps. Furthermore, a state capacity was formed – both in technical terms and in the form of institutional learning – significant and relevant for the treatment of this type of information and its translation into public policies and legal regulations. This database, as well as this state capacity, is an undeniable asset. It is now spread across a set of organizations and people, inside and outside the State, but it is an institutional capital that can be reactivated and converted into innovations, further

strengthening the government policy, as long as the environment is favorable.

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References

- Ab'Saber, A. Zoneamento ecológico e econômico da Amazônia: questões de escala e método. *Estudos Avançados*, 3(5), 4-20, 1989. doi: 10.1590/S0103-40141989000100002
- Acelrad, H. Ecological-economic zoning in the Brazilian Amazon region: the imperfect panoptism. In: Stiftel, B.; Watson, V. (Eds.). *Dialogues in Urban and Regional Planning*. London: Routledge, 2004.
- Becker, B. K.; Egler, C. A. G. *Detalhamento da metodologia para execução do zoneamento ecológico-econômico pelos estados da Amazônia Legal*. Brasília: SAE/MMA, 1997.
- Brasil. *Lei n.º 4.504, de 30 de novembro de 1964*. Dispõe sobre o Estatuto da Terra, e dá outras providências. Brasília: DOU de 30/11/1964.
- Brasil. *Decreto n.º 83.518, de 29 de maio de 1979*. Institui Grupo de Trabalho destinado a estudar e propor medidas para formulação de uma política florestal para a Amazônia brasileira. Brasília: DOU de 30/05/1979.
- Brasil. *Lei n.º 6.938, de 31 de agosto de 1981*. Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação e dá outras providências. Brasília: DOU de 02/09/1981.
- Brasil. *Constituição da República Federativa do Brasil*,

de 5 de outubro de 1988. Brasília: Senado Federal, 1988.

Brasil. *Decreto n.º 96.944, de 12 de outubro de 1988*. Cria o Programa de Defesa do Complexo de Ecossistemas da Amazônia Legal e dá outras providências. Brasília: DOU de 13/10/1988.

Brasil. *Decreto n.º 99.540, de 21 de setembro de 1990*. Institui a Comissão Coordenadora do Zoneamento Ecológico-Econômico do Território Nacional e dá outras providências. Brasília: DOU de 24/09/1990.

Brasil. *Medida Provisória n.º 1.511-12, de 27 de junho de 1997*. Dá nova redação ao art. 44 da Lei nº 4.771, de 15 de setembro de 1965, e dispõe sobre a proibição do incremento da conversão de áreas florestais em áreas agrícolas na região Norte e na parte Norte da região Centro-Oeste, e dá outras providências. Brasília: DOU de 28/06/1997.

Brasil. *Medida Provisória n.º 1.795, de 01 de janeiro de 1999*. Altera dispositivos da Lei nº 9.649, de 27 de maio de 1998, que dispõe sobre a organização da Presidência da República e dos Ministérios, e dá outras providências. Brasília: DOU de 01/01/1999.

Brasil. *Decreto de 28 de dezembro de 2001*. Dispõe sobre a Comissão Coordenadora do Zoneamento Ecológico-Econômico do Território Nacional e o Grupo de Trabalho Permanente para a Execução do Zoneamento Ecológico-Econômico, institui o Grupo de Trabalho Permanente para a Execução do Zoneamento Ecológico-Econômico, denominado de Consórcio ZEE-Brasil, e dá outras providências. Brasília: DOU de 31/12/2001.

Brasil. *Decreto n.º 4.297, de 10 de julho de 2002*. Regulamenta o art. 9º, inciso II, da Lei nº 6.938, de 31 de agosto de 1981, estabelecendo critérios para o Zoneamento Ecológico-Econômico do Brasil - ZEE, e dá outras providências. Brasília: DOU de 11/07/2002.

Brasil. *Decreto n.º 5.875, de 15 de agosto de 2006*. Adota a Recomendação nº 003, de 22 de fevereiro de 2006, do Conselho Nacional do Meio Ambiente - CONAMA. Brasília: DOU de 16/08/2006.

Brasil. *Decreto n.º 6.469, de 30 de maio de 2008*. Adota a Recomendação nº 007, de 28 de maio de 2008, do Conselho Nacional do Meio Ambiente - CONAMA. Brasília: DOU

de 02/06/2008.

Brasil. *Decreto n.º 7.130, de 11 de março de 2010*. Adota a Recomendação nº 010, de 26 de junho de 2009, do Conselho Nacional do Meio Ambiente - CONAMA. Brasília: DOU de 12/03/2010.

Brasil. *Decreto n.º 7.378, de 01 de dezembro de 2010*. Aprova o Macrozoneamento Ecológico-Econômico da Amazônia Legal - MacroZEE da Amazônia Legal, altera o Decreto nº 4.297, de 10 de julho de 2002, e dá outras providências. Brasília: DOU de 02/12/2010.

Brasil. *Lei n.º 12.651, de 25 de maio de 2012*. Dispõe sobre a proteção da vegetação nativa; altera as Leis nºs 6.938, de 31 de agosto de 1981, 9.393, de 19 de dezembro de 1996, e 11.428, de 22 de dezembro de 2006; revoga as Leis nºs 4.771, de 15 de setembro de 1965, e 7.754, de 14 de abril de 1989, e a Medida Provisória nº 2.166-67, de 24 de agosto de 2001; e dá outras providências. Brasília: DOU de 28/05/2012.

Brasil. *Decreto de 24 de abril de 2013*. Autoriza a redução da Reserva Legal de imóveis rurais situados nas Zonas de Consolidação I, II e III, definidas na Lei Estadual nº 7.398, de 16 de abril de 2010, do Estado do Pará, que dispõe sobre o Zoneamento Ecológico-Econômico da Zona Leste e Calha Norte do Estado do Pará. Brasília: DOU de 25/04/2013.

Brasil. *Decreto n.º 10.087, de 05 de novembro de 2019*. Declara a revogação, para os fins do disposto no art. 16 da Lei Complementar nº 95, de 26 de fevereiro de 1998, de decretos normativos. Brasília: DOU de 06/11/2019.

CONAMA — Conselho Nacional do Meio Ambiente. *Recomendação n.º 003, de 22 de fevereiro de 2006*. Autorizar a redução, para fins de recomposição da área de reserva legal, para até, no mínimo, cinquenta por cento, das propriedades situadas na Zona 1, conforme definido no Zoneamento Sócioeconômico-Ecológico do Estado de Rondônia. Brasília: DOU de 27/03/2006.

CONAMA — Conselho Nacional do Meio Ambiente. *Recomendação n.º 007, de 28 de maio de 2008*. Recomenda ao Poder Executivo Federal autorizar a redução, para fins de recomposição, da reserva legal dos imóveis situados na Zona I, definida na Lei Estadual nº 1.904, de 5 de junho de 2007, do Estado do Acre. Brasília: DOU de 29/05/2008.

- CONAMA — Conselho Nacional do Meio Ambiente. *Recomendação n.º 010, de 26 de junho de 2009*. Recomenda ao Poder Executivo Federal autorizar a redução, para fins de recomposição, da reserva legal dos imóveis situados nas Áreas Produtivas (Zonas de Consolidação e Expansão), definidas no artigo 5, inciso I, na Lei Estadual n.º 7.243, de 9 de janeiro de 2009, do Estado do Pará. Brasília: DOU de 01/07/2009.
- Favareto, A.; Razera, A. *A experiência do Zoneamento Ecológico-Econômico na Amazônia Legal*. Relatório de Pesquisa para o Projeto Amazônia 2030. Belém: Centro de Empreendedorismo da Amazônia, 2020.
- IEA – Instituto de Estudos Amazônicos e Ambientais. Políticas Públicas e Meio Ambiente. O Zoneamento Ecológico-Econômico da Amazônia Legal. In: Fundação Ford. *Projeto Políticas Públicas para a Amazônia*, 1993. p. 97-112.
- Lotta, G. (Org.) Teorias e análises sobre implementação de políticas públicas no Brasil. Brasília: Enap, 2019.
- Lotta, G.; Favareto, A. Desafios da integração nos novos arranjos institucionais de políticas públicas no Brasil. *Revista de Sociologia e Política*, 24(57), 49-65, 2016. doi: 10.1590/1678-987316245704
- Mato Grosso. *Lei n.º 9.523, de 20 de abril de 2011*. Institui a Política de Planejamento e Ordenamento Territorial do Estado de Mato Grosso, e dá outras providências. Cuiabá: DO de 20/04/2011.
- MMA – Ministério do Meio Ambiente. *Portaria MMA n.º 414, de 20 de novembro de 2009*. Institui no âmbito da Comissão Coordenadora do Zoneamento Ecológico-Econômico do Território Nacional-CCZEE, o Grupo de Trabalho para participar da elaboração do Macrozoneamento Ecológico-Econômico da Amazônia Legal. Brasília: DOU de 23/11/2009.
- MMA – Ministério do Meio Ambiente. *O Zoneamento Ecológico-Econômico na Amazônia Legal. Trilhando o caminho do futuro*, 2016. Disponível em: <https://antigo.mma.gov.br/images/arquivo/80253/ZEE_amazonia_legal.pdf>. Acesso em: set. 2021.
- MMA – Ministério do Meio Ambiente. *Situação Geral do Zoneamento Ecológico Econômico no Brasil: iniciativas federais e estaduais*. Disponível em: <https://www.mma.gov.br/images/arquivo/80253/Estados/Informacoes_ZEE_2018_novo.pdf>. Acesso em: set. 2021.
- Pará. *Lei n.º 7.243, de 09 de janeiro de 2009*. Dispõe sobre o Zoneamento Ecológico-Econômico da Área de Influência das Rodovias BR-163 (Cuiabá - Santarém) e BR-230 (Transamazônica) no Estado do Pará - Zona Oeste. Belém: DO de 20/01/2009.
- Pará. *Lei n.º 7.398, de 16 de abril de 2010*. Dispõe sobre o Zoneamento Ecológico-Econômico da Zona Leste e Calha Norte do Estado do Pará. Belém: DO de 22/04/2010.
- Porto de Oliveira, O.; Hassenteufel, P. (Orgs.). *Sociologia da ação pública: teorias, abordagens e conceitos*. Brasília: Enap, 2021.
- Roraima. *Lei Complementar n.º 144, de 06 de março de 2009*. Dá nova redação ao §3º do art. 16 e ao §3º do art. 17 da Lei Complementar n.º 143, de 15 de janeiro de 2009, que institui o Sistema de Planejamento e Ordenamento Territorial do Estado de Roraima e dá outras providências. Boa Vista: DOE de 06/03/2009.
- Sadeck, L. W. R.; Lima, A. M. M.; Adami, M. Artificial neural network for ecological-economic zoning as a tool for spatial planning. *Pesquisa Agropecuária Brasileira*, 52(11), 2017. doi: 10.1590/S0100-204X2017001100011
- Schubart, H.O. R. A Institucionalização do Zoneamento Ecológico-Econômico no Brasil: situação atual e perspectivas. In: Encontro Nacional de Produtores e Usuários de Informações Sociais, Econômicas e Territoriais. Rio de Janeiro, 1996.
- Souza, J. S. A. *O Programa de Zoneamento Ecológico-Econômico para a Amazônia Legal e a sustentabilidade: aspirações e realidades*. Brasília, Tese (Doutorado em Desenvolvimento Sustentável) – CDS/UnB, 2008.
- Tovar, J. G.; Larson, A. M.; Barletti, J. P. S.; Barnes, G. Politics and power in territorial planning: insights from two 'Ecological-Economic Zoning' multi-stakeholder processes in the Brazilian Amazon. *International Forestry Review*, 23(1), 59-75, 2021. doi: 10.1505/146554821833466077
- Vasconcelos, V. V.; Hadad, R. M.; Martins Jr., P. P. Me-

thodologies for integrated studies of natural resources:
a discussion on ecological-economic zoning. *Pesquisas
em Geociências*, 40(1), 21-30, 2013. doi: 10.22456/1807-
9806.40829