



Multi-scale participatory scenario methods and territorial planning in the Brazilian Amazon



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ABSTRACT

In recent years, discussions regarding *scenarios methods* for the Brazilian Amazon have been mostly explored from the sole perspective of deforestation concerns. This paper proposes an original approach using participatory scenarios as a method that may be able to put in perspective, at different levels of decision-making, a specific action of territorial planning in Pará State, Brazil. The method allows the dialogue between stakeholder representatives, government organizations and communities involved in that territorial process. The scenarios produced substantial and sometimes contradictory data: while they can be considered as a way of empowerment for the local communities, participatory scenarios also have their limits and may reveal structural forms of authority or domination within the project-promoting institutions and local communities. The information collected allows scientists of various areas (Modeling, Social Sciences), community leaders and managers to elaborate a reflection upon the levers that may condition the implementation of effective actions and public policies in territorial units.

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1. Introduction

In recent decades, scenarios approaches came to be considered a valuable tool in the environmental area, due to concerns related to climatic changes, water availability, ecosystem functioning, air quality and land use change (Wilkinson & Eidinow, 2008). Scenarios are plausible, challenging, and relevant stories about how the future might unfold, which can be expressed in both words and numbers. Scenarios are not projections, predictions, or recommendations. They are about envisioning future pathways and accounting for critical uncertainties (Raskin, Monks, Ribeiro, Van Vuuren, & Zurek, 2005). Environmental scenarios have been built up on global, regional and local scales, with different objectives and degrees of social participation (Alcamo & Ribeiro, 2001; Kok, Patel et al., 2006; Kok, Rothman, & Patel, 2006). Scenario-building experiences carried out in different parts of the world indicate that involving stakeholders in the reflection process may favor

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understanding of diverging points of view, and the attainment of consensus, facilitating the collective decision-making process (Wollemberg, Edmunds, & Buck, 2000).

Up to now, scenario discussions for the Brazilian Amazon has been mostly limited to future deforestation trends at broad-scale (Buarque, 2003; Lapola et al., 2010; Laurance et al., 2001; Soares-Filho et al., 2006). The Brazilian Amazon rainforest covers an area of approximately 4 million km². Due to the intense and increasing occupation process in the last decades, approximately 18% of the forest has already been converted into pastures and croplands. The biodiversity loss and the greenhouse gas emissions derived from the deforestation process drew international attention to the region. However, under the deforestation process lies a dynamic of occupation, historically built on top of territorial and agrarian conflicts, for land possession and ownership (Araújo & Léna, 2010; Becker, 1997, 2009; Bunker, 1985; Schmink & Wood, 1992).

In the last decade, along with deforestation control policies (Dalla-Nora, Aguiar, Lapola, & Woltjer, 2014), several governmental programs focusing on land tenure regularization and state territorial planning were implemented in the Amazon region. The aim was to regularize the occupation of public land (since most of Amazonian peasants are not legal owners of their lands), mediate conflicts of interest and lay down rules of use of the land and its natural resources. As a result, today, the Brazilian Amazon looks like a mosaic of different territorial units, including indigenous lands, protected areas of different types (national forests, ecological reserves, etc.), and agrarian projects to settle farmers. Such units act as a barrier against the deforestation progression and contribute to biodiversity conservation purposes. But they also have the social function of granting land tenure rights to a diverse local population. In this context, the State conceived new modalities of agrarian projects and conservation units, based on the sustainable exploitation of natural resources. Such is the case of the Agro-extractivist Settlement Project (PAE) modality, a kind of unit aiming at regularizing the land situation of the so-called “traditional populations” (a legal category that designate historical and riverine peasantries). Currently, the mosaic of territorial units covers approximately 60% of the region. Therefore, the future of the region largely depends on the sustainability of each unit.

The use of scenarios in the Brazilian Amazon as a tool for local population empowerment and collective decision-making is an incipient process (de Aguiar et al., 2014; Folhes, 2010). In this paper, we propose to adapt participatory scenario approaches to explore how this method could contribute to strengthen local population political awareness, which eventually would fortify the creation process of territorial units and their subsequent sustainability. Our hypothesis is that a simple and replicable normative and multi-scale method (Folhes, 2010; Wollemberg et al., 2000) could facilitate the dialogue across levels, mainly between local populations and governmental agencies, and help to promote the empowerment of the first. To explore this idea, we chose to focus our research in the Agro-extractivist Settlement Project PAE Lago Grande, located in the rural area of the municipality of Santarém, West of Pará State, along the Amazon River (Fig. 3).

PAE Lago Grande is an agrarian project that was created in 2005 by the National Institute for Colonization and Agrarian Reform (INCRA), in a region characterized by a precolonial human occupation process as it is attested in chroniclers' registers (e.g. Acuña, 1994; Bettendorff, 2010) and recent archaeological works (e.g. Gomes, 2007). PAE Lago Grande illustrates the situation of many other units in the Amazon: even after being officially created, it still does not receive public policies' benefits, such as those aiming at regularizing the land-tenure status and promoting socioeconomic development through the implementation of infrastructures (roads, electricity network, etc.), credits and technical assistance. Beyond these problems, local populations are being highly pressured by economic interests connected to the lumber, mineral and agricultural sectors attracted by PAE Lago Grande land and its natural resources.

In the following section, we will introduce a theoretical dialog between the scenario method that we adopted in our work and the other potentially relevant scenario approaches. In Section 3, we will present a detailed description of the research area (socio-environmental characterization, social organization, socio-environmental conflicts, and communities' characterization) and of the research protocol. In Section 4, we will expose the results and discuss them at the community and settlement levels, including convergences and divergences between scales. Finally, in Section 5, we will synthesize our main conclusions.

2. On scenario methods

2.1. Background: main scenario types

Various typologies have been proposed to classify scenario approaches (Aguiar et al., 2014; Alcamo & Ribeiro, 2001; Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006; Bradfield, Wright, Burt, Cairns, & Van Der Heijden, 2005; Godet, 2000; Kok, 2009; Müller, 2007; Swart, Raskin, & Robinson, 2004; van Notten, Rotmans, van Asselt, & Rothman, 2003). In this section, in order to contextualize the approach we adopted in relation to the works mentioned above, we summarize the main variations found on environmental scenarios through an organization in four topics: (1) *qualitative and quantitative scenarios*; (2) *normative and exploratory scenarios*; (3) *participatory or developed by specialist scenarios*; (4) *single or multi-scale scenarios*.

2.1.1. Qualitative and quantitative scenarios

Scientists developed two distinct approaches for scenarios' construction during the period between World War II and the mid-90s: (a) *quantitative modeling* and (b) *qualitative narratives* (Raskin et al., 2005). However, these approaches did not dialog between them. That dualism reflects two challenges of equal importance in terms of scenarios: to provide systematic and replicable representations, on one hand, and to contrast social and non-quantitative visions, on another. According to

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