HYDROELECTRIC SWELL AND PROTECTED AREAS IN AMAZON

Marco Aurelio Santos

Introduction

Brazil has the largest number of protected areas, sheltering in its territory 12 % of the global total (WDPA, 2016). National Register of Conservation Units of Brazil (MMA, 2016) show that in 2016, Protection Areas (PAs) covered 18.5% of the Brazilian territory, corresponding to 158.2 million hectares with 73.6% of this total in the Amazon biome. Of these areas, 35% correspond strictly protected[1] and 65 % sustainable use[2].

The creation of conservation areas is extremely positive, because they ensure, among other benefits, maintenance of the germplasm bank and water flow for human consumption (Medeiros et al., 2011) as well as the conservation of natural resources. In addition, they are also one of the policy pillars of deforestation reduction in the region.

Despite all previously mentioned advantages, the maintaining of conservation areas is potentially conflictive with infrastructure works. One of the main conflict scenarios is associated with hydroelectric power plants (HPP) expansion in the Amazon.

Some mechanisms that are being used by the government to enable HPPs that affect the land itself are conservation area boundary redefinition, re-categorization or Removal of legal status. The objective of this study is to analyze the use of these instruments and verify how they are being applied in Brazil, especially those related to hydroelectric plants in the Amazon.

Protected areas change of legal status, excisions, rescissions and energy use

Changes of legal status of protected areas can occur in several ways. In order to define this phenomenon, Mascia & Pailler (2011) used a term called PADDD (*Protected Areas Downgrading, Downsizing and Degazettement*).

i. *Downgrade* is a decrease in legal restrictions on the number, magnitude, or the extent of human activities within a protected area, which can occur when an area changes its category from a more restrictive to a less restrictive;
ii. *Downsizing* refers to a protected area size decrease, as a result of land or sea area exclusion through a legal limit change, and finally;
iii. *Degazettement* is defined as an entire area legal protection loss.

Currently, electricity obtained from renewable sources in Brazil represents more than 78% of domestically produced energy, according to the Ten Year Plan for Energy Expansion 2024 (PDE) data (EPE, 2015). Of these sources, a large part comes from hydroelectric sources (65%).

The Amazon River watershed, home of much of the Brazilian hydroelectric unexploited potential, is where the country's hydro expansion is concentrated (Matos et al., 2011; Finer & Jenkins, 2012; Andrade & Santos, 2015), both in number of projects and in terms of installed capacity. For the 2014-2023 period, 92% of the expected power is located in the Amazon River watershed.

Figure 1 shows the restricted use area polygons (Indigenous Lands and Protected Areas) and the hydropower projects listed in the PDE 2023. It is noticed that many projects, such as

[1] Strictly protected areas have the function of maintaining ecosystems free of changes caused by human interference, only admitting its natural attributes indirect use (Brasil, 2000).

[2] The basic objective of Sustainable Use Units is to harmonize nature conservation with the sustainable use of a portion of its natural resources (Brasil, 2000).

Paredão A, Ferreira Gomes, Cachoeira Caldeirão, São Luiz do Tapajós and Jatobá power plants are either within protected area limits, or their future reservoirs will be limited by protected areas, which can be considered an additional conflict factor in project planning.

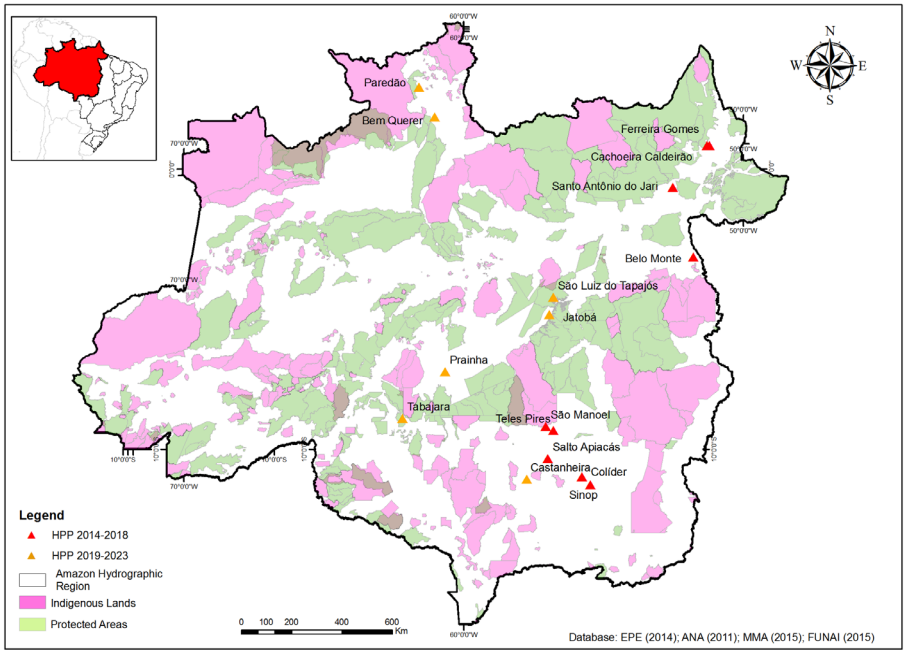

Figure 1. Proposed hydropower plants in the PDE 2023 and restricted use areas.

As already mentioned, electricity production and transmission are among the main causes of changes in protected areas. As there is no hydropower project installation legal prerogative in protected areas, particularly those strictly protected, an alternative to enable projects is to remove their legal protection and restrictive use status of areas that would be occupied by plants.

In recent years, legal acts in Brazil changed the boundaries of protected areas to facilitate the licensing of power generation projects. The 2010-2016 period accounted for 74.1% of PADDD events.

The compilation of some changes in protected areas boundaries due to energy uses in Brazilian Amazon twenty-three projects (Figure 2) until the year 2016, ten are related to limit reduction of the land area protected (downsizing), eleven were associated to the loss of legal protection (degazettement) and two projects are associated to area redefinition (expansion with area inclusion and exclusion). In some cases during the PADDD process, was changed areas of increase in units or creation of new protected areas to offset the losses.

The compilation of some changes in protected areas boundaries due to energy uses in Brazilian Amazon twenty-three projects (Figure 2) until the year 2016, ten are related to limits reduction (downsizing), eleven to revocations (degazettement) and two to area redefinition (expansion with area inclusion and exclusion). In some cases during the PADDD process other áreas were increased or added to offset losses due to PADDD.

However, the PADDD process resulted in a residual deficit with the total altered areas sum 1,613,024 ha, total added areas sum 993,959 ha. The deficit of area losses is certainly one of the arguments used in opposition to such action. Noteworthy is the creation of Maués Ecological Station as compensation for the loss of federal protected areas occurred in 2012 in the Tapajós basin, state of Pará.

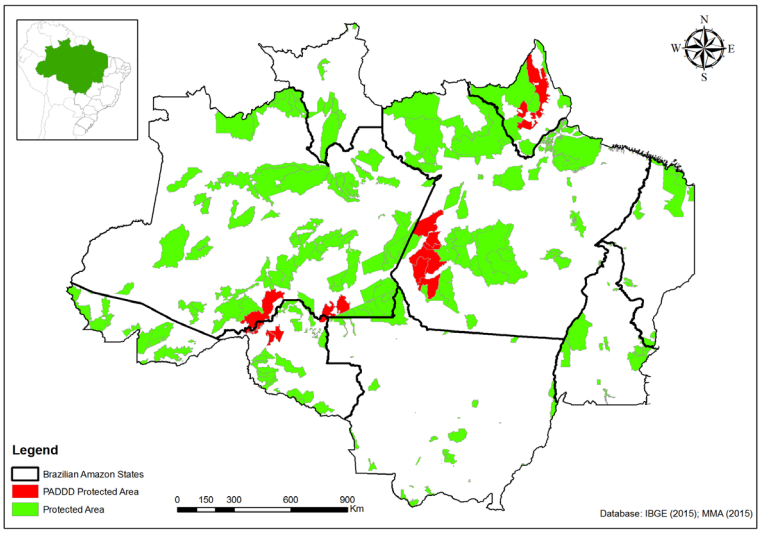

Figure 2. PAs in Amazon, with emphasis on the altered for the production of energy

PADDDs: Causes and consequences

In Brazil, two justifications most widely used for the occurrence of downsizing are legal and economic character. In the legal case, the management institutions of protected areas are reluctant to accept the preparation of environmental studies in strictly protected areas because these units do not allow direct use of their resources.

In this context, Bim (2015) states one of the reasons that discredit the view, that the authorization to carry out the studies is not possible from a legal point of view, lies in the fact of Law 9,985/2000 to restrict various activities in the areas of full protection, limited basically to the research and/or education. The environmental study, although geared to subsidize the environmental licensing process, is a type of research, and can provide important data that would make it possible to identify the exact extent of the damage to the PA, enabling an informed policy decision to maintain the PA or to reduce it.

From an economic perspective, hydroelectric plants have investments that reach billions of dollars, in this case legal protection is rearranged to given for the entrepreneur who wants to invest in the project. Regarding this issue the downsizing appears as an instrument to increase the attractiveness of the project to the extent that it will not directly affect protected areas where licensing, in the case of strictly protection area, cannot occur.

The main issue is that previous downsizing, without knowing the environmental feasibility of the project, is usually harmful. A recent case in this regard was the licensing of the hydroelectric plant of Sao Luis do Tapajós (8,040 MW), located in the state of Pará. For possible environmental and feasibility studies two protected areas (Amazon National Park, Itaituba II National Forest) were were subject to degazzettement in 2012. However, in August 2016 IBAMA denied the previous license on the grounds of inconsistencies in the EIA and the flooding of indigenous land in the demarcation borders. Since the process of downsizing, more than four years have gone and the project has not been licensed.

The protected area losses stimulate increased degradation and deforestation. Accordingly, Martins et al. (2014) research evaluated the deforestation in 10 areas that have lost legal protection between 2003 and 2011. This analysis was considered over a period of 10 years, five years before and five years after changes occurred. An evaluation was performed regarding the rate of deforestation in the area, which have suffered loss, or reduction of legal protection in the remaining

areas and around (a distance of 10 kilometers from the boundaries of the protected area before the loss or reduction of legal protection was considered).

Another research study from WWF (2014) showed that between 2000 and 2012, areas that have lost their protected status recorded deforestation rates 18 times higher than the protected areas in general, and 2.65 times higher than regions that were never protected. Forrest et al. (2014) on analysis of areas that suffered PADDD in Peru and Malaysia found that these regions suffered high deforestation and loss of carbon.

During the analysis of case studies PADDDs finds a set of critical problems present in most publications (Gouveia & Sena, 2012; INESC, 2012; Omoto, 2012; Bertrand et al, 2014). Some of them were: reduction of protected areas; lack of technical study that supports disaffection; lack of consultation with affected populations; no study to prove the technical feasibility, economic and environmental HPP; short term deadlines to conduct the legal instrument that defines the disaffection, limiting debate and possible improvements.

Conclusions and recommendations

Processes involving PADDD by generating as Downgrading, Downsizing and Degazettement in protected areas are not highly regarded by society in general. Actually, alternatives provided by governmental agencies could be taken better into account by stakeholders. In many cases, PADDD events are detrimental to biodiversity conservation. Thus, upon the occurrence of these events, conservation and environmental management instruments should be used to mitigate and compensate area losses.

A balanced solution has to be reached using political apparatuses and conflict management techniques. Regarding the legal aspect, it is understood that it is not reasonable to involve PADDDs in order to carry out surveys for the preparation of studies of environmental and socioeconomic impact in the Protected Areas because, these same studies, as stated by Omoto (2012) and Bim (2015), can identify the exact damage to the PAs and will support a proper political decision to keep or to downsize these areas.

Thus, some measures are proposed here:

i. The downsizing process should be based on technical and environmental studies coordinated by those management institutions responsible for protected areas, ensuring popular participation. The proper use of the excluded area, to ensure that the activities or occupations developed does not affect the biota of protected areas, with clear rules that reconcile the use and protection of ecosystems.

ii. The case of downgrading protected areas should be supported by a study verifying the new classification.

iii. The areas considered should prioritize the connection with other protected areas fostering the formation of ecological corridors.

iv. The PADDD instrument should only be adopted together with proof of the technical, economic and environmental impact of the project.

v. The reincorporation of area losses, which have not been effectively occupied by the project, is another prerogative that should be present in the normative acts, which authorize the downsizing or resettlement. This would be a priority consideration as environmental and feasibility studies indicate in areas that are without legal protection tend to be more vulnerable to harmful activities like deforestation.

Brazil's good hydric potential and natural richness potential, such as the biodiversity of the Amazon region, cannot be discarded. If a solution is reached in due time, it will be possible to

implement good hydroelectric projects and create environmental compensatory mechanisms far beyond what is expected today in Brazil's specific legislation.

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