

Governance guided by Impact Assessment instruments in the Brazilian Hydropower sector

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Abstract: The Brazilian hydropower sector has been recognized not only for causing environmental impacts but also for pioneering the application of IA instruments. Brazil has had long experience in the EIA of hydropower plants; it has also used a tool focusing on the cumulative impacts of a set of dams in a watershed and has only few examples of SEA. This work aims to analyze the contribution of the IA instruments to the environmental governance of the Brazilian hydropower sector. This governance system has shown to be the result of the interaction of two smaller systems: one aimed at the management needs of the electric sector and the other focused on environmental management – it is concomitantly composed of the structure of water resources management and the application of the environmental policy. We conclude that the environmental governance lacks a proper definition of environmental guidelines for the sector. IA can contribute to strengthening the governance if SEA is implemented following good practices.

1. Introduction

The Brazilian hydropower sector is invariably under scrutiny due to the significant environmental impacts caused by the large dams that mostly feed the energy demand in the country. This sector has been recognized not only for causing significant environmental impacts but for being a pioneer in applying Impact Assessment (IA) instruments, too. Brazil has had long experience in Environmental Impact Assessment (EIA) of hydropower plants, using a tool locally named Integrated Environmental Assessment (IEA) – a kind of IA that focuses its analysis on the cumulative impacts of a set of dams in a watershed – and only few examples of Strategic Environmental Assessment (SEA).

The hydropower sector is one of the pioneers in the use of Impact Assessment (AI) instruments in Brazil (Fuchs, 2016). However, despite its importance to the national economy and the use of some environmental planning and management tools, the sector still lacks studies on its environmental governance (Hernandez, 2012). For Young (2011), environmental governance is about the processes and institutions by which society makes decisions about the environment and should include different stakeholders, minority groups, access to information, adequate funding, transparency and accountability.

Bredariol and Vinha (2015) advocate the assumption that for a better understanding of the limits of the scope of IA instruments (EIA, IEA and SEA) in Brazil, it is important to

understand the environmental governance of the hydropower sector. Researches on environmental governance seek to analyze the effectiveness and efficiency by which institutions, processes and behaviors contribute to the management and improvement of environmental quality (Loë, Plummer, Armitage, Davidson, & Moraru, 2009). In this context, Meuleman (2014) and Chi et al. (2016) highlight that without an effective environmental governance system, the use of IA instruments is not enough to promote sustainable development.

This work aims to analyze the contribution of the IA instruments to the environmental governance of the Brazilian hydropower sector. This research analyzed the main dynamics and regulatory frameworks of the hydropower sector, carrying out an institutional mapping.

2. Methods

We analyze the potential contributions of EIA, IEA and SEA to the system of environmental governance established in the hydropower sector. The analysis was based on the Organisation for Economic Co-operation and Development (OECD) theory and framework (OECD, 2011, 2015b) on the main gaps of the environmental governance system, originally proposed for the analysis of governance of water resources management presented in Table 1.

Table 1 – Governance gaps and their goals (OECD, 2011, 2015a, 2015b)

Lack	Rationale
Administrative	Reconciling administrative and technical operational limits.
Police	Addressing institutional and territorial fragmentation of policy among multiple actors and identify success stories and incentives for effective coherence policy across sectors
Financial	Verifying any incompatibility between responsibilities and the resources available to carry them out developing mechanisms for distributing and obtaining resources
Training	Ensuring infrastructure and expertise capacity at central and subnational levels
Goal	Aligning the objectives, divergent interests and priorities, to promote synergies and complementarities at the right scale and to overcome the discontinuity of interests
Responsibility	Promoting accountability mechanisms for relevant actors and protecting stakeholders through inclusive and transparent decision-making
Information	Developing physical, socioeconomic, financial and institutional information systems for water resources to support decision makers, with specific attention to their consistency, consistency, reliability and public disclosure, as well as their costs and benefits.

We also analyze the possible contributions of the SEA to the environmental governance system based on a review of good international practices of SEA (Mccluskey & João, 2011; Partidário, 2000; Sánchez, 2008; Tetlow & Hanusch, 2012; Unalan & Cowell, 2009) and not by the experiences of this instrument in Brazil. As this instrument is not yet institutionalized in the country, this guideline was chosen to encourage the adoption of the practice in Brazil, based on the best international practices.

4. Results and Discussion

The comparative analysis of the potential contributions of EIA, IEA and SEA to the system of environmental governance established in the hydropower sector is presented in

Table 2. The contribution capacity was defined based on an analysis of the capacity of the IA instrument to meet the needs for exceeding each gaps according to the OECD (2011 and 2015). The results were presented in a simplified way by means of 4 scales: none (no contributions were identified); small scale (capable of supplying less than half of the needs), medium (able to supply about half of the needs) and great (able to meet most needs) (Table 3).

Table 2 - The Role of IA Instruments in the Environmental Governance of the Hydropower sector.

<i>Type</i>	Objectives of governance instruments to fill this gap	Environmental Impact Assessment	Integrated Environmental Assessment	Strategic Environmental Assessment
Main sources	(OECD, 2011; Rodrigo, Allio, & Andres-amo, 2005)	(Chi et al., 2016; Morgan, 2012)	(Castro, Romeiro, Kelman, & Hallot, 2013; Westin, 2014)	(Andrade & Santos, 2015; OECD, 2012; Partidário, 2012; Switzer, 2016)
Administrative gap	Reconciling administrative and technical operational limits.	None.	None	Small contribution: The instrument can contribute to reducing this gap by defining responsibilities for those involved.
Political gaps	Addressing institutional and territorial fragmentation of policy among multiple actors and identifying success stories and incentives for effective policy coherence across sectors	Small contribution: public hearings can help dealing with fragmentation among actors.	Medium contribution: When carried out within the scope of planning, it can be argued that its results should increase the commitments in keeping the impacts within an acceptable level.	Great contribution: In its analysis, the SEA has the potential to analyze the sector in a multidimensional manner, to identify the need for partnerships and leadership among the actors involved, as well as to establish monitoring criteria, which in turn can contribute to the commitment of the parties involved
Finantial gaps	Verifying any incompatibility between the responsibilities and the resources available to carry them out besides developing mechanisms for distributing and obtaining resources.	Medium contribution: The environmental compensation rates resulting from the environmental licensing of individual projects contribute to obtaining resources at the environmental scale, but there is no linkage of these resources with the electric sector or the hydrographic basin.	Small contribution: a better understanding of the different types of impacts of an enterprise will be used as a more accurate basis in the environmental compensation calculations.	Medium contribution: Although it does not contribute directly to obtaining resources, it can be an important instrument for adopting priorities in the allocation of resources, as well as criteria for establishing compensation values in the EIA.
Training gaps	Ensuring infrastructure capacity and expertise at central and subnational levels.	None.	None.	None.
Objectives gaps	Align the objectives, divergent interests and priorities, to promote synergies and complementarities at the right scale and to overcome the discontinuity and interests.	Small contribution: The analysis of impacts and the definition of environmental programs can contribute to the alignment of future objectives.	Small contribution: the understanding of the interaction between the different impacts of the basin can contribute to the alignment of environmental goals and targets.	Great contribution: The realization of the SEA at the strategic level of planning has as one of its objectives the alignment between the different plans that deal with the object of study.
Responsibility gaps	Promoting accountability mechanisms for relevant actors and protecting stakeholders through inclusive and transparent	Small contribution: EIA will define some responsibilities, mainly related to mitigating and compensating the	None.	Great contribution: SEA can contribute to accountability through the elaboration of programs by the

<i>Type</i>	Objectives of governance instruments to fill this gap	Environmental Impact Assessment	Integrated Environmental Assessment	Strategic Environmental Assessment
	decision-making.	impacts, but have their scope restricted only to the project level. It also contributes to the decision making at the project level.		stakeholders, as well as contributing to the protection of vulnerabilities, besides being involved from the moment it provides more subsidies and criteria for the decision maker.
Information gaps	Developing physical, socioeconomic, financial and institutional information systems for water resources to support decision makers, with specific attention to their consistency, reliability and public disclosure, as well as their costs and benefits	Medium contribution: Although it contributes significantly to understanding, transparency and obtaining information related to the projects, its scale is small when analyzed within the entire electric sector.	Medium contribution: allows generating and sharing information at the watershed level.	Medium contribution: Allows the transparency of environmental criteria used in different planning documents (policy, plans and programs)

Table 3 - The Role of IA Instruments in the Environmental Governance of the Hydropower sector.

<i>Type</i>	Environmental Impact Assessment	Integrated Environmental Assessment	Strategic Environmental Assessment
Administrative gap	None	None	Small contribution
Political gaps	Small contribution	Medium contribution	Great contribution
Financial gaps	Medium contribution	Small contribution	Medium contribution
Training gaps	None	None	None
Objectives gaps	Small contribution	Small contribution	Great contribution
Responsibility gaps	Small contribution	None	Great contribution
Information gaps	Medium contribution	Medium contribution	Medium contribution

By analyzing the OECD environmental governance gaps (2011), the EIA and the IEA, both systematically used in Brazil, contributes to overcome these gaps. Besides these IA instruments – EIA and IEA – SEA was the instrument of impact evaluation analyzed with the greatest potential to contribute to the strengthening of the environmental governance system in the case of the Brazilian hydroelectric sector as presented in Table 3. Moura (2016a) and Jiliberto (2011) also indicate that SEA can support the environmental governance structure of the hydropower sector and contribute to strengthening public environmental policies.

5. Conclusions

EIA and IEA are two instruments with important contributions to the environmental governance structure of the hydroelectric sector, contributing to information dissemination platforms, space for participation and determination of vulnerabilities and environmental priorities. SEA could fill a more representative space for the consolidation of good environmental governance to the hydropower sector, provided it is implemented according to international governance excellence standards. Given the strategic nature of the SEA and its

ability to integrate different sectoral plans, the instrument allows, among other roles, a political and administrative articulation unreachable by the others IA instruments. Finally, we conclude that SEA has the potential to become a relevant instrument for the improvement of the environmental governance system of the Brazilian hydropower sector.

As for the contribution of IA instruments to governance of the hydropower sector, the role of EIA and IEA should be valued. Unlike the SEA, these instruments have a more technical and less comprehensive scope of action, but embrace important contributions formally established in the hydropower sector, which contributes to the environmental governance of the sector.

In order to achieve more efficient governance to the sector SEA should be formalized within the regulatory framework of the sector. SEA can add and improve some objectives of good governance not or poorly embraced for these IA instruments. Finally, SEA can enlarge the IA instruments contribution for the environmental governance of the hydropower sector.

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Acronyms Glossary

EIA	Environmental Impact Assessment
IA	Impact Assessment
IEA	Integrated Environmental Assessment
OECD	Organisation for Economic Co-operation and Development
SEA	Strategic Environmental Assessment

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