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Analysis of Impacts due to the Madeira River Dam Complex Project

Environmental Impact Assessment

William Steimel
B1778102

Introduction

This paper seeks to examine Environmental Impact Assessment (EIA) in the context of the Madeira Dam Complex project. EIA is often seen as an essential step for reduction of environmental impact when it comes to project development but there are a number of cases where EIA was not able to produce this desired outcome. In these situations, projects were either grossly underestimated in terms of impact or completely circumvented for economic development. This paper looks at how the EIA failed in this case by examining the nature of EIA, reviewing background on the Madeira Dam Complex project, and analyzing the environmental, social and economic impact after the construction.

What is Environmental Impact Assessment (EIA) ?

According to Huang, EIA can be defined as the systematic identification and evaluation of potential impacts of proposed projects on the total environment. [1] This makes EIA an essential tool for finding a projects significant impacts to the environment early on to promote reduced impact or mitigation. EIA requirements differ by country as well as their standards or criterion for projects that require an EIA. This means that outcomes of EIA can differ or vary greatly depending on how the government defines EIA.

Madeira River Dam Project Background

The Madeira River is considered the Amazon's largest and most important tributary and the Madeira River Dam project aimed to build two hydroelectric power dams called the Santo Antonio and Jirau. [2] The initial construction began in 2008 and the project hopes to help meet the Growing Energy demands in the region. [2]

The project is quite controversial and has been met with environmental protests and conflict between the Bolivia and Brazilian government. An independent study by various scientist's titled "Studies That Don't Hold Water" examined the Madeira River project and came to the conclusion that the EIA suffered from a variety of insufficiencies including inadequate scoping, underestimation in studies of territory and population, insufficiency on studies impacting Bolivia, weak models in regards to sedimentation and erosion, failure to identify fish impacts, omission on mercury impacts, insufficient analysis on biodiversity impacts, as well as energy impact and public health impact analysis among others. [3] Despite the inadequacies in the EIA

presented by technical experts and public protests, the project still was approved for development.

One such criticism of the EIA was that that the scope and impacts were completely underestimated. If you think about the project from a scale perspective, it is massive as it even includes transnational impact which makes understanding the scope an even bigger challenge. This makes analysis of similar projects that have come before it with similar circumstances vital for determining an accurate projected impact in future cases.

Impacts

The below sections will review impacts of this project from the perspective of the environmental, social, and economic aspects.

Environmental Impact

Environmental Impact is one of the biggest concerns when it comes to conducting an EIA for projects. One study conducted in the Madeira River after Dam construction came to the conclusion that Reservoirs grew 64.5 % larger than expected, 120 km² more forest was flooded than planned, and flooding often crossed the border into Bolivia in comparison to the original EIA. [4] This shows that the environmental impacts were heavily underestimated in the original Environmental Impact Assessment.

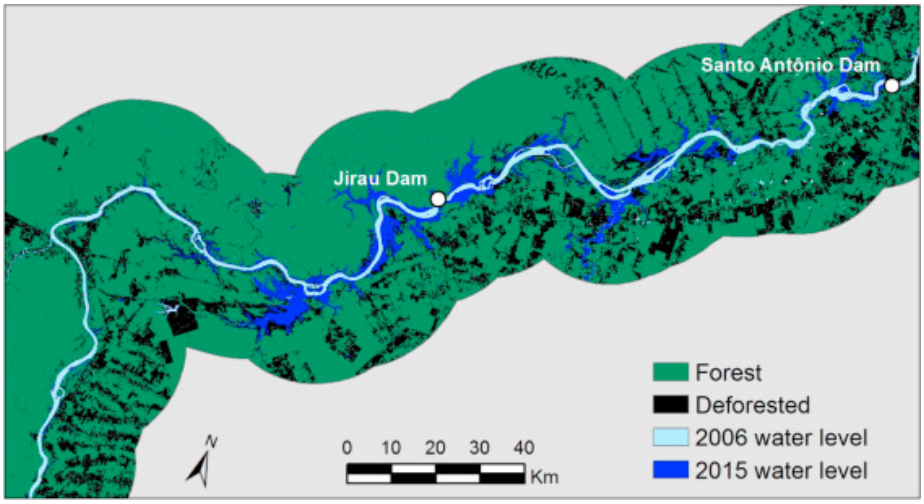

Fig 1: "Classified image of the upstream study area that compares the 2006 water area from before the dams were built to the 2015 water area from after the dams' construction." [4]

Another environmental impact cited was the associated impact to fish that are native to the river. According to Morgan Erickson-Davis, "The Waterway is a critical connection between the Amazon and Andes, and many aquatic species migrate over its course to breed and feed." [5] These dams clearly impact ecosystems as they create a clear obstruction to any fish that depend on the river for spawning and possibly any downstream populations that rely on fishing for sustenance.

Social Impact

One of the negative social impacts of the Madeira River Complex was the displacement of many local river populations. According to a paper by Harvard School of Public Health, Displacement is forced and refers to moving a population from their place of residence to another area. [6] The estimated population directly affected due to this project totals 2,849 in which much of the population depending on fishing for sustenance. [7] Many of these populations who lived on the river and depended on fishing were likely impacted by either the loss in fish ecosystems or relocations due to the project. A study by the California Institute of Technology, found that of 44 dams worldwide a majority of the resettled populations were impoverished in most cases. [8] This shows the negative of some of these hydroelectric infrastructure projects that seem to disproportionality impact the poor with the Madeira River project being no exception.

Economic Impact

The purpose of hydroelectric dams is in essence to provide energy infrastructure which helps increase hydropower ability within the region. This on one hand brings a great deal of economic benefits but the real question is at what cost does this development come in the short and long-term?

Possible negative economic impacts can come about from this project due to flooding, increased greenhouse gas emissions, aesthetic impacts, and impact to local populations. One possible impact is the economic impact that Brazil and the world will face due to CO2 emissions caused by deforestation due to increased flooding. In regard to aesthetics, although the impact is currently unknown it is likely the river and forest around dam looks completely different than it did pre-construction. Some perspectives would say this eliminates the natural beauty and any opportunity for this area as a tourism or environmental landmark. Lastly, there is a significant economic impact inflicted on populations that depended on fishing and lived along the river as

well those located in downstream Bolivia. The economic impacts from this project are hard to quantify as the project is still quite new, but it is likely future research will illuminate more negatives impacts caused by these projects in the future.

Conclusion

This project is challenging as it involves cross boundary impacts and a regions economic development. Although countries are trying to develop their infrastructure needs to meet the demands of their people these developments can sometimes come with a cost from a social, environmental, and economic perspective. It is important when constructing EIA that nations work together especially when transnational conflicts exist to analyze the cost and benefits. Another challenge is that EIA standards completely differ around the world and no real global standard exists. Some type of global standard would also possibly help with these cross-boundary projects.

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