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# BIODIVERSITY AND SOCIO-ENVIRONMENTAL DISASTERS IN HAITI: A COMPLEX INTERSECTION

# BIODIVERSIDADE E DESASTRES SOCIOAMBIENTAIS NO HAITI: UMA INTERSEÇÃO COMPLEXA

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**Abstract:** This article aims to understand the role of Haitian biodiversity in the calamities faced by Haiti. With a population of 11 million over 27,750 km², the country is in a calamitous situation, with 60% of the population living in poverty and hunger. Haitian biodiversity, crucial for medicines and food, is affected by deforestation. The exploratory and qualitative research analyzes protected areas and their contributions. It concludes that biodiversity and socio-environmental disasters influence calamities, but calamities also affect biodiversity, emphasizing the complexity of the scenario. Limitations include the need for quantitative methods. More in-depth future studies on the subject are recommended.
**Keywords:** Biodiversity; Haitian Calamities; Socio-environmental Disasters; Hunger and poverty; Republic of Haiti.

**Resumo:** Este artigo busca compreender o papel da biodiversidade haitiana nas calamidades enfrentadas pelo Haiti. Com uma população de 11 milhões em 27.750 km², o país enfrenta uma situação calamitosa, com 60% da população vivendo em pobreza e fome. A biodiversidade haitiana, crucial para medicamentos e alimentos, é afetada pelo deflorestamento. A pesquisa exploratória e qualitativa analisa áreas protegidas e suas contribuições. Conclui-se que a biodiversidade, os desastres socioambientais, influenciam as calamidades, mas estas também afetam a biodiversidade, sublinhando a complexidade do cenário. Limitações incluem a necessidade de métodos quantitativos. Recomenda-se estudos futuros mais aprofundados sobre o tema.
**Palavras-chave:** Biodiversidade; Calamidades haitianas; Desastres Socioambientais; Fome e pobreza; República do Haiti.

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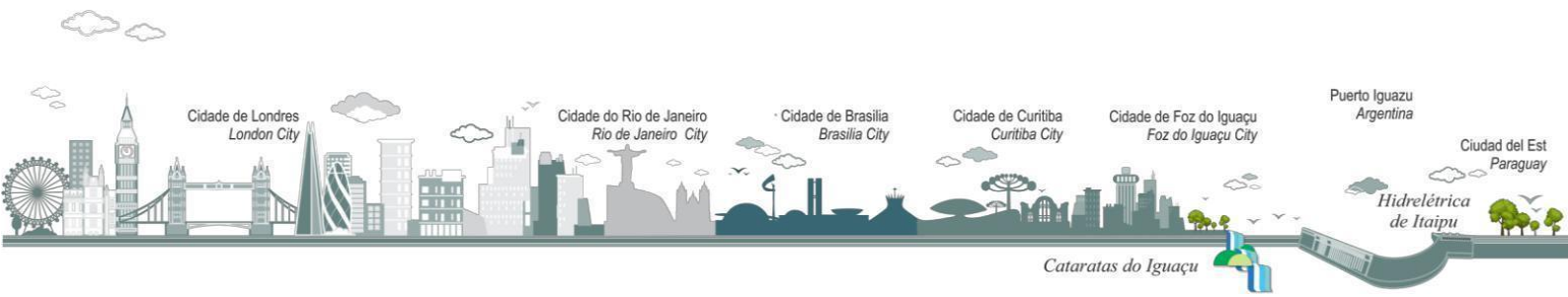

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## INTRODUCTION

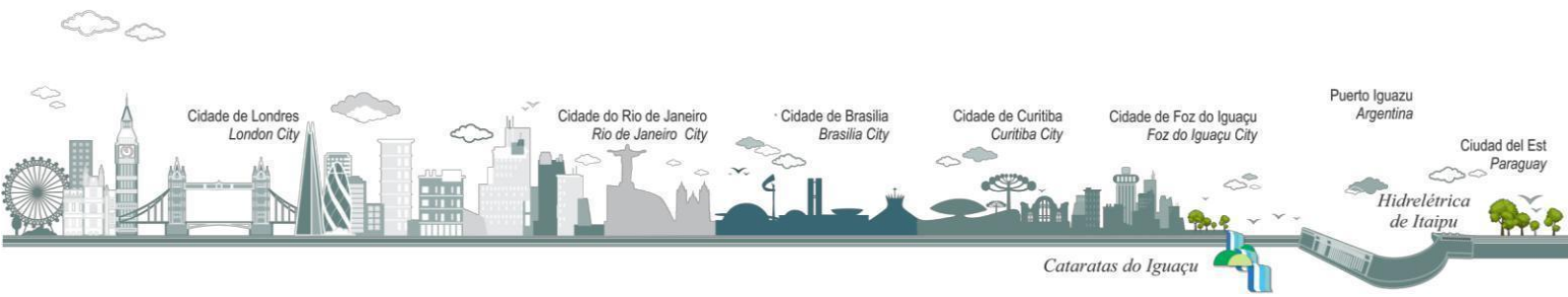
The Republic of Haiti is a country in Latin America and the Caribbean with a population of approximately 11 million inhabitants and 27,750 km² bordering the Dominican Republic (EXIME, 2023; BURKI, 2023). The situation of the country is considered chaotic and calamitous, with about 60% of the population living in hunger and poverty, 82% of citizens with severe and moderate food insecurity, food inflation considerably reducing the quality of life of Haitians, and this is the Haitian calamity introduced in these initial notes (FAO, 2021; EXIME; PALLÚ, 2022; EXIME; PLEIN; PALLÚ, 2022). When thinking about Haiti, it is undeniably large the impact of the 2010 earthquake, socio-environmental disasters, economic crises, as well as the role of Haitian biodiversity (Carvalho; Oliveira, 2021).

One potential way to address these challenges is through the preservation and utilization of Haiti's biodiversity. Biodiversity is a set of varieties of life on Earth, including plants, animals, fungi, microbes, and ecosystems that are essential to the health of our planet (Silvestre et al., 2022; Exime et al., 2023). In this way, the survival of species can have excellent contributions to human life, with an important role in the production of medicines, natural remedies for treating diseases (MACLAURIN; STERELNY, 2008). It also stands out in terms of food, food security, the evolution of agriculture, wild plants, and animals.

In this way, the efficient and sustainable management of water resources is crucial to guaranteeing adequate access to water and promoting socio-economic development, as well as social inequalities. (NEPOMOCENO et al., 2024). However, in the context of Haiti, corruption and political problems have significant impacts on water resource management (Exime, 2022; Exime et al., 2024). Haiti occupies the western third of the island of Hispaniola, next to the Dominican Republic. Situated in the Enriquillo-Plantain Garden subduction zone, the country is more susceptible to earthquakes and other geological disasters (SAINTE; CATAIA, 2024).

From the Haitian perspective, biodiversity has a positive impact and plays valuable roles in the economy. For example, Haitian forests are a vital source of resources, providing wood, fruit and other products. However, this is accompanied by the problems of deforestation, which decreases local production and increases Haitian calamities such as hunger and poverty, food insecurity, socio-environmental disasters, etc.





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## METHODOLOGY

This research is exploratory and qualitative, developed from the interpretive case study on Haiti (Yin, 2015), which seeks to contextualize the information and data available to think about the studied phenomenon (De Antonio et al., 2019). This interpretive case study seeks to understand the role of Haitian biodiversity in the calamities faced by Haiti. We used data from national and international websites, such as the Food and Agriculture Organization of the United Nations (FAO), the Center for Research in Disaster Epidemiology (CRED), *CEPAL-Comisión Económica para América Latina y el Caribe,* among others.

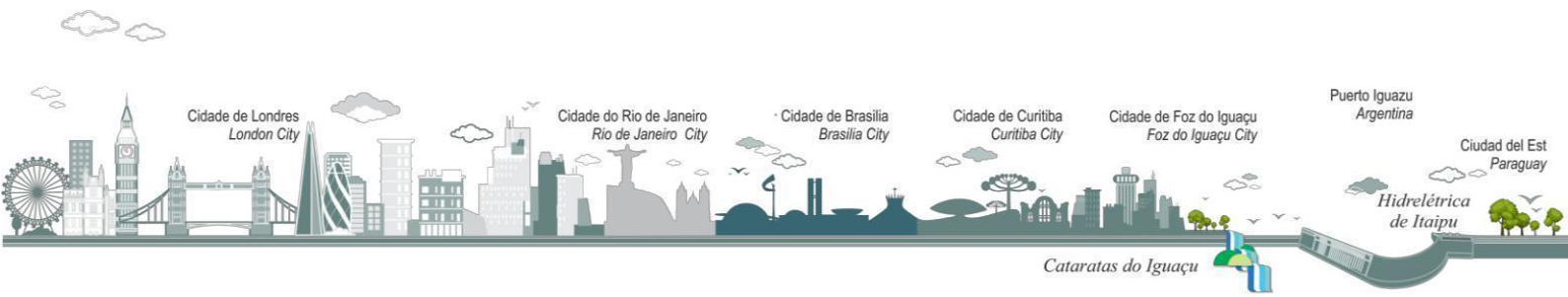
### Applying the method

The interpretive approach of the case study was applied through a detailed examination of these sources, which included official Haitian government websites such as the Ministry of the Environment. It focused on identifying patterns and relationships between biodiversity and socio-environmental disasters in Haiti. Specifically, it was possible to think about biodiversity in the supply of resources for medicines, and how it impacts on Haitian agriculture and food security. In addition, it focused on socio-economic factors linked to Haitian disasters, such as hunger and poverty.

### Data analysis

This stage involved compiling the data into spreadsheets and tables, which were then subjected to thematic analysis and coding based on Haitian disasters, socio-environmental disasters, and biodiversity. Familiarization involves reading and re-reading the materials collected to interpret the results and data acquired.





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## TRANSPARENCY AND LIMITATIONS

To ensure transparency, we explicitly note which data was obtained from each source. For example, deforestation rates and their impact on local biodiversity came mainly from FAO reports, while data on the incidence of disasters was obtained from CRED. This detailed sourcing allows for better replicability and credibility of the study. Future research could therefore benefit from incorporating quantitative data to provide a more comprehensive analysis of the issues. It should be noted that the availability of up-to-date data from the Haitian government and Haitian institutions remains a challenge.

## RESULTS AND DISCUSSIONS

Haiti's biodiversity is of global importance due to the presence of endemic species, i.e. species found only in that specific region. These endemic species are adapted to Haiti's unique environmental conditions and play a crucial role in maintaining the stability of local ecosystems. Of Haiti's 27,750 km², 18.3% is agroforestry, in addition to 2.6% Forests, 44.1% Intensive Crops, 1.4% Wetlands 0.7% Mangroves 31.8% Grasslands 1.1% (POSNER; MICHEL; TOUSSAINT, 2010). Within these areas, we include the parts that have protected historical monuments, national parks, and various forests, which cover approximately 6% of Haiti's territory.

Historic protected areas, such as Fort Jacques, Fort Alexandre and the Citadel, Sans Souci, Ramiers, are important for the preservation of Haitian history and culture. They represent the Haitian people's struggle for independence and freedom, and contribute to the country's cultural tourism. Natural protected areas, such as Sources Cerisier et Plaisance, Sources Chaudes, Sources Puantes and Lac de Péligre, are important for preserving Haiti's biodiversity. They are home to a variety of plants and animals, which are essential for the balance of the ecosystem.



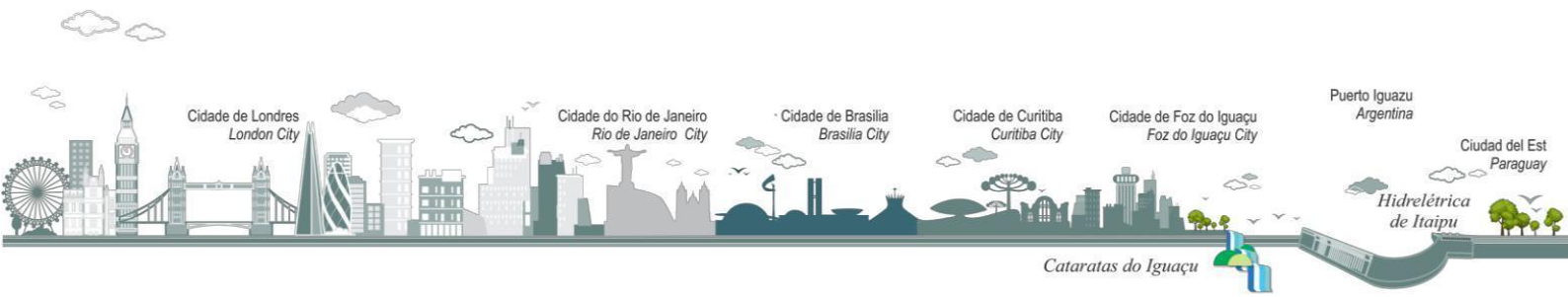

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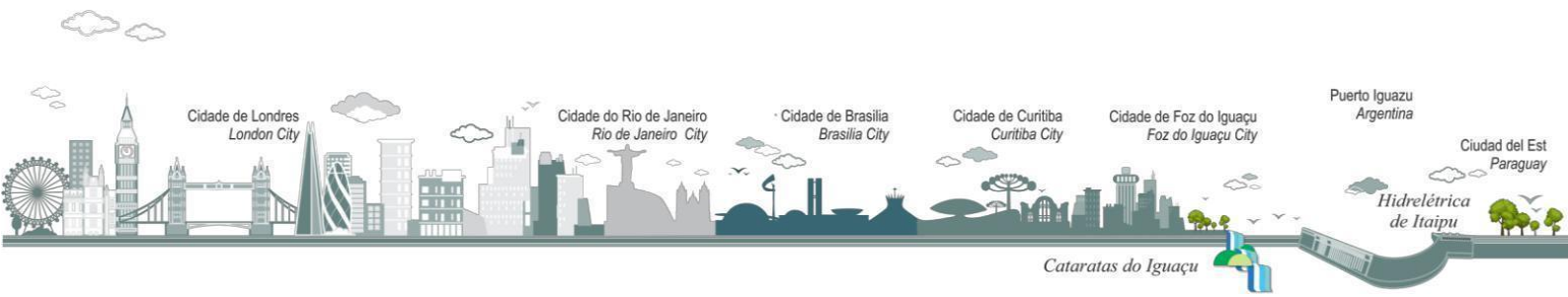
Table 1 - Climatic events affecting the lives of Haitians, by the number of people directly affected

| Years | Earthquakes | Climate change | Tempests | Floods | Droughts |
|---|---|---|---|---|---|
| 2010 | 3700000 | * | * | * | * |
| 2018 | 39336 | * | * | * | * |
| 2021 | 812763 | * | * | * | * |
| 1992 | * | 1000000 | * | * | 1000000 |
| 1993 | * | 5000 | * | 5000 | * |
| 1994 | * | 1587000 | 1587000 | * | * |
| 1996 | * | 155 | 115 | 40 | * |
| 1998 | * | 12029 | 12029 | * | * |
| 1999 | * | 50 | * | 50 | * |
| 2000 | * | 1200 | * | 1200 | * |
| 2001 | * | 5081 | * | 5081 | * |
| 2002 | * | 38589 | 250 | 38339 | * |
| 2003 | * | 197545 | 155 | 162390 | 35000 |
| 2004 | * | 353377 | 322094 | 31283 | * |
| 2005 | * | 42061 | 27978 | 14083 | * |
| 2006 | * | 39700 | 15000 | 24700 | * |
| 2007 | * | 220042 | 115081 | 104961 | * |
| 2008 | * | 246276 | 246276 | * | * |
| 2009 | * | 12706 | * | 12706 | * |
| 2010 | * | 100229 | 78142 | 22087 | * |
| 2011 | * | 7482 | 3044 | 4438 | * |
| 2012 | * | 236322 | 209857 | 26465 | * |
| 2013 | * | 33265 | * | 33265 | * |
| 2014 | * | 1030000 | * | 30000 | 1000000 |
| 2015 | * | 46969 | 1969 | 45000 | * |
| 2016 | * | 5794944 | 2100439 | 94505 | 3600000 |
| 2017 | * | 90434 | 40092 | 50342 | * |
| 2019 | * | 4433 | * | 4433 | * |
| 2020 | * | 44175 | 44175 | * | * |
| 2021 | * | 13383 | 3 | * | * |
| 2021 | * | * | * | 13380 | * |
| 2016 | * | * | * | 13000 | * |
| 2022 | * | 13000 | * | * | * |
| 2022 | * | * | * | * | 13000 |
| 2022 | 1017 | * | * | * | * |

Source: ECLAC, 2023; CRED / Center for Research in Disaster Epidemiology, Catholic University of Leuven / International Disaster Database (EM-DAT), 2023.





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Others, such as Parc La Visite, Parc Macaya and Forêt des Pins are more recent natural protected areas. These areas represent an effort to preserve natural ecosystems that are crucial to Haitian biodiversity. Although it is estimated that there are between 27 and 35 Protected Areas, most do not actually have an effective management system for building a National System of Protected Areas, which would help preserve other species (UNEP-WCMC; IUCN, 2023). In addition, disorganization and lack of care can increase problems related to biodiversity, nature, and the environment in general. Thus, Table 1[2] Is presented with historical data on climatic events to better understand the relationship between calamities and the living conditions faced by Haitian society.

The destruction of ecosystems and the loss of biodiversity contribute to aggravating the impacts of socio-environmental disasters. In 1992, the country faced a wave of drought and climate change that affected about 1,000,000 people, mainly in the rural area, where 42% of the population lives (Fao, 2021; Cred, 2022; Cepal, 2023). The problem of socio-environmental disasters is not new, and the most shocking was the 2010 earthquake, which devastated the country, leaving 3,700,000 affected. In addition to leaving millions of Haitians hungry and food insecure, the situation has exacerbated economic challenges (Eckstein; Künzel; Schäfer, 2021; Exime, 2023).

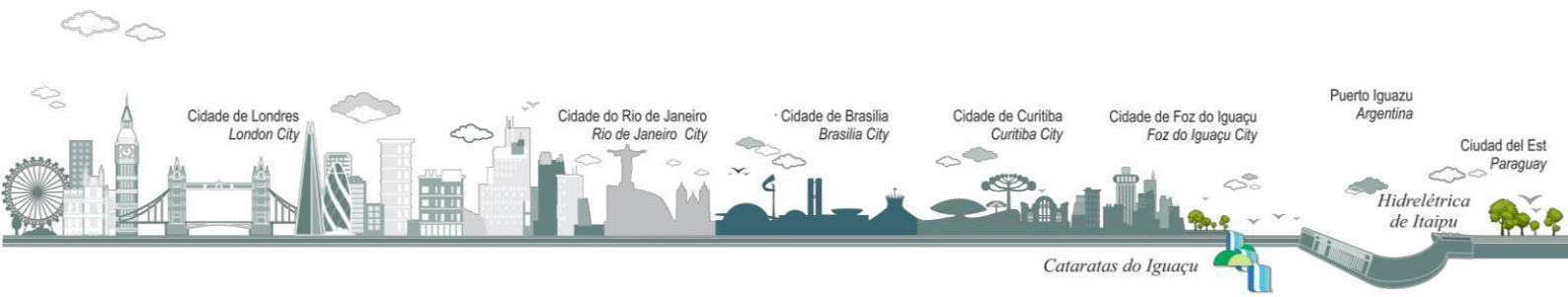
Thus, the relationship between biodiversity and climatic events affecting Haitian disasters can be defined as complex, severe, and multifaceted. It involves many variables: earthquakes, droughts, floods, storms, hunger and poverty, food insecurity, malnutrition, diseases, climate change, and others, which have direct and indirect impacts on Haitian society.

As a result of this importance, Haitian biodiversity has a vital role to play in the fight against hunger and food security in the country. The impacts of biodiversity on reducing hunger can be seen in different spheres.

Source of food: Haitian biodiversity offers a wide range of essential foods for the subsistence of local communities. Various species of plants, fruits, vegetables, fish and wild animals provide essential nutrients and contribute to the diversity and quality of the diet, for

[2] Table will be published in the article entitled *Dèyèmòngenmòn: the construction of hunger in Haiti at the hands of capital in the journal social em Questão.*





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example, breadfruit (Figure 1). This variety of foods is important to avoid food monotony, provide essential nutrients and ensure balanced nutrition.

Figure 1 - Breadfruit, an important vegetable on the Haitian menu

Source: Photos of breadfruit, taken on the family farm for sale in the Morland family's local shops, 2023.

Biodiversity also plays a key role in sustainable agriculture. Crop diversity, seed varieties and traditional farming systems help to increase the resilience of crops and reduce dependence on a single crop (Brown; Ward, 2014). In addition, the preservation of agricultural biodiversity contributes to the conservation of plant genetic resources, which are fundamental for the development of new varieties resistant to pests, diseases and adverse climatic conditions, which could prevent disasters such as floods (Figure 2).

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Figure 2 - The most recent floods in 2023, in the town of Léogane, located 40 km southeast of the capital, Port-au-Prince

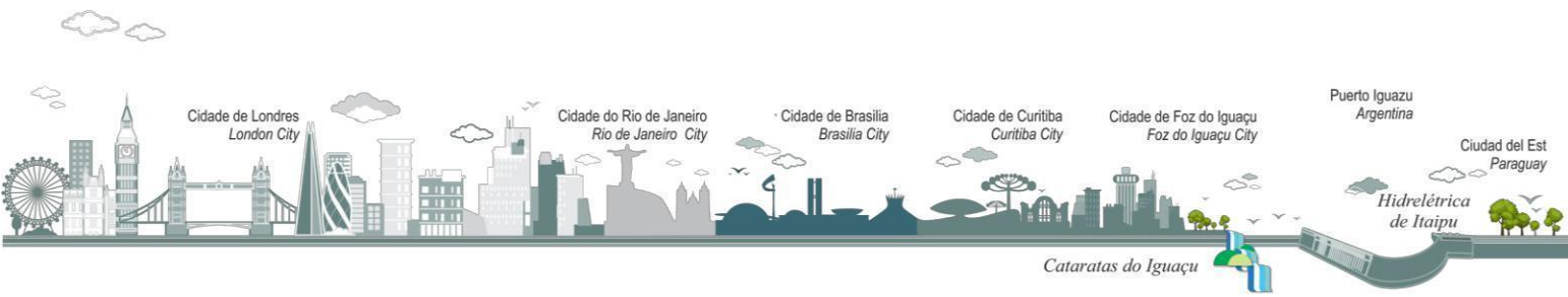
Source: Author's personal archive, 2023.

Haitian ecosystem services, such as forests, mangroves and coral reefs, provide ecosystem services that support food production. Forests, for example, play a key role in soil conservation, regulating the water cycle and providing wood for construction and energy. Mangroves and coral reefs help protect coastal areas, provide habitat for fish, shellfish, and contribute to fishing and aquaculture (Brown; Ward, 2014).

As important features and aspects, to reiterate the role of biodiversity in the Haitian disaster, by preserving the environment and the ecosystem, the positive impacts on socio-environmental disasters and climate change will be clear and sharp. It is understood that socio-environmental disasters have a significant impact on biodiversity. For example, deforestation and desertification[3] can be caused by socio-environmental disasters. However, it is also

[3] It is understood that desertification in Haiti transforms fertile lands into arid areas due to soil erosion, drought, and deforestation, exacerbated by unsustainable agricultural practices and climate change. This results in biodiversity loss, food insecurity, rural exodus, and impoverishment. On the other hand, deforestation refers to the drastic reduction of Haiti's forest cover due to agriculture, logging, and urban





important to emphasize that disasters have an effect on biodiversity and natural resources equally, especially when it comes to deforestation and desertification as a means of survival for Haitians.

## FINAL CONSIDERATIONS

The role of biodiversity in the Haitian disaster is reiterated by preserving the environment and the ecosystem. It is concluded that a sensitive approach is needed to promote awareness of Haitian society on the issues discussed, to promote public policy and mitigation strategies, as well as building social resilience and promoting climate justice, in addition to recognizing the importance of biodiversity in the Haitian calamity.

The three fundamental elements of the study have demonstrated both direct and indirect impacts: biodiversity, socio-environmental disasters, and calamities. These are interconnected and mutually influence one another.

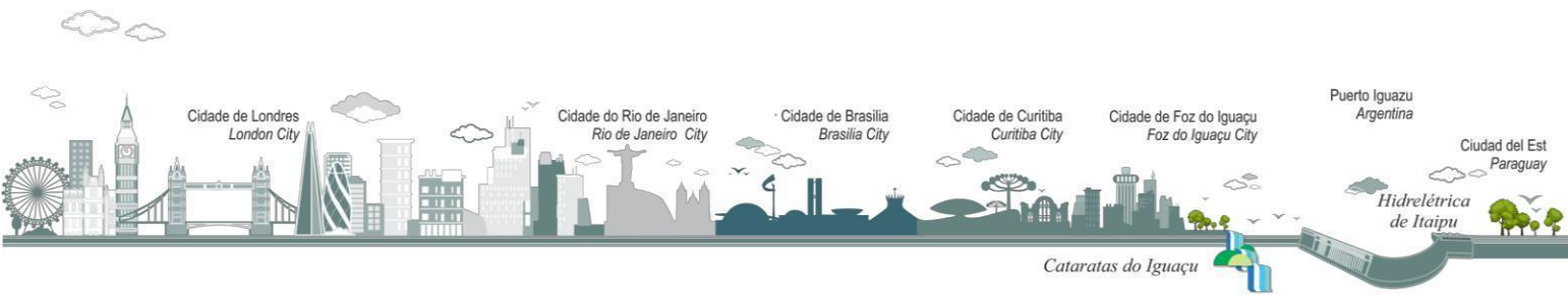
The analyzed data indicate that biodiversity loss contributes to reduced agricultural productivity and food security, increasing reliance on limited resources. From the perspective of socio-environmental disasters, intensified by deforestation, there is frequent soil erosion, flooding, and landslides. Furthermore, these two issues exacerbate Haitian calamities such as hunger and poverty, further stressing the socio-economic fabric of Haitian society, which endures prolonged and persistent social inequalities.

Thus, it is believed to be necessary the proposition of future actions and recommendations to address these issues. Firstly, the adoption of an ecocentric perspective that recognizes the inherent value of nature, independent of its utility to humans, can motivate a shift towards sustainable practices that prioritize biodiversity conservation, recognizing the intrinsic values of nature and the environment.

The second recommendation is that Haitian society should consider the well-being of future generations, which requires a shift towards environmental justice, ensuring intergenerational equity. The third recommendation is to acknowledge the cascading effects of

expansion. The loss of biodiversity weakens the ecosystem, increasing the risk of erosion, floods, and natural disasters, in addition to contributing to global warming.





biodiversity loss on disasters and social well-being, which helps foster a holistic thinking intertwined with ecology and social sustainability.

The fourth recommendation is to establish scientific committees and research groups to investigate Haiti's environmental problems, extending the understanding of the primary causes of biodiversity loss. Finally, a systemic responsibility is recommended, which entails the international community understanding its moral and ethical obligation to assist Haiti in addressing these problems. This includes, for example, the training of professionals to deal with these challenges and the transfer of technology for sustainable development.

The limitations of this study stems from the necessity to dive deeper into data analysis using additional quantitative methods and to extend discussions, enabling a more specific conclusion regarding the impacts of the three elements under consideration. For future studies, an article with the same objective should be conducted with greater methodological and theoretical depth, potentially yielding novel insights into these Haitian issues.

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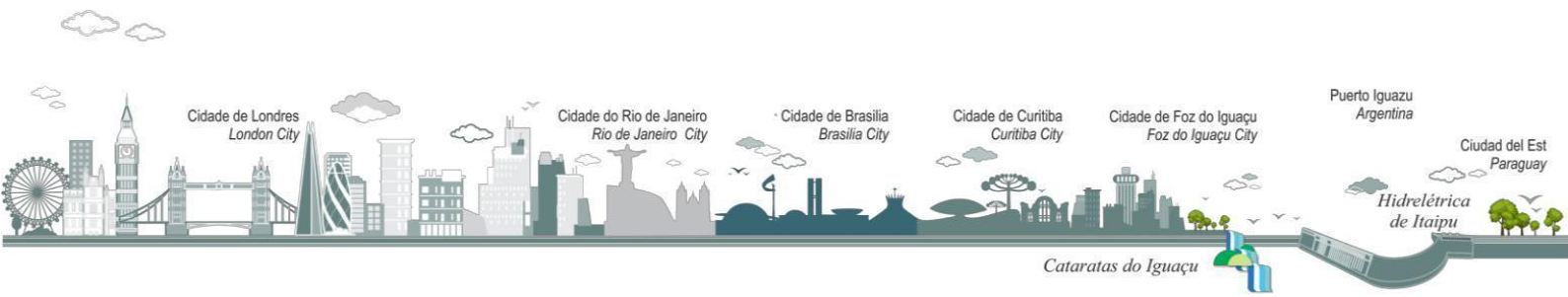

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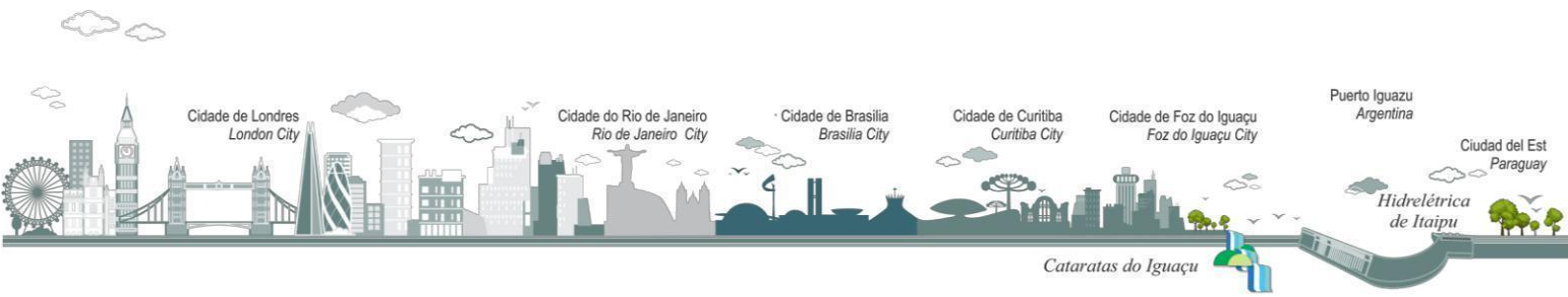

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