

## Resilience in The Face of Social and Environmental Impacts

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### SUMMARY

*The dynamics of the systems present in the Amazon require a detailed view of the aspects involving human actions and their consequent interactions with the forest. The impacts caused by this relationship have been the subject of numerous studies aimed at understanding the responsiveness to these impacts, risks, and vulnerabilities of the environment subject to risk factors. The general goal of this paper is to conduct a theoretical and conceptual study on resilience in the face of socioenvironmental impacts in the Brazilian Western Amazon. The specific goals are to contextualize the concepts of situational resilience in the face of environmental impacts, to address the main definitions of environmental impacts in the Amazon, and analyze the approach in the face of the Amazon environmental heritage. Regarding the problem, the following question was proposed: how is resilience characterized in the face of social and environmental impacts? In order to answer this question, a theoretical-conceptual review based on the Contingency Theory was conducted to support the conclusions. In order to reach this goal, we sought the conceptualization of resilience in the face of environmental impacts, the search for the main definitions of environmental impacts in the Brazilian Amazon and some concepts about the Amazonian environmental heritage in a qualitative approach by collecting data through qualitative research for further analysis of the problem and literature review, in order to build knowledge for the theoretical foundation using the Contingency Theory, which springs from environmental conditions to actions that minimize the impacts of human action.*

**Keywords:** Resilience, social and environmental impacts, Amazon, environmental heritage, Contingency Theory.

### 1. INTRODUCTION

According to Mendonça (2011), originally used in the social sciences, the term resilience involves risks and vulnerabilities. It refers to the ability of an environment or society to return to conditions that were previously impacted by extreme characteristics. More specifically addressing social and environmental problems, it brings with it an analysis of adaptation, individual variations and/or response to risk factors. This work has as its general goal to conduct a theoretical-conceptual study on resilience in the face of socioenvironmental impacts in the Brazilian Western Amazon; and to obtain results the specific goals are to contextualize the concepts of situational resilience in the face of environmental impacts (1), to address

the main definitions of environmental impacts in the Brazilian Amazon (2), and to analyze the approach in the face of the Amazonian environmental heritage(3).

This work is justified by the great concern regarding the Amazon biome led by environmental movements in direct conflict with the developmental and exploratory policy of natural resources. The focus of this work is the search for a balance between development and preservation, translated into the word sustainability. The inquiry is: How is resilience characterized in the face of social and environmental impacts?

## **2. THEORETICAL AND CONCEPTUAL REVIEW**

The theoretical basis of this study is the Contingency Theory. Chiavenato (2014) postulates that in this theory everything is relative and depends on situations. It also states that the environment has a functional relationship with administrative techniques, which implies that administrative techniques accompany the variables. In other words, in the contingency approach, the administrative actions are contingent on the functional characteristics to obtain the functional result.

### **2.1 Concepts of situational resilience in the face of environmental impacts**

In the exordial basis of this work, resilience is defined in the cognitive format pointed in this compartment of the task. According to Benetti and Crepaldi (2012), the term originates from Latin, *resilio*, *resiliri*, and has the meaning of jumping backward.

A bibliographic survey in Ferreira (2016), citing several authors, brings definitions of resilience delineated by areas of knowledge and applications, as follows: in materials science, it is considered tension and compression; it has a connotation with the modulus of elasticity. In psychology, several authors apply the concept of resilience and consider it as the ability of the individual or group to positively recover after adversity. In ecology, the concept of resilience is centered on the persistence of living systems given their capacity for change in the face of disturbances; this way, they maintain similarities in the relationships between populations or state variables. Finally, in the social sciences, social resilience appears as the ability of communities to withstand external disruption resulting from political, social and environmental change. It is worth noting here that in the context of ecology, resilience is the ability of a given system to regain balance after a disturbance.

Gonçalves (2017) postulates the existence of support for the sustainability tripod, technically known as the triple bottom line. This tripod satisfies resilience in the face of social and environmental disturbances while expanding the opportunities for community progress, as well as the suitability of individuals and groups in the environmental space they occupy and where progress should occur. This is where the concepts of environmental quality, economic prosperity and social justice emerge. The author also states that this means that sustainability implies functional environmental systems suitable for human activities with structures and institutions that guarantee the fair use of resources and economic progress.

Seeking this balance, men investigate solutions to the theme of sustainability. One such attempt was the document called the Kyoto Protocol, which Gonçalves (2017) claims to be a global instrument for an attempt to restore stability between economic development and environmental values. According to

Ferreira, the aim of the document goes beyond reducing pollutant gas emissions but instead seeks to perpetuate the need for developed countries' dependence on fossil fuels and to maintain the original plan of multinationals and their production schemes in heavy industries. by issuing bonds of financial speculation on the carbon market that generate the right to pollute beyond their quota by buying from the least polluting, thus aggravating world inequality.

## **2.2 Main definitions on environmental impacts in the Brazilian Amazon**

Conceptualizing the term environment also requires some caution, given its variety of interpretations. According to the Federal Constitution: I) environment, the set of conditions, laws, influences, and interactions of a physical, chemical and biological nature, which allows, shelters and rules life in all its forms.

In addition to this aspect, the environment can be considered as the place from which the resources necessary for life and socioeconomic development are extracted, as pointed out by Sanchez (2013). For this author, environmental degradation brings an imbalance in the way nature is preserved. From that arises the thought that every human action of altering an environment has an impact on it that will be to a greater or lesser extent, depending on its scope. This impact can be measured by the difference observed in the environment from the start of a given project over a period of time and how it would be without human intervention.

According to the International Standard Organization (ISO), the environment is defined as the surrounding area in which an organization operates. It includes air, water, soil, natural resources, flora, fauna, humans and their interrelationships. This institution guides the concept of environmental impact as any adverse or beneficial environmental modification that results, in whole or in part, from environmental aspects. These elements are the constants of the activities, products or services of an organization, and that can interact with the environment where the organization operates. In this sense, Gonçalves (2017) proposes that the goal of sustainability is the maintenance and creation of social, economic and ecological systems in a development process for the good use of natural resources such as water, air, food and energy that, if misused, may generate undesirable effects in the medium and long term. Thus, resilience consists of actions that will minimize the damage caused by poorly planned use of the environment.

We read in Andrade Filho (2017) that among the world's major emitters of pollutants are forest fires and intended or not biomass burns that expose populations to high levels of pollution. In the region known as the "Arc of Deforestation", whose limits range from southeast Maranhão, including northern Tocantins, southern Pará, northern Mato Grosso, the state of Rondônia, southern Amazonas, to southeastern Acre, says the author, that burnings are generally associated with agricultural activities in an attempt to prepare land for planting and raising animals after deforestation.

However, this phenomenon is not recent. Penha (2014) states that the burnings already occurred in the Amazon region even before the arrival of European settlers with the occupation of the region by indigenous tribes. But it was with the increase of colonization by government incentives from the 1960s that the author tells us about the explosion in the pace of occupation through infrastructure policies and settlements with an exponential increase in timber and livestock activity.

### **2.3 Concepts about the Amazonian environmental heritage**

The concept of an environmental heritage of the Amazon refers to the green cover that characterizes it. However, analyzing the scenario more accurately, the Amazon should be observed in the axis of complexities. It involves the systemic perception that includes the environmental heritage and the associative attributes that imply the storage and distribution of water, not to mention wildlife and biodiversity. This ecosystem is the target of attacks by those who seek to satisfy a wide range of interests.

Taking into account this heritage and the development and integration of the Amazon as a whole, Gomes and Filho (2016) highlight the signing of the Amazon Cooperation Treaty (TCA), to carry out joint efforts and actions in their respective territories and exercise their sovereignty over it; This deal emerged as an attempt to promote international cooperation in border areas, and was signed by Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela for the preservation and conservation of the environment and the rational use of natural resources. The consignees aimed not only at the commercial issue but also the preservation of natural resources such as water, energy, land, wood, and ores, as pointed out by Gomes and Filho (2016), in addition to promoting scientific and technological research and information exchange. They sought cooperation in health services, improved sanitation, transportation, and communications, among others. It was during this period, according to the authors, that the expression "integrate to not give up" was coined, at the end of the military dictatorship.

Currently, with the reorganization of the treaty and the creation of an organization to monitor the actions of the ACT, the so-called Amazon Cooperation Treaty Organization (ACTO), Gomes and Filho (2016) also report the creation of several programs, especially projects such as monitoring deforestation, forest use and land-use changes, the integrated and sustainable management of transboundary water resources of the Amazon River Basin, the environmental health surveillance project in the Amazon region, the Sustainable Use and Forest Conservation program and Biodiversity of the Amazon Region and demonstration projects in member countries.

In this colonizing and expansionist eagerness, Bampi et al. (2016) narrate the capture of the Brazilian West from the 1970s, especially the north of the state of Mato Grosso, a place that housed a good part of the Amazon biome, where they had contact with the indigenous, explicitly ignoring the existence of native societies, a collection of natural resources and the connection of ecosystems. Progress consisted (and still consists of this vision of immediate profit) in the dispossession of the forest, minerals, and "bare land" for agricultural production, soybean, and livestock. Thus, the existing biodiversity in the so-called empty spaces, more emphatically in the Amazon Forest with all its richness of fauna and flora, was subdued in the same way as the inappropriate action implemented in the country since the entry of the European in the 1500s. This forced the natives to partake into forced integration, be decimated or escape to areas further from deforestation, with all their ethnicities and culture. Bampi et al. (2016), bring alarming data from the estimate that around a thousand languages have been lost in the last 500 years of colonization by the disappearance of their populations.

Santos (2014) reports that, besides being the largest tropical forest on the planet, with the most significant biological diversity, with the largest river basin and the largest aquifers in the world, we also have the largest strategic reserves of natural and mineral resources, essential to the technology and defense industry, such as iron, manganese, aluminum, copper, zinc, nickel, chrome, titanium, phosphate, gold,

silver, platinum, palladium, rhodium, tin, tungsten, niobium, tantalum, zirconium, rare earths, uranium and diamonds, giving the region an important geopolitical value at the international level. Santos (2014) points out that the region has been the target of action by countries interested in extracting key elements for its technological development, veiling threatening the sovereignty of the biome-owning countries in their territories.

Reading in Sato and Pedrozo (2012) complements the information on natural resources as postulated so far and the numerous classifications, highlighting the physical and biological characteristics, the mode of production, the degree of private appropriateness and the time the environment needs to be redone. among the most relevant in the concept of human vision that is constantly examining the physical environment and seeking organic and inorganic elements for extraction.

According to Buschbacher (2016), within its complexities, Amazon has been characterized as a hub for disputes between competing groups that claim open access, limited governance, and land, forests and mineral resources. The social and economic activities of this region influence and are influenced by biophysical factors such as water, climate, and biota, seeking to combine the satisfaction of human needs with the challenge of ecosystem services; This author considers that a fundamental point in the thoughts and concepts of resilience is to understand that human society belongs to a socio-ecological and biophysical system that interacts from a local to a global scale, capable of absorbing external influences without losing their essential properties for human welfare. This is a broader concept than sustainability according to the author, as it focuses on the system's ability to change and informs management of the ability of systems to learn, self-organize and adapt to unpredictable changes.

### **3. METHODOLOGY**

Silva (2015) describes that the way admitted by scientists to increase their knowledge about a phenomenon, object or fact is called 'method', which is the set of processes used in the investigation and subsequent dissemination of the truth.

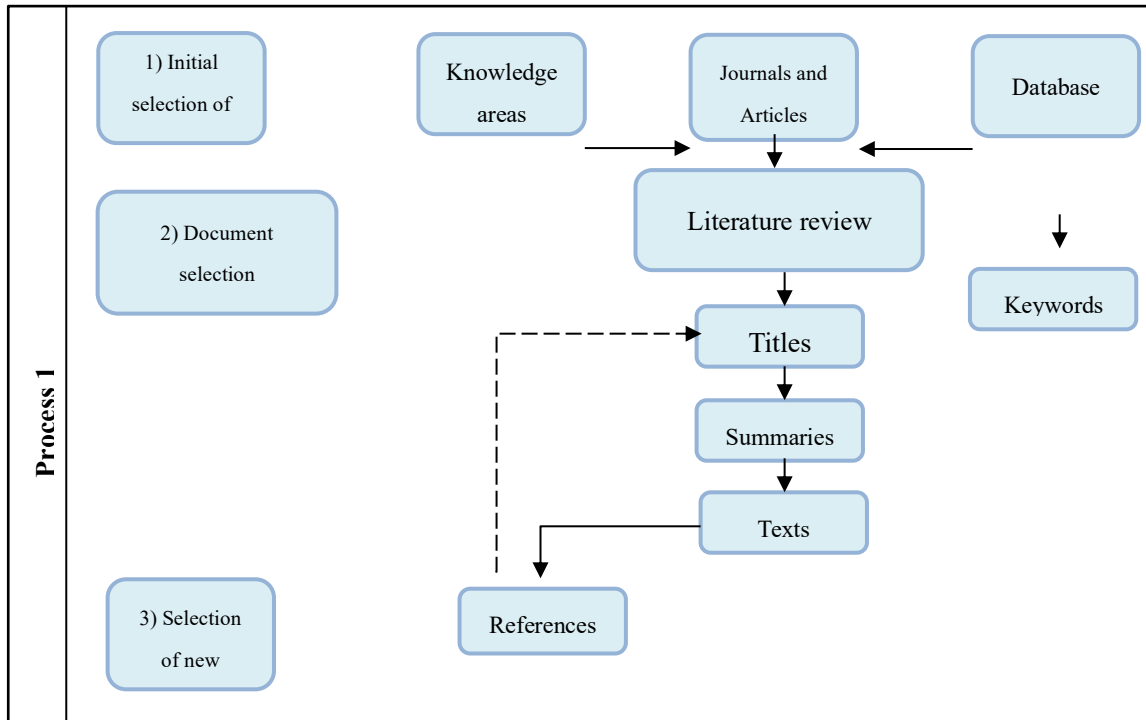
In this work, a qualitative approach will be used, characterized by data collection through descriptive qualitative research for further inductive analysis in the examination of the problem. A literature review will be used to build knowledge for the theoretical foundation.

Qualitative research considers that there is a relationship between the world and the subject that cannot be translated into numbers; research is descriptive when the researcher tends to analyze their data inductively.

Initially, sources from journals, theses, dissertations, and books were selected. At this stage, the survey was carried out in various portals through Google Scholar and Ark (Institutional Repository of Fiocruz) of publications related to the areas of Social and Multidisciplinary Sciences.

After that, the selection of references was focused on the search for documents that contained the keywords Amazon, Resilience, Environment, and Environmental Impacts in the title and/or abstract. Then, titles and abstracts of the articles were analyzed, selecting those that were relevant to this work.

Finally, the selection of new documents was made to identify the most cited works from the list made, and include them in the portfolio, as seen in picture 1.



Picture 1 - Bibliographic Search Model Used

Source: Tezza R. et al. (2010)

Elements	Descrição
<b>Initial Source Selection</b>	Begin the work by selecting the initial sources.
<b>Knowledge areas</b>	Choose the areas where searches will be done..
<b>Journals and Articles</b>	Initial survey of journals and articles to be analyzed.
<b>Base de Dados</b>	Selection of databases to be analyzed.
<b>Key words</b>	Choice of keywords used in the search.
<b>Document Selection</b>	Selection of relevant documents found in the search by keywords.
<b>Literature review</b>	Analysis of selected documents.
<b>Titles</b>	Initial selection by titles.
<b>Summaries</b>	Reading of abstracts.
<b>Texts</b>	Reading of texts.
<b>Selecting New Documents</b>	Process restart with new documents
<b>Bibliographic references</b>	Text selected for the collection.

Picture 2: Research Procedures.

Source: Adapted by the author from Afonso et. Al (2011)

## **4. THEORETICAL-CONCEPTUAL STUDY ON RESILIENCE IN THE CONTEXT OF SOCIAL AND ENVIRONMENTAL IMPACTS ON BRAZILIAN WEST AMAZON**

This is a work of theoretical-conceptual methodology for a discussion about resilience in the context of socio-environmental impacts in the Brazilian Western Amazon, resulting in the survey of some relevant points to corroborate the planning of the actions needed to mitigate the impacts generated by the development devoid of a holistic view of the Amazon biome and its social and environmental developments, as well as pointing out perspectives for future research in the dissemination of information from the researcher to his peers, as is the case with literature reviews.

### **4.1 Contextualization of concepts about situational resilience in the context of environmental impacts.**

Amazon is an interconnected socio-ecological system and therefore a notoriously dynamic socio-ecological system. Buschbacher et al. (2016) highlight that the region has already undergone major changes, led by the wave of rubber extraction in the late nineteenth century, the Belém-Brasília highway built in the 60s and the Carajás project in the 80s among many others. These actions have brought with them strong impacts on this system, leading to its extreme resilience, that is, its ability to absorb such disruptions while still maintaining its essential properties, including ecosystem services that are fundamental to human well-being.

Neu et al. (2016), states that in situations where the environmental balance is threatened by human action, environmental restoration emerges as an effort to restore the ecosystem functions of the environment. One of the most important strategies is the reintroduction of native species that have been significantly reduced or even extinct to minimize the limits of ecosystem resilience, which must be accompanied by actions that identify and correct what caused the impact so it can achieve its goals. The vulnerability of underserved populations living without any infrastructure is as damaging to the environment in poor or developing countries where they are embedded as the extravagant patterns of production and consumption that characterize the wealthy social classes of rich countries.

Also according to Neu et al (2016), there is a fine line between the exploitation of natural resources with consequent production of waste from this activity and the ability to restore the degraded environment to maintain production activities without prejudice to ecosystem functions. of the natural environment. This is how resilience demonstrates its limited power of temporary recomposition in the face of environmental impacts without collapsing into ecological, social or economic processes.

To step back from this escalation of environmental damage, Viana et al. (2014) propose little known solutions, disseminated and developed towards sustainable development in the Amazon, using information and technology to bring those who develop solutions closer to those who demand this knowledge. This proposal includes sustainable management in captive fish farming in the region, investments in education and early childhood, power generation from renewable sources for communities, agriculture with agroforestry systems and good practices for mineral production, among others, to conserve the forest while

promoting quality of life for all segments of Amazonian societies. To this end, the authors suggest the mobilization of this society in the dissemination of solutions and in the development of others that may arise from the synergy of its actors, valuing the knowledge of institutions and other participants in the various types of partnerships and institutional arrangements looking for solutions to promote sustainable development.

#### **4.2 Main definitions on environmental impacts in the Brazilian Amazon.**

Unlike other sciences that have their terms to coin their phenomena as accurately as possible, Sanches (2015) considers that environmental management borrows common terminology such as the words "impact", "assessment" or even "Environment", widely used by professionals in this area. Therefore, to understand more precisely the concept of "environmental impact" with the meaning of "environmental degradation", it is necessary to understand the context to which the terms refer. Therefore, according to the author, the term environment must be in connection with the scope of environmental planning and management instruments.

From their origin, Ferreira et al. (2017) postulate that the degradation of the environment marked the occupation of the Amazon territory, which inexorably reflects the disrespect for the rights of people and nature that suffer the worst effects of aggressive capitalism that stands out in the contrast between misery and the richest regions of the planet.

Another form of environmental impact is defined by the National Environment Council (NEC) as chemical, physical and biological changes caused to the environment as a result of anthropic activity, according to Teixeira and Michelin (2017), as a result of visitations and changes in the soil, waters, flora, and fauna. The authors point out that, when treading on the trails, the effect of soil compaction and erosion brings consequences such as the exposure of tree roots, which can cause vulnerability to diseases and, in extreme cases, their fall by reducing their capacity of retaining water.

We also have the action of livestock as the main activity developed in the Amazon. Nascimento et al. (2015), question the justification of maintaining this harmful activity. The authors consider the fact that livestock guarantees land tenure, having a low risk in terms of market, trade, and price, requires a lower investment value compared to agriculture, fewer workers and easier transportation, among others. However, the activity causes severe environmental damage due to the loss of biodiversity, soil exposure that culminates in erosion and loss of forest function in the water cycle and carbon retention. Also, the authors describe that logging is closely linked to cattle ranching, where logging uses deforestation proceeds for further deforestation and land preparation in other exploratory activities.

Nascimento et al. (2015) also point out that, despite the known environmental impacts of livestock, little has been done to minimize its effects and point to cooperation between institutions in the elaboration of a legal framework that protects the forest as a way out of these aggressions that affect riversides, traditional, extractive and indigenous populations.

Given the above we conclude, agreeing with Homma (2017), that there is a need for change in the current proposals for the Amazon to reduce environmental impacts and to generate employment and income that go through plant extraction, traditional activities and even the sale of carbon credits, solutions widely advocated by non-governmental organizations and other external entities. For the author, targeting the



population as a whole, it is better to take advantage of already deforested areas with more appropriate productive activities, rather than returning to the forest.

**4.3 Analysis of the approach in the face of Amazonian environmental heritage.**

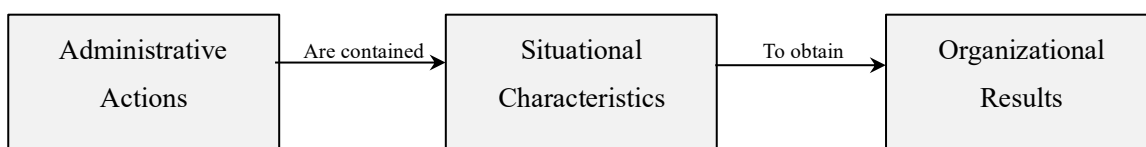
The Amazonian environmental heritage, as already explained, is not limited to the green cover of its territory. It includes its subsoil formed by rocks that not only retain but also transfer drinking water, as well as carbon-rich soil that, if released into the atmosphere, can significantly alter the balance of greenhouse gases and the potential for fossil fuel production.

However, environmentally aggressive practices such as the use of fire in order to clear and transform the forest into pasture, bring soil infertility, destruct biodiversity, weaken ecosystems, worsen air quality, increase risk of air and land accidents due to lack of visibility and many others, according to Cabral et al (2013) logging, large hydroelectric complexes, deterritorialization and finally , the eviction of families from their natural habitat by the land dispute in favor of agribusiness, as prescribed by Cunha et al. (2008).

The Amazonian environmental heritage can no longer be seen as an element outside human activity, with a purely economic look at the benefits that may be appropriated from its riches, but with an administrative view converging to actions that are appropriate to the characteristics of each environment in order to minimize the impacts imposed by human intervention.

From the concepts of Chiavenato (2014), it is possible to affirm that the environmental heritage has its situational characteristics, which can be analyzed and will result in administrative actions, to obtain results that will impact the quality of life of local populations through the proper management of its natural riches.

The contingency approach emphasizes that everything is relative and is tied to the situation, in a functional relationship between environmental conditions and administrative techniques, as advocated by Chiavenato (2014), who also points out that environmental variables are independent, while within a relationship functional, administrative techniques are dependent variables, but there is no causality between them, but only an if-then relationship, as shown in Figure 3:



Picture 3 - The Contingency Approach

Source: Chiavenato 2014

Through this approach, the Amazonian environmental heritage is inserted from the perspective of scientific management by the Contingency Theory. Thus, studies related to the environment begin from environmental conditions to actions that minimize the impacts suffered by human action in the search for methodological and scientific tools to equalize the aims with the demands required by the natural environment, following the precepts of Silva (2015).

These actions certainly pass through a set of achievements as proposed by Viana et al. (2014) in the initiative called the Sustainable Development Solutions Network of the Amazon, where they suggest the need for practices that address the real needs of the region in order to achieve a transformative impact focused on sustainable development, which is only possible through engaging decision-makers, addressing technical issues to foster synergy between governments, civil society and the private sector to address information and develop strategies that underpin the implementation of policies that point to the correct economic, social and ecological advancement of the Amazon.

## **5. CONCLUSION**

Historically, the Amazon has been suffering strong impacts due to exploratory actions of its riches that directly affect its resilience. In the developmental zeal, the environment has been suffering multifaceted aggressions that go beyond the ability of the natural system to recompose itself.

On the other hand, the first concepts of sustainability emerge, supported by opportunities for community progress, adequacy of individuals and groups and resilience in the face of social and environmental disturbances, aiming at environmental quality, economic prosperity and social justice.

However, what has been seen are changes in the environment and its main aspects as a result of the activities, products or services in which individuals or organizations have been acting, generating strong impacts.

An attempt to unify efforts for environmental sovereignty was created by the Amazon Treaty Organization with the development of programs for monitoring deforestation, forest use, and land-use change, integrated and sustainable management of transboundary water resources in the Amazon basin among other actions in the member countries, aiming at the integration and occupation of the Amazonian space.

Another effort in this regard was the taking of the west in the 1970s as an expansionist policy of great social and environmental impact with the expulsion of native populations and the destruction of natural wealth and their connections with ecosystems through the dispossession of forest, minerals and “bare land” for agricultural production, soybean crops and livestock. Also, the region is a source of ores of strategic value to the technology industry, which gives it an important geopolitical value at the international level.

Considering these questions and in response to the research problem, it is possible to state that resilience in the face of socioenvironmental impacts is characterized by the exacerbated human action in view of the limited recovery capacity of the environment, in a cause and effect relationship by the exploratory action in search to meet their immediate needs, therefore, there is a need for planning by political leaders, environmental managers, and preservation communities that can use the concepts exposed here to converge studies that induce the rational use of the Amazon biome without losing focus on sustainability.

The search for possible solutions to the environmental issue is closely related to the joint efforts between governments, the private sector and civil society for the exchange of information that points to the elaboration of strategies that form the basis of policies for sustainable development of the Amazon.

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