

Environmental impacts Caused by Irregular Occupation around the City of Lights, in the city of Manaus-AM

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Abstract— In recent years the numbers of irregular occupations, so-called "invasions" are growing rapidly. Thus, this article deals with the environmental impacts caused by irregular occupations around the City of Lights, which is environmentally friendly. The objective of this work is to analyze the worsening of the environmental impacts caused by the "invasion" and irregular occupation of the City of Lights, in the city of Manaus-AM. This research is a case study based on lap visits and direct observation of the studied site and application of a closed questionnaire containing ten bibliographic questions and research and exploratory study technique. The results obtained indicate that it is advantageous to preserve and implement green areas around the City of Lights of Manaus, because influence on good air quality, in the local landscape, allows good thermal comfort and consequently influences d of people's quality of life, but there are some disadvantages, such as irregular occupations on site that is environmentally friendly.

Keywords— Invasion; City of Lights; Environmental Impacts.

I. INTRODUCTION

The search for housing spaces has multiplied in recent decades in large urban centers. Allied to this demand, there is the growth of social conflicts in cities, competition between social classes, a scenario, where the majority of the population is forced to look for less privileged places of services and with precarious infrastructure. In these areas we can verify that formal and informal dispute for physical space. Also, according to Carlos (1992), "society and space cannot be seen unboundmind, because at each stage of the development of society, will correspond to an stage of the development of space production".

Moreover, the high growth of cities combined with a lack of public housing policies does not allow cities to absorb and integrate the population, emerging from the need to expand their urban boundaries. Consequently, the landscape of cities ends up changing and areas covered by primary forests often suffer spontaneous occupations (invasions) (ROVERE e CRESPO, 2002; OLIVEIRA e SCHOR, 2009).

Therefore, irregular occupations are growing more and more and more often bringing changes to the environment, it is the case of irregular occupation around the City of Lights. Moreover, in many cases, significant portions of this population begins to occupy the "free" areas,

areas aimed at environmental protection, common use of the people, planning of cities, protection of natural drainages, climate balance, protection of fauna and flora, construction of collective equipment (squares, parks, health center, schools, among others), further aggravating the socio-environmental problems experienced in cities.

The city of Manaus/AM is an example of this strong growth and modification of the landscape. A recent example, it was the Tarumã neighborhood that developed with the construction of the City of Lights, where less privileged people erect shacks causing various environmental impacts in the region through clearing and burned harming the natural environment, According to Assad (2011), almost always in these areas the deforestation index is high due to the construction of the shacks, this removal of vegetation directly impacts on the soil structure, as well as other impacts such as the loss of vegetation cover and soil compaction. In addition, the city of Manaus is valued as capital-nature for its location in the center of the Amazon, known for its great biodiversity (ARAÚJO *et al.*, 2015).

The area of the City of Lights, in the Tarumã neighborhood, West Zone of Manaus, was occupied irregularly, the place was to have been recovered and transformed into an ecological park to maintain the

environmental preservation of the region, according to Manaus prefecture, but what we see is a scenario of destruction with many shacks erected. The occupation causes problems in the natural environment, as often the "invaders" make fires to lift the shacks on site. The authors Durigan et. al., (2011) mention that, in order to avoid further anthropic degradations, measures can be made by surrounding the area and placating.

The impacts of invasions cause changes in the physical, chemical and biological properties of the invaded area, and these changes tend to compromise the structure of the site and the functioning of the natural ecosystem temporarily or definitively, making that disturbed environment (MMA, 2013). Thus, everything is aggravated mainly when they invade places of forest where environmental preservation is necessary, causing several impacts to the environment due to irregular occupations.

Albuquerque (2007) states that socio-environmental problems cannot be considered an imbalance in a relationship between man and nature. The author also states that it is not because nature is disgusted with the man who therefore wants to exterminate him. Nature has its own dynamics of transformation, but it is a man/nature relationship that is causing the environmental problems that threaten to extinguish our own species, after all the results come from a relationship of man with himself. In addition, environmental impact can be defined as "a set of social and ecological changes caused by disturbances in the environment, as well as the relationship between nature and society that transforms with time and place" (COELHO, 2001).

One of the main problems related to the occupation of urban areas, according to Nascimento (2007), are the environmental impacts, almost always noticed through floods, landslides, landslides, garbage production, erosions, among others.

The social impacts resulting from this irregular occupation is the situation of the low-income population suffering from the lack of resources to have a dwelling. According to Carvalho (2015). Environmental impact "is a set of social and ecological changes caused by disturbances in the environment, as well as the relationship between nature and society that transforms with time and place" (COELHO, 2001).

Therefore, data and information were sought with the purpose of analyzing the worsening of environmental impacts caused by the invasion and irregular occupation of the City of Lights, in the city of Manaus-AM. Linked to the general objective of the work, the specific objectives were limited: to verify the main damage caused to the environment around the invasion of the City of Lights and identify how the government acts to minimize these impacts. Thus, in this work, on-site visits were made to obtain the information and thus evaluate the impact of irregular occupation on the City of Lights community.

II. MATERIAL AND METHODS

The research was carried out in the area of the City of Lights, located in the Tarumã Zona Oeste neighborhood of Manaus / AM, which has about 57,000 hectares and has approximately 500 families living on site irregularly.

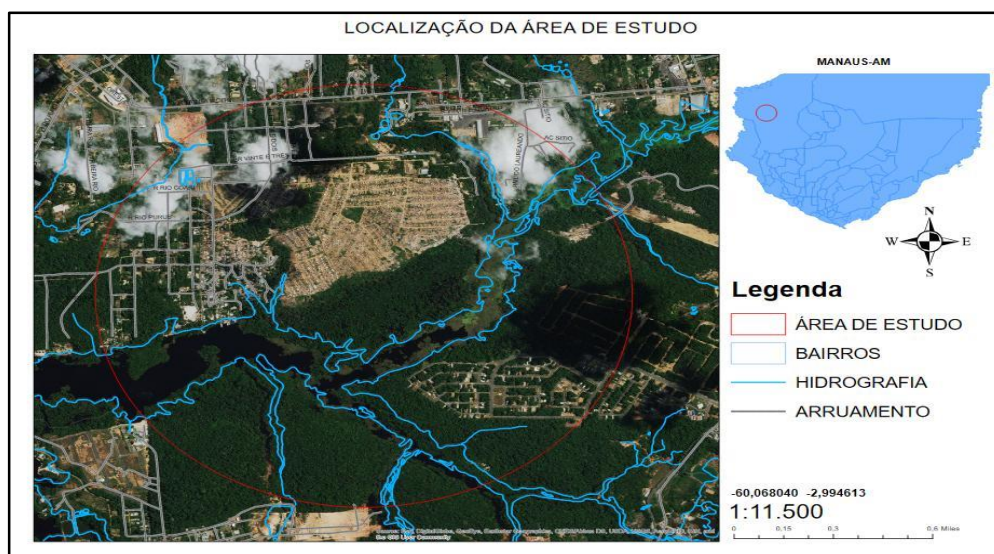


Fig.1 - location of the occupation of the City of Lights, Manaus-AM.

Source: (GOOGLE EARTH PRO 2019).

For the development of this research and data

collection, the following procedures were adopted: There

were visits on site, where photographic records of the site were made. Observations at the site were made in September 2019 at the site of the "invasion" in the City of Lights community, located in the Tarumã Zona Oeste neighborhood of Manaus/AM. Due to start in 2015 it was necessary to survey satellite images to have a real dimension of the loss of native vegetation. In addition, a closed questionnaire was applied to the residents of the place in order to know what they think about the problems caused by these irregular occupations and the impacts they cause to the environment.

The relevant aspects of this type of invasion begin by felling vegetation and fires to obtain space for the beginning of the construction of houses, for each aspect raised there is an impact of relevance not only for the occupants of the site, but also for the population in general. For fires there is the air pollution factor affecting the entire region due to smoke being carried by the force of the winds.

Irregular occupation brings waste accumulation problems since the area has no planning for traffic of collecting trucks, with this the problem of attracting animals that comes with the bad smell and remains of food, animals that attract diseases to adults and children who transit near the waste. Diseases that affect residents is a problem for public authorities to have to invest not only in the treatment of these diseases, but to mitigate the problem caused by the dumping of waste and effluents. In the case of effluents, given the location is close to a tributary called tarumã açu, where people from all over the city attend for leisure and outdoor bath.

The data collected during this research were



Fig.2: a) irregularly occupied area in the City of Lights; and b) irregular occupancy area.

It is possible to observe in Figure 2 the emergence of degraded areas in the region of the new neighborhood, the cause of the degradation of the site according to Santos (2013), is related to the uncontrolled population increase of Manaus, including the environmental damage caused by the construction of the shacks in the occupied area.

tabulated in Microsoft Excel program spreadsheets so that they could be analyzed later. For analysis of the questionnaire and the interview conducted with the residents of the invasion, bardin content analysis (2012) was used, the set of analysis techniques may be systematic procedures and objectives of describing the content of messages and Documents. Therefore, the data were interpreted to verify the main environmental impacts caused by irregular occupations of the site studied.

In addition, the CHECK-LIST method was used, the model consists in the identification and enumeration of impacts, from an environmental diagnosis, which should include the physical, biological and socioeconomic means. After diagnosis, the diagnosis of the impacts caused at the site is made, and classify them into positive and negative (MEDEIROS, 2010).

III. RESULTS AND DISCUSSION

The irregular occupation around the City of Lights generates several environmental and public health problems, mainly due to the lack of an efficient system of selective garbage collection. In the short term, the residues generated in the occupation are responsible for: bad smell, contamination of groundwater and surface waters, visual pollution (NASCIMENTO, 2007). In addition, incorrect disposal provides the appearance of vectors, worms, cockroaches, rats, spiders and all kinds of venomous animals, and can even expand the appearance of diseases and epidemics (BACKES, *et. al.* 2007).

In the area where irregular occupations occur, there is no collection of solid waste, so these are accumulated in a place and later burned. The burning of this manaus waste greatly affects the quality of air in the neighborhood City of Light, but the smoke generated by burning is transported to the central areas of the city of Manaus (Figure 3).

In addition to discarded waste, occupations cause changes in soil characteristics in the region. First, soil mischaracterization began with the removal of vegetation cover for the opening of roads and constructions of residences (Figure 3), making the soil more exposed and

vulnerable. Giangiulio (2009) showed in his analysis that one of preventing soil erosion from occurring is through the insertion of grassy species that do not require so much of soil, water and nutrients.

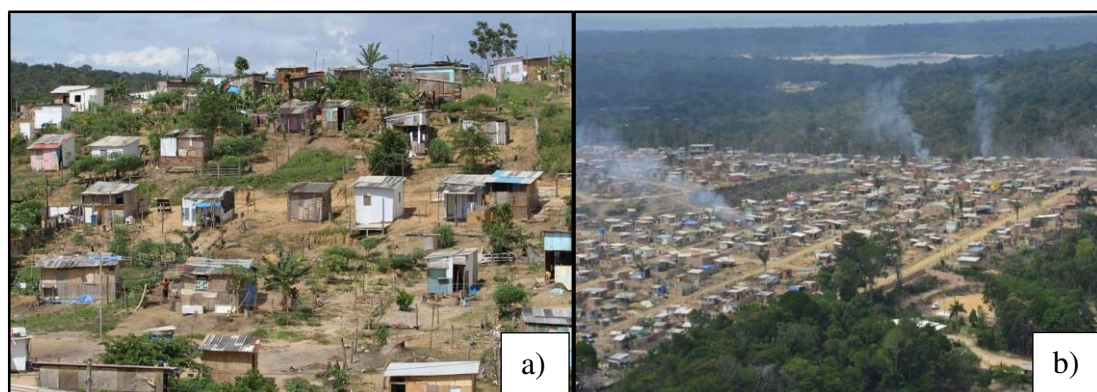


Fig.3: a) irregular occupation, "invasion" City of Lights; b) burned in the City of the Lights (occupation)

As Figure 4a shows, about 90% of people living in the area assume they have deforested the site to build their homes, while only 10% deny having done any kind of deforestation. Deforestation causes a serious ecological imbalance, especially in invaded areas, according to Batista

(2016) rates of infectious diseases increase in environmentally degraded areas, there is epidemic incidence as cases of dengue malaria due to the aggressive process of deforestation of green spaces.

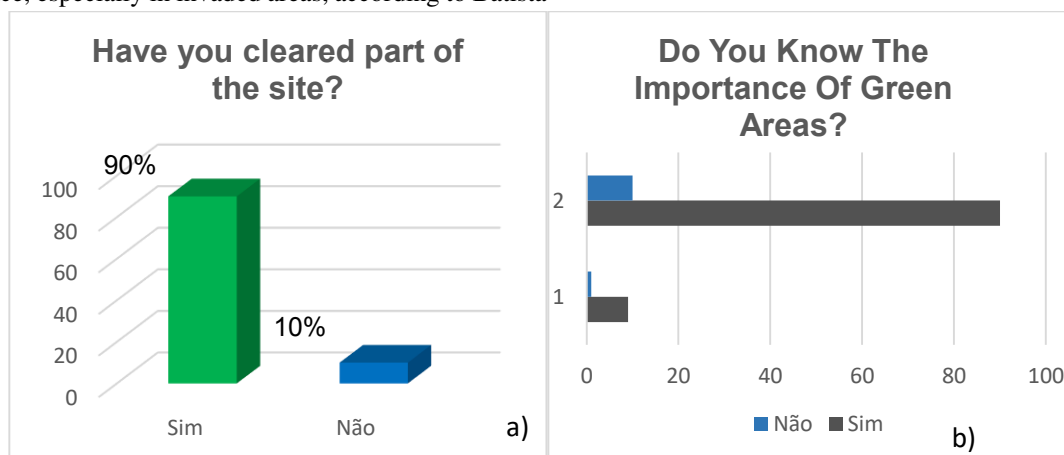


Fig.4 a) and b) Questioning the residents of the neighborhood Cidade das Luzes

Regarding the agreement of the interviewees regarding the influence of green areas on the preservation of springs and bodies of water, the result was positive since 82% of the interviewees fully agree with the importance of maintaining the Areas of Permanent Preservation, while only 18% partially agree, that is, most can identify the importance of joining the two biomes (Figure 4b). Still, Sánchez (2013). Therefore, fauna is seriously affected according to the Municipal Secretary of Environment and Sustainability (2018), and the impacts of deforestation can affect the well-being and behavior of wild animals.

At extremes, wild animals can extinguish species that are threatened with extinction. The main existing

animals of the Amazon region according to Jabur and Junior (2018) are: beetles, butterflies, spiders, ticks, centipedes, shrimps, garden armanets, worms, blind snakes, royal hawk, eagle, falcons, macaws, parrots and parakeets among others.

Degraded areas need to be recovered, the main degrading activities are: agriculture, mining, desertification and uncontrolled urbanization. However, there are several models and techniques for the recovery of a degraded area, whose choice depends on the situation of degradation of the area and the regeneration conditions of the affected ecosystem (MMA, 2013).

Table 1: Conceptualization of the Attributes Used in the "Check List" and Definition of Attribute Valuation Parameters.

Attributes	Evaluation Parameters	Symbol
CHARACTER Expresses the change or modification generated by an action of the Enterprise proposed on a given component or factor environmental by her Affected.	BENEFICIAL When the generated effect is positive for the environmental factor considered.	+
	ADVERSE When the generated effect is negative for the environmental factor considered.	-
MAGNITUDE It expresses the extent of the impact, to the extent that a gradual valuation is attributed to the variations that actions may produce in a given component or environmental factor affected by it.	SMALL When the variation in the value of the indicators is inexpressive, the environmental factor considered.	MP
	AVERAGE When the variation in the value of the indicators is significant, but without scope to mischaracterize the environmental factor considered.	MM
	BIG Where the variation in the value of the indicators is such that it may lead to the mischaracterization of the environmental factor considered.	MG
IMPORTANCE It establishes the significance or how important each impact is in its relationship of interference with the environment, and when compared to other impacts.	NOT SIGNIFICANT The intensity of interference from the impact on the environment and in relation to other impacts does not imply a change in quality of life.	IN
	MODERATE The intensity of the impact on the environment and in relation to other impacts, assumes recoverable dimensions, when adverse, for the fall in quality of life, or assumes improvement in quality of life, when beneficial.	IM
	SIGNIFICANT The intensity of impact interference on the environment and with other impacts causes, as a response, loss of quality of life, when adverse, or gain, when beneficial.	IS
DURATION It is the record of the time of permanence of the impact after the action that generated it has been completed.	SHORT There is the possibility of reversing the environmental conditions prior to the action, in a brief period of time, that is, that immediately after the completion of the action, there is the neutralization of the impact generated by it.	DC
	AVERAGE A certain period of time is required for the impact generated by the action to be neutralized.	DM
	LONG A long period of time was recorded for the permanence of the impact, after the completion of the action that generated it. In this degree, those impacts whose length of stay, after the completion of the generating action, assumes a definitive character.	DL

Table 2: Conceptualization of attributes used in the "Check List" and Definition of Attribute Valuation Parameters.

Attributes	Evaluation Parameters	Symbol
CONDITION OR REVERSIBILITY Delimits the reversibility of environmental impact as a result of this action.	REVERSIBLE When the action that generated the change has ceased, the affected medium can return to its primitive state.	RR
	IRREVERSIBLE When the action that generated the change has ceased, the affected medium will not return to its previous state.	RI
ORDER Establishes the degree of relationship between impactful action and the impact generated on the environment	DIRECT It results from a simple cause-and-effect relationship, also called primary or first-order impact.	OD
	INDIRECT When it generates a secondary reaction to the action or, when it is part of a chain of reactions also called secondary impact or umpteenth order, according to the situation in the chain of reactions.	OI
TEMPORALITY Expresses the interinity of the alteration or modification generated by a project action on a given component or environmental factor affected by it.	TEMPORALITY When the generated effect presents a certain duration period.	TT
	PERMANENT When the generated effect is definitive, that is, it lasts even when the action that generated it has ceased.	TP
SCALE It refers to the magnitude of the environmental impact in relation to the geographical area of scope.	LOCAL Where the scope of the environmental impact is restricted only to the area of direct influence where the action was generated.	EL
	REGIONAL When the occurrence of environmental impact is more comprehensive, extending beyond the geographical boundaries of the direct area of influence of the project.	ER
CUMULATIVENESS Accumulation of changes in environmental systems, time and space, in an additive and interactive way, caused by the sum of past, present and/or predictable impacts in the future, generated by one or more of an isolated but contiguous undertaking in the same environmental system.	CUMULATIVE When there is accumulation, overlapping impacts of different natures or not on a given target (system, process or environmental structure).	CS
	NON-CUMULATIVE When there is no accumulation, overlapping impacts of different natures or not on a given target (system, process or environmental structure).	CN

Source: adapted by the author.

Table 3: Conceptualization of attributes used in the "Check List" and Definition of Attribute Valuation Parameters.

Observed Impacts	Attributes		
	Positive	Negative	M/P
1. Elimination of flora and fauna	-	X	X
2. Suppression of biodiversity corridors	-	X	X
3. Increase in vector population	-	X	X
4. Landscape change	-	X	X
5. Formation of disease processes	-	X	X
6. Change in water quality	-	X	X
7. Increase in waste generation	-	X	X
8. Increase in local population	X	X	X
9. Increase in car movement	-	X	X
10. Increased noise levels	-	X	X

Source: adapted by the author

Table 4: Environmental Impact Assessment Matrix - Control Listing.

- Landscape changes	-	MP	IM	DM	RR	OD	TT	EL	CS	SS
- Landscape degradation	-	MP	IM	DM	RR	OD	TT	EL	CS	SS
- Loss of vegetation cover	-	MP	IN	DL	RI	OI	TP	EL	CS	SS
- Fuga da fauna	-	MP	IN	DM	RR	OI	TT	ER	CS	SS
- Imbalance of trophic links	-	MP	IN	DM	RR	OI	TT	ER	CS	SS
- Loss of floristic potential	-	MG	IS	DL	RI	OD	TP	EL	CS	SS
- Damage to fauna	-	MG	IS	DL	RI	OD	TP	EL	CS	SS
- Ecosystem changes	-	MG	IS	DL	RI	OD	TP	EL	CS	SS
- Landscape change	-	MM	IM	DL	RI	OD	TP	EL	CS	SS
Morphological alteration of the terrain	-	MM	IS	DL	RI	OD	TP	EL	CS	SS

PE - PHYSICAL ENVIRONMENT; BM - BITIC MEDIUM; AM - ANTHROPIC MEDIUM || C - CHARACTER; M - MAGNITUDE; I - IMPORTANCE; D - DURATION; R - REVERSIBILITY; O - ORDER; T - TEMPORALITY; S - SCALE; C - CUMULATIVE; S - SYNERGY

Fonte: Longaretti (2015) adaptado pela autora

P (+) – Positivo – N (-) – M/P Medidas e Progra

The use of check-lists methods are standardized relationships of environmental factors from which the impacts caused in the natural environment are identified, thus environmental impacts when environmental impacts are identified most often it is necessary to create a project that is intended to reduce these damage caused to the nature of the.

As visualized in Table 4, all those mentioned suffer from the actions of impacts related to irregular occupation around the City of Lights.

In addition, it is possible to visualize in table 4 the negative aspects that interfere in the damage related to flora

and fauna. Also analyzing the impacts described in Table 3 related to vegetation cover becomes cumulative due to several impacts that happen at the affected site.

Therefore, the main environmental impacts that can be observed in the area surrounding the City of Lights are presented in the control list, which can be noticed in Table 4. In which the analysis of the Control List present in Chart 01, it is verified that the main impacts observed are: Biological Medium: Elimination of flora and fauna, biodiversity and increase in the population of vectors and

diseases. Regarding the Physical Environment: change in the landscape, formation of processes that harm the environment, change in soil quality Environment Anthropic: increase in waste generation, increase in local population.

Thus, among the measures adopted for these impacts the impacts on the biotic environment, we highlight the creation of protection areas for flora and wildlife, as well as the planting of new seedlings; isolate the protected area to prevent people and domestic animals from entering the site. Adopt an environmental education program, through lectures and courses on the environment and insert signage signs with phrases on environmental conservation.

IV. FINAL CONSIDERATIONS

This work highlighted the irregular occupation of the City of Lights as an example of a degraded area due to irregular occupations that occurred in recent years at the site. From the observations made from visits *in colo* it was possible to observe: deforestation, fires and damage to the natural environment.

In addition, the relationship between the human being and the environment needs to be carefully managed so as not to worsen negative environmental pressures and impacts on the environment. It has been identified that more effective work is needed by the bodies responsible for green areas to be truly conserved, so that they are preserved and function properly by providing benefits to society as a whole, currently Manaus suffers from the lack of effective actions, lack of awareness of the population regarding the importance of preserving and conserving green areas and what is so important to ensure a healthier environment for future generations.

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