ENVIRONMENTAL IMPACT OF URBANIZATION ON SANTA EULÁLIA SMALL FARM, SÃO LUÍS-MA, BRAZIL

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ABSTRACT

The small farm Santa Eulália occupies a privileged area in the landscape composition of the city of São Luis, being situated in one of the vectors of urban expansion, the edges of the avenue Euclides Figueiredo, on the northwest of the island of Maranhão, next to the center. In the decade of 1980, the small farm was inserted in area of permanent environment protection and in the beginning of the decade of 1990, Santa Eulália received great landscape alteration for interest in creating the housing development Santa Eulália for an estimated population of 35 thousand inhabitants. The intervention was made aiming to organize the growth of the city, however the execution of the work generated a great controversy, as much political as environmental, but also social, with the argument that the area destined to the implantation of the housing development would be of permanent preservation and placed on the side of a garbage deposit that served as a deposit of solid residues for all the cities of the island. After the deforestation of 107.32 hectares and the implantation of the primary infrastructure in the place that involved services of embankment, drainage and pavement, the work was seized by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), but the main environmental impacts had already occurred or was occurring. Due to the land filling, embankment, previous cut of palm trees and mangrove, some foci of erosion with the creation of several gullies had originated and had a consequent sanding of creeks due to the material carried by the rain, besides that, the exposed soil is poor and with lateritic concretions . These factors made it difficult to attempt the forest resetting of the area in study. Therefore, the recovery of all the area becomes necessary in order to leave it with a profile similar to the original, mainly in the areas considered untouchable for the Brazilian environmental legislation.

Key Words: environmental impact, urbanization, land degradation, Santa Eulália small farm.

INTRODUCTION

The island of São Luís, is situated in the northern part of the State of Maranhão (Brazil), that reaches the coast, situated in the central part of the Golfão Maranhense understanding four towns: São Luís, São José de Ribamar, Paço do Lumiar and Raposa.

The area of Santa Eulália small farm belongs to the state public servers and it's under responsibility of the IPEM. In 1981, through the Decree nº 8,245 of September fourth of 1981, part of the area (7.18 ha) was overthrown by the Government of Maranhão´s State as perpetual patrimony of the Institute of Social Service of the State of Maranhão - IPEM.

In 1982, the IPES (Research Institute of the State of Maranhão) by request of the defunct BNH (National Bank of Habitation) made a management work to know the cost of the land and to confirm the vocation of the area as Park and Forest Reserve, which had its natural environmental conditions.

In the period of July to December of 1989, in order to implant a housing development, to take care of 7.002 houses with an esteem population of 35.010 inhabitants, had been mechanically deforested 96.59 ha and manually 10.73 ha of Santa Eulália small farm, in a totally of 107.32 ha of the area.

MATERIALS AND METHODS

As methodology for the accomplishment of the present work, the bibliographical revision on Santa Eulália small farm was the main used method. However, visits to the field were also used.

Study Area

The island of São Luís belongs to the Tropical climate as KOPPEN (1948) defined, under the **Aw** acronym - hot climate and with rains in the summer. According to PEREIRA & ARAÚJO (2000) the island is inserted in an area of climatic transition of tropical northeast semi-arid and tropical humid Amazonian, being submitted at strong solar radiation during all year. The rainy period occurs on March to May and the dry period in August to October.

The island is inserted in a sedimentary basin of São Luís that in turn, is placed in the cratonic area of São Luís and it's formed by one prolongated graben of 15.000 km^2, SCHOBBENHAUS et al (1984).

Santa Eulália small farm meets totally in the urban center of São Luís, it takes place only 8 km of the center and it has an access by the Avenue Carlos Cunha / Ponte Bandeira Tribuzzi. Currently, it fits an area of permanent protection, inserted in the diverse category of use, whose type of established occupation is the exposed soil, together with the degraded mangrove area, as it can be visualized in picture 1, (MARANHÃO, 1988).

Picture 1: Aerial sight of Santa Eulália small farm, source: SOBRINHO, 2002.

Its vegetal composition is the antropic nature of trees of average size and bushes characteristic and the herbaceous vegetation near to swamps, see picture 2.

Picture 2: Central part of Santa Eulália small farm, showing the vegetation.

The soil of the region has acid characteristic, of sandy loam texture in which more than 50% of the soil has a predominance of a fine sand, whose percentage between silt and clay varies of 2.33 the 2.57 (SOBRINHO, 2002).

RESULTS AND DISCUSSIONS

After the deforestation of great part of Santa Eulália small farm, the total ground was rummaged, which favored the appearance of gullies in some points of the small farm. Due to the stop of the work on half of the pavement of the housing development and the abandonment in the following years, it originated some foci of erosion - over all, in areas not vegetated, and the gullies that devolved had appearance in form of an open hand, to see figure 3. The gullies of Santa Eulália small farm are of antropic nature, result of the landscape transformation for real estate interests with the total cleanness of the area due to the withdrawal of trees processes and embankment.

Picture 3: Gullies of antropic nature in Santa Eulália small farm.

The gullies of the small farm possess dynamics in function of the rain, once that the vegetal covering inhibits the action of the winds and the effect of "splash".

Beyond gullies, others erosive nature are found in Santa Eulália small farm:

- Pedestals: sculptured nature by "splash" and the described superficial draining by GUERRA, SILVA & BOTELHO (1999), where the lateritic materials with varied sizes, hinders that the sediments that are situated right below are carried by the water, see picture 4.

Picture 4: Pedestals situated at the border of the gullies.

- Alcoves of regression: they are originated by the superficial and sub-superficial draining that can make the mass that concentrates above of the alcove falls down, thus, increasing the crack, see picture 5.

Picture 5: Alcoves of regression.

Therefore, with the lack of vegetation on the surface of the small farm, some problems can occur, such as:

- alteration of the superficial draining regime;
- alteration of the infiltration regime;
- alteration in the microclimate;
- speed up the erosion process.

CONCLUSION

The gullies of Santa Eulália small farm are of antropic nature, result of the landscape transformation for real estate interests with the total cleanness of the area by the withdrawal of trees processes and embankment.

However, the gullies of the small farm present slow evolution due to diverse factors, the position of these as the topography - localization in the top of the tray, the presence of the primary rock in the surface, the ground compacting for housing construction, inhibiting the volume of subsurface waters and the hydrologic cycle with direct consequences to the dynamics of the reigned erosive processes.

The situation is of extreme importance for the city, because the most part of the small farm does not present vegetal covering. The soil composition facilitates it's consumption through erosions and the area is surrounded by the arms of estuary that feed the Anil River characterizing the sanding of the same. If there's not a control on the erosive mechanisms, the "gullies" area will be irretrievable for any use of occupation of the ground.

Mitigation Measures

The main mitigation measures that we consider in this work are:

- To protect the soil against the impact of the water of rain, coating the ground with vegetal covering for cushioning the rain drops. It presents advantage for being a cheap construction and the disadvantage occurs because it does not have the correction of the declivity of the barrier;
- To diminish the speed of the water, through the vegetal covering and/or mechanisms that facilitates the infiltration inside of the not erosive gradient. The canals of water division will have to be constructed in the above part of the gullies, 20 to 30 cm of its headboard, in a way that the superior abrupt declivity is well stabilized;
- To diminish the volume of waters in torrents consists of techniques that do not leave waters to join and to augment. The constructions can be of some forms such as: trenches that avoid erosion with function to hold back and/or to deviate the water; barrages of rocks; wire screen; stump of tree and leaves of plants in the gutter and in the sources of gullies.

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