

THE USE OF BIOTEXTILES TO RECUPERATE DEGRADATED AREAS BY EROSION

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INTRODUCTION

The erosion is a process that results from the conjunct action of many natural agents over the grounds. However, this process can be accelerated, mainly by the action of the human being that has caused numerous degrading actions of the environment, depending on the level of intensity and from the characteristic of his intervention. Among the ways of degradation it is possible to stand out accelerated erosive processes, like ravines and gullies. These processes can be mitigated with the use of several technical and material alternatives, being necessary specific knowledge for the right choice, in each case.

In *São Luís*, a research project started since 2002 and thanks this project, it was indentified and monitorated several erosive processes with high degree of evolution, like gullies in *Salina*, *Sacavém*, *Araçagi*, *Castelão*, *Bequimão*, *Coeduc*, *Santa Eulália* site, among others.

After these phases of the recognition and monitoration, the efforts for recuperation of the degraded areas have been developed with the use of bioengineering techniques. Such initiatives have been applied in different situations, with positive results for being an alternative which makes use of biodegradable materials such as vegetal fibers, wooden stakes, rigid iron-like structures, besides vegetation to make the soil more stable, lowering the costs and providing improvement to the environmental balance. Firstly, biodegradable screens, made of *buriti*, *carnaúba*, *tucum*, *babaçu* and *marajá* palm will be installed, as a matter of an experiment, at Sacavém's gully, in São Luís – Maranhão State.

The choice of the gullies in *Sacavém* occurred because the necessity of the area, once this area offers serious risks to the population around, but later the project is going to contemplate the other monitored areas.

METHODOLOGY

The development of this study had as basic basement the deductive method according to Guerra and Guerra (1997), based on the phenomenology of the perception, in that is related to the observation and the record of more evident environmental problems. It was developed the following steps to the realization of the work: bibliographic and cartographic survey, visits to the area and analysis in office.

Besides the visits to the area in studying, some trips to *Barreirinhas-MA* happened, from where it was extracted the *buriti* fiber, to get to know the process of extraction. After workshops will be performed in that community to the production of canvas.

As the result from the visits to the area, it was implanted an experimental station with the extension of 40 m², to the recuperation of a slope of the gully in *Sacavém* (neighborhood) from the Pereira's studies (2001), Guerra and Fuler (2002), with the following proceedings:

- Selection of the area to the installation of the estation;
- Lectures, discussions, sensitization about the importance of the works for contention of erosion in the *Sacavém* community and neighborhoods around;
- Making 80 biodegradable canvases with *buriti* fiber (50 x 50 cm), using needles (15 cm) and hardboard (55 x 55 cm).
- Removal of the loose sediments to regulate the ground;
- Protection of the heads of drainage as the result from the construction of the grooves of drainage;
- Drainage for the captation of the pluvial water, to the protection of the station;
- Preparation of the soil with aplication of things like seeds, fertilizers and organic manuring to the vegetal cover
- Utilization of vegetal canvas made with *buriti* fiber.

RESULTS

The erosion of the soil is resulted from a whole series of factors that according to *Guerra Mendonça* (2004), "they are related to the nature, to the quantity and distribution of

rains, declivity, length and shape of slopes, the chemical and physical properties of the soil, the kind of vegetal cover and also the human action, like the use and handling of the ground that, most of the time, tend to accelerate the erosive processes”.

Thanks to the growing of the population, those problems tend to intensify due to the inadequate use of the soil. In *São Luís*, even as most of Brazilian cities, occurred a fast population growing in the last decades that created a whole series of social environmental problems due to the lack of planning. Thanks to the desordenate urbane growing, there was the acceleration in the erosive processes that are more and more frequent in the urbane areas.

According to *Botelho* (1984) “some aspects need to be analised and studied to control in a definite way the urbane erosion: a net of galleries of pluvial water; the works of extremity that assure the stabilization of declining natural channels; pavement of streets; and measures of prevention, necessaries to avoid future problems”.

The erosion because gully according to *Oliveira* (1999) “it is caused because several mechanisms that act in temporal and spatial different scales, and it is realized by: displacement of particles, transport through diffuse superficial leakage, transport through concentrate fluxs, erosion caused by waterfalls, landslides, liquefaction, movements of mass and drag of particles”.

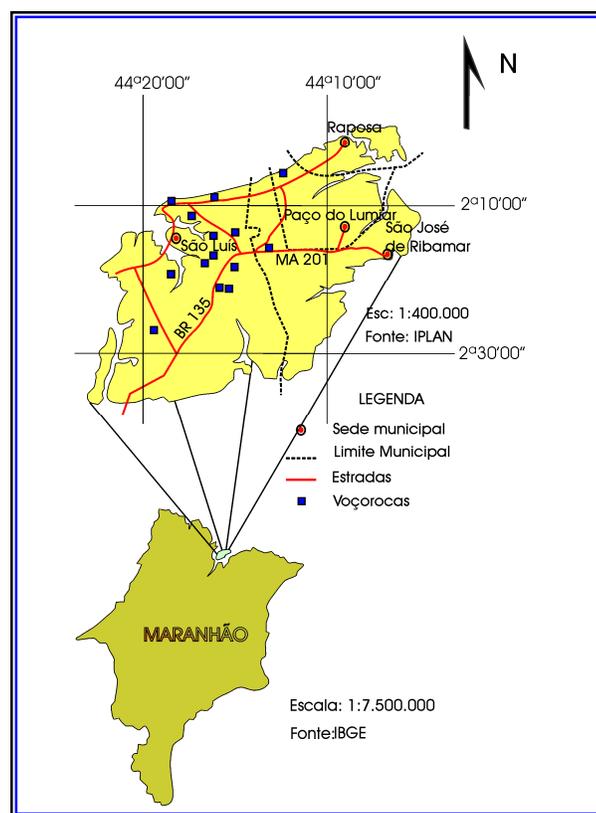
The city of *São Luís*, located in center west of *Maranhão* island (Picture 01), with coordenates 2° 19’ 09” - 2° 51’ 00” south latitude and 44° 01’ 16” - 44° 19’ 37” west longitude, has physical features that provide the beginning of erosive processes, like sedimentary lithology, stratified, unconsolidated, sufficient porous and permeable, elevated temperature and high pluvial indexes. These associated characteristics to other factors, like anthropic acting, confer great vulnerability of the area to erosive processes.

The principal sponsors for erosive processes, in *São Luís*, are: action of rain (pluvial erosion), action of wind (aeolian erosion) and, mainly, the outstanding anthropic action due to inadequate use of the soil, the irregular occupations and the mineral exploration.

To mitigate these problems, it is necessary the application of techniques that become possible the recuperation of these areas, among them, stand out the bioengineering that according to *Pereira* (2001) is an association of alternatives, involving biodegradable structures like: vegetal fibers, stakes of wood and hard structures like stone, concrete, iron and others, besides the vegetation.

In *São Luís*, this technique will be used in the recuperation of degraded area because of erosion, with the implantation of biotextiles, which are biodegradable canvases (picture 02), made from the fiber or straw of some native palm trees, like it is the case of *buriti* (picture 03) that is being studied. By the way, some canvases have already been produced for the implantation of the experimental station, but other species of palm trees will be studied.

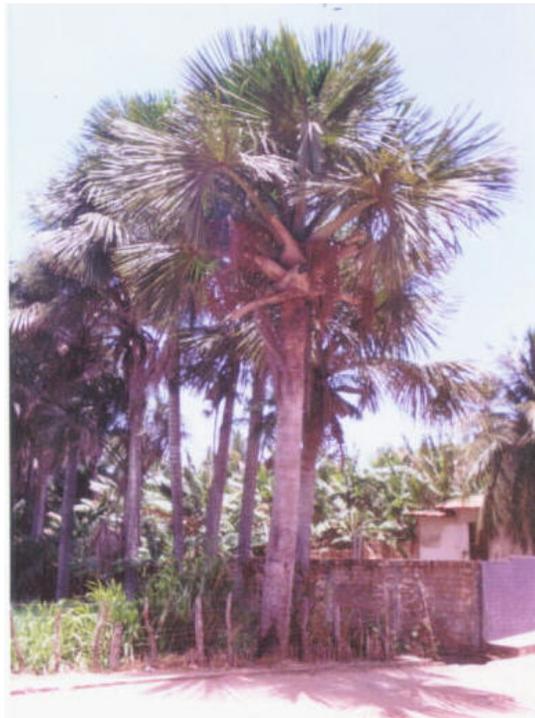
The use of those fibers, in order to produce the screens is an adaptation of techniques used in other places with other kinds of vegetation. In Africa, for instance, the native vegetation called *Borassus*, which is similar to *Buriti*, is the raw material.



Picture 01 – Map of the localization of the are in study



Picture 02 – Biotextiles



Picture 03 – Buriti palm

CONCLUSION

The dynamic of the landscape is a natural process that occurs constantly, but the frequency and intensity vary according the action of the morphogenetic agents involves in the processes. Currently, the human being has contributed in a decisive way to modify the relief, considering that he intensifies the erosive processes.

The areas in what the man interferes in an intensive way, are more susceptible to desequilibriums, a good example is the erosion that in spite of being a natural process is accentuated by the anthropic action.

In São Luís, the physical conditions, like: sedimentary lithology little consolidated, low altimetric amplitude, high pluvial indexes and elevated temperatures help the modeling of the relief. These factors, and the fast urbane growing, without adequate planning, have contributed to start and accelerate several erosive features like furrow, ravines and gullies.

In the attempt to soften the impacts that results principally from the bad utilization of the soil, especially in urbane areas, it is being developed a project of recuperation of the degraded areas in the gullies of *Sacavém*, which use the bioengineering, considered in several realities as an efficient technique that offer environmental and financial advantages, had been each time more used.

This type of technique can be shown as the best solution for the environmental problematic generated by degradation of soil by gullies. In São Luís, the biodegradable canvases are been made with the *buriti* fiber, native palm tree from the region. The choice of this palm was done due to its great incidence in Maranhão, particularly in *Barreirinhas*, where the fiber is used to the production of handicraft and also by its similarity to *borassus* palm, used in Africa to make biotextiles. However, other species of palm are being studied.

In case the results are as expected, according to the experiences embraced in other places, projects will be created for the recovery of the other monitored gullies, with a broader participation of the public and private institutions, and communities of the neighborhoods surrounding the gullies.

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