

# DEGRADATION DUE TO GOLD EXPLORATION IN THE CAXIAS MINE, LUÍS DOMINGUES – MA

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## INTRODUCTION

The gold is one of few metals that exist in the nature in natural state, showing natural brightness and great beauty. For these features it is supposed to be the first metal to call the attention from primitive man about 20.000 years ago. This mineral is supposed to be the first metal, whose importance was recognized by the human being, but its use only was possible in the Bronze Age, with the development of the foundry art.

The actions that result from the mining demonstrate a degradation environmental feature bigger than what seem, because, when it is practiced in a disordered way and with low technologic control, it is a negative aspect because of the environmental devastation that occurs.

It is undeniable that, in a modern world, the mining in general has decisive importance for the economic progress and development, since the mining mineral of the nature are present in almost all manufactured goods, and this generate the human dependence on the minerals. However, this dependence implies charges to the society by the development of huge degraded areas, which after the exploration, most time, cannot be occupied or explored economically.

Since the beginning of its colonization, Brazil suffers reflex of mineral extractive activity, which is practiced in a disordered way and with low technologic control. In Maranhão is not different. The discovering of gold in northwest of the State, in a region located between the Gurupi and Maracaçumé rivers, in 1624, with the first incursions of European adventurers in Brazilian territory. According reports from this period primitive Indians who lived in the region have already known the metal, but for them this metal was not important.

The first adventurers to explore the gold in northwest of *Maranhão* were the jesuit padres, who utilized the Indians and African slaves to remove the metal from the alluvions. The search for the gold spread beyond the *Turiaçú* and *Maracaçumé* basins, where it was located the *Caxias* and *Aurizona* mining places, reaching *Bragança* in *Pará* State.

In the *Caxias* mining, the extraction of gold was made in a manual way, without control and adequate technics, that has caused significative alterations in the landscape, like the removal of the vegetal cover, incisions in the topography and, consequently, the desintegration of the soil that is exposed to the climatic actions and the intemperate weather.

## **METHODOLOGY**

The worrying with the environmental impacts that results from *Caxias* mining area awakened the interest to the achievement of this work, in which the proceedings adopted were inductive and quantitative methods and according to Guerra (1997), based on the perception of the phenomenology referring to the observation and to the record of more evident environmental problems.

So these are the methodologic proceedings performed:

Survey and analysis of the bibliografic material related to the theme and the area in studying; visiting to the area; elaboration and application of questionnaires to miners and dwellers of the area and fotografic register from mining areas with bigger impacte, confection of the map of localization of the area in studying in scale 1:1,600,000, adapted from IBGE, collection of samples of water from lakes that where old banks of gold exploration where were common the utilization of the mercury.

Works published in books were consulted for theoretical grounding, periodics and annals of congresses, among the consulted authors stand out the contribution of Kopezinski (2000), Ibram (1992) and Teixeira (2001) as the most important to subsidize this study.

The visits to the area were performed in the period between 2002 and 2004, twice per year, with the objective to observe and follow the more expressive environmental alteration, analysing the main physical and social enviromental impacts that result from the human activities related to the mining. Among them, the deforestation, the erosion, the

degradation of soil and silting besides social problems that involve a local population. During the visiting were utilized some instruments like GPS, photo camera, note pad and video camera.

Two kinds of questionnaires, one destined to dwellers of the mining area to investigate social aspects, and the other to miners that refers to social environmental problems.

Analyses, interpretations of the data and collected information were performed in office.

## RESULTS

The mining of *Caxias* is in northwest of *Maranhão* State, area considered as *Pre-Amazonic*, (picture 1). Located at 8 Km from *Luís Domingues* town, the mining place is delimited by the following geographic coordinates: 01°25'18" south latitude and 44°50'40" west longitude and 01°25'05" south latitude and 44°50'54" west longitude. It is possible to access to *Luís Domingues* town from *Maranhense* capital by highway through BR-316 MA-010 and by maritime way. By small and medium planes, it is possible to get to *Caratapera*, *Godofredo Viana* and *Cândido Mendes*. The mining place in *Caxias* only can be achieved by vicinal road.

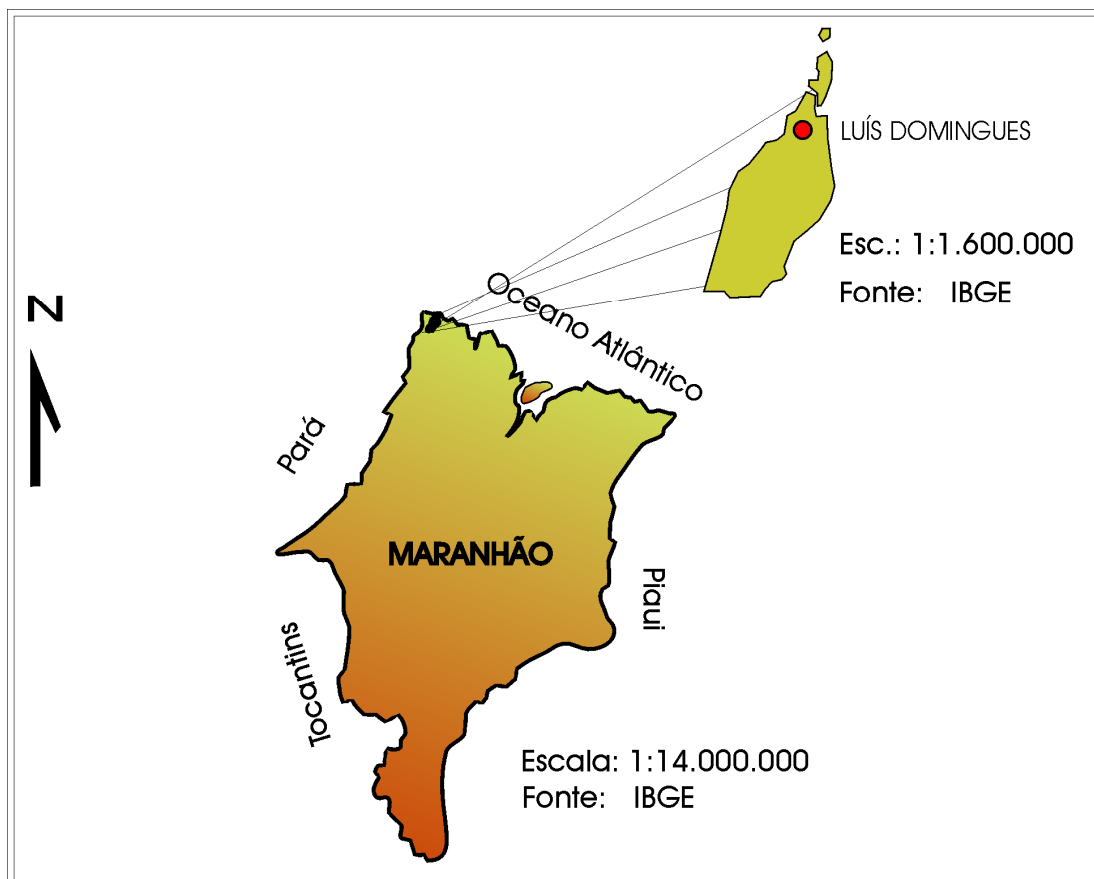
Geologically the area in studying is characterized by *Cristalino Complex*, *Tromaí* formation that outcrops in small isolated strips of low course of the river *Gurupi* and nothwest of State. In *Tromaí* formation predominates *gnaisse*, *quartzitos*, granite and chrystalline calcareous, marbled (BRASIL, 1991).

Second *Brazil* (1986) the occurrence of gold in the mining in *Caxias* is associated to volcanic-sedimentary rocks and granitic intrusions, whose origin is *orogenética*.

The auriferous exploration in *Caxias* occurred with more intensity in the decade of 1980, when happened the biggest mineral exploration. The activity is practiced in a clandestine way since the miners do not have enviromental authorisation or even Prior License from any environmental organization, because of this there is a decontrolling about the activities and the yearly production.

The gold extraction in this mining place starts, according to Gonçalves (2004), with the removal of the vegetation to clean the area to be explored, after these followed by destruction of the banks and the extraction of the gold.

The disassembling of the banks is made in a manual way and the capstone is removed with the help of spade and pickaxes, forming like this chops and the phase of deepening of the bank. The following step corresponds to the hydraulic disassembling, with the use of engines and bombs of suction, called “something that sucks”. The “something that sucks” use engines that work in the following way: one of the engines works like monitor to cause the disassembling, (picture 2 ) while the other works attached to a bomb with hoses, that transport the mineral to a 180-liter-barrel, where is stocked until to be benefited. In the area where the mineral is benefited and there is the concentration box, large pools caused for the refuse (picture 3). The gold more valuable attaches to the mercury, forming an amalgam.



Picture 1- Map of the localization of the are in study



Picture 2- Mining activity



Picture 3- Concentration box

After the exhaustion of the mining place, craters of several dimensions remain and indicate the drain of the mineral occurrence. Because of this it is necessary to transfer the extraction area, modifying the topography and providing new deforestation. The grounds subordinated to exploration gold processes are exposed to sunstroke and the precipitation that intensify the erosive processes, once started they are repeated cyclicly.

The extractive activity in *Caxias* has left significant marks of environmental degradation, like destruction of organic layer (picture 4), formation of large craters and contamination of the liquid bodies with mercury. In some places the intense outwear of the soil becomes impracticable the recuperation of area to vegetation or agriculture.



Picture 4-Waste of soil

## CONCLUSION

The mineral extraction in Caxias shows the environmental degradation generated by this kind of activity, mainly because it is practiced in a manual way and without control to minimize the impacts. Among the several problems, the deforestation, modification of the topography, great craters arising of old banks, the lakes around 60 m of depth and the contamination of liquid bodies, and possibly miners too, since they directly work with mercury, without the adequated security equipment.

Because it is an essencial activity for miners, the whole problems related to this activity deserve special treatment, regulating its form of action. That's why the necessity to perform lectures to the mining community to clarify the population about the social environmental risks from the mining activities.

To minimize the social environmental impacts in mining area, it is suggested the following proposition: a plan of inspection; development of environmental studies; application of the plan of recuperation of degraded areas (PRAD); development of educational lectures that become conscious the population and health care, precisely the realization of periodic medical tests in the mining community.

## REFERENCES

BRASIL. Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais Renováveis/ Secretaria de Estado do Meio Ambiente e Turismo do Maranhão. **Diagnóstico dos Principais Problemas Ambientais do Estado do Maranhão**. Programa Nacional de Meio Ambiente/ Secretaria de Estado do Meio Ambiente e Turismo do Maranhão. São Luís. LITHOGRAF, 1991.194p.

Departamento Nacional de Produção Mineral. **Mapa Geológico do Estado do Maranhão**. CPRM. 1986.

GONÇALVES, LÍlian Daniele Pantoja. **Degradação Ambiental decorrente da extração do ouro no garimpo de Caxias, município de Luís Domingues-MA**. Monografia de graduação. 55p. São Luís-Ma. 2004.

GUERRA A.J T. GUERRA. A.T. **Dicionário Geológico e Geomorfológico**, Bertrand Brasil, 1997, 648 p.

INSTITUTO BRASILEIRO DE MINERAÇÃO - IBRAM. Comissão Técnica de meio Ambiente. Grupo de Trabalho de redação, Brasília, 1992.126p.

KOPEZINSK, Isaac. **Mineração x Meio Ambiente:** considerações legais, principais impactos e seus processos modificadores. Porto Alegre: ed. Universidade/ UFRGS, 2000. 103p.

TRINDADE, Roberto de B. Emery; FILHO, Olavo Barbosa. **Extração de Ouro - princípios, Tecnologia e Meio ambiente.** Rio de Janeiro, 2002, 322p.