

# RESCUE ARCHAEOLOGY IN BRAZILIAN AMAZON: RETROSPECT AND PERSPECTIVES.<sup>1</sup>

*Solange Bezerra Caldarelli*

*Walter Alves Neves*

*Fernanda Araujo Costa*

Museu Paraense Emilio Goeldi<sup>(1)</sup>

## THE LEGAL CONTEXT

Similar to other third-world countries, the problem of dealing with the preservation of archaeological heritage in Brazil is not the inexistence of appropriate laws, but how to make these laws effective.

The first Brazilian legislation regarding the protection of cultural heritage as a whole dates back to 1937. In addition, in 1961 a specific law making archaeological Sites and monuments protected against damage and destruction was issued by the Federal Government. From then on this law has been actively used by archaeologists, to prevent partial or total damage of sites, when a threatening situation is recognized in advance.

But most of the time, sites are intentionally destroyed. Some are even recognized as such prior to destruction. Hence the existence of an archaeological heritage protection law in Brazil has not yet prevented damage and hundreds of sites are disturbed every year, either due to individual action or to large scale enterprises.

Since 1983 this situation has found significant progress, at least in regard to large scale projects. A bill regulating the "National Environment Council" (CONAMA) was created. Under this new policy, all organizations, private or public, are obliged to finance environmental studies prior to the establishment of any large economical undertaking. Since archaeological heritage is part of the subsoil, and this aspect of the landscape is under protection by this new policy, rescue archaeological programs have also to be granted.

The great majority of undertakings carried out before 1983 were completed without any study of the local archaeology. Most were planned and executed by the government itself.

In 1986 the National Environment Council defined the steps they consider fundamental to any impact evaluation plan. Concerning the archaeological heritage, the steps are: diagnosis of the existing archaeological heritage before the enterprise is set up; evaluation

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of the impacts (negative and positive) caused on the archaeological heritage assuming the establishment of the enterprise; definition of strategies that might mitigate the negative impacts elaboration of a comprehensive program to monitor the impact.

A Report of Environmental impact (RIMA), has to be prepared by the developer and opened to public debate after these steps are fulfilled. The consequences of the enterprise can be analysed, at this moment -by the local community and by the scientific community as a whole. In principle, the enterprise is established only if it is considered that the environmental impact can be appropriately mitigated.

The first RIMAs are now under preparation. We think this is a very special moment for the definition of methodological frame-works to be adopted by the archaeologist to deal with large rescue archaeological programs in Brazil. This paper presents a general picture about the present situation of rescue archaeology in Amazon and suggest a multistage research schedule to cope with the new federal policy on environmental studies and with the scale of destruction of the regional archaeological heritage.

## **THE GEOGRAPHICAL CONTEXT**

The Brazilian tropical rainforest area is geographically know as "Brazilian Legal Amazon", which comprises 5.033.072 km or 59,1% of the national territory (figure 1). This corresponds approximately to 10 times the size of Sweden. The region is characterized by a hot and humid climate and is mostly covered by dense tropical forest. Notwithstanding, significant patches of open vegetation (Savannah like) can also be found within it. The soils are in general poor (oxysols and ultisols). Homogeneity has been claimed, so far, as the most important aspect of this region, but this view becomes fragile when fine grained ecological investigation are brought to completion.

If we assume that any scale of human social activity leads to environmental changes, the impact of cultural process in the area should be evaluated at least from the beginning of the Holocene. If this view is taken seriously, hundreds of sites were possibly damaged by the indigenous succession itself. Since this phenomenon is out of our responsibilities towards the archaeological heritage we will concentrate our attention specifically on the question of the modern large scale menace to the remains of extinct Amazonian social systems.

Since the rubber boom (1840-1910) the Brazilian Amazon has been receiving significant contingents of people from other parts of the country. This immigrants developed intensive exploitation of (raw-materials from the rainforest, causing localized damage into the ecosystem. Notwithstanding, their activities never challenged the ecological continuity of the region. This picture changed abruptly from the 1960's on, when the Federal

Government raised attention towards the region as a potential solution for several economical problems of the country<sup>(2)</sup>. This culminated in the 70's with the establishment of several programs of social-economic development, carried out by the military regime. The economical "development" of Amazon has been so intense in the last two decades that it is running very rapidly to a point of "incompatibility of infinite demands with finite resources"<sup>(3)</sup>.

Since the definition, of the PIN (National Integration Program), in 1970, followed by several National Development Programs (PNDs) the area has been treated by the Federal Government as a potential solution for the national poverty, either through the settlement of hundreds of landless families or through its transformation into an immeasurable source of raw-materials and energy, regardless of its ecological peculiarities.

After a decade of construction of routes, stimulation of agroindustrial activities, establishment of several mining basis, issuance of official permission for deforestation and wood exploitation and building of hydroelectric power plants, the national welfare remained the same, if not worsened, and one of the most important ecological areas of the world suffered a tremendous environmental impact.

The Brazilian Amazon population jumped from about five million persons in 1960 to about eleven million in 1980. In some specific areas the population increased at a rate of 330% in this period, and in some localities at 5.000% from 1970 to 1980. As a consequence large areas of tropical forest - the geological background included were devastated. From 1975 to 1978 the deforestation increased 169, 88%, with an annual increase of 17, 66%<sup>(3)</sup>. In accordance with recent estimates Rondonia (243.044 km), one of the States of the Legal Amazon will be completely deforested by the end of this decade, if wood exploitation and irrational land occupation progress under the same speed as they have since 1970.

## **THE DIMENSIONAL CONTEXT**

It is impossible, for the time being, to quantify the total damage already caused by large scale developing projects to the Amazonian archaeological heritage. Data necessary for an evaluation of this kind are not published or even systematized. The best information in this sense can be obtained from the field of energy production, and this source was deeper explored by the authors to formulate the fundamental reflexions presented in this paper. In fact, for other economical fields only case examples can be presented with a minimal accuracy of damage scale. Although partial, these examples illustrate very well the dimensional scale of rescue archaeology in Amazonia, and hence some of them will be presented in the next paragraphs.

Before 1970, Brazilian Legal Amazon was cut just by two roads: Belém-Brasília highway and Cuiabá-Porto Velho highway (Figure 1). From 1970 to 1974 three new long routes (Transamazônica, Cuiabá-Santarém and Manaus-Boa Vista) were opened, raising an impressive impact into the tropical rain forest environment and, consequently, to its archaeological heritage. A huge train route (Norte-Sul Railway) is presently being constructed. Several thousands of kilometers will be directly affected in the near future.

The most conspicuous example of impacting transport project in the region is, by far the Transamazônica Highway. Approximately 3.000 km of route opened in the jungle allowed the fixation of approximately 6.000 families, during the 5 years period that followed its accomplishment<sup>(3)</sup>. In average, every 10 km Transamazônica was crossed by vicinal routes, called "travessoes", which, by their turn, enhanced a direct impact on at least 10 km into the forest in both sides of the road. If we only consider the segment of Transamazônica between the cities of Marabá and Itaituba - where the colonization process was emphasized an area of 20.000 km can be estimated as having been directly affected. Not even an inch of this area was inspected for archaeological sites prior to the opening of the road and to the fixation of the newcomers.

In terms of farm and cattle raising large scales programs the dimensions involved are also dramatic. If only the 112 projects approved and supported by SUDAM (Superintendency of Amazon Development) from 1978 to 1988 are considered an area of 25.000 km comes out. Again even an inch of this area was inspected for archaeological sites beforehand.

Gold mining and other mineral extraction activities have also been important agents of environmental disruption in Amazon and one of the most menacing activities for the archaeological heritage, because of its direct impact on the geological substratum. Since mid 70's the Brazilian government has been emphasizing and supporting the idea that the Amazon Region has an infinite vocation for raw-material and energy supply. From then on, official and unofficial gold fields increased significantly in number. Presently, there are 7 authorized gold fields and, at least, 6 large unauthorized ones. If 28 km is taken as the basic unit for quantification, since this is the maximum area authorized by the National Department of Mineral Production, 364 km of potential bearing archaeological sites deposits are being virtually destroyed, without any study in advance. Regarding mineral extraction, the two most important enterprises are Ferro-Carajás Project and Porto Trombetas Mining (Figure 1). The first one is centered on the largest mineral deposit of the world, with a potential area of 150.000 km. The second concentrates in bauxite exploitation and involves a potential working area of 800 km. Huge mineral deposits are being discovered every year in Amazon. Hence, the number of mining basis will probably increase exponentially over the next years. Differently from the aforementioned

economical activities, mining companies have been financing archaeological rescue operations prior to the destruction of the subsoil.

In order to keep the rhythm of the national industrial expansion, the country will have to increase its energy production from 41.560 TWh to 102.760 TWh in the next two decades. To make it possible, Brazilian government created the "2010 Plan"<sup>(4)</sup>, which implies in the construction of 82 hydro-electric power plants in the Amazon Basin. Most of these plants are currently under very preliminary economical and environmental studies. However, four of them are already operating or in final conclusion, and eight were already initiated (Figure 1). Out of these twelve, only one was not followed by any kind of archaeological study. The other plants, in different phases of the engineering work, involved at least general survey and test pitting of sites. A rough idea of the direct impact of these twelve dams can be evaluated if one considers that their pooled flooded area sum up to approximately 16.000 km<sup>2</sup>. If an average density of one site per square kilometer is assumed - which is very realistic for the riverine areas of Amazon - 16.000 sites become expected to be, soon, irreversibly covered by water. If we take the average unit size of these dams (1.000 km<sup>2</sup>) as a start point for reflexion, it turns out that in the next 20 years an area roughly equal to the Austrian territory will be flooded in Brazilian Amazon. Therefore, archaeologists will have to face the mission of rescuing information from approximately 80.000 archaeological sites in the Amazon Region to be affected just by the energy production sector.

## **THE PROFESSIONAL CONTEXT**

Rescue archaeology in Brazil is primarily conducted by university departments or museums, and so far no private contract archaeology corporation was created. It is very likely that this situation is changed in the near future because the demand for rescue operations is surpassing the work capability of academic cycles and because several undergraduate archaeologists are now being formed every year, by a private college in Rio de Janeiro, generating an unprecedented pressure for employment.

Taking the academic cycle as a basis for analysis, the existing active staff of archaeologists in Brazil is quantitatively and qualitatively far below the already existing rescue archaeology needs. Just as an example, in Brazilian Legal Amazon (5.000.000 km<sup>2</sup>) there is only one institution with an Archaeology Section structured (Museu Paraense Emilio Goeldi), where only two professionals have master degrees.

The first large scale archaeological rescue operation carried out in Brazil dates back to the mid seventies (Itaipu Binational Dam Project) This fact could be used to explain the unavailability of well-trained archaeologists for these operations in the country But,

unfortunately, this is not necessarily true. With few exceptions, archaeological research moved by scientific or academic reasons alone shows an unacceptable absence of updated theory and method, if any. Concepts like “spatial archaeology”, “systemic archaeology”, “site system”, “probability sampling” and “site significance” are very far from being widely incorporated into the national archaeological research. Consequently, it is our opinion that most of the problems faced by rescue archaeology in our country is a reflection of what is going on with Brazilian Archaeology as a whole.

Given the aims of this paper, we will restrict our comments only to rescue archaeological research carried out so far in Amazon. The projects already undertaken can be classified into two categories: those designed to the definition of chronologies of cultural phases<sup>(5)</sup> and those designed with no a priori theoretical concern. Although small in numbers in the past, these later are significantly increasing with time.

This picture leads to the first corollary of this paper: should Amazonian archaeological heritage be appropriately rescued, the definition of a local program of human resource training has to be urgently set up. It is obvious that such program cannot follow the particular “tempo” and “mode” of formal university undergraduate and graduate courses. There is not enough time for that! On the other hand, any optional training policy cannot be adopted in detriment of high standards of theoretical and methodological background.

We see, however, no possibility of running such proposal without the involvement of international cooperation. These new archaeologists have to be trained under the notion of Archaeology as a tool to recover past social systems, and more specifically, to recover adaptive responses of systems to specific environmental conditions. Brazilian Archaeology, even in the most developed areas of the country, is, as we mentioned before, very far from these aims.

## **THE THEORETICAL - METHODOLOGICAL CONTEXT**

Site surveys, in Amazon, have been very unsystematic and exclusively limited to the riverine zone because archaeological rescue research undertaken so far in the region ignored spatial information. Furthermore, rivers are the only available routes of penetration. In other words, rescue archaeology done in Amazon privileged cultural material variability instead of social variability. The rivers have been followed by small crews of archaeologists checking the more likely locations of sites or checking areas where the local few residents indicate that sites can be found.

When sites are located, spatially uncontrolled surface collections are carried out, a rough delimitation of the surface scatter is worked out and, in most of the cases, a test pit is opened to accomplish seriation needs.

This kind of investigation does not involve a rigid apriori design of field research, and does not generate information about extinct social systems. Archaeological “significance”<sup>(6)</sup> in this case is in fact synonymous of quantity of sites and amount of pot shreds’ that can be translated into chronological information.

In 1985 the authors were invited to design and coordinate a rescue archaeology program at Xingu River Basin, where a large hydro-electric complex is to be constructed (Figure 1). We used that opportunity to run a methodological experiment regarding rescue operations in Amazon. Our experiment was based on the association of CLARKE’s “Spatial Archaeology”<sup>(7)</sup>, REDMAN’s “Multi-stages Field Work”<sup>(8)</sup> and PLOG’s suggestions for systematic surveys<sup>(9)</sup>.

Most of our initial ideas and strategies were frustrated by natural constraints of the rainforest, by the dimensions of the enterprise (approximately 7.000 km ) and by our own underestimates of crew size. On the other hand, the first two years of research in the Xingu area provided us an excellent raw material for reflexion about rescue archaeology in the Amazon Basin.

Taking this experience into account, we formulated the second corollary of this paper: any large scale rescue archaeology program in Amazon has to be developed in accordance with a multistage schedule coupled with the steps of the economical enter-prise it self and with the recommendations for impact evaluation issued by the Brazilian Environment Council.

Due to obvious reasons, we organized a proposal in agreement with the steps adopted by the Brazilian Energy Company (ELETROBRAS). It can-be briefly summarized as follows:

## **1. Inventory**

1.1 Preliminary Phase: Its main purpose is to generate a general background ~bout the local archaeology, history, ethnography and landscape. This phase has to be carried out based primarily I on bibliographical sources.

2.2 Final Phase: At the end of this phase the encharged archaeologist has to have a detailed picture about the scale and the sequence of the impacting actions of the enterprise, a detailed picture of the fieldwork logistics and a preliminary view of visibility and accessibility of the working area. This phase, of course, involves a certain amount of exploratory and opportunistic fieldwork. It is also expected that the encharged archaeologist is able to draw a formal proposal of research design for the next phase, including the financial and crew needs.

## **2. Viability**

The most important issue at this step is "quantification". The amount of financial and logistic support the archaeologist will receive for the next steps depends very much on his ability to prove the existence of a significant number of sites and monuments. In other words, at the end of this phase he has to be able to quantify, at least approximately, the potential number of sites existing in the impacting area. Although the "quantity" concept is far of being unanimously accepted as the best criterion to define "significance" in rescue archaeology, we do think that in this phase -and taking into consideration the Brazilian developers present mind -a real estimate of "numbers" and "amounts" is still the best way to ensure that archaeological heritage will be seriously treated. Furthermore, anthropological concepts of "significance" might be exercised in the next steps of the schedule.

The best survey strategy for this step is random or systematic probabilistic sampling, keeping survey intensity homogeneous over the sampling units. Our experience demonstrated that both sampling strategies are very difficult to be applied in Amazon, because of natural constrains. An alternative is to define landscape units within the impacting area (universe) based on maps and aerial photographs, and to distribute the sampling units in a way that inside each ecological zone at least the whole topographical variation is covered. It is, indeed, a stratified sampling strategy, but not probabilistic under a statistical strictly sense. Site work in this phase has to be brief, and, surface collection should be restricted to small amounts of diagnostic features that do not truncate future systematic collections. Very localized test pits can also be done to meet relative chronologies needs. It is very important in Amazon to ascertain how surface scatters reflect the total amount of sites, existing in the area. For this reason, at least a parcel of the sampling units inspected for surface debries, has to be surveyed for buried sites. Detailed observations about the prevailing state of site conservation, and the already existing causes of , site damage is essential because at the end of this step the encharged archaeologist has to be able to evaluate quantitatively the damage that the local archaeological heritage will suffer if , the economical enterprise comes to be established. Scientifically speaking, this phase allows for the formulation of predictive models, since besides the preliminary archaeological data the archaeologist viii have at hands several environmental information derived by other specialists.

## **3. Basic project**

This step can be used as a turning-point between pure contract archaeology and academic research. The premise here is detection of heterogeneity of social systems, in time and space. By logical inference the establishment of regional site typology should be

the final target of this phase. In other words, the encharged archaeologists, or archaeologists, have to finish this phase with a very clear picture of the main anthropological problems posed by the region. It would be very unrealistic to expect that by this time the causes of the variability and the detailed process of interaction between humans and environment is understood. The study of the “processes” themselves is a mission for the next and longest phase. It is enough, by the end of “Basic Project”, to have just a descriptive configuration of the regional site systems. Sampling units surveyed at Viability Phase has to be increased in number and/or surveyed more intensively. Intrasite surface and sub-surface work has to be carried out systematically to allow for reliable definition of site typology.

For those who opted for a hypothetical deductive strategy in the previous phase the “Basic Project” should be used to generate information to feed the original models, adjusting them to local specificities.

#### **4. Executive project**

The “Executive Project” is characterized by a predominantly problem oriented concern. In this phase, which is the longest in any economical enterprise, the “rescue” itself is undertaken, either through the elaboration of explanatory models to account for the previously defined site variation or through the physical preservation (locally or elsewhere) of sites and monuments. Besides intensified surface collections, this phase is greatly used for probabilistic excavations, large surface diggings (ethnographic excavations), applied ecological research, intensive laboratory analysis and data matrix interpretation. Taking into account that all sites in the working area will be, soon or later, destroyed, we hold the position that in large scale rescue programs sites to be exhaustively worked out must be defined by their significance with in the appropriate historical-anthropological context.

The adoption of the previous multistage schedule might contribute not only to the rescue of the regional archaeological heritage, given the circumstances, but also to the advancement of knowledge about human adaptation to tropical environments. The correct use of the proposal depends very much on the capability of developers to contact archaeologists early in the process of establishing an impacting large scale project. So far, archaeologists have been contacted late in this process. As a result, an important part of the Amazonian archaeological heritage has already been destroyed without the production of proportional scientific knowledge.

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## Notes

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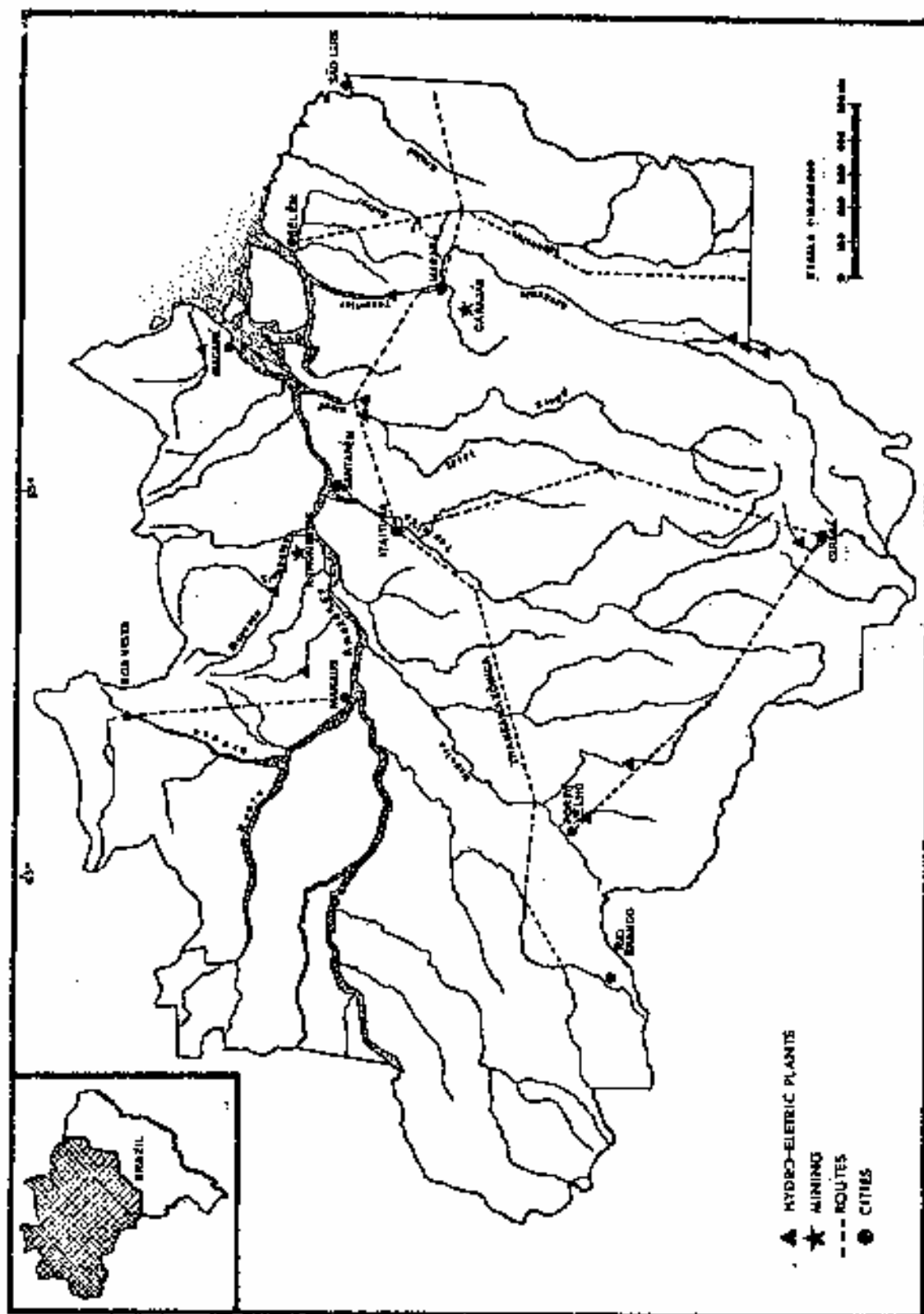


Figure 1 - Some of the impacting economical enterprises developed at the Brazilian Legal Amazon.