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# Damming the Usumacinta: The Archaeological Impact

S. JEFFREY K. WILKERSON

INSTITUTE FOR CULTURAL ECOLOGY OF THE TROPICS

In 1983, I addressed the Fifth Mesa Redonda concerning the alarming news of a massive dam project to be undertaken on the Usumacinta River. Since the meeting, much has transpired and many more details of this immense hydroelectric project have been confirmed.<sup>1</sup> As a result we can now more accurately examine the major factors that have an impact upon the ample archaeological patrimony of the region.

This brief presentation concentrates upon six aspects: (1) a general background of the threatened region; (2) the basic facts about the proposed dams; (3) a preliminary appraisal of the archaeological risk; (4) the current status of the dams; (5) a review of the archaeological input into the decision-making process; and (6) some suggestions of what we, as concerned scientists and individuals, can do about this situation.

## Profile of a Declining Wilderness

The Usumacinta River drains a 106,000 km<sup>2</sup> area of northern Guatemala and southeastern Mexico. This large region represents 42 percent of Guatemala and major portions of the Mexican states of Chiapas, Tabasco, and Campeche. Following the demise of the Classic Period Maya cities, most of the broad Lowland region slowly became a true wilderness. By the time Hernán Cortés struggled across it in 1525, this great belt of rain forest was an established area of refuge for fleeing Maya groups.<sup>2</sup> Although towns and villages were few, Indian merchants found the shorter routes through the forest convenient until colonial rule and drastic population decline ended such commerce.

Throughout the colonial period, the Usumacinta region became a still greater void. Although a few towns, such as Palenque, were founded on its margins, and Spanish entradas encroached upon it, the European impact was minimal. This situation was to change rapidly with independence in the nineteenth century and the availability of new technologies, as well as markets, for lumber exploitation and agricultural endeavors.<sup>3</sup>

Throughout that century, population grew, particu-

larly on the Tabasco Plain, and the exploitation of the resources of the isolated region upstream from the San José Canyon increased. It soon became necessary to define the extremely vague border between Guatemala and Mexico. After much dispute, the present river boundary following first the Usumacinta proper, and then its main tributary, the Chixoy or Salinas, was ratified at the very end of the century.<sup>4</sup>

During this same period, archaeological discoveries were constant and many of the major Maya cities we are aware of today were recorded. The more accessible riverbank sites such as Yaxchilán and Piedras Negras attracted particular attention (Charnay 1885; Maudslay 1889; Maler 1901).

The first half of the twentieth century was a time of increasing lumber exploitation and slow reduction of the rain forest. Although much of this vast rain forest persisted into the twentieth century, it is now severely threatened. On the Mexican bank the Lacandón Forest was estimated to have covered 1.3 million hectares in 1875. By 1960, it had been reduced by only 6 percent. Yet by 1982, just one year before the last Mesa Redonda, it had suffered a 42 percent reduction! It is *conservatively* estimated that by 1990 nearly 70 percent of the forest will have been cleared.<sup>5</sup>

Population in the region has also risen from an estimated 12,000 in 1965 to over 200,000 today. At this writing the Mexican government continues an active policy of forming new *ejidos* in the forested area. In short, the rate of environmental alteration has greatly accelerated, particularly in the period from 1970 to the present.

Other resources have also been exploited. During this same period highly organized looting of archaeological sites, especially in Guatemala's El Petén, reached incredible proportions. It has abated somewhat due to more effective government enforcement as well as the guerrilla presence in more extensive portions of the rain forest.

As the region has been opened up to settlement and mechanized lumbering, there have also been extensive

studies of petroleum and hydroelectric power potential. This has led directly to exploratory drilling in the previously isolated Marqués de Comillas Zone and the formulation of a large-scale dam project.

### The Dams

The origin of the dam projects on the Usumacinta goes back thirty years or more to the first efforts to estimate the hydroelectric potential of this vast region.<sup>6</sup> As roads and the Ferrocarril del Sureste made the area around Tenosique more accessible, attention focused on Boca del Cerro, the point where the Usumacinta breaks free of the Sierra de Chiapas. In fact, plans for this original site have been dusted off and incorporated into the new multidam project (fig. 1).

Although the Usumacinta is an international border, the early proposals and concepts were essentially Mexican. Alarm in Guatemala over the possible unilateral construction of this and other dams, with the inevitable flooding of the lower Guatemalan bank, led to preventative action. In the mid-sixties cooperative villages were established on both the Río de la Pasión and the Usumacinta proper. The presence of the settlements in the threatened areas was thought to be a significant deterrent. In point of fact they, as well as deteriorating bilateral relations, were sufficient to halt further development of the proposal. Mexico instead undertook major dams (La Angostadura, Chicoasén, Nezahualcōyotl-Malpasos) on the neighboring Grijalva system and did not return to the Usumacinta concept until the late 1970s.<sup>7</sup>

At that time both countries agreed to full-scale feasibility studies of the Usumacinta in preparation for a joint project of massive proportions. The studies were to be carried out under the auspices of the already existing and jointly constituted International Limits and Water Commission (CILA). This organization is considered a part of the Foreign Relations ministries of each country. Representatives of the various government agencies concerned with the dam project formed a committee, headed by the CILA commissioner in their country. These committees directed surveying and field analysis and met periodically with their counterparts.

Eleven different segments of the river between Boca del Cerro and El Chorro were analyzed for dam construction potential.<sup>8</sup> Twenty-six locations within these segments were measured for dams. Five segments and fourteen dam locations were rejected. The remaining possibilities were grouped into seven dam configurations at five points on the river: Boca del Cerro, La Línea, El Porvenir (next to Piedras Negras), Salvamento (just downstream from Yaxchilán), and San Fernando (near the once famous lumber center of Agua Azul or "Fildelfia"; fig. 2, 3, 4).

The bend in the river at Yaxchilán had been ruled out as a dam location by late 1982 but was revived for con-

sideration by the Mexican delegation in the winter of 1984–1985. Its status is still pending.

As a result of the field inspection, the proposal came to be defined in terms of the construction of two to four dams that would produce between 2 and 3.7 megawatts of electricity. The inundated areas would vary according to which of the seven different dam configurations were selected. However, if the highest level studied is chosen, in excess of 1,315 km<sup>2</sup> will be flooded.<sup>9</sup> Potentially, a staggering 525-km segment of the Usumacinta River system would be directly affected by water backed up by these dams.

Although relative proportions change with the various possible dam combinations, at basin levels now being considered, 67 percent of the flooding would be in Guatemala and 33 percent in Mexico. These disproportionate figures reflect the topography of the region, for the Lacandón Forest is generally higher than the low areas west of Guatemala's Sierra del Lacandón.

The electricity to be generated greatly exceeds Guatemala's current needs and is far from major urban centers. Excess electricity is likely to be sold to Mexico or Central American countries.

### Archaeological Risk

Of critical importance for assessing the archaeological impact of this project are the heights of the dams. Virtually all the dam combinations threaten known archaeological sites, but some more than others. Current studies concentrate upon the highest dam holding back water at the 105- or 120-m contour line. Both these levels have severe implications for major sites. Currently, the higher of the two levels is favored by the participating engineers since more electricity can be produced at a cheaper per unit cost (fig. 3).<sup>10</sup>

A second factor in any calculation is the role of the seasonal and cyclical flooding of the Lacantun, Chixoy, and Pasión tributaries of the Usumacinta. Not only do they rise dramatically during each rainy season, but there is apparently a multiyear cycle. The highest recent flood of the Pasión, without any dams to hold water back, reached the 117-m contour level at Sayaxche. What would happen if a similar, or greater, volume of water descended upon the dam basins has yet to be fully calculated. Unquestionably, there would be still more damage to archaeological sites.

A third factor in any archaeological consideration is the problem of locating affected sites. There are numerous small and medium-sized centers within short distances from the river and adjoining low-lying areas. Many, in spite of much systematic looting in recent years, have never been surveyed or mapped.<sup>11</sup> Basically, we do not really know at this time how many sites lie within the potentially affected area. In spite of decreasing isolation the region, particularly the threatened Guatemalan side of the river, is still an archaeological frontier.

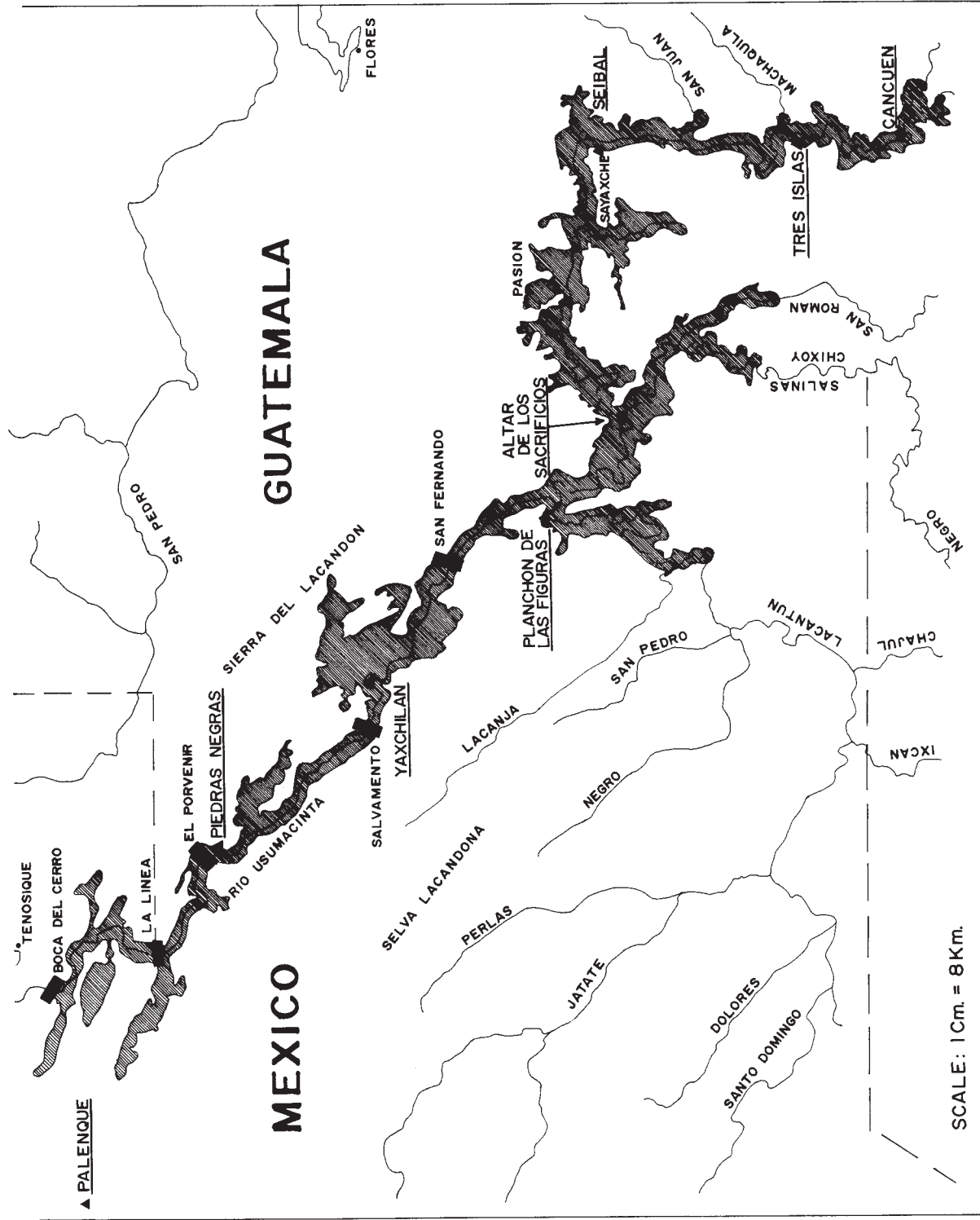


Fig. 1 Proposed dam basins on the Usumacinta River (principle source INDE 1982).

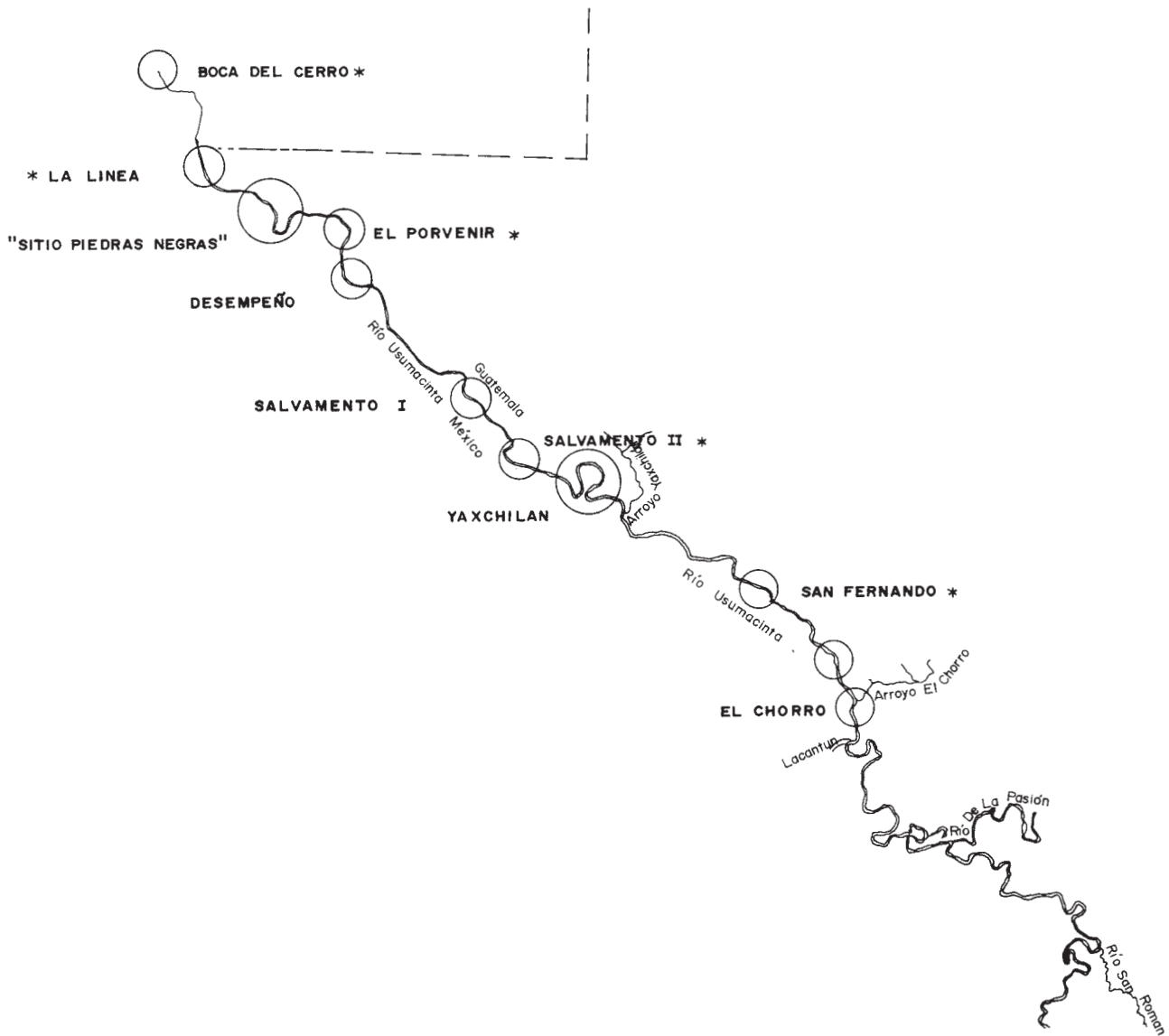


Fig. 2 Analyzed dam sites on the Usumacinta River (after INDE 1982). Asterisks (\*) indicate selected sites.

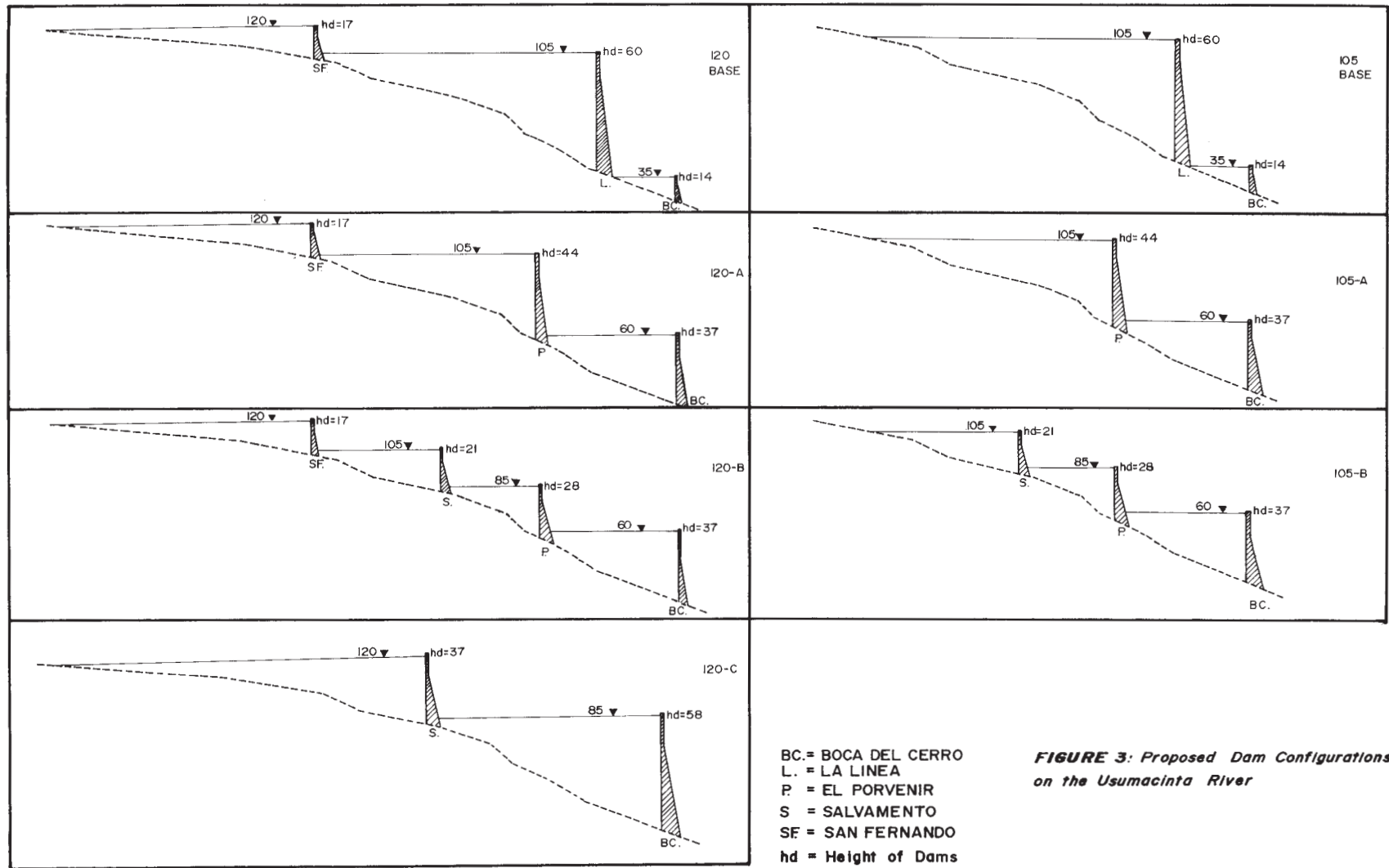
Fourth, many sites outside the actual dam basins would be destroyed, or looted, in the process of establishing access roads and the inevitable land clearing that would accompany dam construction. There is no way, at the moment, of quantifying this risk except to realize that, given the considerable density of sites in many adjoining areas, the secondary damage could be nothing less than extensive.

It is important to bear in mind that the total archaeological risk is not solely a matter of which sites are to be flooded, but rather a question of all sites that would be affected by this massive project. It is in fact possible that secondary destruction might in the long run be greater than the not inconsiderable primary damage from flooding.

Let us briefly consider the implications for some of the better-known Usumacinta sites.

#### Piedras Negras

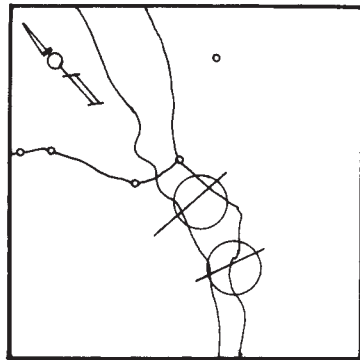
Moving upstream from Tenosique and the Boca del Cerro dam location, the first major riverbank site is Guatemala's Piedras Negras. Most of the city is on land over 80 m in elevation.<sup>12</sup> Nevertheless, virtually all of the dam configurations would flood portions of it (figs. 5 and 6). The lowest would transform the site into a series of promontories; the highest would flood practically everything beneath the level of the West Group Plaza.<sup>13</sup> Much of the East Group and practically all the earlier South Group buildings, which have had little exploration, would be lost.



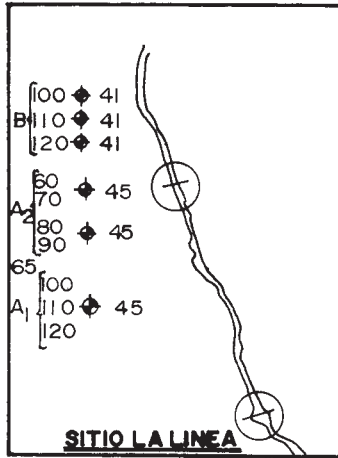
**FIGURE 3: Proposed Dam Configurations on the Usumacinta River**

Fig. 3 Proposed dam configurations on the Usumacinta River (after INDE 1982).

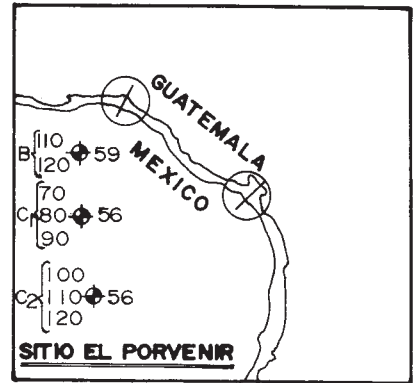




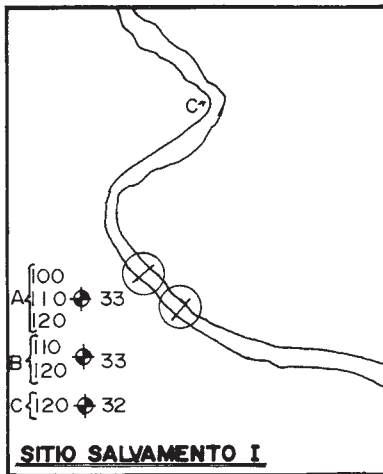
**SITIO BOCA DEL CERRO**



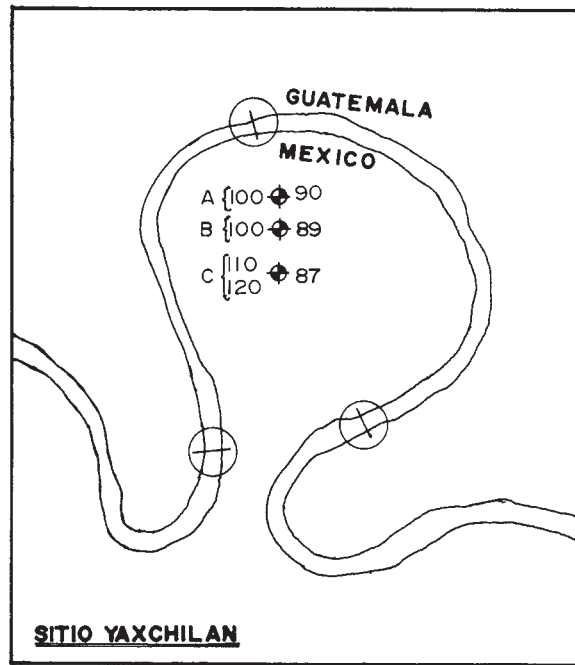
**SITIO LA LINEA**



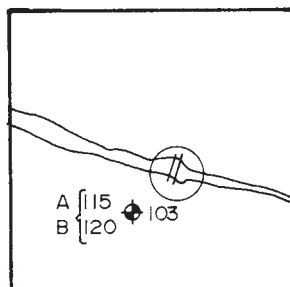
**SITIO EL PORVENIR**



**SITIO SALVAMENTO I**



**SITIO YAXCHILAN**



**SITIO SAN FERNANDO**

Fig. 4 Dam locations under consideration on the Usumacinta (after INDE 1982).

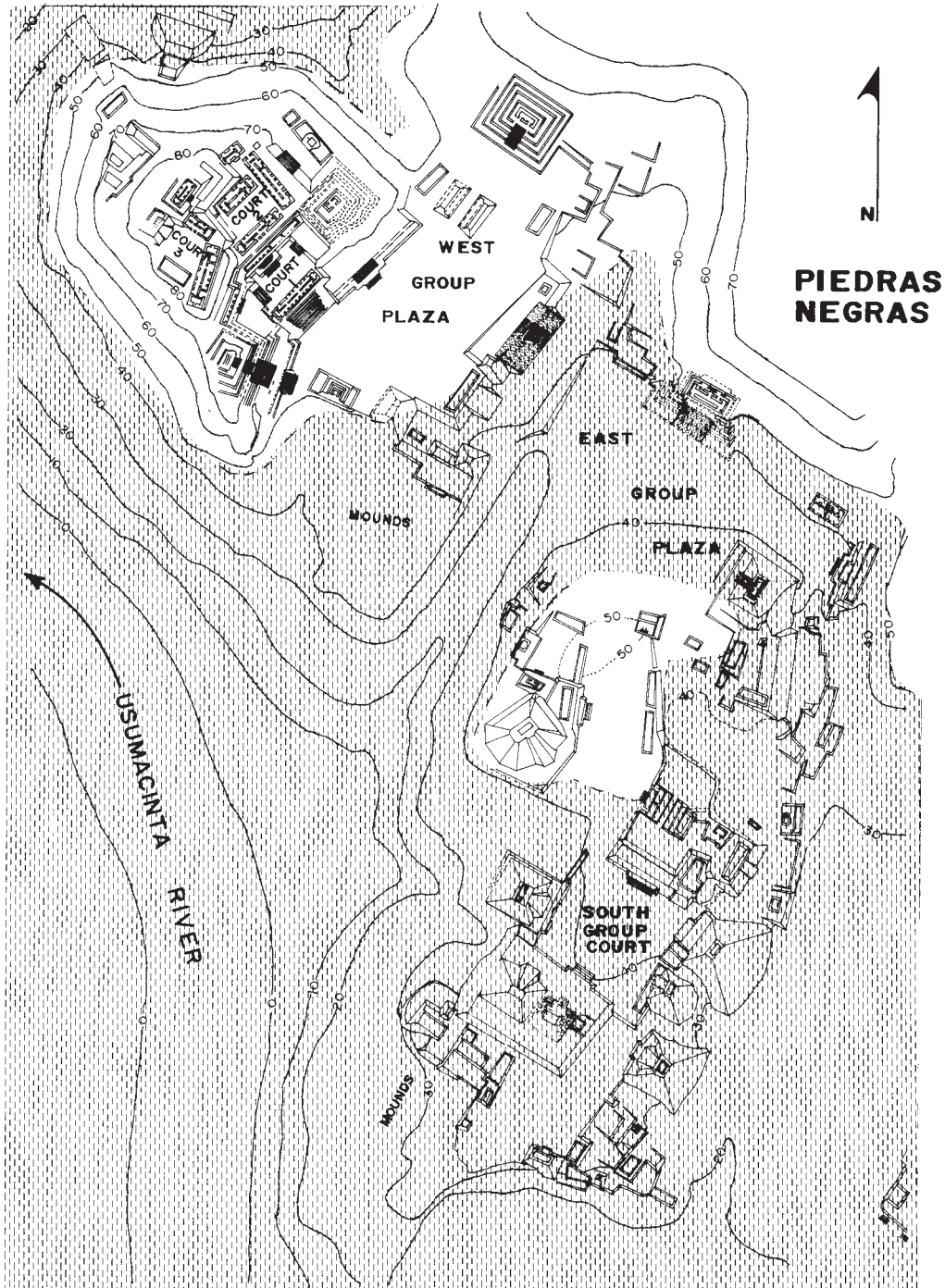


Fig. 5 Threatened portions of Piedras Negras (after Paris et al. 1939).

In addition to the site itself, portions of its original support area would also be directly threatened (Wilkerson 1983). The probable placement of the El Porvenir dam just over 1 km downstream from the city would result in the flooding of all the unsurveyed low areas that surround the site. There is no doubt that any of the dams

would have a catastrophic impact on Piedras Negras, unquestionably one of the most important Maya sites known.

In the vicinity of Piedras Negras, and between it and Yaxchilán, are a series of smaller sites such as Busilja, La Mar, El Cayo, Texcoco, Chicozapote, and Anaite.<sup>14</sup>

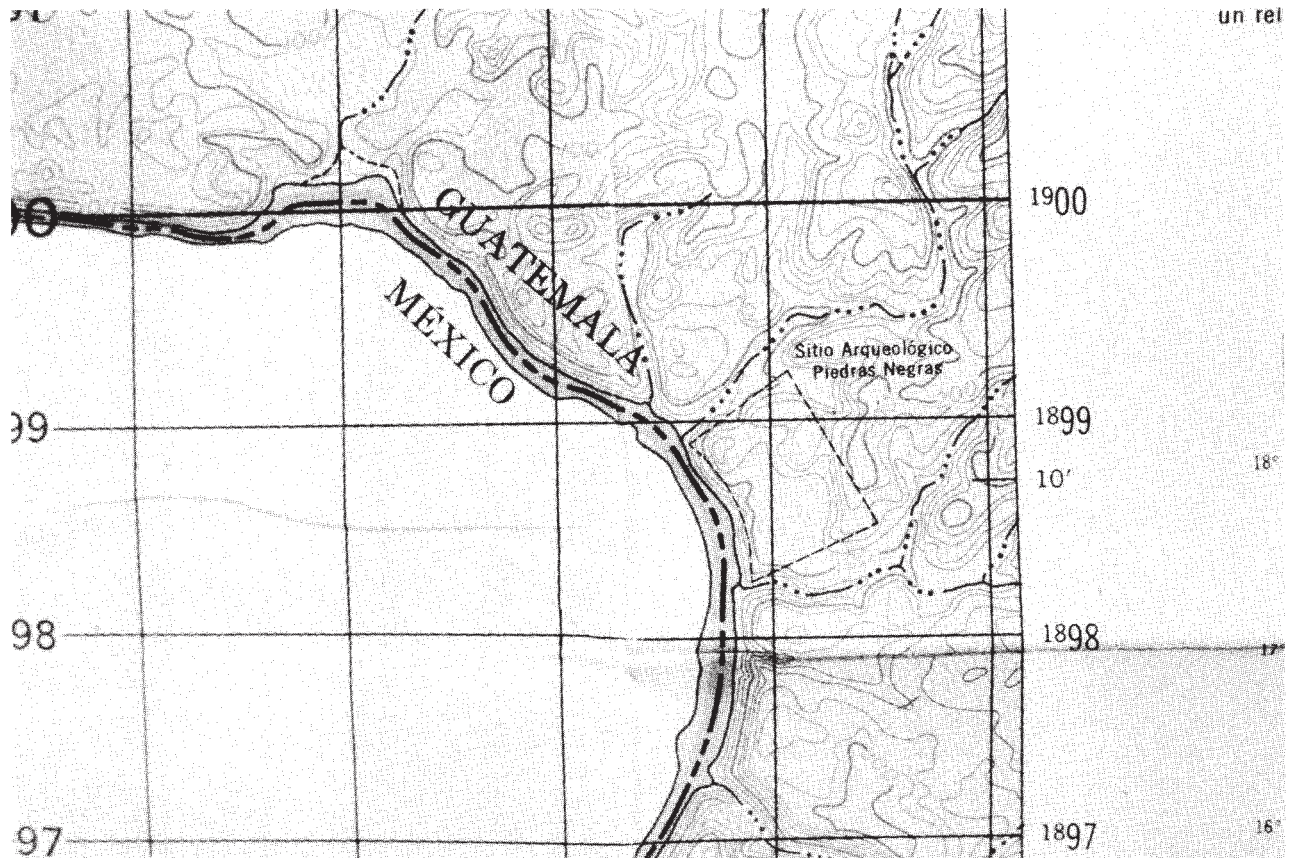


Fig. 6 Location of Piedras Negras (detail 1:50,000 sheets, Guatemala).

Any portions of these centers that lie beneath 105 m in elevation are directly in jeopardy. Texcoco, on the Guatemalan side of the river, would probably disappear completely (fig. 14 below).

#### Yaxchilán

Yaxchilán is another major site directly threatened by the projected basins. However, its precise status is still in doubt. It was originally disregarded in late 1982 as a construction location, but the Mexican commission reopened the question of locating a dam on the bend around the site in the winter of 1984–1985.

There are three proposed locations in the huge river bend. One is upstream from Yaxchilán near the start of the loop; another is at the corresponding downstream position. The third, incredibly, is at the site itself. The downstream location is actually the most threatening to the city: it is considered ideal for a basin height of 110 or 120 m, as opposed to a 100 m height for the other two (fig. 4).

At risk at Yaxchilán, regardless of the nearest downstream dam location, is the lower riverbank area of the city. Not only would the famous “rock pile” in the river itself be covered, but also numerous buildings in the great expanse of the lower portion of the site. Any water

level over 100 m is bound to affect it. This will be all the more true if no dam is built upstream to take the brunt of normal wet season flooding. If the Salvamento dam, several kilometers downstream, is built to its maximum height of 120 m, virtually all structures on the riverbank will be covered by the basin (fig. 7).

Archaeologist García Moll’s strategy of excavating and reconstructing the riverbank buildings is to be complimented. Apart from the discovery of significant new sculpture (Wilkerson 1985:541), he demonstrated the exceptional value of the threatened riverbank structures and made it more difficult to flood them.

The problem of Yaxchilán, however, does not end with the direct impact on the Mexican riverbank. Any dam near the city, or any nearby high dam downstream, will inundate a massive adjacent area on the Guatemalan side. This region includes significant satellite sites such as La Pasadita and certainly the majority of the support area for ancient Yaxchilán (Wilkerson 1983). Although this area has been looked at, it has never been adequately surveyed or excavated (fig. 8).

Our understanding of Yaxchilán or any of the riverbank sites will never be adequate, even if they are not flooded, until we can view them in the context of their immediate support areas. The Usumacinta has only been



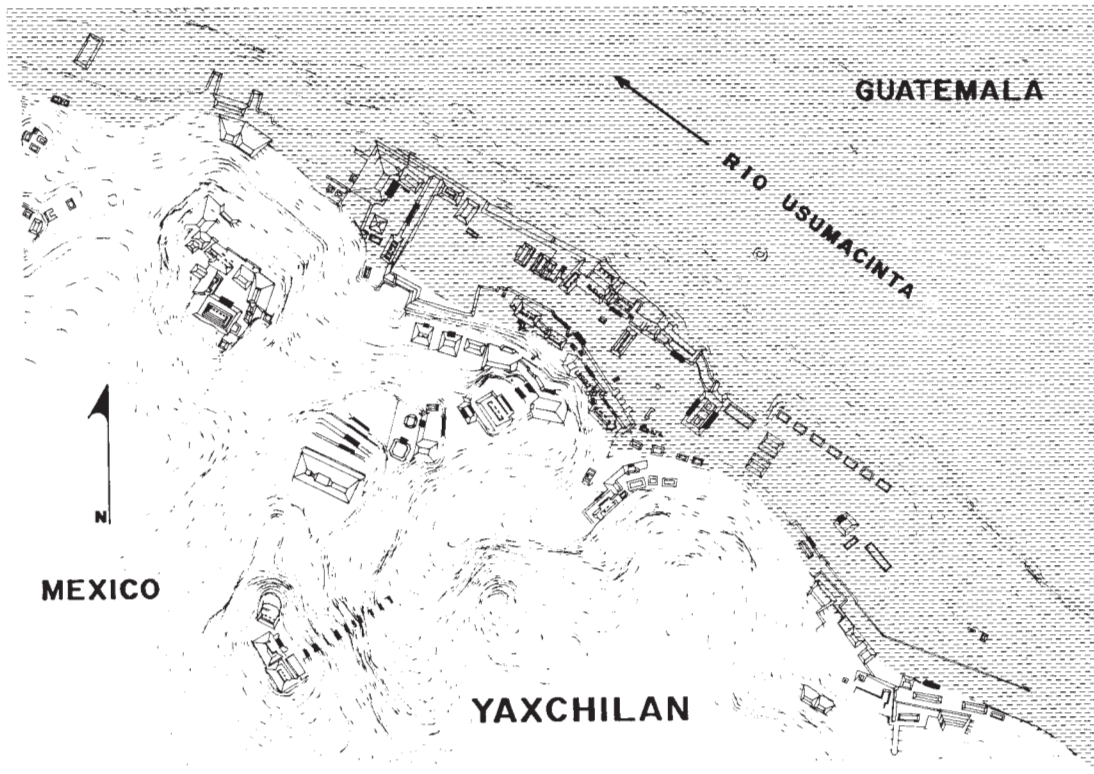


Fig. 7 Threatened portions of Yaxchilán (after Marquina 1964).

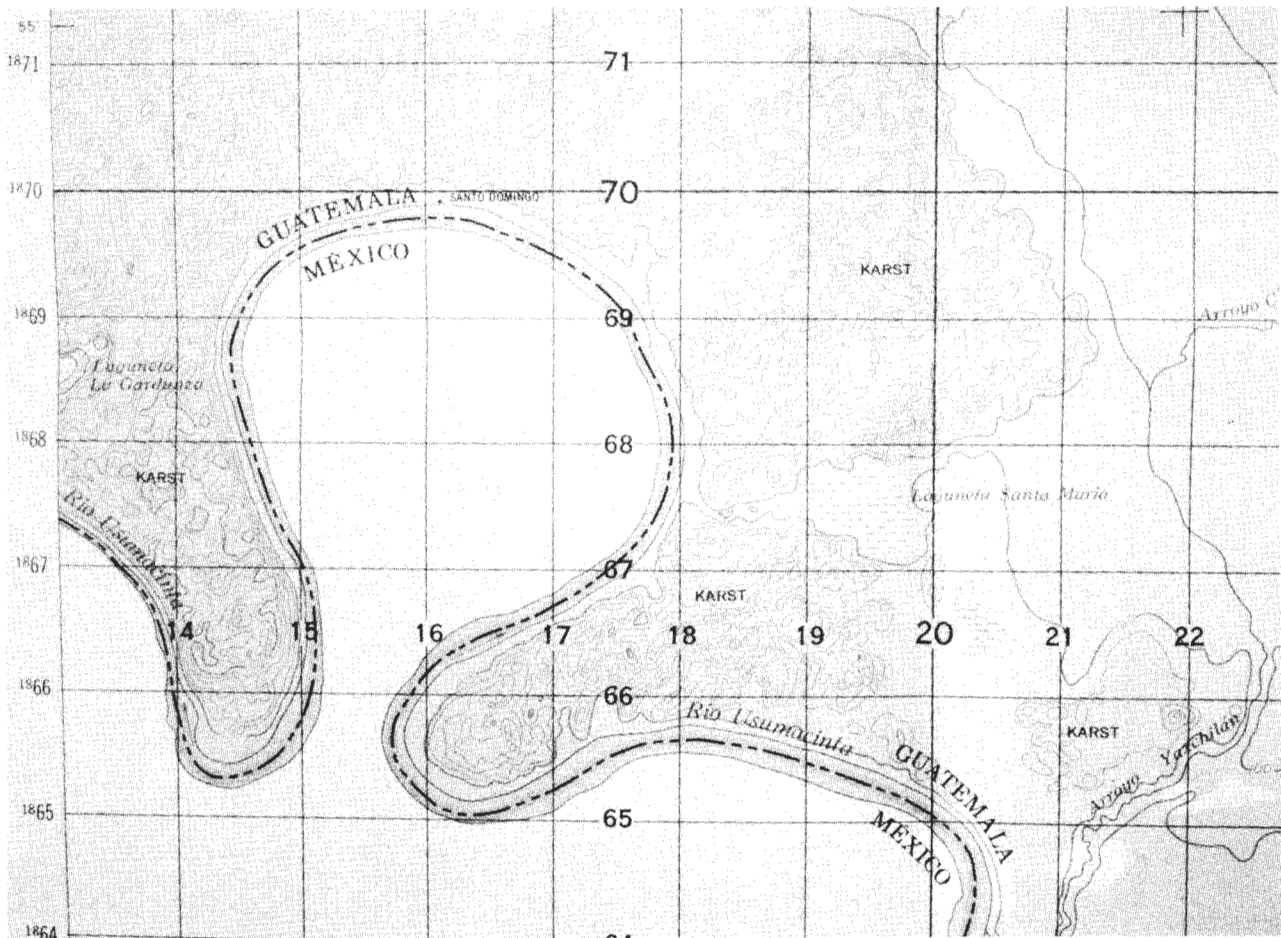


Fig. 8 The river loop around Yaxchilán and the Low Guatemalan (detail 1:50,000 sheets, Guatemala).

a political border for less than a century. It was, and still is for the inhabitants of the region, a unifying highway, not a boundary.

**Río Lacantun Sites**

The Río Lacantun will be affected from the vicinity of Pico de Oro to the confluence with the Usumacinta. Apparently there are no large riverbank sites in this stretch of river. However, small sites between the 105- and 120-m contour levels could be affected. These include El Palma, Yaxun, San Lorenzo, and Planchón de las Figuras (fig. 15 below).<sup>15</sup>

This latter site is extremely important for its dozens of formal and graffiti-like depictions on an huge riverbank slab of limestone (Wilkerson 1985; Stuart and Wilkerson 1985; García Moll 1986).<sup>16</sup> It is already underwater nearly half of the year due to seasonal flooding; any permanent rise in water level, however, modest, will inundate it permanently. This site clearly demonstrates that more than standing architecture is threatened by the dams.

**Altar de Sacrificios**

This well-known site near the confluence of the Río de la Pasión and the Usumacinta is at extreme risk if the dams are built. Most of the area occupied by the site is just above the 110-m elevation. Flooding to the 120-m

line will come close to inundating it completely, as well as considerably altering the confluence of the two rivers (fig. 9).

**Río de la Pasión Sites**

At sites upstream from Altar de Sacrificios on the Pasión and in the Laguna Petexbatun there would certainly be some damage. Most of the known sites, however, are above the 120-m elevation. However, portions of Aguas Calientes, Tres Islas, and Cancuén, as well as the low area across from El Seibal could be flooded. Further backup of seasonal flooding by the dam basins is likely to affect many of the Pasión sites adversely. It should also be pointed out that there are certainly numerous unreported small sites along the middle and upper Pasión that may be touched, by water backup (figs. 10–13).

**Chixoy (Salinas) Sites**

This is again a case of small and medium sites, most of which are unrecorded, being affected by the basins. There are a number on both banks in the vicinity of the Mexican *ejido* of Roberto Barrios. Most show pitting from looting and the majority are low enough to be flooded, or at least partially inundated, by the dam basins. Apparently, there is no major site on the immediate banks of the affected portions of the Chixoy.

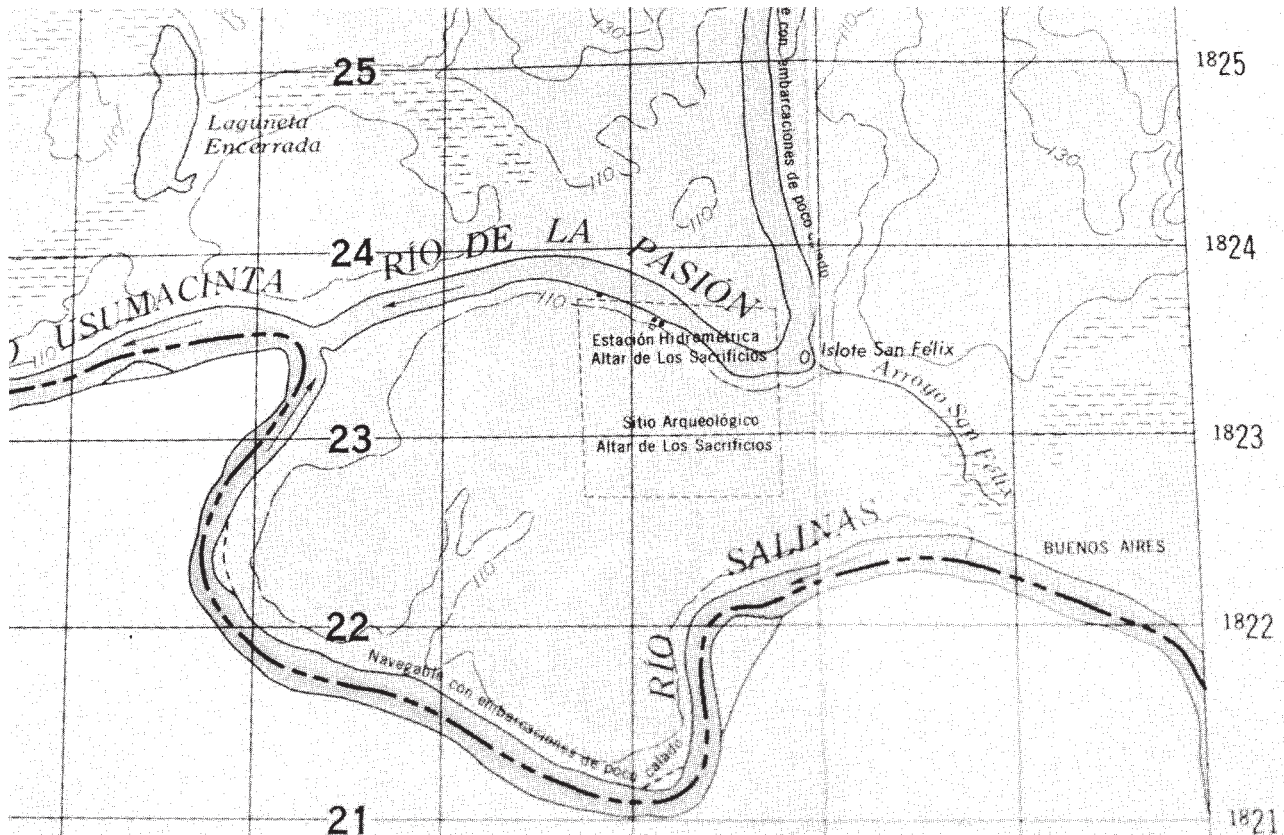


Fig. 9 Altar de Sacrificios (detail 1:50,000 sheets, Guatemala).



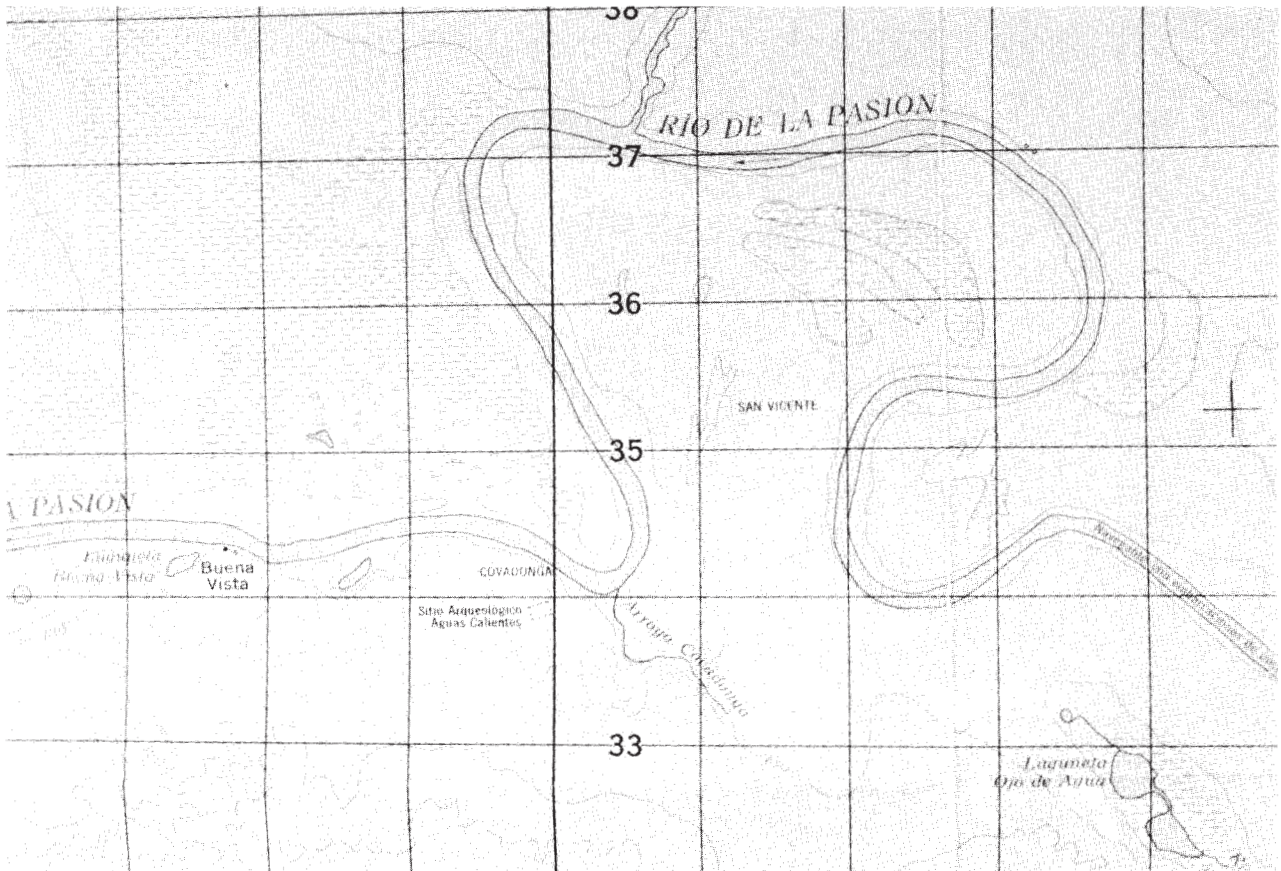


Fig. 10 Location of Aguas Calientes (detail 1:50,000 sheets, Guatemala).

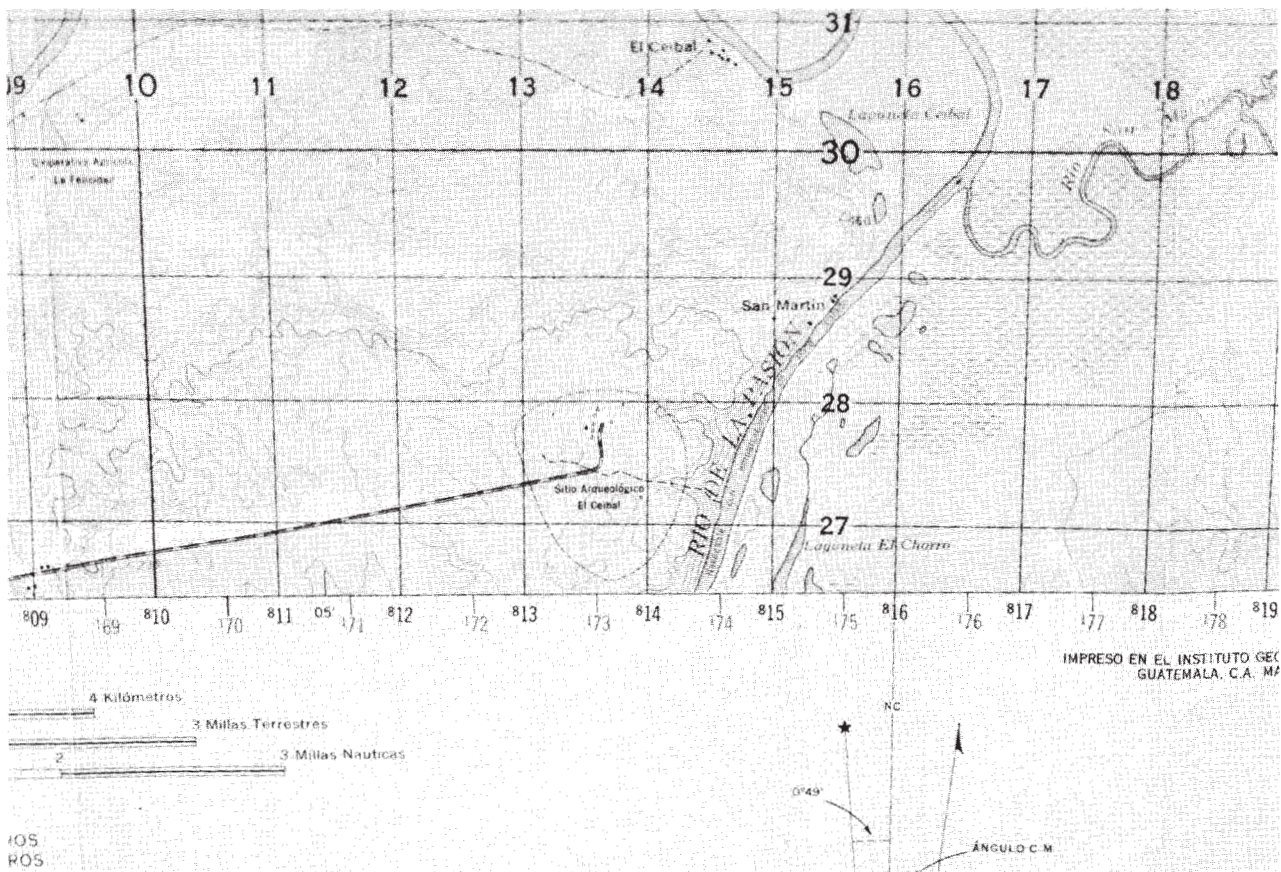


Fig. 11 Location of Seibal (detail 1:50,000 sheets, Guatemala).



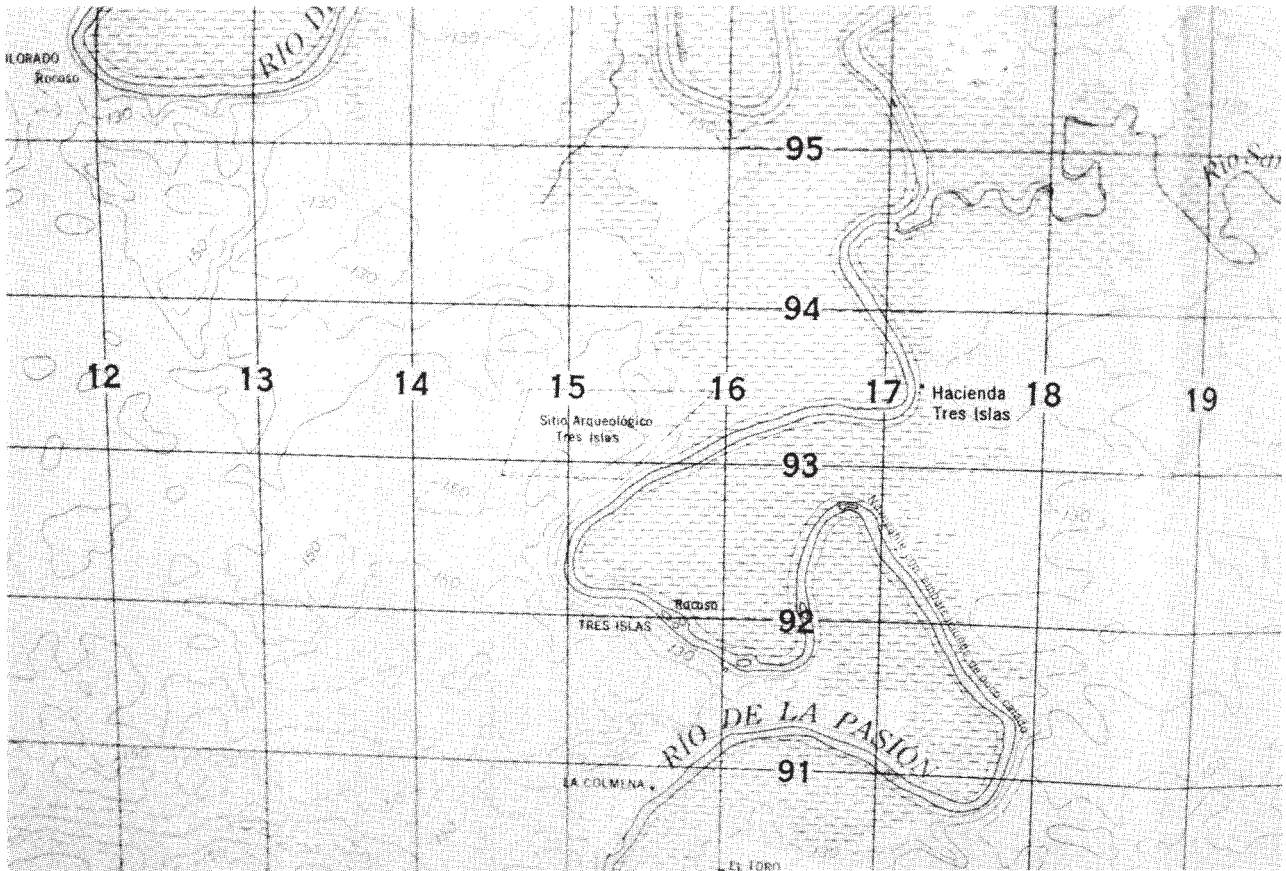


Fig. 12 Location of Tres Islas (detail 1:50,000 sheets, Guatemala).

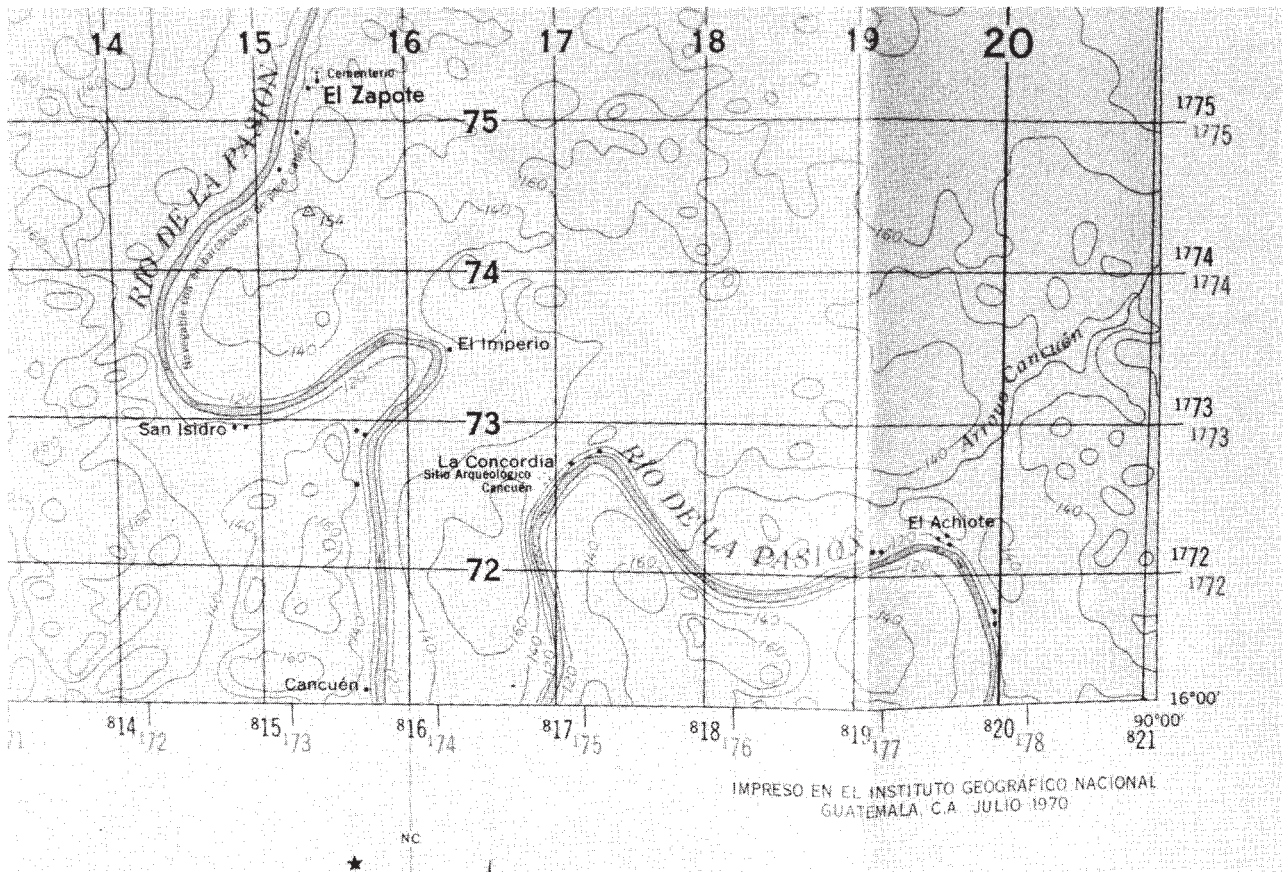


Fig. 13 Location of Cancuén (detail 1:50,000 sheets, Guatemala).



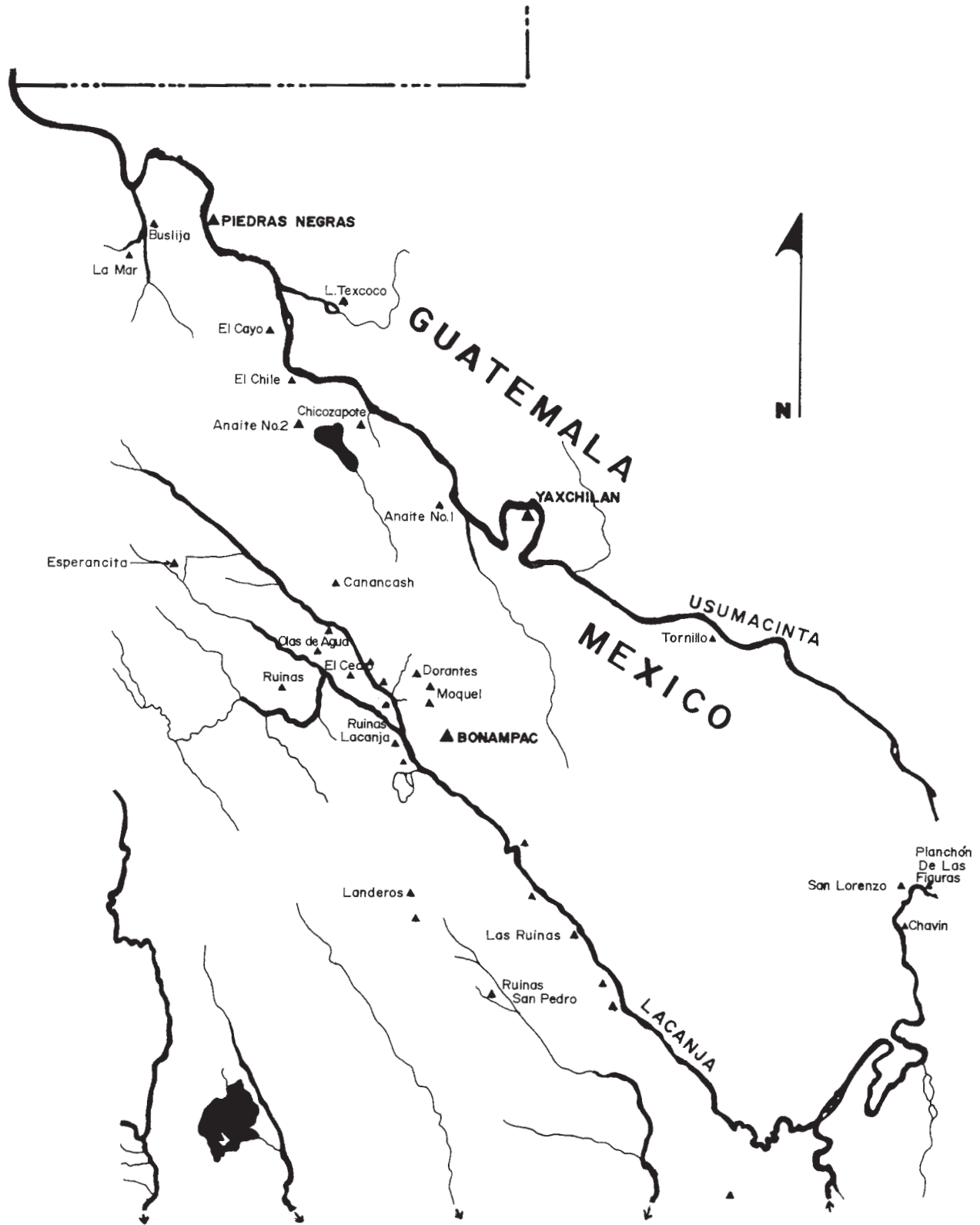


Fig. 14 Sites recorded along the Usumacinta by Frans Blom (detail Blom 1953).

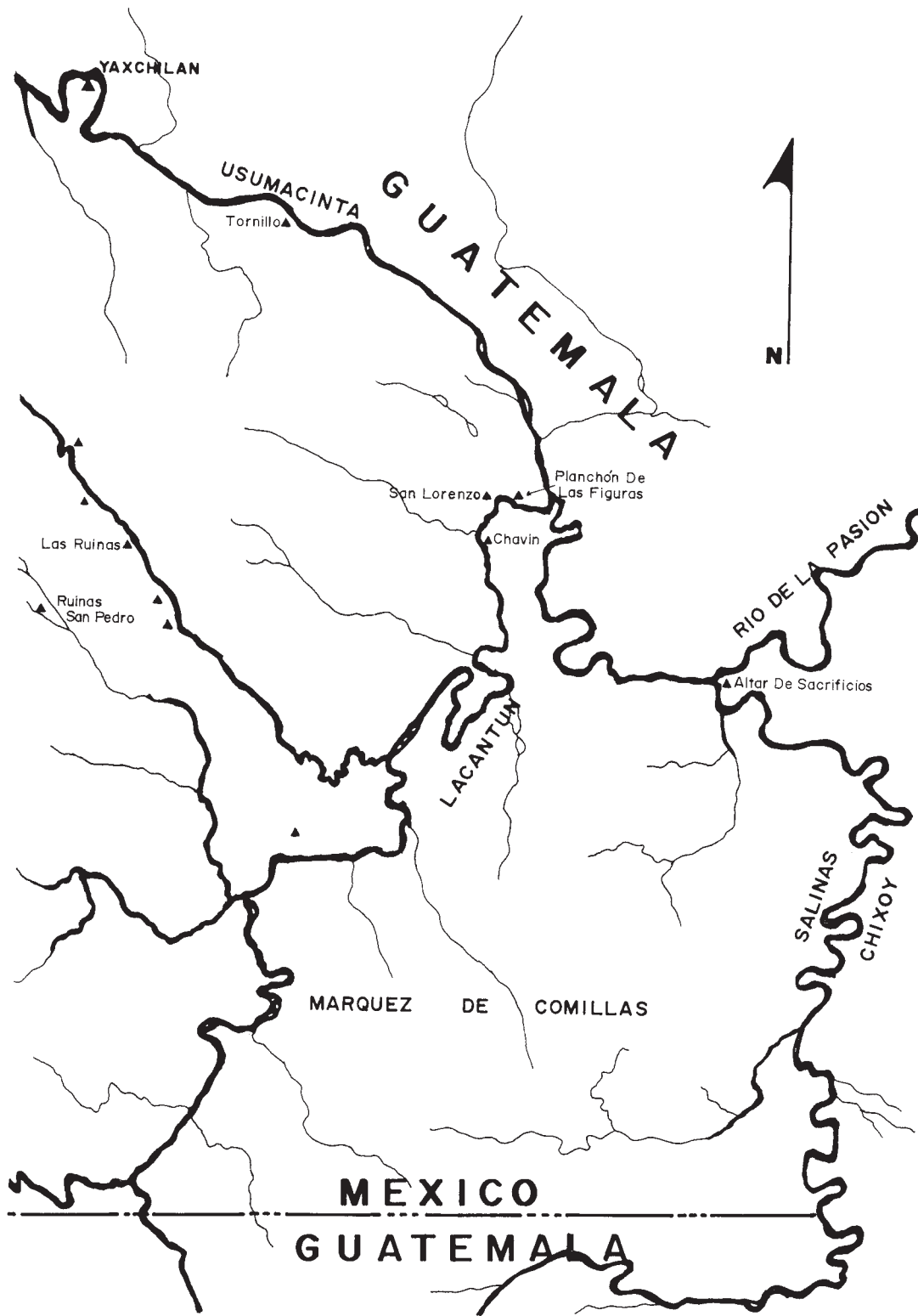


Fig. 15 Sites along the Lacantun recorded by Frans Blom (detail Blom 1953).

### Present Status of the Dam Project

The present dam project was proposed during the heady years of petroleum affluence in Mexico. By late 1982, when the peso crashed and a severe economic depression set in, field activities by Mexican personnel had been greatly reduced. Guatemalan surveyors and engineers, working from the onset with more modest budgets, continued their field activities until guerrilla activity by the FAR (Fuerzas Armadas Rebeldes) picked up in the second half of 1983. During 1984, their major camps at Salvamento, Porvenir (near Piedras Negras), and La Linea were occupied and/or destroyed by the FAR. Since that time, the economic situation in Guatemala has worsened and little field activity has taken place.

Nevertheless, the scope, basic costs, and possible dam locations had all been determined by late 1982. There still remains some surveying to be done, as well as the selection of the final dam configurations.<sup>17</sup> Because deliberations of the joint commission and its recommendations to the two governments are kept secret, it is not publicly known if such a momentous decision has already been reached. Mexico particularly has strictly avoided any publicity about the proposed dams or even the nature of the preliminary research.<sup>18</sup>

In spite of the delays due to financial problems and intensified guerrilla activity, this international hydroelectric project has not been canceled. Both the Mexican and Guatemalan commissioners, as well as other project participants, have made it clear that the project retains the highest priority in their respective countries and will be resumed as soon as conditions permit. Essentially, the project has been delayed. Although most field crews have been withdrawn, the commissions continue to function and the already established core plans are being refined.

It is also pertinent to note that the guerrilla opposition to the dams is not based upon espousal of ecological or archaeological factors. Interviews (Wilkerson 1985, 1986) have shown that the opposition has been to the project being undertaken by either the previous military (Victor Mejias) or the current civilian (Cerezo) governments. In other words, once in power the FAR would consider damming the Usumacinta appropriate.

In summation, both Mexico and Guatemala continue to favor the construction of the dams and both will press ahead in the near future. Also, the guerrillas oppose the construction by any Guatemalan government of which they are not a part, but not the concept of the dam project itself. The current delay is, however, an unusual opportunity to make the magnitude of the archaeological impact clear to those who participate in the dam decisions.

### Archaeological Input into the Decision-making Process

As originally constituted six years ago, the commissions in Mexico and Guatemala did not have any member

who represented either archaeological or environmental concerns. Their purpose was, and is, to determine if the dams could be undertaken and how. Collateral damage to archaeological sites or the rain forest environment was not quantified or, for that matter, appraised as a determinant factor. Input from these quarters was initially nonexistent.

Following the 1983 discussion of the dam project in the forum of this Mesa Redonda, interest among personnel of the Instituto Nacional de Antropología e Historia in both Guatemala and Mexico increased. In 1985, the director of Guatemala's INAH (Lic. Edna Nuñez) was included in the commission. This is an important precedent that, year and a half later, still had not resulted in a corresponding Mexican appointment.

While the effectiveness in Guatemala of INAH's participation in the commission will have to be judged by the future, INAH put forth a significant initial proposal to examine the threatened region (INAH 1985). Due to lack of funding, both within Guatemala and abroad, this has not yet been implemented.

On the international level, interest has been growing and has been manifest in several ways. There has been some discussion in various newsletters. Also, there was a well thought out resolution formulated by the German Ethnological Society in late 1983 and forwarded to the Mexican and Guatemalan governments through the West German Foreign Ministry.<sup>19</sup> Neither government publicly acknowledged receipt of the resolution. However, once it was published by a German news agency, the Guatemalan vice-minister of foreign relations held a press conference and acknowledged not only the resolution but also the dam project itself (*Prensa Libre*, 9 November 1983). This is a clear demonstration that rational and well-reasoned concern on the part of the international scientific community can effectively aid efforts by colleagues in the affected countries.

In general, input into the decision-making process by individuals and institutions concerned with the archaeological impact of the dam projects has grown from nothing in 1980 to a very hesitant first step over the last few years. Much more will certainly be needed if a totally adverse impact is to be avoided in the immediate years ahead.

### Avenues of Reaction

Electricity is a modern necessity. Hydroelectric dams are a major option available to countries with the appropriate rivers. Major dam projects have never been canceled on solely archaeological grounds, not even in the exceptional case of the Nile. Such are the basic facts of policy making that we must deal with in realistically assessing the available avenues of reaction.

Certainly, it is pertinent to question whether the Usumacinta dams are really needed in both countries at this time; if they will be situated too far from the primary metropolitan use-areas to be cost efficient; if the gigantic expense of large-scale dams is consistent with long-term

debt reduction policies; and if the loss to national and international patrimonies implicit in flooding the drainage is outweighed by short-term energy benefits. Nevertheless, short of a clear and loud statement of engineering infeasibility, the joint international commission is bound to announce its recommendation to proceed. Indeed, it may already have done so.

Public debate and consultation with the scientific community has not characterized the process of formulating the dam project to date, so there is no reason to believe that such procedures will suddenly and automatically be given pivotal roles in the final decision. If concerned individuals and institutions wish to have the archaeological and artistic issues heard, there must be a concerted effort to place them before interested segments of the public and the officials who must act on the commission's recommendations. Let us not forget that the dam project requires the consent and participation of the governments of two countries. Should one decide that proceeding would not be in its best interest, then the project will not be undertaken.

A first step in this direction is to make sure that all who study the archaeology and art of the Usumacinta region are aware that it is threatened. Another is to support our Guatemalan and Mexican colleagues in any effort to participate in the decision-making process in their countries. Still another is to increase research in the region and demonstrate the singular importance of these ancient resources in all available forums.

A different avenue, bearing in mind that archaeologists and art historians alone have never stopped a large dam, is to make other colleagues in the environmental sciences aware of the situation. There are many cases where combined proposals have more weight and are likely to attract a broader audience. There is certainly no reason why carefully crafted proposals of large natural parks around major sites could not be put forth.<sup>20</sup>

Of critical importance to the implementation of the dam project is international funding. The dam costs were estimated to total between 2.1 and 3.7 billion 1982 dollars depending on the final dam configuration. Most if not all of this funding must be sought abroad through banks and international lending organizations. Much international concern can be concentrated on these institutions. It would not be inappropriate or out of proportion, given the unique cultural attributes of the affected Maya cities, to propose that 1.5 percent of the total expenditure be devoted to the support of proper investigation and salvage in the threatened region. That could generate between 32 and 56 million dollars for emergency research. Even so, these amounts alone could never cover all the needed salvage operations.

The proposed damming of the Usumacinta should be a matter of grave concern to all Precolumbianists.<sup>21</sup> By virtue of unforeseen delays, the pace of the dam proposal has momentarily slowed. We have been given time carefully to consider our arguments and to propose appropriate action. Do we forfeit the very heart of Mesoamerican art and architecture without fully knowing its extent and value? If we do, perhaps we can be likened to the mindless people whom the heart of Heaven destroyed by a deluge in the First Creation of the Popul Vuh (Edmonson 1971:25, 26):

Then their flood was invented by the heart of Heaven  
A great flood was made, and descended on the heads  
of those who were dolls  
who were carved of wood.

If the dams are to be built, and the delicate creations of the Maya inundated, it behooves those of us who cherish knowledge of the past to demonstrate the value of salvaging this great patrimony of all humankind.

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## Appendix A

### RESOLUTION OF THE DEUTSCHE GESELLSCHAFT FÜR VÖLKERKUNDE 11 OCTOBER 1983 (Sent to the governments of Mexico and Guatemala, October 1983)

El motivo de la presente carta es elevarle la Resolución emitida el día 11 de octubre de 1983 por la Sociedad Alemana de Etnología en el curso de su reunión bianual. Lleva el texto siguiente:

La 'Deutsche Gesellschaft für Völkerkunde' (Sociedad Alemana de Etnología) expresa profunda preocupación acerca del proyecto de represas en el Río Usumacinta, las que constituyen una amenaza grave, tanto para la población del área afectada,



como para testimonios únicos e irrepetibles de la Cultura Clásica Maya.

Se ruega a las instituciones responsables en México y Guatemala de evaluar otra vez cuidadosamente las ventajas y los inconvenientes de este proyecto. Acaso que el plan siga vigente, se deberían realizar por lo menos todos los esfuerzos, no sólo para la indemnización de la población afectada, sino también para la protección de los sitios arqueológicos de fama mundial.

Deutsche Gesellschaft für Völkerkunde,  
Anthropologische Gesellschaft in Wien,  
Österreichische Ethnologische Gesellschaft,  
Tagung vom 10.–14 Oktober 1983 in Freiburg.

### Notes

1. Background research on the region has been carried out since 1980 with the aid of the Institute for Cultural Ecology of the Tropics (1980–present), National Geographic Society (1984–1985), and Yale University (1983). Portions of the data have been presented in Wilkerson (1983, 1985, 1986).

2. The best approximation of Cortés's route through the lower Usumacinta region is by Scholes and Roys (1968). Although their analysis of the route is thorough, it is not totally convincing with respect to the area of the San Pedro tributary.

3. An excellent example of a nineteenth-century descriptive appraisal of a major portion of the Usumacinta for potential use is the study of Marciano Barrera (1965). Originally published in 1865 in numerous newspaper segments during the time of the Emperor Maximilian, it reflects the predominant view of tropical resources at the time. To facilitate its use by modern scholars, the Institute for Cultural Ecology of the Tropics is preparing an edition of this useful but little-known work.

4. Much of the history of the wildly fluctuating border between the two countries is contained in the annotated 1895 map of Miles Rock. The crucial role of this American engineer, employed by the Guatemalan government to represent it in the often emotionally charged negotiations with Mexico, is another little-known aspect of Usumacinta history.

5. These figures are extracted from detailed studies undertaken by personnel of Mexico's Secretaría de Agricultura y Recursos Hidráulicos (SARH 1983:10–11, 1984:3). It should not be assumed that remaining portions of the forest are untouched: the figures include a rapidly growing portion of "disturbed forest." For example, in 1982, 18.3 percent of the still forested area was considered disturbed.

6. Apart from the locations on the Usumacinta, up to sixteen separate projects have been proposed on its Mexican affluents (SARH 1983:6; SARH 1976a: map 20) and two on the Guatemalan tributaries (Renato Fernández, Instituto Nacional de Electrificación Guatemala, personal communication). The Mexican potential in the Lacandón Forest area is thought to total at least 3,740 MW annually (SARH 1983:13). The Grijalva dams are described in detail in Secretaría de Recursos Hidráulicos (1976b).

7. Guatemala also undertook a major hydroelectric dam project of its own on the upper Chixoy, the principal tributary of the Usumacinta.

8. In ascending order these are Boca del Cerro, La Linea, "sitio Piedras Negras" (actually Busilja), Porvenir, Desempeño, Salvamento, Yaxchilán, San Fernando, and El Chorro.

9. These data are abstracted from the study prepared by the Instituto Nacional de Electrificación in 1982. At this time these projections are still considered valid by Guatemalan and Mexican engineers.

10. This was confirmed in interviews with participating engineers from both countries in 1985.

11. Many of these uncharted sites have sculpture. A 1984 trip by muleback toward the Sierra del Lacandón from the Guatemala cooperative of Bethel showed there are many such sites yet to be examined (Wilkerson 1985:533–536).

12. It should be noted that in the University of Pennsylvania site map (Paris et al. 1939), the 1:50,000 sheet for the area and the new survey for the dams do not necessarily match because different base data are utilized.

13. In late 1982–early 1983, a major base mark was placed directly in front of the stucco mask on building K-5. Another was situated in the old Fordson tractor abandoned nearby by the University of Pennsylvania excavation team in the 1930s. Both carved stones and stucco in the vicinity were also defaced.

14. Most of these sites were visited by Maler (1901–1903) and are listed on Blom's map of the Lacandón Forest (1953).

15. There are also small riverbank sites on the Usumacinta upstream from Yaxchilán. Those that are in whole or part beneath the 105 and/or 120 contour lines are threatened. These include El Tornillo on the Mexican bank and Ixcoche on the Guatemalan side.

16. Planchón was first recorded by Maler (1901–1903) in 1900, then by Mulleried in 1927, and third by Bullard in 1965.

17. Surveying the basin contours on the Guatemalan bank is critical to the overall project because of the large areas to be inundated. However, it is made extremely difficult by the complicated karst topography. Undetected "saddles" between forested hills, or porous spongelike limestone, could allow massive flooding of portions of the region between the Usumacinta proper and the San Pedro.

18. So effective has the publicity blackout been that Lacandóns, from Naja, attending the 1983 Mesa Redonda, indicated that they had been unaware of the purpose of the large crews that had been operating in their traditional region for over three years. Also, during extensive travels in the affected area (1983–1985), outlined in Wilkerson (1985), we encountered villages on the Guatemalan bank with some awareness of the dam survey but practically no knowledge of the project among their Mexican counterparts.

19. A copy of that resolution is appended to this article.

20. Guatemala's Tikal Park is a most important precedent in this respect. It is sufficiently large enough not only to protect, and enhance, the archaeological remains, but also to shelter the endangered flora and fauna of the rain forest environment. Parks of similar, and even larger, extent could still be established at Yaxchilán and Piedras Negras. It would also be possible to propose international parameters for such parks. The Guatemalan area in front of Yaxchilán, including the artistically significant site of La Pasadita, might also be set aside to complement the archaeological site on the Mexican side. The same could be done in the Mexican area in front of Piedras Negras.

21. Subsequent to the Sexta Mesa Redonda de Palenque, and intensive discussion by participants from numerous countries, a resolution was passed by the Mesa Redonda. Copies of the resolution in Spanish, English, German, and French were forwarded to the foreign ministers of Mexico and Guatemala a week later.