

## Introduction

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The long neglected lowland American tropics have only recently received any significant amount of scientific attention. This unprecedented explosion of interest is the unfortunate product of a conspiracy of events whose global repercussions have forced us to confront the dramatic consequences of rapid ecosystemic degradation, declining biodiversity, and cultural extinction. As we race against time to learn as much as possible about these quickly transforming environments, we are consistently frustrated and humbled by how little we actually know. In our search for a clearer appreciation of the future implications that current policies and practices may hold, we are simultaneously compelled to reflect on the area's rich and complex archaeological past.

The relative paucity of systematic archaeological investigation conducted throughout this vast region is generally attributed to some combination of logistical constraints, lack of ground visibility, meager preservation, and/or an historic deprecation of lowland environments. Much of our knowledge of lowland neotropical prehistory is built upon a scattered patchwork of museum pieces and fortuitous observations. Together with a healthy dose of speculation, these isolated bits of data are linked together via trait comparison, and correlated with reliable observations obtained from the few geographically disparate scientific excavations undertaken so far.

Amongst the small group of intrepid archaeological pioneers whose efforts unearthed an early glimpse at the prehistoric world of the vast South American lowlands, Donald W. Lathrap occupies a prominent niche. Spanning four decades of research, Lathrap's career was marked by a bold rethinking of the role played by lowland areas in prehistoric New World developments. Frequently depicted as an area whose limited potential forfeited any claim to prehistoric achievement, lowland neotropical prehistory was subsequently marginalized as the degenerated consequence of externally derived influences. Lathrap's synthetic vision emphatically inverted this viewpoint. His research thrust the lowland neotropics into the forefront of consideration, and provided the intellectual stimulus for subsequent research into new and diverse geographical, temporal, and topical areas.

The impact of his legacy as a scholar and teacher has been addressed in a number of recent posthumous tributes,<sup>1</sup> and will be appreciated for many years to come. As a lasting recognition of Lathrap's vision, he motivated generations of researchers who continue to conduct archaeological investigations in the lowland neotropics. The often widely divergent but mutually complementary methodological perspectives taken by those he inspired, reflects yet another aspect of Lathrap's profound influence. Much of this analytical diversity can be attributed to the heightened appreciation which lowland-oriented archaeologists must bestow upon maximizing data recovery. This stems from a very practical concern for successfully extracting information in a burial environment repeatedly perceived as hostile toward the preservation and detection of all but the most durable remains.

Preservation biases, whether perceived or real, were always at the forefront of Lathrap's attention. He chided those who cited the regular litany of problems associated with conducting archaeology in the neotropical lowlands as a justification for using simple or inadequate field techniques. He chose to view this substantial list of grievances not as an obstacle, but as a challenge. He dogmatically cajoled his colleagues and students to critically evaluate the data upon which they based their interpretations, and constantly coaxed them to maximize data recovery wherever, whenever, and however possible.

Most of the contributors to this volume worked and studied closely with Lathrap; many are his former students. Each author has confronted the issue of maximizing data recovery and interpretation in neotropical lowland contexts. In addressing the crucial considerations of preservation and detection, each paper explicates methodologies designed to maximize, redefine, and/or perfect data recovery and interpretation. These concerns are illustrated from the complementary perspectives of different specializations, and through the inclusion of tangible applications derived from archaeological contexts within the lowland American tropics. The eleven contributions to this volume are sequentially arranged. They encompass: archaeological survey; site excavation; studies of regional landscapes and paleoenvironments; analysis of paleobotanical and osteological materials; approaches to ceramic analysis; and the critical application of ethnohistoric and contemporary oral records.

The volume begins with two contributions which examine aspects of site survey, recovery, and definition in the lowland neotropics. Zeidler emphasizes the omnipresent problems of poor surface visibility and site accessibility, which exacerbate the systematic discovery of archaeological sites in a regional landscape. His contribution explores the nature of lowland neotropical archaeological sites, and the specific field methodologies used to achieve both broad and representative coverage. The effectiveness of probabilistic sampling, through the use of small quadrats and shovel test probes, is evaluated with data from the forested lowlands of western Ecuador. Siegel continues, by addressing the problems of visibility and deep site excavation. Adapting solutions developed by archaeologists facing similar problems in other areas, he demonstrates a multi-

stage nested framework of site detection and sampling at the complex site of Maisabel, Puerto Rico. A circular pattern of community organization is convincingly demonstrated through a tiered recovery program of auger test-pitting and expanding horizontal excavations.

Next, consideration is given to the study of regional archaeological landscapes in space and time. The difficulties of studying tropical lowland garden and field systems within a regional landscape are addressed by Erickson. Major limitations imposed by constantly reworked stratigraphy, poor preservation, and the inadequacy of direct historic analogs, are overcome through a combination of specific field methods and experimental archaeology. The massive precolumbian land modifications of the Bolivian Llanos de Mojos are effectively studied through integrating a mixed media approach to remote sensing, with aerial and pedestrian survey, and excavation. An ongoing program of agricultural experimentation not only provides direct clues for the interpretation of this prehispanic landscape, but also offers tangible recommendations for modern development and sustainable agriculture. Bray continues with a diachronic examination of the interplay between global, local, and human-induced environmental factors in the prehistoric landscape of Colombia. Stressing the need to interrelate events within lowland and adjacent highland areas, he demonstrates that subsistence and environmental data can be recovered for lowland settings. These can reveal massive regional landscape changes, including large-scale drained field constructions and irreversible degradation, brought about through the interaction between natural and anthropogenic environmental factors.

Despite the repeated axiom that organic preservation is exceedingly poor to non-existent, significant information can be fruitfully recovered, analyzed, and integrated into archaeological research. Pearsall addresses the problems of botanical macroremain preservation, recovery, and identification in the diverse neotropics. She stresses the maximization of botanical data during all phases of project planning, excavation, and analysis. This can be achieved through the successful adaptation of recovery and sampling techniques, and appropriate identification in adequate comparative collections. Problems and prospects involved in optimizing pollen and phytolith microremain data for archaeology in the lowland neotropics are also discussed. The productive integration of macro- and microremain data is advocated, and illustrated for northwestern South America. This theme is elaborated by Piperno, who provides a general review of pollen and phytolith analyses carried out under the limiting conditions of the American tropics. Significant improvements to paleobotanical technique are illustrated through the tandem application of microfossil analyses to the study of prehistoric subsistence and settlement in Panama. Pollen, phytolith, and charcoal records reveal the antiquity of slash and burn cultivation in the neotropical lowlands. She advocates the retrieval of data from culturally created, nonoccupational contexts, combined with the systematic construction of modern analog data for the comparison of natural and cultural effects on vegetation.

The study of organic remains in lowland neotropical contexts is further

explored in three papers dealing with osseous residues. Stahl critically examines the basic axiom that poor bone preservation is principally the result of hostile burial conditions in lowland environments. The qualitative attributes of a large mammalian archaeofaunal collection from the western Ecuadorian lowlands, are used as an entry point to illustrate the complex set of variables that can affect the survivorship of animal bone assemblages. These variables, which are strongly affected by animal size, can combine to systematically distort preservation, recovery, and subsequent archaeological interpretation. The effects of intrinsic and systematic biases on inferences regarding ancient lowland environment and subsistence are considered. Ubelaker addresses the major problems associated with the analysis and interpretation of human skeletal remains in neotropical areas. His contribution focuses on the extent of representation in sampled skeletal populations, and offers recent analyses of human skeletal collections from adjacent lowland and highland areas in Ecuador. The temporal and spatial breadth of this uniquely large sample presents an unusual opportunity to examine ancient variation in biological information from these areas. Norr outlines current developments and methodology for dietary reconstructions, using the stable carbon and nitrogen isotope ratios in collagen and apatite fractions from archaeological human remains. She details the situations in which isotopic ratios are recommended for dietary reconstruction in the neotropics, the relationship between dietary isotopic composition and consumer tissue, and the selection of appropriate samples. Possibilities and limitations in the use of stable isotope ratios as one line of evidence for answering interrelated questions about early New World maize agriculture, are illustrated with data from Panama.

Due to factors of preservation, analyses of durable ceramic fragments have overwhelmingly comprised the major source of interpretive data for archaeologists. Raymond explicates the methodology of modal analysis, which was earlier advocated by Donald Lathrap and fruitfully applied over the last three decades in the tropical lowlands of South America. Pointing out some of the limiting factors of typological approaches in these environments, he clearly explicates the underlying rationale and methodology of structural analysis, with illustrations from the Upper Peruvian Amazon. The meaningful integration of technological variables into this approach is further discussed with early examples from northwestern South America.

Finally, despite many of the limiting conditions imposed by working in tropical lowland environments, DeBoer emphasizes the privileged position occupied by archaeologists working in the tropical forests. Here, thriving ceramic expertise and extant mythology and oral traditions are powerful tools in aid of archaeological interpretation. DeBoer critically synthesizes data from oral traditions, historic chronicles, and archaeology as they inform on the disputed origins of the Chachi who currently reside in the Santiago–Cayapas region of northern Esmeraldas Province, Ecuador. The independent role of archaeological data supports the Chachi version of their own origins.

A recurrent theme emerges from these various attempts at maximizing and perfecting data recovery in neotropical lowland settings. This theme counters historically prevailing notions which have only served to increasingly isolate the area's prehistory, at least on methodological grounds. It is apparent that many of the difficulties associated with conducting lowland archaeology are basically similar to those faced by archaeologists working in other parts of the world. Although not distinctly unique to lowland environments, they may nevertheless be worse in matters of degree. Relatively inadequate infrastructure is a common feature encountered by archaeologists working in many areas, yet it is ubiquitous and generally more inadequate in the lowland tropics. Poor visibility caused by vegetation cover, or site destruction caused by looting or meandering rivers, are problems frequently confronted by archaeologists, yet are regular and often exaggerated facts of life in the tropical lowlands. Differential bias in material cultural preservation is a fundamental feature of all archaeological research, yet the lowland neotropical archaeologist must be particularly vigilant in controlling this pernicious variable in any attempt at interpretation. Potential solutions to all these concerns, and more, are found in the expanding repertoire of a robust archaeological discipline. They need only be judiciously adapted to local conditions, and their findings cautiously appraised.

Donald Lathrap was perhaps best known for his hemispheric-wide perspectives which enabled a radical and occasionally controversial rethinking of lowland American tropical prehistory. The tropical lowlands were often geographically isolated through the use of heuristic dichotomies (for example, lowland/highland, marginal/nuclear, "tribal"/"chiefdom") which frequently masked more than they facilitated, a point clearly brought out in a number of the contributions. It is not surprising that Lathrap, who trained and worked in various areas of North America, brought a hemispheric perspective to the practice of archaeology in the South American tropical lowlands. Perhaps less known or acknowledged, are the many significant methodological developments he either introduced or directly stimulated. These include undertaking tropical riverine surveys from a Mississippian perspective in Perú; introducing midwestern techniques of extensive aerial archaeological excavation in Ecuador; explicating ceramic analysis modeled after the methodology of descriptive linguistics; applying some of the earliest ethnoarchaeological studies to archaeological interpretations; and stimulating the use of flotation recovery and phytolith studies in the New World tropics. It is through his stimulus and encouragement to younger generations of archaeologists, that his legacy continues to discover and redefine prehistory in the lowland American tropics.

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## Notes

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- 1 Recent tributes include proceedings of a 1991 symposium at Cumaná, Venezuela: *Homenaje al Dr. Donald W. Lathrap*, edited by Erika Wagner (1991), and published in *Antropológica*, 75–76; “Gifts to the Cayman: Essays in Honor of Donald W. Lathrap,” edited by Evan C. Engwall, Margaret van de Guchte and Ari Zieghelboim (1992), and published in the *Journal of the Steward Anthropological Society*, 20; and the 1992 symposium “Model Building and Validation in New World Archaeology: Papers in Honor of Donald W. Lathrap,” held at the 91st Annual Meeting of the American Anthropological Association in San Francisco. A thoughtful reflection on Donald Lathrap’s scholarly accomplishments has been published by José Oliver (1992).



# 1 Archaeological survey and site discovery in the forested neotropics

JAMES A. ZEIDLER

Until recent years, archaeologists seldom carried out large-scale surveys in regions having poor visibility and accessibility. Survey in such areas requires a variety of heroic and methodologically unlovely techniques . . . , such as periodic shovel testing and use of local informants, to simply make site discovery possible (Schiffer 1987: 350).

While the preceding statement is true of numerous areas in New World archaeology, the dual problems of low surface visibility and limited accessibility are probably nowhere greater than in the tropical lowlands of South America, particularly Amazonia. These problems, combined with the sheer immensity of the area and small number of archaeologists working there, have led to widely conflicting interpretations of the archaeological record, not to mention opposing reconstructions of macro-regional prehistories (Gibbons 1990; Roosevelt 1991). In spite of these differences, all archaeologists working in this area have had to confront the severe logistical constraints and preservation biases imposed by the humid tropical environment, and in so doing, have been forced to employ “methodologically unlovely techniques” of one kind or another.

My purpose in this chapter is not to enter into this protracted debate on Amazonian prehistory. Instead, I explore certain methodological themes relating to archaeological survey and site discovery in the forested tropics of lowland South America, using as my point of departure Donald Lathrap’s seminal article entitled “Aboriginal Occupation and Changes in River Channel on the Central Ucayali, Peru” (1968a). This article is methodologically significant for two reasons. First, it outlined a specific field procedure for locating remnant archaeological sites in a broad meandering riverine environment where destructive fluvial forces commonly leave only a palimpsest of former prehistoric occupations. Using techniques common to contemporaneous archaeological investigations in the Mississippi floodplain, Lathrap employed aerial photographs to document the “horizontal” stratigraphy left by complex meander sequences. Remnant archaeological sites were found only in bluff areas of older alluvial terraces, but nonetheless revealed long stratigraphic sequences. Even though these sites have been spatially truncated by fluvial processes, “the ancient communities seem neither to be small nor particularly short-lived” (Lathrap 1968a: 75). He further notes that:

Most of the sites which once existed within the Central Ucayali flood plain will never be seen by the archaeologist and, in most instances, have ceased to exist, for each meander loop completely destroys any previous sites within its limits.

Sites located on the bluff of old alluvium directly adjacent to the flood plain have a better chance of surviving and of being found by the archaeologist, but even here the odds are not good (Lathrap 1968a: 76).

In some cases, cultural midden was buried by sterile alluvial deposition. The Cumancaya site (UCA-22), for example, “would be impossible to locate from surface indications were it not for the fact that wave action is continually cutting sherds out of the bank . . .” (Lathrap 1968a: 74). As an early documentation of natural formation processes in floodplain habitats of Amazonia and their effects on the archaeological record, Lathrap’s study represents a methodological *tour de force* given the intellectual climate of the time.

Second, and perhaps more importantly, in its critique of “traditional” archaeological survey methods, the article represents an early and valiant attempt at illustrating bias in the archaeological record of Amazonian *várzea* environments. It also demonstrated a cautious approach towards negative evidence, and warned against premature conclusions regarding site densities in areas where survey intensity was low. Two quotes adequately demonstrate these points:

Any site more than 100 years old is bound to be in a different spatial relationship to the active river channel than when it was occupied . . . One would predict that longitudinal site survey along the river, unless augmented by frequent trips back to the bluffs lining the floodplain, would be a most inefficient way to locate old archaeological sites. This has indeed proved to be the case (Lathrap 1968a: 75).

. . . I would hold that the *negative* evidence from rapid site surveys, along the routes which are presently most accessible, is not reliable. The failure of such initial surveys to find remains of a particular culture is not good evidence that peoples of that culture did not migrate through or occupy the region in question. Furthermore, such surveys will certainly give a misleading picture of past population densities (Lathrap 1968a: 77; emphasis in original).

By today’s standards for conducting regional archaeological survey, Lathrap’s discussion of site discovery may seem somewhat antiquated. Present-day archaeological field techniques and hi-tech wizardry for locating and examining sites far surpass those available to Lathrap and associates in the 1960s. Nevertheless, it would be a mistake to overlook his fundamental methodological insights on the nature of the archaeological record in neotropical floodplain environments, or his early recognition of biases inherent in contemporary archaeological surveys. Indeed, many investigators in Amazonia *still* conduct field surveys in essentially the same manner that Lathrap was criticizing, whether due to financial limitations, methodological ignorance, or both.

In the remainder of this article, I pursue in greater detail two themes related to the foregoing: (1) the nature of archaeological “sites” in the forested neotropics (including various factors affecting their discovery probabilities); and (2) specific field methodologies designed for efficient, systematic, and representative discovery of neotropical sites in a regional landscape (as well as an explicit assessment of



bias in the evaluation of survey results). Finally, these themes are briefly illustrated through a case study from the Jama Valley in the western Ecuadorian lowlands. Emphasis is placed on the need to balance efficient and representative archaeological survey sampling with the logistical constraints of conducting fieldwork in neotropical environments. Here, surface visibility is generally low to nonexistent due to dense vegetation cover. Accessibility is severely constrained by characteristics of vegetational growth, geographical remoteness and lack of infrastructural support.

### Discovery probabilities and site constituents in the neotropics

Earlier researchers in Amazonian prehistory have been quick to point out the strong preservation biases in neotropical archaeological sites which leave “only a few axe fragments and a vast mass of smashed pottery” (Lathrap 1970: 63; see also Meggers and Evans 1957; Hilbert 1968, for similar comments) to carry the interpretive burden in archaeological reconstruction. However, in spite of the general truth of such statements for certain sites, it is also true that feature contexts, charred organic remains and clear evidence of stratigraphic deposition have also been documented in lowland neotropical sites, such that earlier complaints of extreme preservation biases throughout the entire neotropics may be slightly exaggerated. As Roosevelt has recently argued, “it is a fact that archaeological sites of many periods abound in the tropical lowlands, and the great majority have abundant stratigraphic and structural patterning and numerous features of artifacts, carbonized macroscopic and microscopic plant remains, and faunal remains, as well” (1991: 118). Moreover, recent advances in archaeological data recovery techniques have helped mitigate, to a certain extent, some of these preservation biases. Perhaps the most important of these is flotation sieving of archaeological sediments for fine-fraction retrieval of macrobotanical, archaeofaunal, and artifactual materials (see Pearsall, Stahl, this volume). Likewise, recent advances in the study of soil micromorphology and sedimentation (Courty et al. 1989) would certainly aid in the interpretation of archaeological site formation processes and midden deposition rates, in instances where visible stratigraphy has been leached out of excavation sidewalls. Systematic refitting studies of conjoinable artifacts can also aid in the interpretation of midden deposition, depositional rate, and post-depositional formation processes (see Villa 1982; Villa and Courtin 1983; Schiffer 1987: 359–362). However, very little research of this nature has been carried out in the neotropics to date.

Considerable headway has been made in overcoming at least some of the limitations imposed by severe preservation biases. Nevertheless, the lowland neotropical archaeologist is still confronted with a common set of factors or variables which determine discovery probabilities in the archaeological record, the effects of which have yet to be fully explored in this special environment. In a detailed treatment of site discovery procedures in areas of dense vegetation cover,

McManamon (1984) describes a range of properties commonly found in archaeological sites, collectively referred to as *site constituents*. These primarily include artifacts, features, and anthropic soil horizons, although human-induced modifications of soil chemistry, magnetism, or other soil characteristics are also pertinent. Regarding all but the latter, McManamon (1984: 229) notes that data on their relative frequency of occurrence is often difficult to find in excavation reports. However, where they do exist, such data support a “general impression of many archaeologists about the relative intrasite abundance and spatial distribution of these three site constituents” (McManamon 1984: 232–233).

Artifacts, defined as “the portable products and byproducts of human activities” (McManamon 1984: 228), are almost always the most widespread and abundant of site constituents. Cultural features, defined as “sharply delimited concentration[s] of organic matter, structural remains, soil discoloration, or a mixture of these and artifacts” (McManamon 1984: 229), generally fall far behind artifacts in abundance but are, nevertheless, detectable by subsurface testing procedures. In contrast, anthropic soil horizons are defined as “extensive deposit[s] that might be sharply or diffusely delimited . . . [which] result from deposition of large amounts of organic remains in a roughly delimited, relatively large (compared to features) area” (McManamon 1984: 229). These phenomena are less well reported in the literature. More often than not, their presence is simply noted and analytical attention is restricted to the artifacts or features contained within them. In any case, like features, they “do not commonly approach the extended spatial distribution of artifacts and in some cases might not even exist in a site area or large portions of it” (McManamon 1984: 233). In support of these relationships, McManamon cites three case studies from the eastern United States which employ different excavation techniques: (1) horizontal stripping of large areas to expose site structure (Illinois); (2) deep trenching in search of buried archaeological sites (Tennessee); and (3) sub-surface testing by shovel-probes and small test pits (Massachusetts).

Given this set of site constituents, discovery probability can be “formally defined as the likelihood that cultural remains of interest will be detected within a sampling domain or sampling unit using a specified sampling procedure, given a certain level of sampling effort” (Nance 1983: 292–293). As Nance and Ball (1986; see also Krakker et al. 1983) have pointed out, discovery probability is itself a product of two independent probabilities: intersection and productivity. The former is “the probability that a test pit intersects the site,” while the latter is “the probability that a test pit yields artifacts, given that it has intersected a site surface” (Nance and Ball 1986: 459). Both of these are in turn influenced by sampling design (especially survey intensity) and the properties of the archaeological remains under study. For example, Schiffer et al. (1978) have enumerated at least three properties of the archaeological record which are important in this regard: *abundance*, *clustering*, and *obtrusiveness*. The effects of artifact abundance and relative clustering on site discovery probabilities have been well