

## *Maya cities and the character of a tropical urbanism*

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However broadly or narrowly one wishes to define it, Western civilization literally cleared its space in the midst of forests. (Harrison 1992, p. ix)

In *Forests, the Shadow of Civilization*, Robert Pogue Harrison (1992) vividly conjures up the fear and wonderment of the forest that prefigure Western civilization's urban imperative – an experience that has been confrontational, in which the terms are all-or-nothing: we win, the forest goes = city; it wins, we go = wilderness. In the paragraphs that follow I suggest that alternative historical and environmental relationships developed between trees and people in the humid tropics, and these relationships constitute the conditions for an ecology of urbanism in humid tropical regions around the globe.

### **Introduction**

The concepts that link my discussion of Maya civilization to early cities in humid tropical Africa are urbanism and environment, but not state or chiefdom or evolution or even, strictly speaking, ecology. 'Urbanism' can refer broadly to social processes that determine urban relationships, and because my discussion focuses on the interpretation of form, it is more about cities (Wheatley 1969, p. 27; Whitehouse and Wilkins 1986, 56–8) than it is about urbanism, although my examples conform to the definition of urbanization provided by Mabogunje (1968). I use 'environment' in two senses. In the first, I refer to the setting in which people live, and use the concept to imagine the range of choices available to individuals in this setting. At the level of ecology, environment loses this human-centred quality because (1) humans are only one of a number of organisms, and the use of the term is relative to the organism or conditions under study – cockroaches are part of our environment, we are part of theirs, and (2) even when a 'human' or a 'cultural' ecology is involved, environmental variables are more strictly defined than a loosely derived range of choices based on tropical experience, which is essentially the gist of 'setting' as I use it here.

In the second sense in which I use 'environment', I borrow from ecology to establish the legitimacy of the concept of the tropics, with a particular focus on the humid or wet tropics. The line drawn by ecology between what is tropical and what is not serves a dialectical purpose as well as a scientific one, and the opposition between tropical/temperate or wet/dry forms an important part of the justification for my approach to urbanism.

The last part of the chapter differs from the rest in that it is fully embedded in the scientific tradition, although I take a critical stance with respect to sciences that make assumptions about the certainty of a culture/nature divide. One aspect of my research seeks to employ principles of soil science and studies of vegetational distribution and community succession in assessments of the long-term impact of urbanism in the humid tropics (Graham In Press). By and large, assessments of the role of humans in long-term environmental change have focused on characterizing and quantifying what might generally be called degradational processes: loss of forests, shrinking resources, soil erosion, deposition of silts in lake bottoms, desertification etc. (e.g. Brenner 1983; Binford, Brenner, Whitmore, Higuera-Gundy, Deevey & Leyden 1987; Heine 1987; Leyden 1987; Udo, Areola, Ayoade & Afolayan 1993). Although it stands to reason that stemming the tide of destructive or degradational processes is critical to ensure a viable future for humanity, the corpus of data on environmental transformation (see Turner, Clark, Kates, Richards, Mathews & Meyer 1993) would be vastly enriched by focusing with equal intensity on constructive and aggradational processes that are the result of human activity. The reasons why degradational processes are quantified with greater facility than aggradational processes are complex, and some of the basis for the imbalance is rooted in cultural and historical perception rather than in scientific reality (Graham In Press). Nonetheless, long-term constructive as well as destructive processes need to become a focus of attention (Denslow & Padoch 1988). Biodiversity, for example, as I discuss in the last part of the chapter, can be expanded under conditions of intensive human activity in the humid tropics. It therefore follows that a focus on tropical urban as well as town or hinterland sites – in the Maya and Gulf coast lowlands of Mesoamerica, the forests of west and central Africa, the Amazon basin, south India, or southeast Asia – in their past and *present* environmental settings is critical in order to expand our knowledge concerning the sustainable or productive consequences of human-environmental interaction over the long term.

As has been shown by Zeder (1994) for pre- and emergent urban communities in the Near East, a variety of subsistence practices and production techniques can be employed to sustain high populations even in marginal areas for long periods of time, with the implication that the urban phenomenon is more than a reflection of population growth or density and hence pressure on

resources, but of the specific character of expanding economies and the pathways chosen for exploitation. Here I do not intend to explore tropical urban economies, but I cite Zeder's evidence to argue 'backward'. That is, whatever diversity existed in pre- and emergent urban communities in the Near East ultimately gave way to intensive agriculture and pastoral economies which, over the long term, resulted in the environment we know today as a treeless steppe where gazelle, onager, deer or wild cattle no longer roam (Zeder 1994, p. 120). On the other hand, much of the humid tropical landscape in areas where urbanism flourished in the past today supports diverse animal and vegetation communities. This is obviously an over-simplification of complex processes – which in the New World include population decline as a result of the Spanish conquest – that can be elucidated only at the local level. It is nonetheless important to inject into the literature the concept that some urbanisms have the potential to enrich landscapes and indeed move towards, and not away from, increasing environmental and resource potential.

## **Perspective**

I am a Mayanist, and the approach to the study of urbanism I describe herein derives from my experience excavating Maya sites in the lowland forests and coast of Belize (e.g. Graham 1989; Graham 1994; Graham & Bennett 1989; Graham and Pendergast 1989). I do not compare features of Maya settlement with features of African settlements in the way Netting (1977) compares Maya and Ibo garden systems, or Wheatley (1969; 1971; 1972) discusses pre-industrial cities with such impressive detail and insight cross-culturally. Fieldwork in Africa may yet come my way, but what I offer is the initial framework of a general approach to urbanism in the humid tropics based on the specifics of my experience in the Maya lowlands.

## **Africa and Maya**

Urbanism, aptly described as a protean term by Wheatley (1972, p. 601), is difficult to reduce to essential qualities, or at least to reduce to qualities whose priorities we can all agree on. I make no claim here to a list of particular characteristics that Maya cities share with African cities of the humid tropics, although I do discuss patterns of recovery that affect interpretation in both areas but that do not pertain, for example, to the cities of ancient Sumer or highland Mexico. I argue that it is useful to draw studies of urbanism out of the confines of either broad culture areas (such as 'Mesoamerica') or geologically defined land masses (such as 'Africa'), if not simply for heuristic purposes, then to escape the 'tyranny of process' in which 'ancient complex societies can

only be studied in terms of their relentless transformation from one developmental stage to another' (de Montmollin 1989, p. 2).

All that is Maya is certainly not pan-Mesoamerican. This is demonstrated at the time of the Classic collapse in the southern lowlands by the cessation of centuries-old writing and recording traditions in stone and stucco, as well as disruption in the maintenance of the distinctively Maya corpus of astronomical knowledge, and the notable diminution in monumental construction (Culbert 1973; Chase and Rice 1985; Pendergast 1986; Sabloff & Andrews 1986; Culbert 1988; Culbert 1991). Maya cities in their settings are strikingly different from the gridded layouts of the highland Mexican cities of Teotihuacan (Millon, Drewitt & Cowgill 1973) and Tenochtitlan (Berdan 1982). Although no Mesoamericanist would deny that a distinctive culture history within a particular environmental setting contributes to the uniqueness of a city, priority is nonetheless given to comparison and generalization within a broad socio-cultural setting (Sanders & Webster 1988, pp. 544–5; Blanton, Kowalewski, Feinman & Finsten 1993). At this level, the character of Maya cities is read as reflecting an evolutionary stage – weak, decentralized rule, emphasis on ritual functions, poorly developed economic institutions, fairly small population (Sanders & Webster 1988, p. 534) – in a fundamental process of urbanization that is not seen as Maya, but as pan-Mesoamerican. An approach that emphasizes environment and/or history and that avoids assumptions about culture area urban traditions would be bound to reveal a different but equally enlightening view of urbanism.

Like 'Maya', which lumps together a number of distinct language and cultural groups, the name 'Africa' subsumes vastly different culture areas. From its Latin source as a probable reference to Carthage, 'Africa' has come to refer to an entire continent (see Rowlands 1989). Evoking sameness rather than diversity, both 'Africa' and 'Maya' derive from the experience of strangers in a strange land.

The same perspective – that of 'outsider' rather than colonizer *per se* – is responsible for the stereotypical images of the tropical forest environment as either a lush garden of Eden filled with earthly delights, or a dense and impenetrable jungle dripping with evil and decay (see Putz & Holbrook 1988; Whitmore 1991, pp. 1–8). With such a heritage of environmental misperception, what can be gained by proposing an approach to urbanism based on what could be interpreted as an environmental 'determinant' – the humid tropical setting?

## **Environment as method**

An emphasis on environment, and in this case the tropical environmental setting, is as much a means as an end. As such it is not the environmental-to-political chain of reasoning so well criticized by de Montmollin (1989, p. 8) in which 'environment determines subsistence which determines settlement which determines political [or any other] structure'. I emphasize the role of environment in small-scale decision-making and in structuring use of space, and not in pre-determining courses of development that end in collapse because of deficiencies in soils or resources (Meggers 1954; Coe 1961; Sanders and Price 1968; Meggers 1991).

By stressing an environmental approach as a method I have no inherent stake in proving that, say, under conditions of high humidity, the timing of building and repair cycles is similar in any given set of humid tropical cities. In fact, I would hazard that they may be found to be tied as much to cosmological or calendrical/ritual principles, as we know was the case with the Classic Maya, as to weather or access to raw materials. However, as a suggested ethno-archaeological exercise it would be interesting to examine all aspects of decision-making affecting building and repair cycles of two or more urban neighborhoods in the humid tropics, and compare the results with examples from urban settings in north America or Europe. Environment may prove to mean less than expected, but the process is as important as the product. The study should originate in the humid tropics (e.g. southern Nigeria or northern Brazil), be carried out by individuals who live in these areas, and be rooted in the tropical experience by comparing temperate-zone results to those in the tropics, and not the other way around. Perhaps this is one way of seeing theory as a form of practice (Tilley 1989, p. 111).

The fact that I have a stake in environment as a determinant should not lessen the importance of environment as a point of comparison. The concept can serve simultaneously as a meaningful potentially determinable variable in decision-making, as a mechanism for highlighting a historical experience, and as a vehicle for transforming scientific concepts to include new vistas of analysis.

One can posit that environment played a role in decision-making and thereby in patterning that also reflects social or cultural expectations, but to assume that there will be measurable evidence of adjustments to environment, let alone adaptation, is problematic. As Fletcher (1977, p. 51) points out, measurements can be used to justify adaptations to environmental or any other conditions. A viable approach, in fact, might be one modelled after Fletcher (1977; see also Sutro & Downing 1988) in his locational analyses of a modern settlement in Ghana and a seventeenth-century Hopi Pueblo and Franciscan mission site in Arizona, in which patterns, not environmental variables, were the issue. Fletcher was interested in spatial relationships, but not so much in how people decided to locate things as in the relationships among spaces. Was there a consistent

locational order, and if so, did this reflect some sort of consistent ideal pattern? In this approach, the effects of environment would show up as ‘distortion’ of the ideal pattern (Fletcher 1977, p. 58). Although environment is not a primary focus in this approach, distinguishing distortion from a pattern may be the most methodical way to attempt to isolate environmental variables.

In the case of the Pueblo mission site, Fletcher (1977, pp. 136–40) was able to show that some environmental considerations did indeed affect Hopi room width. To allow regeneration of timber, only branches, rather than entire trees, were used by the Hopi as roofing material to span rooms. The Franciscans, on the other hand, were fixed in their ideas about how the mission should be built: ‘Neither the size of available timber nor the specific features of any other element of the environment determined the form of the mission ...’ (Fletcher 1977, p. 138).

This example serves to show not only how the effects of environment might be isolated in individual studies, but also how relationships of communities to environments were affected by the colonial encounter. In Belize, at the sixteenth-century frontier Maya community of Tipu (Fig. 1), archaeological evidence indicates that the formal order of plaza and courtyard arrangements was influenced, although perhaps not entirely structured (Low 1995), by Catholic priests who were responsible for converting and catechizing the Maya in the area (Jones 1989; Graham 1991). No colonial plaza has been detected at Lamanai, also in Belize (Fig. 1), but construction of civic, ceremonial and residential buildings at both Lamanai and Tipu exhibits different degrees of integration of use of local materials, Maya design and Spanish notions of space (Graham, Pendergast & Jones 1989; Graham 1991; Pendergast 1991; Pendergast 1993).

Although neither Tipu nor Lamanai was an urban centre during the Spanish colonial period, and indeed became ‘frontier’ in the course of Spanish domination of Yucatan (Jones 1989), Lamanai had been a major urban centre from at least Preclassic times (300 BC) until the thirteenth century AD, at which time there was some diminution of monumental construction but maintenance of large population until the time of the first *encomiendas* established in the area in 1544 (Pendergast 1986; Jones 1989, p. 59; Pendergast 1991; Pendergast 1993). The architectural remains at Tipu suggest that it was at least a major town until, like Lamanai, it was brought within Spanish administrative and economic control, if only nominally, in the early sixteenth century (Graham, Jones & Kautz 1985; Jones 1989; Graham 1991).

The archaeology of colonial Tipu, to which I shall return below to examine one aspect of the human-environmental interface, has bearing on the kinds of questions that can be asked about space and structures in an urbanized setting. This is partly in the very general sense that Tipu has something to teach us about the archaeology of perishable buildings; but a general argument (see Arensberg 1980, p. 41) can also be made for a commonality of form between villages and city

throughout Maya history, with the city distinguished by scale, greater use of masonry, and the elaboration of well established building types and features (see Haviland 1970, p. 190). From this I draw support for the view that there are environmental parameters that affect decision-making and organization of space independent of the level of urbanization or nucleation. Tipu is not an 'ideal' test case because it was affected by the colonial encounter, but this disjunction forced us to focus our efforts on spatial organization in a way that is not normally demanded of archaeologists in situations in which masonry architecture permits ease of mapping and planning.

Before I discuss the excavations at Tipu, it is necessary that I describe the environmental parameters I have alluded to, because it is important to document how I make the connection between these parameters and archaeological interpretation.

### **Strategies for living in the humid tropics**

Environment draws societies of the humid tropics together in terms of strategies for space allocation, management of household resources, minimizing the deleterious effects of high moisture levels, meeting child-rearing demands under these conditions, maintenance of hygiene, ensuring building longevity through repair schedules, management of time, and dealing with the difficulties in prediction of celestial events owing to proximity to the equator. Constraints are implicit in this use of environment because the emphasis is on what the humid tropics (or areas of tropical moist forests) are said to have in common: constant high temperatures, high humidity, heavy rainfall for most or all of the year, soil climate, weathered soils, and distinctive types of forest formations or vegetational communities (Whitmore 1991, pp. 9–35; Van Wambeke 1992, pp. 5–68). The implication is also that these conditions limit options.

Shanks and Tilley (1988, p. 95) have characterized 'most of contemporary archaeological discourse' as concerned with 'the delimitation and analysis of constraints, usually of an asocial nature, impinging upon *societies* [emphasis mine]' with environment cited as a major culprit. Cultural ecology has indeed focused on how environment affects *culture* (Steward 1955, pp. 30–42), rather than how environment affects people or individuals (Marquardt 1994, p. 204; McGovern 1994, p. 152); my concern is decidedly people. Constraints can be conceived of as extra-cultural (Steward 1955, p. 36) or extra-social natural phenomena, but 'to constrain' is a transitive verb; it takes an object which, if it is not culture or society or a system, can only be people. Hence, despite appearances, human interaction is inherent in the concept of constraint, but by no means is it subsumed or simplified by it. As Patterson (1994, p. 234) has articulated, human

inter-penetrations with the natural world (which I take to include environment) need to be viewed in different dimensions, at different scales, and at different levels of inclusion.

Patterson (1994) emphasizes social and cultural inter-penetration, but if we think not in cultural ecological or ecosystemic terms of how societies or cultures interact with the environment, but rather in terms of how people do, constraints become meaningful on a different scale. Because my vision of the possibilities of interpretation of the perishable structures at Tipu was greatly expanded by my experience living and raising children in both forest and urban settings in Belize, I use this example.

### **Babies' bottoms**

A grand and perfunctory sweep of environmental considerations might go as follows: In the rains, exploiting the abundance of water is common sense, so that if a river is not nearby, facilitation of collection (roof catchment, surfaces for collection and storage) is important. But there is also the problem of keeping babies' bottoms dry, general drainage, drying clothes during the rains, minimizing mold and mildew, and the general restructuring of household space from the dry to wet seasons to accommodate to these conditions. Although roofed and walled interior space is an important part of a house in city or forest, it is also important to be able to carry out a range of activities under roofed space without walls. Drying clothing, household items, or children is facilitated by having household space that is roofed, but without walls, to allow for ventilation and at least some sunlight. During the rainy season, after the initial gusts and gales that herald a storm, the rain falls steadily but generally vertically, so that much use can be made of roofed and unwalled space. Clothes can usually be dried here, and during periods of incessant rains, if the house interior is masonry, mold and mildew are minimized in roofed and unwalled or partially walled space.

In the dry season, roofed and unwalled space offers shade and protection from the sun in a variety of household activities, and can be restructured relatively easily to accommodate different activities, seasonal or otherwise. Partial or single walls can act as windbreaks, sunshades or utility surfaces. Roofed and unwalled space usually connects to roofed and walled interior space, but also to areas around the house or household in which activities are carried out over a prepared surface with neither roof nor walls. Today this might be low grass – very low to minimize the danger of snakes or insects to children – packed clay, packed earth, cement, or asphalt. In the past, only asphalt was not used, and instead of cement, thin plaster or packed lime would suit.

## **Tipu and beyond**

At Tipu, stone-faced platforms common at Maya sites (Fig. 2) were not a dominant feature of the Spanish colonial component, which was the focus of our investigations. We did not extensively excavate every colonial structure, but we exposed most elements of several such buildings, and we were faced with interpreting the significance of various concentrations and spreads of cobbles (Fig. 3) that made no sense in terms of the Maya archaeology I knew. Beginning from the beginning, I drew on what I knew about the organization of household space based on my own experience in Belize. Then, I began to be able to suggest, at least, recognizable patterns: Some areas without stones conformed to interior, roofed and walled space; areas with tightly packed cobbles, which could be quite variable and irregular, conformed to roofed and unwalled space; and there were other patterns with evidence of more repeated environmental exposure that may have been prepared exterior surfaces. These lay both outside the house but within the house platform, and beyond the platform itself. Postholes are not a standard archaeological feature at Tipu, but a few added support to my hypothetical interpretations, which can be tested by further fieldwork.

My experience at Tipu has forced me to think more deeply about how easy it is to underestimate the complexities of the built environment when construction materials are perishable, which is a situation also faced by excavators of African towns and cities in tropical forest (Sinclair, Shaw & Andah 1993, p. 27). In the case of Maya towns and cities, especially during the Classic period, perishable structures and features were integrated with an extensive masonry-built architectural environment, and it is this masonry setting to which archaeologists have paid the most attention. From it we have recovered information on architectural styles, writing, kingship, ritual, caching practices, aspects of city planning, settlement growth, and how buildings facilitate astronomical observations. Perishable structures and the use of space with no visible masonry features have been given far less attention, yet they are the key to a fuller understanding of urban form and function in the Maya area. Archaeologists have recognized that many dwellings are missed either because of low visibility or because some perishable structures were never built on platforms (see Wilk & Wilhite 1991, p. 119), but only a few have actually attempted to address the problem (Tourtellot 1988; Pyburn 1989; Pyburn 1990; Wilk & Wilhite 1991; Hendon 1992).

The ancient Maya normally built houses as well as civic and ceremonial buildings on raised platforms faced with stone, so that we can locate the sites of perishable pole-and-thatch buildings even when preservation has not been fostered by burning (Fig. 2). (The process of ancient burning

preserves pole impressions in clay daubed on house walls.) At Tipu, the situation was more complicated because platform styles changed in the colonial period; platforms were much lower and often, but not always, bordered by a mixed lot of river cobbles rather than faced with cut or roughly regular-sized stone. Floors were no longer commonly built of plaster, and with colonial period remains so close to the surface, post holes were obscured by disturbance. In addition, late post-classic buildings were used, built over, expanded, and borrowed from during the colonial period, with a resultant odd mix of architectural styles. At first an apparent disadvantage, the enigmatic features created a situation in which we focused more intensively on sorting out the variety in building plans and features than would have been the case at a 'normal' pre-Columbian Maya site in which stone platforms are obvious and relatively easy to detect and follow.

### **The forest for the trees**

Another result of working in a masonry dominated environment is that when we map the building plan, we do not normally extend horizontal exposures much beyond the stone platform (although see Webster & Gonlin 1988) except to locate more deeply buried platforms (e.g. Hammond 1991). Perishable buildings of multiple components, compounds of buildings with and without platforms, roofed and unroofed space, informal structures, outbuildings, quarries, storage areas, prepared surfaces, and many other construction elements are notoriously difficult to identify this way. Where excavations take place in forest, as most of ours do, we have to consider whether recovering such elusive but important archaeological evidence warrants cutting down more trees. Corners of masonry buildings can be located and walls followed with minimal removal of earth and uprooting of vegetation; sorting out the remains of perishable structures requires large-scale horizontal exposure (Barker 1969, p. 220), which was possible at Tipu only because it was located in a cattle pasture. Where we are now working, at the site of Marco Gonzalez on Ambergris Caye (Graham & Pendergast 1989), we are attempting to disrupt the forest environment as little as possible, and to work without daily immersion in insect repellent. One low-impact approach is 'shifting archaeology', modelled after local shifting agriculture, in which small areas are cleared and excavated, then filled in to allow the forest to regrow.

The bias towards masonry remains, however justified, has contributed greatly to the problems we have in interpreting Maya settlements and cities, because what appear as 'spaces' between buildings make Maya cities seem less densely populated, less heterogeneous, and less 'city-like' than the urban models familiar to us. But to rectify this imbalance, we are faced with contributing in our own small way to significant environmental disruption. In Belize, the

government and world-wide conservation groups are already setting standards that will not permit any trees on some archaeological reserves to be felled. Mesoamericanists have consistently criticized Mayanists for a fixation with ceremonial precincts and a reluctance to undertake systematic reconnaissance that is at least representative if not complete (Blanton, Kowalewski, Feinman & Finsten 1993, p. 6). Like traditional west African archaeologists (Connah 1987, p. 129), we have been disinclined to undertake regionally broad, let alone complete, survey in the forest. Innovative, broad regional analysis such as that carried out on the Zimbabwean plateau (Sinclair, Pikirayi, Pwiti & Soper 1993) is difficult to envision for a forested zone. The result in the Maya region, in any case, is that 'little area in the eastern lowlands has been systematically surveyed' (Blanton, Kowalewski, Feinman & Finsten 1993, p. 6) relative to the valleys of Mexico and Oaxaca where forests have been cleared. I think that one answer for tropical forest archaeology may lie in a more sophisticated approach to vegetation and soils, a subject to which I return below, rather than in conceptualizing trees and vegetation as a problem, as highland Mexicanists have done.

## **Environment as a mechanism for highlighting historical experience**

### **The colonial past**

Thus far I have used the concept of the humid tropical environment to suggest ways in which a reading of the archaeological data in the Maya area, and by implication the tropical forest zones of Africa, might be expanded or improved, essentially on the basis that we share similar problems in excavation and interpretation. But Maya and African cities can be drawn together by more than an emphasis on a similar tropical setting. Equally important is the fact that these same environmental conditions separate sub-Saharan tropical Africa and lowland Mesoamerica from the settings for the urban traditions of the 'north', especially the Near East and Mediterranean, where so much archaeology has been concentrated. Focusing on cities of the tropics is a matter of 'attitude and perception' (Ucko 1989, p. xv), and it serves neatly to reverse normal centre-periphery relationships (see Champion 1989) by distancing developments in the tropics from the overwhelming dominance of ideas of urbanism rooted in the Near Eastern/Mediterranean experience (see also McIntosh 1991) and exported in their recent manifestations by European colonialism.

### **The imperial past**

A focus on the deep tropics serves a fuller purpose, which is to diverge from the pervasive emphasis on the West as the only source of economic and political imperialism, and to include the imperialist traditions of Asia, and particularly China (Szynkiewics 1989). In saying this I do not mean to imply that the growth of Chinese cities duplicates the growth of cities in the West, or that early Chinese cities ought to be reduced to Western cultural models. Western scholars themselves have long recognized that Chinese urbanism must be treated on its own terms (Needham 1954; Wheatley 1971). Civilization in China has, in fact, been compared to that of the Maya in aspects of politics, warfare, writing and cosmology (Wheatley 1971; Chang 1986, p. 419–22), and an alternative approach sees similarities between ancient Asian and New World cities that sets them apart from the rest of the world (Chang 1984; Chang 1992).

The first known civilizations in China, and the earliest urban forms, occur in the north along the Yellow river (Chang 1986, pp. 295–367, Fig. 309). In both historiography and archaeology, this area, and especially the Central plains, has dominated scholarly interest, although since the 1970s enough evidence has been recovered from other regions in China, particularly along the Yangtze, to begin to redress the imbalance (Chang 1986, p. 192–3). Where the Chinese spread much later in historical times into tropical areas, such as the peninsula of Southeast Asia in the third century BC (Higham 1989, pp. 287–306), they brought their ideas of settlement organization with them. To this extent, the Chinese can be seen to have had a relationship with northern southeast Asia similar to that of Europeans as they expanded into Africa and the New World. Tropical Indian civilization, through its merchants and the expansion of trade, had a hugely transformative influence on the societies and cultures of southeast Asia, thereby blurring my tropical/temperate divide. On the other hand, southeast Asian archaeologists have rejected Indian colonialist models as an explanation for the rise of civilization and cities in southeast Asia and have favored more complex models that emphasize the strength of local traditions, the expansion of trade along the coast and later inland, and the expedient appropriation of aspects of Indian religion, political theories and culture by indigenous elites in the forging of newly sought identities and power (see Wheatley 1983; Higham 1989, pp. 242–87, 306–20).

An archaeology of the humid tropics, then, and perhaps an archaeology of the tropics in general, may receive its strongest support not from acceptance of the idea that environmental parameters are important in illuminating the courses toward urban life, but from the fact that it seeks to ‘recover and present archaeological data in a form relevant to the widespread extension of an historical consciousness as part of a non-capitalist development strategy’ (Sinclair 1986, p. 81). However, I have extended ‘non-capitalist’ to include a broad belt of the globe that has

generally been on the receiving end of pre-colonial and colonial imperialist expansion or economic/religious influence.

## **Models, patterns and process**

### **The archaeological past**

Cities, towns and forests of the humid tropics of Mesoamerica, South America, sub-Saharan Africa, south Asia and southeast Asia share something beyond imperialist/economic domination at the hands of Europe, China or, more recently, Japan. Their archaeology and urban traditions across the board have never received anything like the attention that has been given to urban traditions of temperate, Mediterranean, or arid regions (see Wheatley 1969, p. 8). The present volume on urban origins (see Andah, Ch. x, this volume) and *The Archaeology of Africa* (Shaw, Sinclair, Andah & Okpoko 1993) that precedes it are redressing the balance, although for a variety of reasons (e.g. see Nzewunwa 1990, pp. 191, 197) urban origins in the humid tropics remain less well known archaeologically than in other regions of Africa.

It is not only Mesopotamia, Egypt, and the Mediterranean region that have received far more archaeological attention than sub-Saharan Africa insofar as urbanism and certainly state formation – in which urbanism is normally contextualized – are concerned. More importance has also been accorded developments in north China, and especially to Shang ceremonial centres, than to the growth of civilization in the south (Wheatley 1970a, p. 185; Chang 1986, p. 192); and, at least in the West, there has been more interest in the Indus valley than in south India or Sri Lanka (see Allchin & Allchin 1988, pp. 366–9). The highland civilizations of south and central America (e.g. Haas, Pozorski & Pozorski 1987; Burger 1989; Blanton, Kowaleski, Feinman & Finsten 1993; Weaver 1993) are also better known than those of the humid tropics, with the possible exception of the Maya. Thus, in studies of evolution in general, our concepts of civilization or state development have been rooted in dry, temperate or highland regions (e.g. Redman 1978 or Wright 1978 on the Near East; Sanders & Price 1968 on Mesoamerica; see Sinclair, Shaw & Andah 1993, pp. 21–2 for African examples; Possehl 1979; Possehl 1990; Possehl 1993; Possehl 1994; Ratnagar 1991 for Harappan civilization; Chang 1980; Chang 1986 on China), which makes urban concepts transplanted to the tropical forest unlikely to survive (see also McIntosh 1991).

Poor preservation plagues tropical archaeology and provides an excuse for the attention given to archaeology in more moderate climates. On the other hand, the huge investment of energy devoted to Maya archaeology shows that where there is a will, there is a way. In the same vein, there is a large literature on urban centres in south India (see references in Allchin & Allchin

1988, pp. 369–71 and papers in Spodek & Srinivasan 1993), where research has been greatly aided by historical texts. In southeast Asia, the Khorat Plateau in Thailand has been more intensively studied than any other region (Higham 1989, p. 92). As in Viet Nam, research on environmental variation, agricultural development and metalworking traditions is expanding knowledge of indigenous socio-cultural developments (White 1982; Higham & Kijngam 1984). Such a process is essential to an understanding of southeast Asian urbanism to counter the biased perspective of Chinese and Indian written sources (Higham 1989, pp. 242–87).

In Cambodia and parts of Thailand, the corpus of information on Angkor and other Khmer cities has been enriched by Chinese and Indian texts, Sanskrit and Khmer inscriptions and a range of cultural and environmental studies as well as archaeological work (Wheatley 1983; Hagesteijn 1987; Higham 1989, pp. 321–55; Van Liere 1989); however, the intensity of archaeological excavation that has been carried out in the Maya area has not been possible in Cambodia. Nevertheless, both archaeology and ethno-archaeology in the humid tropics in general are expanding, best exemplified recently for Africa by a range of studies in *The Archaeology of Africa* (Shaw, Sinclair, Andah & Okpoko 1993; see Abungu & Mutoro 1993; Andah 1993; Anquandah 1993a; Anquandah 1993b; Eggert 1993; Folorunso & Ogundele 1993).

## **Models for what constitutes the urban**

Whatever the reason for the historical neglect of tropical archaeology, it can probably be safely said that general archaeological models for what is urban are not rooted in any of the cultural traditions of the humid tropics.

In that diminutive peninsula projecting from the western marches of Asia there has evolved in comparatively recent times a mode of urbanism that differs in many important respects from that of the rest of the world in earlier ages. It has been this genre of city which, in its modern industrialized form in Europe, America, and Japan, and in somewhat diminished export versions in a few other territories, has become the ideal-type city, the norm of contemporary urban life. (Wheatley 1969, p. 8)

A look at the history of urban studies in the Western social sciences shows tropical cities either to be ignored entirely (Mumford 1961), weighed and categorized along with all pre-industrial cities (Sjoberg 1960; Fox 1977), or included in categories by continent, as in ‘African cities’ (Hull 1976; Winters 1983). Not surprisingly, Western urbanism has loomed largest in studies of urbanism by westerners (Wirth 1938; Weber 1958; Mumford 1961). Where the western European

urban tradition is concerned, scholars trace roots to Greece and Rome and then beyond the Mediterranean to the urban centres of the Near East, where archaeology has a long history (e.g. Woolley 1930; Perkins 1949; Oates 1973; Postgate 1977; Adams 1981; Safar 1981; Nissen 1988; Kemp 1989; Crawford 1991; Diakonoff 1991; Hassan 1993). Our picture of early cities comes from this intensively studied region, and how form relates to function in Mesopotamian cities has structured ideas of what is essentially urban.<sup>1</sup>

Arensberg (1980, p. 40) believes that the definition of the city as a 'gathering in of the top commands of the diverse organs of control in society' is derived from Near Eastern, Chinese and recent European examples and does not describe early urbanism in many places in the world. McIntosh (1991) proposes a recent twist on this theme by rejecting the imposition of centralized coercion as a force in nucleation for both cities on the middle Niger and those of pre-Shang China. The investment made in counteracting extant models and their roots in Western values is partly indicative of how entrenched these values are.

A contrast between more widely known and lesser known images of what constitutes the urban can also be drawn between the grid-plan cities of the Indus valley in their arid setting (see Whitehouse & Wilkins 1986, p. 17, illustration above right), and the urbanism of south India (e.g. Nagaraja Rao 1983; Nagaraja Rao 1985; Palat 1987; Morrison & Sinopoli 1992; Sinopoli 1994). If one had to pick a model of urban that dominates the archaeology of early India (Gupta 1993, p. 243), or at least that pervades Western views of urban origins in India, it is more likely to come from Harappan civilization than, say, from Sri Lanka (Bandaranayake, Mogren & Epitawatte 1990; Bandaranayake & Mogren 1994).

Although work in the tropics will result in the recovery of more information over time, such efforts may not be enough to provide a basis for a model of urbanism, especially for those whose work is centred in the tropical forest, where the built environment is perishable. Ideas for a tropical urbanism may have to be generated from other sources, such as ethno-archaeology. More needs to be known about locational models, spatial relationships, and levels of urban integration and their material and spatial correlates to enrich archaeologists' conceptual inventory of what is urban, and to improve our planning of excavation of tropical cities. I also think, and this is an idea

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<sup>1</sup>It should be noted, however, that the picture of early cities in the Near East that informs our model of what is urban may have to change to incorporate more variation, because recent research reveals that the courses towards urbanization in the region are not everywhere the same (see Falconer & Savage 1995).

with which I only brush shoulders in the last section of this chapter, that detailed studies of micro-vegetation and soils may be one answer. Otherwise, the correlate of our conceptualization of the vegetation that conceals settlement in tropical forest as a 'difficulty' is, ironically, that data recovery will be maximized only under conditions of deforestation.

## **Process of nucleation**

One of the processes used to identify the urban pattern is nucleation. The use of the term is an attempt on the part of archaeologists to isolate a universal process with respect to urban development. Density of structures, and presumably population, is the pattern and nucleation is the process that produced the pattern. However, nucleation is limited to an image of people gradually moving nearer and nearer to one another in space, and the word does not describe the relationships that produce the changes. The term is, nonetheless, useful in archaeology, where social, economic or political dimensions of change are difficult to know.

Determination of patterns of density, then, is critical in assessing processes of nucleation. Given the nature of tropical archaeology as I have described it, there remains the question of how density is adequately detected in the investigation of tropical cities. With Maya archaeology in mind, I am not concerned here with debates about overall population estimates (Culbert & Rice 1990; Becquelin & Michelet 1994), but with the question of the relative nucleation or dispersal of population that has been a focus of considerable interest among Mesoamericanists (Drennan 1988, p. 273). An explanation that diverges from the evolutionary interpretation of less density = weak state control (Sanders & Webster 1988) is that of Drennan (1988), who proposes that the intensive nature of Maya agriculture before and during the Classic period, such as terracing or wetland or raised field agriculture (Harrison & Turner 1978; Siemens 1982; Turner & Harrison 1983; Lambert, Siemens & Arnason 1984; Pohl 1990) necessitated that families reside near their fields, which produced a dispersed settlement pattern record. The nature and time depth of wetland Maya agriculture remains to be fully elucidated, however, and agricultural terracing has been reported from only a few regions (Dunning & Beach 1994, p. 52). Nonetheless, conclusions ultimately drawn about Maya agricultural systems will obviously affect explanations of settlement patterns.

My focus, however, is the micro-scale – on problems in the interpretation of space not clearly defined by masonry or non-perishable features. I have discussed a specific instance in the excavation of Tipu, in which roofed but unwalled space formed a major portion of household activity areas, as did prepared surfaces of various kinds. If an important measure of nucleation is

density of buildings represented by standing walls or masonry faces, and if perishable structures and features were as common as the Tipu and other (Pyburn 1989; Pyburn 1990; Wilk & Wilhite 1991) evidence suggests, then indices for nucleation will have to be revised. Detection of features in 'vacant' spaces, as well as the management of greenspace (discussed below), may help explain what has been called the less compact and sprawling appearance of Maya cities (Haviland 1970, p. 193), the 'uncooperative disorderliness of the Maya and their settlement record' (de Montmollin 1988, pp. 162, 164), or the greater dispersal of late pre-classic (late formative) and classic Maya settlements than settlements of the same period in highland Mexico and Oaxaca (Drennan 1988, p. 285).

## **Stone and green**

Interpretations of the material remains of tropical cities will also be affected by the urban models in circulation. For example, we feel more comfortable interpreting the patterns of cities such as Ur or Teotihuacan because the high density of buildings, whether the result of agglomeration or planned grid, is reminiscent of modern cities, which not only have a high ratio of buildings and covered space to vegetation, but also plan green space in culturally familiar ways (e.g. parks or lawns). Tropical cities are therefore enigmatic because they conform to no recognizable pattern (Haviland 1970; Winters 1983, pp. 12–13; de Montmollin 1988), and also because we cannot 'read' what separates the built and green environments with any facility. Arensberg (1980) caught this distinction admirably, if informally, in his categorization of stone versus green cities. The distinction 'built versus green' is not adequate because the green environment, too, is designed, landscaped, or managed. The advantage in the use of 'stone' is that the term refers not only to buildings of masonry, but also to anything used to cover ground and prevent vegetation from growing, such as mud or mud brick, cement, plaster or asphalt (as in reservoirs, roads, etc.).

Among the 'stone cities', Arensberg (1980) includes the urban centres of the Near East, China and parts of Europe; 'green cities' occur in Yucatan, south India, west Africa south of the Sudan, but also in old Japan. In the 'stone cities', there is a compact centre of houses, alleys and squares – where vegetation is rare – enclosed within a wall; outside the wall and surrounding the centre is an expanse of fields and other land. In the 'green cities' there is no neat separation of residences and fields. Confirmation of this for ancient times in Belize is the occurrence of agricultural terraces among buildings near core areas of sites such as Caracol (Healy, Lambert, Arnason & Hebda 1983, p. 402; Chase & Chase 1987, p. 37) and also in the Petexbatun (Dunning & Beach 1994). At the late classic site of Cobá, data have been interpreted by archaeologists to

indicate that a concentration of cultivated trees stood within the community (Folan, Fletcher & Kintz 1979).

During the early colonial period in Yucatan, the Spaniards dictated major restructuring of Maya communities in order to facilitate political control (Farriss 1984, pp. 147–68). They made it clear that the Maya had to conform to the Spanish pattern of order, so that ‘the internal layouts of all the towns were rearranged from what the Spanish regarded as an amorphous sprawl into the familiar colonial grid pattern’ (Farriss 1984, p. 159). Maya towns and villages have traditionally included garden plots, orchards, and scattered cultivated trees (Tozzer 1941, p. 64; Marcus 1982, pp. 249, 268). Given this custom, as well as the Maya pattern of building residences together with civic and/or ceremonial buildings around open spaces onto which the structures face (Bullard 1960), it is not difficult to understand why the Spaniards found this settlement pattern unfamiliar and thereby a stumbling block in their efforts to control the movements and activities of the Maya populace. Since Arensberg’s time, much more evidence has accumulated as the result of both architectural investigation (e.g. Chase & Chase 1987; Pendergast 1979; Pendergast 1982; Coe 1990; Pendergast 1990; Fash & Sharer 1991; Chase & Chase 1994) and studies of the intensive use of wetlands (Turner & Harrison 1983; Pohl 1990) to indicate a higher concentration of buildings and population in Maya city centres than was originally thought to be the case. The form of the Maya city, however, remains outside the realm of the familiar.

Farmers were, and are, resident in tropical African cities (Bascom 1955, pp. 448–9; Wheatley 1970b, pp. 411–12; Winters 1983, p. 14; Freeman 1991), in close parallel with the Maya case. However, farmers made up a portion of the population in non-tropical early urban centers as well (e.g. Sanders & Webster 1988, p. 543 for Teotihuacan; Hassan 1993, p. 556 for Egypt). The gradual movement of food-producers out of cities is usually seen as a step in an evolutionary process towards greater hierarchical complexity. In fact, green cities share the problem that they have traditionally been seen as ‘a simpler stage of the stone city’ (Arensberg 1980, p. 43). The implication is that green = cultivated land = agriculturalists = not enough specialization to qualify as a true city = an interim form of settlement that, with further specialization (in anything *except* aspects of cultivation and manipulation of green space) will become a city.

Few would argue that the growth of western cities represents a move towards greater hierarchical complexity, but a city by this definition can represent one of three processes. The first, and at one time considered the only, interpretation is that the western city is the most advanced stage of a world-wide evolutionary process (so that anything different is thereby less advanced). The second interpretation is that the western city-type in its most advanced form is a

northern European adaptation, so that it is still evolutionary (rooted in the Near East) but ultimately an adaptation to conditions in northern temperate Europe and can be expected to differ in areas with different (warmer) climates or different social histories. For example, Weber (1958, p. 71), in discussing agriculture and cities, states that the ‘presence of large acreages accessible to the urbanite is found more frequently as one turns attention to the south or back toward antiquity’. Either Weber sees southern European cities as representing a more primitive form of the city, so that his definition of the city is more in accord with the first interpretation above, or – interpreting him more kindly – cities simply evolved differently in northern and southern Europe by adapting to particular local conditions. A third interpretation would be that the modern city as we know it is the product of a specific *historical* process (with no evolutionary implications) which unfolded in its latter stages in western Europe. We would refrain in this case from evolutionary characterizations because we do not yet know whether the city in this form is indeed a successful adaptation – it could yet turn out to be a huge mistake.

Where do we go, then, with green cities? If green can indeed always be equated with cultivated space, evolutionary frameworks of the past have given far less attention to exactly what is grown in cities and for whom, simply because this all pales in importance to the movement of food-producers out of the city. Weber (1958, pp. 70–2), despite his emphasis on the true city as a place without agriculture, gives some attention to the nature of cultivation in early European cities. In some circumstances, as has been suggested for the Maya (Folan, Fletcher & Kintz 1979), it was the elite city-dwellers who satisfied their food needs by cultivation in the city. Studies of urbanism might benefit by assuming that cultivation within cities is not a homogeneous phenomenon, and that it changed through time and reflects different sorts of trends in specialization. Intense dissatisfaction with the declining quality of marketed foods in cities in north America in the sixties and early seventies prompted a return to urban gardening and horticulture, so that we may not have seen the death of farming in cities yet.

We might also consider that green space is not always equivalent to cultivated space. If we compared non-perishable remains of buildings and their densities among cities, there would be interesting parallels between early African and Maya cities and some north American suburbs. The trend in the last decades has been for major industries to move away from cities to industrial parks in the suburbs. Archaeologically, these industrial parks display a relationship of stone to green space that is completely at odds with traditional notions of cities, yet no one would argue that they represent vacant ceremonial centres (except on weekends), or that they were not loci of economic power. In addition, the ‘sprawling’ nature of Maya cities has a parallel in modern suburban housing developments. Streets can be designed according to a grid-plan, but many

suburbs, including the one in which I grew up, are characterized by curving streets, cul-de-sacs, winding access drives and houses that are placed on lots in a variety of orientations. Not least important, the relationship of stone to green, or houses to green space, is very different from that of a city, so much so that in some areas, status is measured not by the quantity of 'stone', but by the acreage of 'green'. Are suburbs less evolved than cities? When suburbs were largely residential they were functionally part of an urban continuum, but in many areas industries, services and markets have moved to the suburbs. Where I grew up, people now take buses from New York City out to the suburbs to shop in the malls. The evidence is stronger in favor of the suburbs as an alternative, although perhaps not a new, organizational form – a response to changing social, economic and political conditions. The important point with regard to Maya and African cities is that even in western society, density of 'stone' can no longer be conflated with evolutionary complexity (if one felt compelled to take an evolutionary approach), so the argument is even stronger for rethinking old assumptions about 'stone' versus 'green'.

The orientation of buildings, the use of green space, and even the incorporation of hydraulic systems in tropical cities can reflect any number of priorities that need not be forced into an evolutionary mold. Maya cosmological principles, for example, were important in the structuring of urban space (Ashmore 1991), as was the concept of 'anchoring' ceremonial and civic buildings to their settings by the designation of a primary axis (the building's mid-line) which did not change as the structures were rebuilt through time (Loten & Pendergast 1984). Political manipulation of architectural expression by the construction, alteration and elaboration of buildings is also documented for Copan (Fash, Williamson, Larios & Palka 1992). In a similar vein, Khmer site-centre planning, including the large-scale waterworks, followed cosmological principles and served ritual and political ends, although the waterworks apparently supplied the capital's practical needs (Van Liere 1980; Wheatley 1983, pp. 419–38; Van Liere 1989). Considerations of cosmology may seem at first to exclude modern cities or suburbs, yet Wheatley's characterization of the Yoruba city applies equally to modern cities or suburbs. He states that Yoruba cities projected 'images of cosmic order on to the plane of human experience where they provide a framework for social action'. Skyscraper design is as important as engineering considerations, and what is 'design' but a projection of our views of cosmic order? Concepts of 'skyline' and 'scenic views' are not rooted in practicality, but in a sense of order that goes beyond the color of a building to the way it both fits in with and reflects its environment – people, other buildings, street-scapes, parks, lakes, sky. Surely the shift to the suburbs can be viewed as an effort on the part of individuals to structure stone and green more equitably than in city centres, and ideas about proportion are rooted in concepts of 'balance' and 'order'. I believe

that what may draw Maya and African cities together are the ways in which balance and order are conceptualized, because these concepts will reflect aspects of the humid tropical environment. One way to test this might be to compare the use of green space in traditional African or Maya cities to the use of green space in north American or European post-war suburbs. In this, the 'lawn' stands out strongly as a unique cultivation practice. Although grasses are encouraged wherever vegetation is repeatedly cut, the lawn – as either an end in itself (America) or as a backdrop for a garden (Britain) (see Pollan 1991) – reflects a distinctive concept of what constitutes cosmic order. It also has strong ties to the colonial experience. Tracking the spread of the lawn into Africa or southeast Asia or central America environmentally and/or historically would reveal a great deal about comparative concepts of balance and order, about the time-depth and character of non-lawn concepts of green space, and would also reveal knowledge about little-studied forms of 'green' resistance.

### **Environment as a vehicle for transforming science**

Until now my focus on the humid tropics has served largely as a device for rethinking the nature of cities, but I also hope to show that the strength of an environmental approach lies in its potential for a programme of action: 'not what we are *against*, but what we are *for*' (Grimshaw & Hart 1994, p. 257). The programme of action in which I am involved takes a critical stance regarding established scientific discourse and by implication, development (see Escobar 1991, pp. 675, 677–8) but from within science, not outside it. In this final section, I embrace science to define what is tropical, and I turn to ecology for the idea that tropical environments do indeed exhibit important biological characteristics that are different from those of temperate zones.

### **The conditions for urbanism in the humid tropics**

The environmental conditions to which I have repeatedly referred define areas characterized vegetationally by what has broadly come to be called tropical rain forest (Schimper 1898, in Mabberley 1992, p. 4). It is important to emphasize that the evolutionary processes of genetic variation, natural selection, and speciation are believed to be the same throughout the biosphere (Deshmuk 1986, p. 172). However, it is thought that the ecological outcomes of such processes are different in the tropics from those in temperate zones, although the nature of the difference is not entirely clear and is the focus of a considerable amount of research at the present time. What seems to be agreed is that the biotic environment is structurally more complex in the tropics than

in temperate zones (Deshmuk 1986, pp. 172–3), and it is this organic spatial heterogeneity that fosters habitat diversity (Dobzhansky, Ayala, Stebbins & Valentine 1977, p. 339). Perhaps best known to non-scientists is the fact that there is far greater species diversity in the tropics than in temperate zones (Baker 1970; Deshmuk 1986, pp. 177–221; Whitmore 1991, pp. 28–33). This is true not only of tropical forests but also of coral reefs, extensively exploited by the ancient Maya, where the biogenic reef structure breaks down the shallow water zones into a number of distinct environments (Dobzhansky, Ayala, Stebbins & Valentine 1977, p. 339), and creates the same sort of organic spatial heterogeneity that is characteristic of tropical forests (see also Connell 1978).

### **Environment and urbanism**

The maintenance of tropical biotic diversity is a controversial topic, but it is worth noting the hypothesis articulated by Connell (1978) that the extent and maintenance of diversity are related to the degree of perturbation or disturbance experienced by floristic (or coral) communities. It is suggested by Connell that moderate perturbation creates conditions that foster diversity maintenance, whereas low or high perturbation produces conditions in which fewer species are likely to dominate. Under conditions of low perturbation, it is competition that would ultimately lead to domination by fewer, and in some cases single, species. At the other extreme, fewer species are well adapted to repeated perturbation, and less diversity is likely to be maintained.

Connell notes an African example (Eggeling 1947) in which colonizing, mixed and climax stands of trees were studied in the Budongo forest of Uganda. The colonizing forest was spreading to grassland, so my assumption is that the grassland represents a zone of repeated disturbance, perhaps due to fires. In areas where disturbance became less frequent, colonizing stands comprised canopy trees of few species but juveniles of different species, the adults of which occurred elsewhere in mixed stands. This suggests that disturbance was low enough to allow colonization by more than the canopy species, which were probably the pioneers, and that succession to a mixed stand was in progress. Mixed stands comprised variety in both canopy and juvenile species. In climax stands, however, where disturbances seem to have been minimal, the canopy and juvenile species are the same, and produce an assemblage of self-replacing species, or a climax community of low diversity (Connell 1978, p. 1303). Connell notes that this is not a special case, and that the Budongo forest is the largest rain forest in Uganda with one-quarter of it dominated by ironwood. What is absolutely fascinating is Connell's other reference to work carried out on a diverse tropical forest in Nigeria (Jones 1956). He suggests that the diversity of this forest reflects the fact that the trees probably established themselves in abandoned fields in the

first half of eighteenth century, when the Benin civilization contracted and the countryside was depopulated. Therefore this mixed forest studied by Jones was in fact an old secondary forest that had invaded after disturbances produced by agriculture during the Benin florescence. As Connell puts it: 'In both Nigeria and Uganda, high diversity was found in a nonequilibrium intermediate stage in the forest succession' (Connell 1978, p. 28).

In Nigeria, the conditions that promoted high diversity were brought about by disturbance attributable to various activities associated with the civilization of Benin. This is qualitatively different from the Near Eastern scenario in which salinization from irrigation created unsuitable growth conditions not easily reversed, even after abandonment (for modern examples of salinization problems see Boyko & Boyko 1968; Chhabra & Singh 1990). Shifting agriculture is now generally recognized as a moderate level of perturbation (Deshmukh 1986, p. 219), and it was and is widely practised in the tropics, although in a variety of historical forms (Pratap 1987). It is also possible that the wetland agriculture of the lowland Maya region (Pohl 1990) would fall within the range of moderate disturbance, not so much because the agricultural practices were not in and of themselves intensive, but because periodic abandonment, cycling, movement or migration as well as size and management of the fields may have mitigated the effects of intensive land use and thus moderated disturbance. A new look at agricultural and settlement practices in the Maya lowlands and humid tropical Africa or Asia might entail a concept of long-term cycling in which the number of people or density of populations, even in urban societies, is not in itself as important in terms of environmental impact as the nature, extent and timing of disturbances. And it is important for the concept of 'disturbance' to include a wide range of activities: agriculture, horticulture, number of residences constructed in a life-time, re-building and re-location, resource exploitation, stable or travelling markets, migration practices, burial practices, waste disposal customs, and so forth.

Connell's examination of diversity maintenance has a second implication for archaeology, which is that we ought to re-examine the role of plant and animal domestication and manipulation in the tropics, and the relationship of the process of domestication to the diversity profile that is characteristically tropical. We do not yet know, for example, whether the trend toward decreasing diversity (e.g. as agro-pastoralism, intensive irrigation agriculture and disappearance of game), which is apparently a phenomenon of domestication in the Near East (Zeder 1991), was equally characteristic of the humid tropics. The indication so far is that it is not (White & Schwarcz 1989; Emery 1990; Emery 1991). The maintenance of a diversity of complex cultivation systems is characteristic of both the ancient and modern Maya (see above; Wiseman 1973; Wiseman 1978; Marcus 1982; Atran 1993). Based on modern analogy and the ethno-historic record, cultivation

included intensive culling and transplanting of species within the forest (Gómez-Pompa, Flores & Aliphath 1990). Today, a mixture of selected native and introduced trees – artificial forest gardens produced by the Maya, in micro-environmental temperature and moisture regimes to which the species are particularly suited – is found in many forests in the Maya area (Barrera, Gómez-Pompa & Vázquez 1977; Gómez-Pompa 1987; Gómez-Pompa, Flores & Sosa 1987), and such practices existed in pre-conquest times, according to a detailed and well documented study of Itzá Maya agroforestry (Atran 1993). If so, in combination with a number of the features of tropical urbanism noted above, cultivation practices would result in an urban blueprint entirely at odds with what temperate-climate scholars, at least, would expect.

My example of the Nigerian forest brings up another issue, which is that if Connell's hypothesis that the greatest biodiversity is associated with periodic moderate disturbances is correct, then abandoned urban sites in the tropical forest do indeed produce a landscape completely at odds with an abandoned urban site in the Near East where, as noted above, degradation processes can be set in motion that are irreversible. If nucleation and increase in population density in the Maya area or Africa are accompanied by a variety of forms of agriculture and horticulture that intensify in some of the ways discussed above; if shifting fields, settlements, people, markets, etc. are a feature of life; and if human, vegetal, construction and other waste, which of course would increase as population increased or would become concentrated in the process of nucleation, is not washed downriver or piled somewhere where it is lost to rains or erosion, but perhaps buried or contained or retained by terracing or vegetation; then it is possible that pre-industrial tropical urbanism was sustainable in ways that arid or temperate cities were not. This would be partly the result of the balance between stone and green; partly the result of the high concentration of organic waste created by nucleation; partly the result of the retention of waste within the broad settlement area (e.g. not lost through salinization or alluvial flooding or desiccation); and partly the result of the cultural maintenance of periodic movement of people, fields, houses, markets, and so forth.

If my proposition is correct, has a connection between urbanism and enriched soils or diverse vegetation been made before? For the Maya, the answer is 'yes', but the association has produced a different conclusion (see Sanders 1977; Folan, Fletcher & Kintz 1979; Fedick 1995). Relationships between humans and the environment that are correlational or associational are often interpreted as causal and uni-directional, especially in the case of soil-settlement associations. For example, if Maya sites are located in zones of soils that today are classified by land-use surveys as fertile or well-drained, it is assumed that the soil characteristics are static and the Maya settled in the area in ancient times because the soils were good. This seems logical until

we remember that it is only an association, and the causal link remains to be clarified. Soils, however, are dynamic, not static, although modern soil classification is rather inflexible with regard to the recognition of the effects of geological and pedological processes over time (for an attempt to address this problem, see Valentine, Fladmark & Spurling 1980), and is even more inflexible with regard to the accommodation of anthropogenic processes. How do we know that the sheer bulk of limestone amassed in Maya urban construction has not affected the soils as parent material (Graham 1993)? Such concentrations of limestone in ancient Maya construction have been noted by botanists as mimicking outcrops of bedrock, and thereby supporting vegetation that is normally characteristic of bedrock outcrop zones (Lambert & Arnason 1982). In another circumstance, a forest with 'lime-loving' species occurs in a region where no limestone parent materials exist, but the forest covers an archaeological site (Graham 1989; Graham & Pendergast 1992). These situations hark back to the Ugandan and Nigerian examples above, and highlight how little we know about the range of long-term effects of human occupation on the environment in situations other than those of massive deforestation and erosion.

Soil-settlement relationships seem generally to be interpreted as if the soils are the constant and humans are the variable. What if soil science is wrong and the interaction is far more complex (Graham In Press)? This would argue not only for a reassessment of the long-term effects of urbanism in the tropics, and the character of urbanism itself, but also for a critical re-examination of soil classification schemes and their implications for development planning and sustainable agriculture.

Although it is of prime importance that area or regionally specific archaeological investigations of urbanism continue and expand, I intend this chapter as a plea for communication and exchange of information among archaeologists and ecologists working in the humid tropics. At the very least, we will break the confines of our normal spheres of exchange; with sustained cooperation and interchange, we may develop a new perspective on tropical cities that is rooted in the tropical experience.

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## **Captions for illustrations**

Fig. 1. Map of Belize showing the locations of Tipu and Lamanai. (Drawing by E. Huston)

Fig. 2. A Classic-period Maya building on a stone-faced platform. The platform on the right supported a perishable building, probably timber-frame, pole walls, and thatched roof. Larger, more elaborate buildings stood on platforms that were terraced or stepped. (drawing by H. S. Loten)

Fig. 3. Plan of one of the structures at Tipu, Str. H12-8. Time permitted only partial excavation, but the overall plan was delimited, and the pattern of stones suggests that the wooden building or buildings that stood here comprised roofed-and-walled space, roofed-and-unwalled space, and open spaces with prepared surfaces. (Drawing by J. Gerhardt)

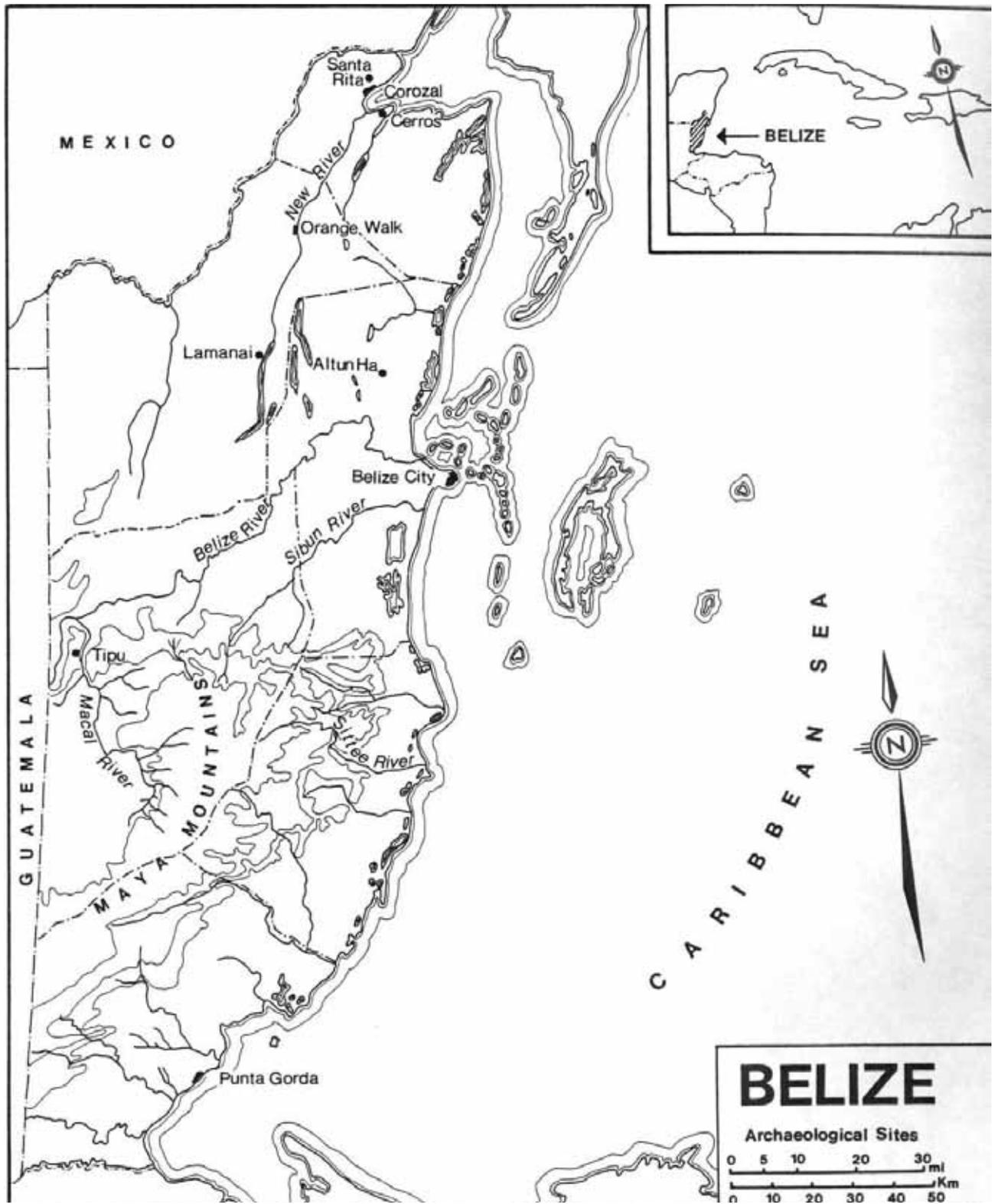


Fig. 1. Map of Belize showing the locations of Tipu and Lamanai. (Drawing by E. Huston)

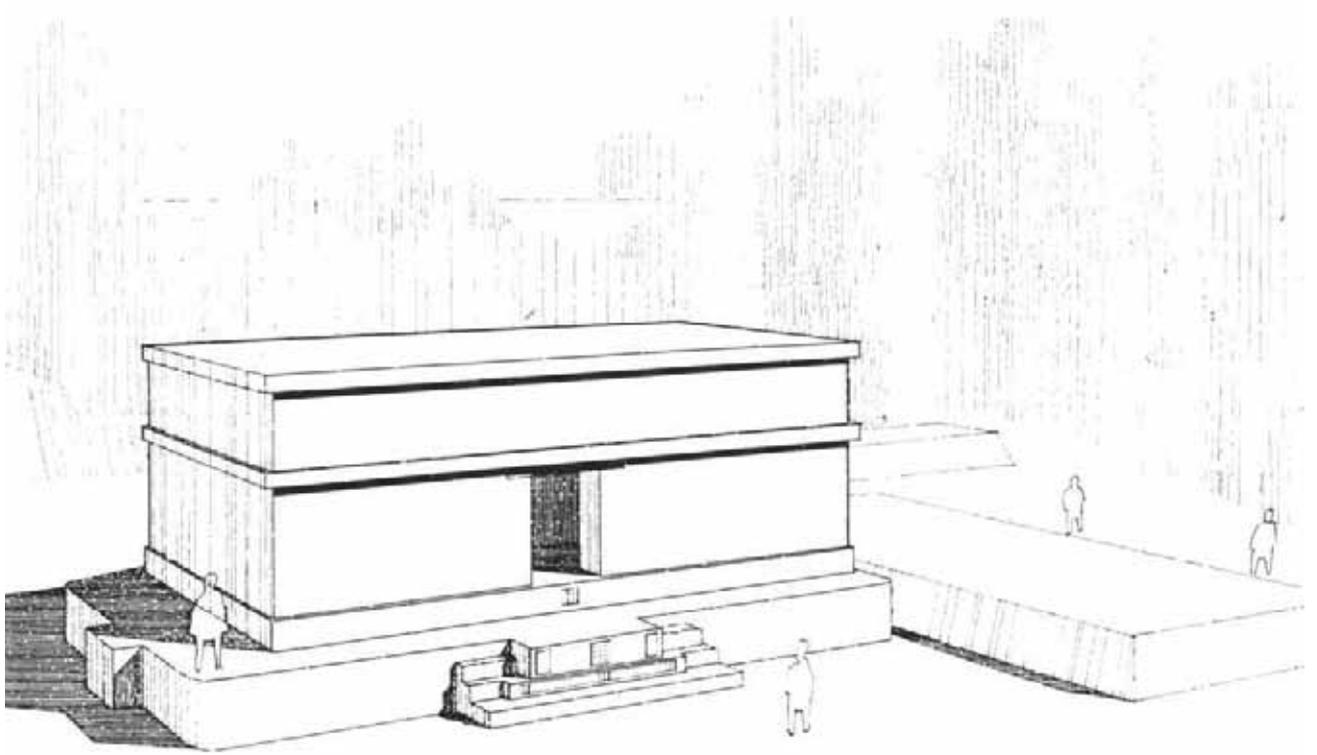


Fig. 2. A Classic-period Maya building on a stone-faced platform. The platform on the right supported a perishable building, probably timber-frame, pole walls, and thatched roof. Larger, more elaborate buildings stood on platforms that were terraced or stepped. (drawing by H. S. Loten)



Fig. 3. Plan of one of the structures at Tipu, Str. H12-8. Time permitted only partial excavation, but the overall plan was delimited, and the pattern of stones suggests that the wooden building or buildings that stood here comprised roofed-and-walled space, roofed-and-unwalled space, and open spaces with prepared surfaces. (Drawing by J. Gerhardt)