Diversity and dispersal in African urbanism – a global perspective

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Introduction

Since the suggestion in 1972 by Alexander (1972) that the oppida of iron age Europe should properly be regarded as urban, the conventional taxonomy of urbanism has been so extended and variously defined that it now lacks rigorous meaning or especial significance. As Adams remarked in 1981 (p. 81), the term specifies 'no set of precise well-understood additional characteristics for societies so described'. The situation has not changed since then. Instead we have chosen sensibly, either to opt for regionally specific, contextual positions (e.g. Silverman 1988) or we have used general perspectives about very broad social conditions, as in Connah's eminently sensible study (1987). The former option leaves us without a cross-cultural frame of references, while sometimes giving the impression that one exists (somewhere). The latter approach is very vulnerable either to the legitimate criticism of hard-line contextualism that it does not attend to the fundamentally unique conditions of each region, or to the nagging feeling that we have an explanation but it does not quite satisfy – in part because it is pretty much what we would sensibly expect. There should be more to the issue than this. The contextual and the generalist perspectives should not be polarised since both views are patently necessary. General and contextual perspectives are not incompatible. They are simply over-extended claims whose core explanatory elements refer to different scales of enquiry and seek properly to produce differing representations in relation to different kinds of questions (Fletcher 1989; Fletcher 1992a). Furthermore, the vast extent of the past ought to contain examples of behaviour which can surprise us profoundly and are essential for assessing radical views of how and why human communities do what they do. Otherwise, archaeology would be a very depressing business and it plainly is not. We do rather tend, however, to normalise its unfamiliarity (Murray 1987), to bring the strange under control and avoid the great windy expanses of experience that lie in wait for us at the end of our shovels and cameras. With the loss of a stable taxonomy new issues should arise. Many different kinds of urban settlement are recognisable and there are numerous differing taxonomies. What we now have to consider is the specific significance of African settlement growth for the discussion of urbanism. To do this we must be able to place the African experience of four and half thousand years of

urban development in a general context which will enable us to decide what questions to ask and what significance it possesses. How do African towns and cities resemble other settlements which are called ‘urban’ or differ from them and to what degree can we then regard their characteristics as contextually specific? Obviously there are differing levels of specificity in the description of settlements. We can ask world-wide cross-cultural questions about overall growth rates in relation to the general behavioural parameters which limit the viability of communities (Fletcher 1981; Fletcher 1986). We can also ask specifically why the east African ‘Swahili towns’ remained so small, or why Great Zimbabwe or Old Oyo collapsed. The insights provided by the answers to the general questions will not give us a deterministic explanation of why particular communities behaved in particular ways during similar growth processes. What they may do usefully is to indicate the general behavioural constraints which each society sought unknowingly to manage in its own unique way. My purpose in this paper is to discuss several examples of African ‘urbanism’ in relation to a general model of the interaction and communication stresses (I-C stresses) which constrain the growth of settlements. The way in which the general model directs attention to a settlement’s characteristics therefore acts as a device for focusing on possible explanations or representations of its nature. These are of consequence both for the study of the constraints resulting from interaction – communication stress and also as a trigger to the kinds of questions which a contextual perspective might seek to pursue. The main point I wish to make is that the label ‘urbanism’ covers a considerable range of settlement sizes and several disparately different kinds of growth trajectories. If we seek to subsume these under one general explanation we are likely to end up with vague or specifically untenable propositions. The purpose of theoretical enquiry should be to tease out whether or not the habitual assumptions of a discipline are tenable.

Interaction and communication

The I-C stress model is predicated on an operational uniformitarian proposition that humans can only tolerate a finite amount of interaction and that human communities will therefore display an upper limit on the residential densities which they can sustain as viable social groups (Fletcher 1981, pp. 100, 106–11). A second related proposition is that any communication system has a finite capacity to transmit information across space. Its expression in settlement size should be a maximum areal extent beyond which a given communication assemblage cannot operate adequately. This effect should be conspicuous in communities with high information transmission loads, i.e. with high residential densities, in which large numbers of signals are transmitted and the network can reach the limit of its capacity to carry messages. In consequence we should find maximum size limits for compact settlements using a given information system (Fletcher 1981, pp. 112–16). For example, compact pre-industrial literate urban settlements had a maximum areal

extent of about 70–100 km^2. According to this premise the growth of compact industrial settlements from areas of about 100 km^2 to thousands of square kilometres (Fletcher 1986, p. 68; Fletcher 1992b; Fletcher In Press) was made possible by the prior development of mechanised communication systems which produced items such as newspapers and rapid distribution services (Fletcher 1981, pp. 113, 116–17). Economic development *per se* was not then the sufficient or even necessary cause of this growth. Rather it sustained a growth potential made possible by antecedent changes in the management of interaction and communication. Since the later nineteenth century AD, the combined introduction of the new suite of communication mechanisms and industrial economies into Africa has served the rapid expansion of the continent's largest modern metropolitan centres such as Nairobi, Lagos, Cairo and Johannesburg.

The communication constraint effect has an important derivative. The restriction of areal extent by communication capacity should not occur in low density residential contexts where a relatively low number of signals are transmitted per unit time and area. The adequacy of a message carrier depends upon the time within which the signal must arrive to be of any consequence. As the signal source and target move further apart we eventually reach a situation in which the delay time in the transmission will obviate the use of the system – except for messages with low time-urgency which will not therefore have a marked distance limit on their transmission. Examples of the kind of low density context envisaged are rural regions of dispersed residence, for example in northwest Ghana (Denyer 1978) and in the Kofyar region of Nigeria (Netting 1965), where residence is not primarily in compact, spatially well defined settlements. Instead the residence units are scattered across the landscape each surrounded by its own fields (Fig. 1). Clearly, the regional extent of such residence patterns is not defined by the basal available communication system i.e. word-of-mouth. There are also large low density urban settlements which should come under the same terms of low frequency interaction without a communication constraint on their areal extent. Literate, agrarian urban examples are the Maya settlements such as Dzibilchaltun (Andrews 1968; Kurjack 1974; Fig. 2) or Tikal (Haviland 1970; Sabloff 1989), and the great dispersed cities of southeast Asia of the fifteenth–eighteenth century AD, of which Angkor (Higham 1989, pp. 321–52) is the largest example (Fig. 3). The industrial world has also produced this urban form in the twentieth century AD, at an even greater magnitude, represented by the East Coast Megalopolis in the USA (Gottman 1961; Fig. 4) and the great conurbations of Europe and Asia (Dogon & Kasarda 1988).

From the three propositions of the I-C model, a diagram can be produced of three kinds of behavioural parameters whose approximate values can be identified empirically (Fig. 5). The diagram represents the stress field or stress matrix across which settlements grow and decline. The interaction limit (I-limit) can be recognised from the world-wide, maximum, overall residential densities within settlements. The major communication limits (C-limits) can be identified from the

maximum sizes of settlements prior to the three great behavioural transformations of community life over the last 15,000 years. A pre-industrial limit for compact settlements of about 100 km^2 (30–40 square miles) is indicated by the size of the greatest agrarian urban capitals prior to AD 1800. The other two great transitions, the initial growth of urban settlements and the initial formation of sedentary communities relate to settlement sizes which are successively a 100 times smaller (Fletcher 1986, p. 69). This suggests that 'ball-park' figures of about 100 ha and 1–2 ha are the rough magnitudes of the proposed communication limits. The latter C-limit would be part of whatever behavioural constraint blocked the initial sustained growth of permanently sedentary communities until the last eight to ten thousand years, but it is not a direct part of the discussion in this paper.

A 100 ha C-limit is consistent with the site size distributions for the 'non-urban' compact or delimited settlements of agrarian communities in Europe from the fifth millennium BC down to about 500 BC (Fletcher 1986, p. 63). This C-limit was crossed during the rapid sustained development of the initial large, urban communities e.g. in Mesopotamia in the fourth millennium BC, China in the second millennium BC and Mesoamerica in the first millennium BC. For compact settlements to grow to sizes in excess of 100 ha elsewhere in the world, a range of new material characteristics which manage interaction and communication, such as writing or the *quipu* has been involved (Ascher & Ascher 1981).

The threshold limit (T-limit) below which the communication constraint does not apply can also be provisionally identified. The highest average rural regional densities should mark the density below which the communication effect would not operate. On rough estimates from Java and China, which have the highest known regional densities, the maximum is somewhere between 10 and 7 persons per ha (Clark 1989). The vagueness of the figure is a result of estimates being derived from two dimensional maps, not from actual surveys of ground surface area, which can differ considerably from more rugged topography. The maximum value for these regional densities should therefore be somewhat lower than the highest reported values though I suspect not necessarily by very much.

Settlement size trajectories

The Stress Matrix (Fig. 5) provides a frame of reference within which various settlement growth trajectories can be modelled (Fig. 6). One instance is those settlements which move toward high residential densities and approach a communication limit. If a C-limit marks the maximum operable settlement size for a given communication assemblage then the settlement growth of the communities with that suite of behaviour will halt at the limit. The second major instance is those communities which take a high density trajectory and happen to develop new communication

systems before they reach a C-limit. They should be able to cross the C-limit defined by the preceding communication assemblage and generate much larger settlement sizes. This is the trajectory that is likely to promote a new I-C assemblage. It provides intense but gradual preferential selection first on interaction controls and then on aids to communication as a community approaches the I-limit and only then encounters severe increases in communication stress as it comes up to the C-limit. A third possible trajectory goes down to low residential densities and bypasses the C-limit by going under the T-limit, and therefore does not require any major change in the communication system used by the community.

General implications

The various trajectories are of consequence for discussions of the development of agrarian urbanism because within that general category we use the labels ‘town’ and ‘urban’ to refer to settlements whose sizes vary from a few tens of hectares to thousands of hectares and whose occupation densities range from conspicuously compact, higher density settlements to dispersed, much lower density forms. Models of urban growth which mix up the various possible trajectories outlined earlier will be unlikely to identify much consistency of process in the behaviour of the communities concerned because the requirements and their outcomes are so very different. In particular the I-C stress model predicts that the growth of compact and dispersed settlements to sizes in excess of 100 ha involves rather different behavioural requirements. Fortunately, the requirements, the predicted effects and the required identifications of settlement form are so gross that they ought to be readily observable in the archaeological record.

Consider the two trajectories which produce settlement sizes in excess of 100 ha. The initial growth of compact settlements to sizes much larger than the notional 100 ha area must be preceded by distinct material changes to the material assemblage which manages their interaction and communication. By contrast the bypass trajectory allows a settlement with an overall low density, or dispersed occupation, to exceed the notional 100 ha C-limit without any alterations to its material assemblage. This may be of considerable consequence since the T-limit then places a ceiling on the maximum operable residential density of such settlements and would make them vulnerable to unstable change. After bypassing a C-limit a community cannot move back up to higher residential densities unless it has obtained a new I-C assemblage. As noted earlier these are only likely to be innovated in high density settlements. By contrast, at low densities further outward extension is less stressful than a move back up to higher densities and the consequent severe communication problems. Since the community will not be aware directly of what is affecting it, and there is no apparent communication control on areal expansion at low densities we might expect growth to take the latter path. Very considerable settlement growth should be

possible on this trajectory. But the communities ought to be rather fragile. If the social variables associated with communication are not the decisive mechanism driving the increasing population growth of the community then presumably resource supply will be. Resources can convert directly into more people. That simply translates outwards into the expansion of settlement area. Instead of developing elaborated social strategies which vary for different parts of the community, interaction would be managed by the minimal tactic of using space to keep down the interaction frequency (Fletcher 1991, pp. 412–14). Changes in circumstances (e.g. external threat), which might be handled by social compaction, should severely threaten the coherence of the community because no internal devices would be available to handle that option. Nor can the community revert to a higher overall density at an areal extent in excess of the C-limit for its communication assemblage. Resource supply alone could not sustain a viable community – new communication mechanisms would be required. Yet continued resource expansion, combined with the prevalent ('normal') social dispersal could also extend the settlement so far that its contextually specific modes of authority expression or social integration would come under strain. Furthermore, if the resource supply begins to decline and the sustainable population is reduced the abandonment of residential localities is more likely to be random than evenly distributed. The effect should be to sunder the former, tenuous but contiguous community into several easily differentiated, fragmented residential loci. Both resource growth and decline could therefore lead to the same overall effect of social fragmentation. The vulnerability of these communities deserves some careful attention. They are the prevalent trend in the contemporary industrial world and have been a frequent feature of large-scale agrarian and pastoral settlement organisation in Africa.

African urbanism – the low density option

African urbanism displays two general trends. The first, for communities possessing some literacy, is toward relatively small compact settlements many of them less than 1 km^2 in extent e.g. the main mound at Jenné-Jeno in Mali at 30–35 ha (McIntosh & McIntosh 1980). Kilwa covered 46–47 ha (Chittick 1974) and Zanzibar about 60 ha (Hoyle 1967, p. 102). As a comparison, Mari in Mesopotamia was about 66 ha in extent in the third millennium BC (Daley 1984). When considering the degree of political control and written communication needed to make these towns function we should bear in mind however, that non-literate communities also create settlements of this extent. Nan Matol in Ponape covered 70–80 ha in the fifteenth century AD (Morgan 1988, pp. 60–7). For nearly 5000 years, following the initial formation of agrarian communities, Europe repeatedly produced compact sites, or bounded sites of varied occupation densities, with areas of up to 100 ha (Fletcher 1986, p. 63). In North America, the elaborate site at Poverty Point extended across about 90 ha at some time in the first millennium BC (Webb 1977) and

Snaketown, the Hohokam settlement on the Gila river, in the tenth–twelfth century AD, was about 100 to 160 ha (1 to 1.6 km^2) (Wilcox, McGuire & Sternberg 1981). We must beware of assuming that these site areas only represent palimpsests of successive small settlements (Tringham & Krstic 1990) – especially when such an assumption affirms a linear evolutionary position which is surely now discredited. Rather than regarding literacy as necessary we might instead consider that literacy would actually serve to manage such small settlements very effectively, since it has the capacity to carry compact settlements of up to 100 km^2.

Above 70–100 ha we begin to see the characteristic size distribution of settlements with literacy. Tananarive (Antananarivo) in Malagasy covered 88 ha in the eighteenth century and 1.8 km^2 in the nineteenth century (Robequain 1958, p. 318). Timbuktu had a maximum extent of about 1 to 1.5 km^2 in the fifteenth century (Tymowski 1979), though Chandler and Fox (1974, p. 209) report 2.5 km^2 according to their reading of Jackson's estimate for AD 1800. During the nineteenth century AD, Kong, in Ivory Coast, had a walled area of about 1.6 km^2 and a maximum extent of about 4 km^2 (Absaka 1976, p. 310). Almost all the bigger African 'towns' were no larger than 20 km^2, from Cairo in the north with 15–18 km^2 in the eighteenth century AD (Abu-Lughoud 1971), to Kano in Nigeria at about 18 km^2 (Mauny 1961) in the 1850s AD. Zaria had a main walled area of over 15 km^2 in the sixteenth century (Sutton 1976). Before the nineteenth century a western extension was added to produce a total area of just over 30 km^2 (Fletcher 1993, p. 743 incorrectly records 50 km^2). Notably, the new extension was not filled with occupation. The predominant size range for the settlements of literate societies is below 30 km^2, with most settlements less than 10 km^2. Compact settlements larger than about 40 km^2 are lacking in Africa. However, the predominant size range up to 20–30 km^2 is much the same as in pre-industrial Europe and India (Fletcher 1986, p. 64).

The second major trend is towards low density occupation. Since the second millennium BC, literate and non-literate societies in Africa have also produced very substantial, extensive, low density settlements. Such settlements can take a wide variety of residential forms. Residence can be evenly space, patchy or centrally clumped but with an extensive skirt of low density occupation. The settlement might be bounded by features such as ditches or else unbounded. The centre of the site might be empty, as is the case with the Zulu kraal at Mgungundlovu (Parkington & Cronin 1979). Alternatively, if there are distinct enclosures the periphery of the site could be almost empty. In either case a quite small population would have the range of its interactions spread over a relatively large area.

Egyptian towns prior to the New Kingdom were generally small (Kemp 1977; Hassan 1993; O'Connor 1993). However, in the New Kingdom, Thebes (Waset), the capital of Egypt in the second half of the second millennium BC, expanded from a compact core around Karnak (Kemp 1989, p. 201–17) out into a sprawling settlement astride the Nile. The settlement extended

from the temple complexes and urban areas of Karnak and Luxor on the east bank across the river to the palaces, residential areas and funerary temples along the western scarp of the valley (Fig. 7). The total area of 30–40 km^2 included large amounts of agrarian land. A millennium later in the Ptolemaic period Memphis spread for 15 km along the river (Smith 1974). How densely occupied it all was remains uncertain.

The literate state of Ethiopia, both in the medieval period and in the nineteenth century, sustained mobile capitals of 30–40 km^2 (Horvath 1969; Pankhurst 1979; Fletcher 1991, pp. 405–12; Negash, Ch. X, this volume). These mobile communities of as many as 30–40,000 people came together in the dry season around the peripatetic Royal court. The court moved, in part perhaps to prevent the state capital becoming a ready target for assault by its Islamic neighbours, but particularly as a way of extracting resources from the provinces of the empire. Instead of a redistributive system based on taxation or tribute the Ethiopian capital went to the resources and consumed them *in situ*. As suggested earlier we should consider that the past is a lot more interesting than we sometimes presume. What the mobile capitals indicate is that the sedentary redistribution system is not as self-evident a practise as we tend to assume from a 'sedentary' perspective. A quite different option was possible which could also operate on a relatively large scale. The permanently sedentary urban system was not therefore inevitable and has to be explained by something more than self-evident common sense or a notion of progress.

In west Africa the forest and edge savanna towns of the southern half of Nigeria reached very considerable sizes. They were characterised by great interlinked enclosures with the central area taken up by an extensive palace complex and occupation scattered apparently less densely from there outwards until it is very patchy in the outermost contiguous enclosures. The greatest obvious example is Old Oyo (Fig. 8) which reached 60 km^2 before it was abandoned in the early nineteenth century AD (Soper & Darling 1980). Benin in the delta region incorporated 30 km^2 within the area of the first and second moats, with adjacent discrete enclosures around it spreading out for many square kilometres across the landscape (Connah 1987, p. 136). The early occupation of Benin as the capital of a state seems to have been located around nodes that extended beyond the core walled enclosure (Connah 1975). With a settlement like Benin the problem becomes where to distinguish between an urban core, separate suburbs and adjacent more scattered villages. With a continuum of degrees of activity between them, especially along the main roads, defining a limit for Benin becomes quite difficult. Perhaps what we should do instead is to stop trying to see all towns and cities as if they are some variant of compact occupation and acknowledge the spread out interconnections of settlements with an aggregate low density. Ife, for example (Willett 1970, p. 320), has occupation debris in the form of pottery pavements scattered for several kilometres beyond the enclosures. Here we encounter the interesting issue that we are probably looking at palimpests of extensive low density occupation, not at a contiguous high density occupation or at

a total area that has resulted from lateral movement of occupation over time. Connah (1987, p. 134) notes Garlake's remark that 'buildings were sufficiently compact and close together for the settlement to be ranked as urban' (Garlake 1977, p. 92). The irony of this is that overall occupation need not be dense for a settlement to be urban. The Maya settlements of Yucatan, or Pagan (Luce 1970) and Sukhotai (Griswold 1967) in southeast Asia, with widely dispersed occupation, can hardly to be disqualified as urban. Nor would small areas of compact occupation indicate continuous dense occupation. Maya settlements are characterised by very uneven concentrations of residence.

According to the I/C model, these very large west African settlements either operated at densities near 10 p/ha or less or had some form of material communication system (Fletcher In Press). If the former is applicable then Old Oyo had 60,000 people at most; Ife had about 15,000; and Benin approximately 30,000 within the two inner moats. Bradbury (1967, p. 8) estimates a population for Benin City of about 27,000 prior to AD 1897, approximately half of the population of 54,000 for the 1950s. We need not suppose that material systems of communication are limited to writing. The *quipu* (or knotted string) system of Inca Peru in the sixteenth century AD was, so far as we can judge, an efficient way to manage and store information. Other possibilities should be envisaged including the 'census pebbles' system of the Fon kingdom (Herskovits 1938; Argyle 1966; Fletcher 1993, p. 746). What was required was a means to store information and assist its retrieval that did not depend upon unaided human memory. Another possibility is that literacy was imported to help the management of the community, as was the case with Nestorian Christians and the Mongol state in the mid-thirteenth century AD (Beazley 1903, p. 137). If none of these options eventuates as credible and it also becomes apparent that the communities were operating at densities well above 10 persons per ha, then the T-limit proposition would have to be reviewed. The Nigerian towns of the seventeenth to the nineteenth century AD offer a critical test case.

Further south, Bigo in Uganda covered 2–3 km^2 in the fifteenth and sixteenth centuries AD (Connah 1987, p. 225). The site consists of numerous interlinked ditched enclosures with only very sparse scatters of occupation except in the central area (Shinnie 1960, p. 27). In the later nineteenth century the transient capital of the Baganda at Kampala in Uganda (Gutkind 1963), centred on the Kabaka's palace on Rubaga hill, covered about 15–20 km^2 (though defining its limits is quite difficult). Occupation was scattered around widely separated large compounds. Extensive gardens, including groves of bananas, surrounded the small huts of the bulk of the population (Stanley 1878, Vol. I).

In Zimbabwe, the site of Great Zimbabwe (Fig. 9) had an area of 7 km^2 in the early fourteenth century AD (Huffman 1977; Sinclair, Pikirayi, Pwiti & Soper 1993, pp. 712–13). Great Zimbabwe was divided up by major enclosure walls and was also a highly dispersed settlement with patches of huts separated by substantial amounts of open space. If its maximum overall

density was 10 p/ha then the largest possible population was about 7000, below Sinclair's 1984 estimate of 5000 adults and the 11,000 or 18,000 total proposed by Huffman in 1977 and 1985 respectively (Connah 1987, p. 198). A decisive test of the proposed model will require far more exact ways of estimating population size. Contemporaneity of the areas of occupation across a dispersed settlements needs to be specified as does the basis for estimating numbers of people per household or residence unit. Cross-cultural comparison will not help because of considerable diversity in the overall amounts of built space available per person in different societies. Nor can we presume that former domestic residential densities were within the current range. There is no stringent operational uniformitarian proposition (Fletcher 1992a, pp. 43–5) which can specify that such densities have been constant within any one region nor even that current local figures sufficiently describe the possible range for modern humans.

Even without population estimates we can, however, begin to ask other questions about the way these lower density communities functioned and why each may have reached its own particular maximum areal extent. Africa is a critical case because though low density settlements occur all over the world this residential pattern was repeatedly used as an option on what we would usually refer to as an urban scale. Examples at a smaller scale are known particularly in the Old World over the past four thousand years. In Europe, the Danubian sites of the sixth–fifth millennia BC spread across more than a 100 ha, as for instance along the Merzbach valley (Whittle 1985, pp. 82–7). Though we do not know the exact contemporaneity of occupation across the entire complex, given the wide dispersal of buildings of approximately similar dates across other sites such as Bylany, a widely spaced residence pattern was likely at any one time. In the later fourth millennium BC in Ukraine and Moldova the remarkable late Cucuteni/ Tripolye sites reached areas of over a 100 ha, particularly Talljanky with an area of about 400 ha (Ellis 1984, pp. 185–9), almost the size of Uruk in the early third millennium BC. Even with a density of only 10 p/ha, Talljanky would have had a population of about 4000 people. Similarly, the oppida of the late La Tene Europe (Collis 1984) reached areas of 400–700 ha within their continuous enclosures, e.g. Manching and Kelheim respectively. In general, oppida had less and less occupation as their size increased. Within Berne Engelhalbinsel there are only patches of occupation. Kelheim has very little occupation except for a settlement area along the river on the northern edge of the site. Manching appears crowded with features but most are pits and are a result of 100–200 years of use. We should not assume that they represent large numbers of people. The 'houses' are either some distance apart or are only found in ones or twos within each big rectilinear enclosure within the site. Wells has estimated a population of only 2000 (Wells 1984, pp. 168–9). The very largest La Tene residential complexes are the discontinuous ditch systems seem at places like Camulodunum or Chichester walls with total areas of 10 to 20 km^2 (Collis 1984, pp. 223–5). Occupation is localised or patchy. The Scythian enclosure site of Belsk (Fig.

10), had an area of over 40 km^2 by the third century BC (Hoddinott 1981, pp. 95–7). Apparently there was little occupation within the main enclosed area. The evidence suggests that low density occupations can reach considerable sizes even if only for short periods of time e.g. about 50–100 years for the oppida and the Cucuteni sites.

In the New World, a low density pattern on a larger scale is apparent in the second half of the first millennium BC at Cerro Arena on the hills above the Moche river (Brennan 1980). The site covers 4 to 5 km^2 and consist of stone-built rectilinear buildings constructed on terraces. Apart from a dense core the occupation is scattered. North America has a variety of dispersed occupation sites such as Cahokia (Fowler 1975) in North America in the fourteenth to sixteenth century AD with an area of 11–12 km^2 (Fig. 11). The site area is defined by a scatter of rectilinear earth mounds. The central 100 ha of the site was enclosed by a palisade and contained denser occupation. The largest known non-literate low density settlement, in and around Chaco Canyon (Cordell 1984, pp. 246–74) in the southwest between twelfth and thirteenth centuries AD, oscillated across 80–100 km^2 of semi-desert landscape (Fig. 12). Either Chaco Canyon should not be considered as single settlement, which seems a little gratuitous given the nature of the Kofyar settlements, or there is little constraint on the growth of low density settlements. They can apparently attain areas almost as great as the next C-limit beyond the one which they have bypassed. However, if we exclude Chaco Canyon they do not much exceed half of the new C-limit they are approaching. We need rigorous specification of what we mean by a settlement and then we can find out from the archaeological record what happens on different settlement growth trajectories. The matter is of some consequence for predictions about the likely scale of future urban growth at low densities.

Conclusions

We need to be attentive to actual settlement area and the degree of residential concentration as well as to estimates of population if we are to identify what behavioural strains are affecting the communities. Moving to low density residence ought to mitigate interaction stress and communication costs since it does not demand a high degree of communication control. But conversely it might not enhance the capacity of a community to change its settlement pattern or adjust to changing circumstances and remain as a coherent community in the same settlement. The option appears to be rather inflexible. What we now need to find out is what scale of growth it permits. The corrollary is to find out what stops low density growth – one of the central concerns of urban planners in the late twentieth century!

The general trend in African urban growth is toward dispersal as settlement area expands, especially for settlements over 100 ha in extent. While literate communities could carry compact

settlements of up to 5–10 km^2 most larger settlements, whether literate or non-literate, tend towards lower densities and either dispersed occupations or extensive minimally occupied enclosures. Interestingly, this applies both to mobile and permanently sedentary communities. South of the Sahara this trajectory has been repeatedly adopted during the second millennium AD. We have access to numerous, contextually unique examples of the role of differing modes of political management and control of resources. Yet these varied social possibilities seem have been behaviourally constrained on a larger scale, producing apparently similar general outcomes. Residential variability became restricted and the communities could not break-out to different settlement patterns without substantial disruption of the existing system.

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FIGURE CAPTIONS

Fig. 1. Kofyar region, Nigeria, late twentieth century AD.
Fig. 2. Dzibilchaltun, Yucatan, Mexico, first millennium AD.
Top: General plan (after Kurjack 1974)
Bottom: Central area (after Andrews 1968)..
Fig. 3. Angkor, Cambodia, fifteenth century AD After Martel 1975. On the Martel illustration, the dots mark villages in the twentieth century AD, identifying the area of land available for residence around the core of Angkor.
Fig. 4. Greater New York and the East Coast urban complex, USA, late twentieth century AD. New York developed from the town of New Amsterdam at the tip of Manhattan island and now extends across parts of New York State, New Jersey and Connecticut. It also can be seen as the core of the East Coast urban complex – the Megalopolis of Gottman's (1961) definition.
Fig. 5. Interaction-Communication matrix. P=Community size. _- =Communication limit.
Fig. 6. Hypothetical growth trajectories. Trajectory 1: C-limit halt. Trajectory 3: C-limit transition. Trajectory 3: Bypass. _- =Communication limit. =Interaction limit. =Threshold limit.
Fig. 7. Thebes (Waset), Egypt, New Kingdom.
Fig. 8. Old Oyo, Nigeria, early nineteenth century AD (after Soper & Darling 1980.
Fig. 9. Great Zimbabwe, Zimbabwe, fifteenth century AD (after Sinclair, Pikirayi, Pwiti & Soper 1993).

Fig. 10. Belsk, Ukraine, sixth–fifth century BC (after Hoddinot 1981).

Fig. 11. Cahokia, USA, fourteenth–sixteenth century AD (after Fowler 1975).

Fig. 12. Chaco Canyon, USA, twelfth–thirteenth century AD (after Cordell 1984).

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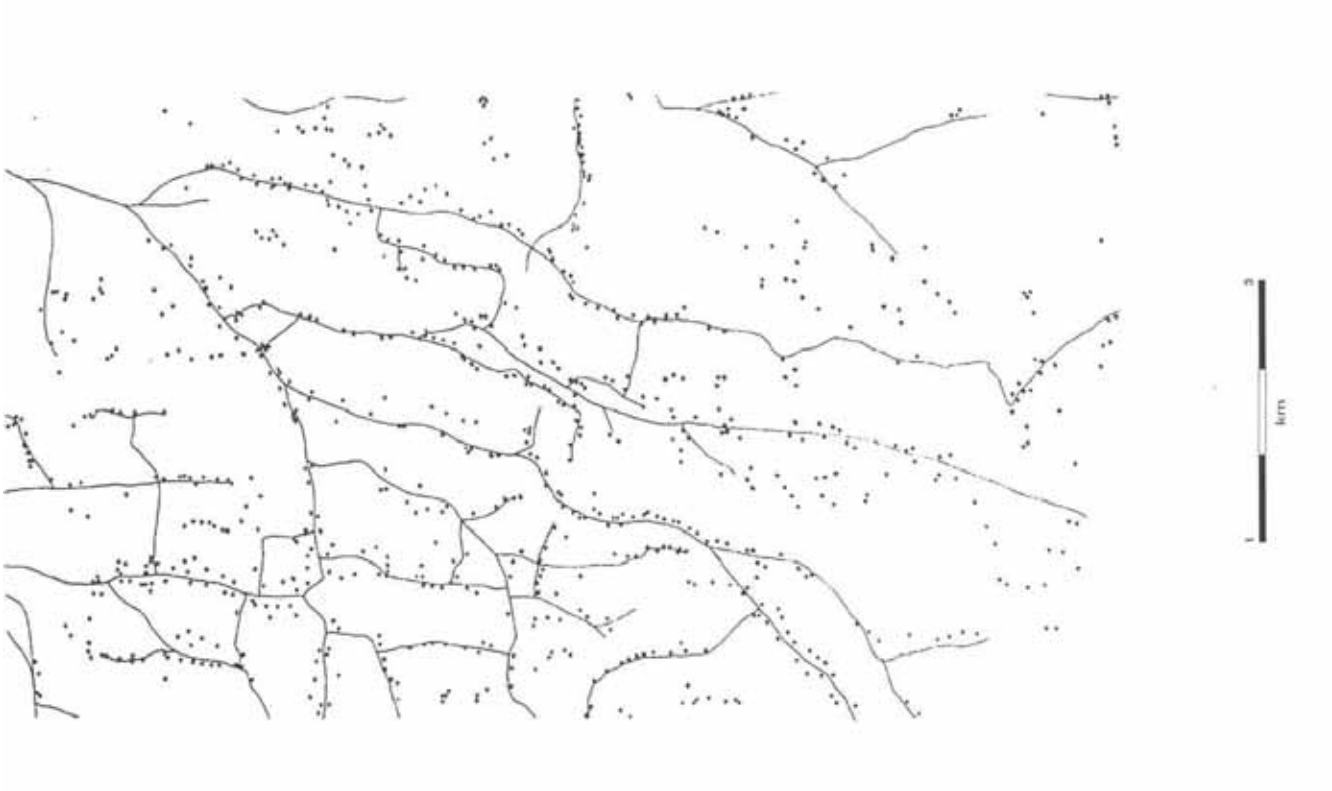

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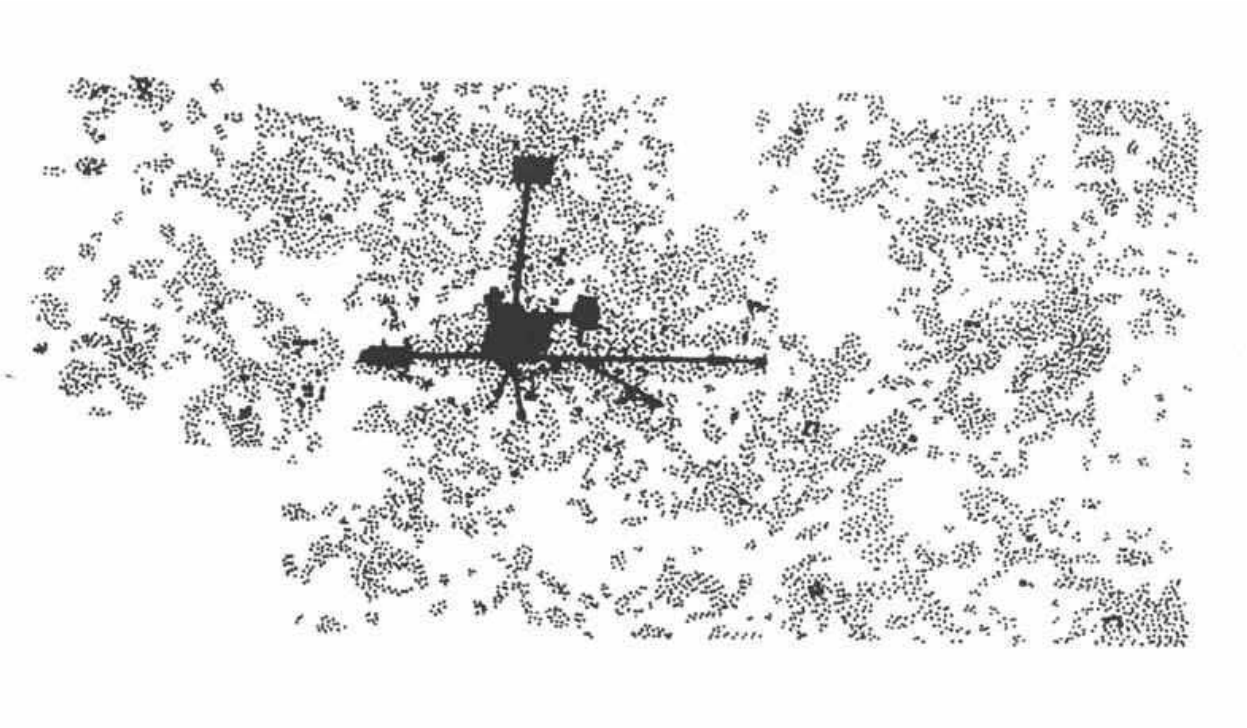

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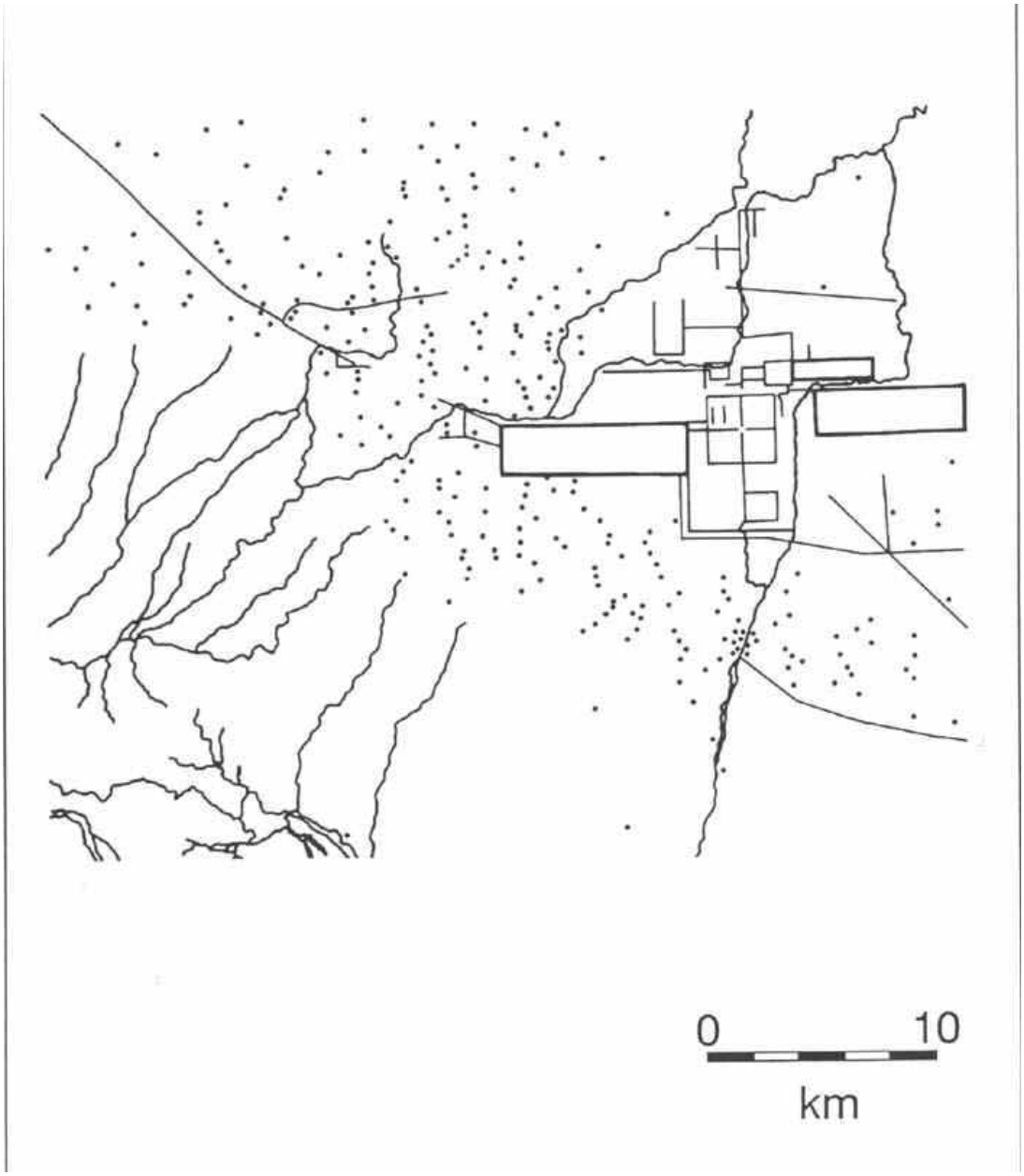

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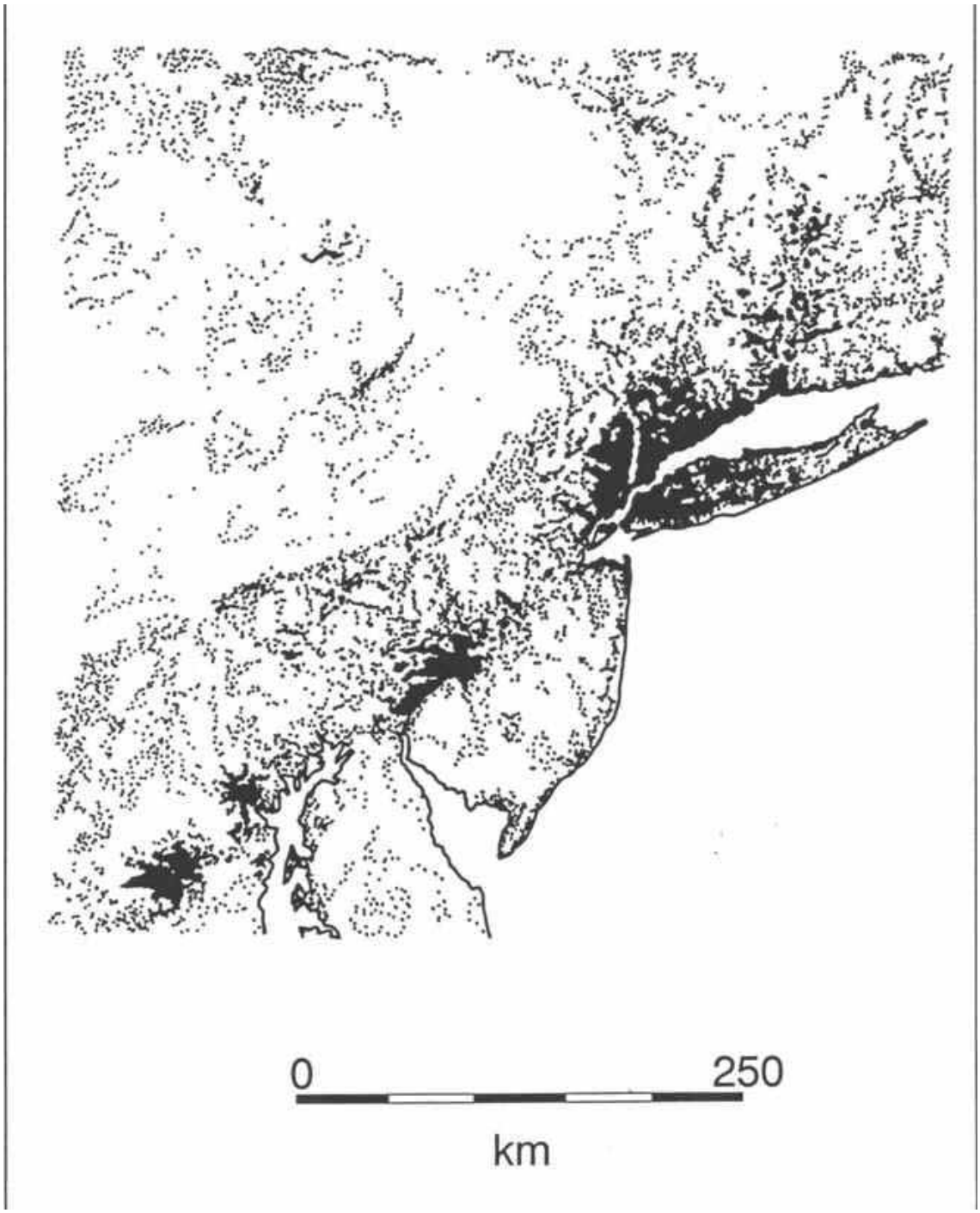

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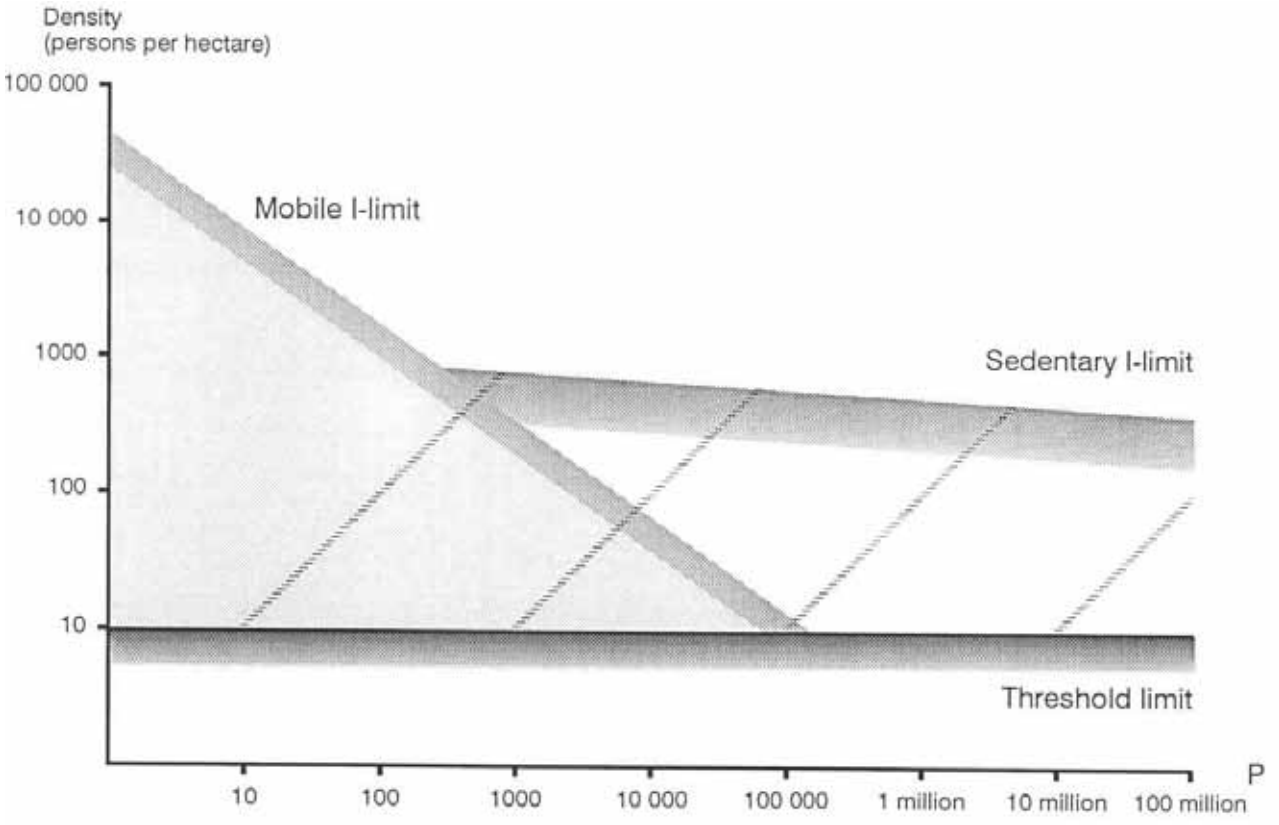

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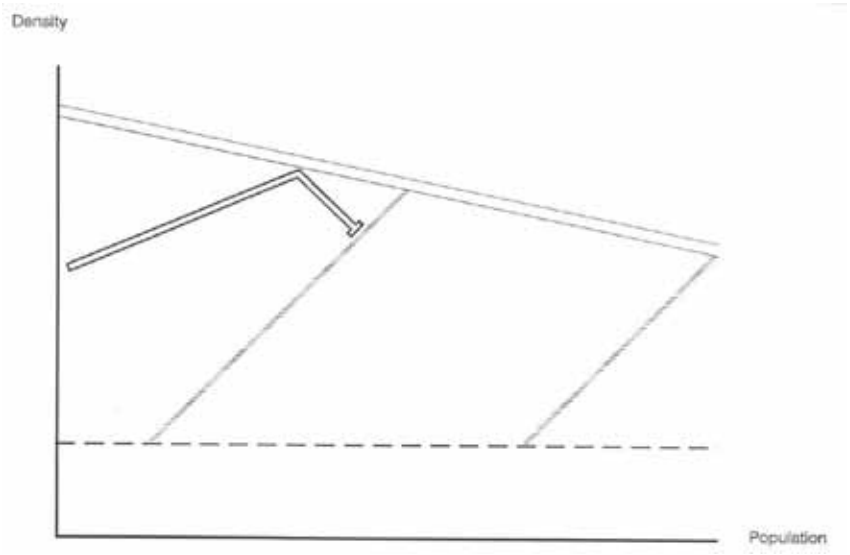

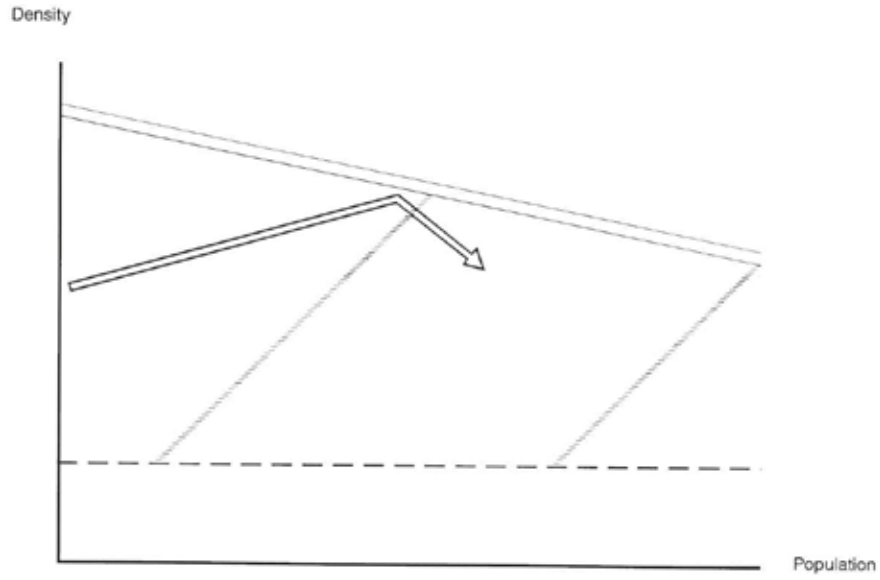

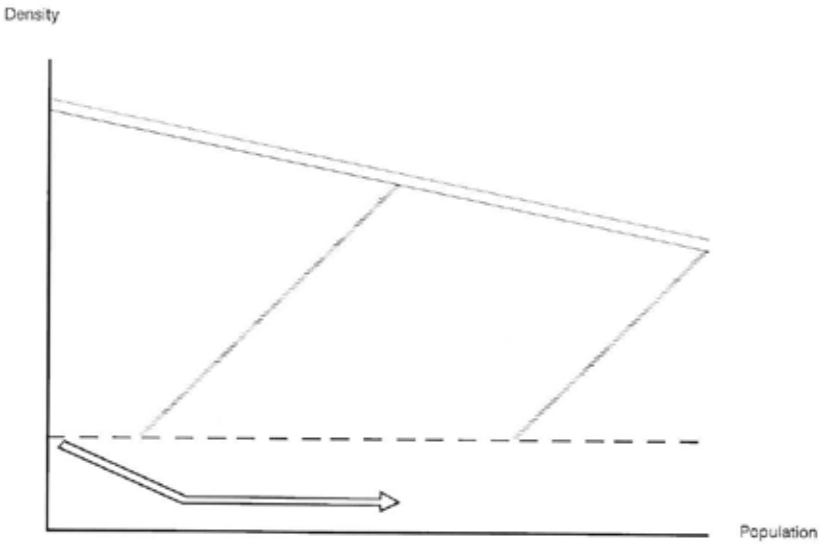

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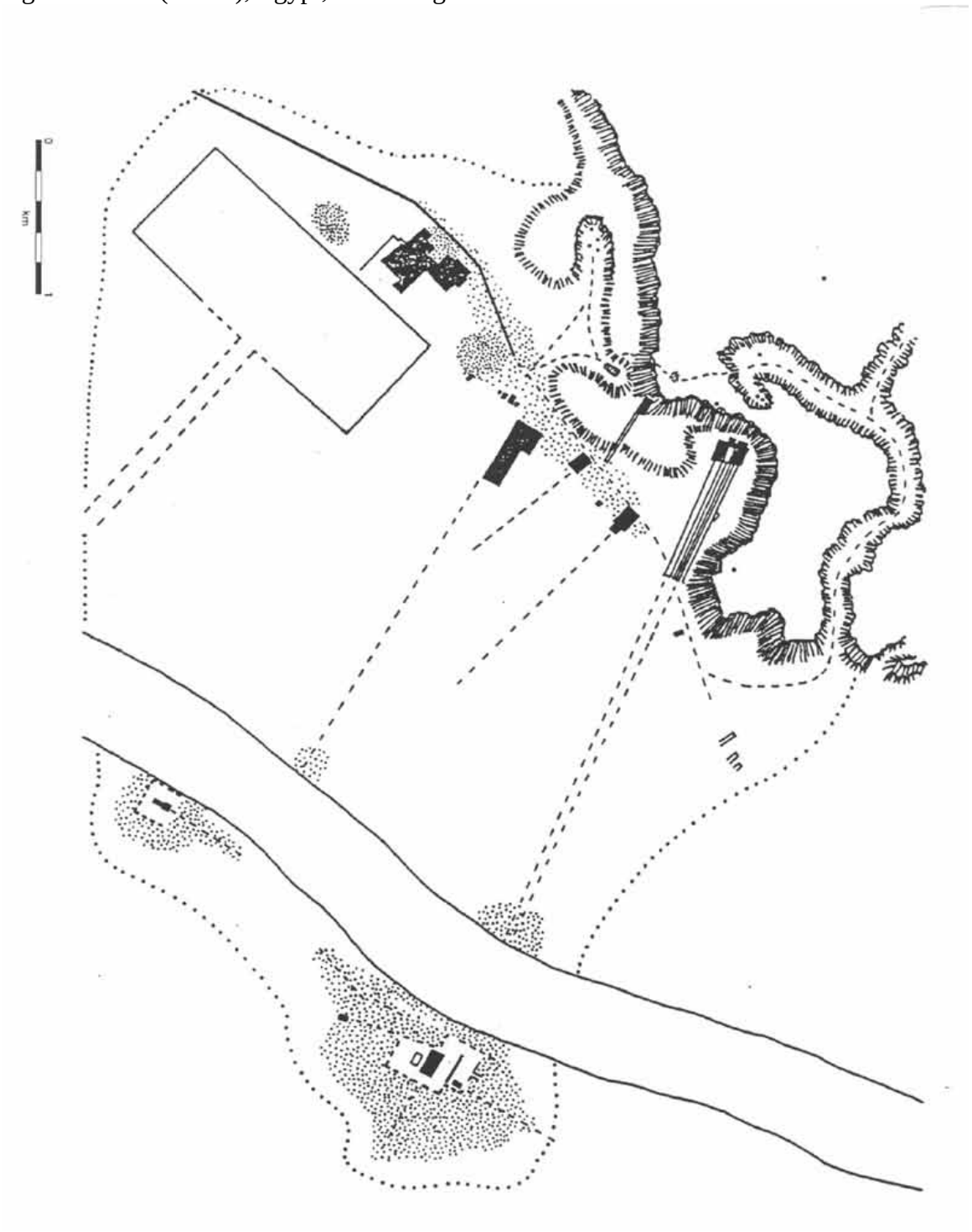

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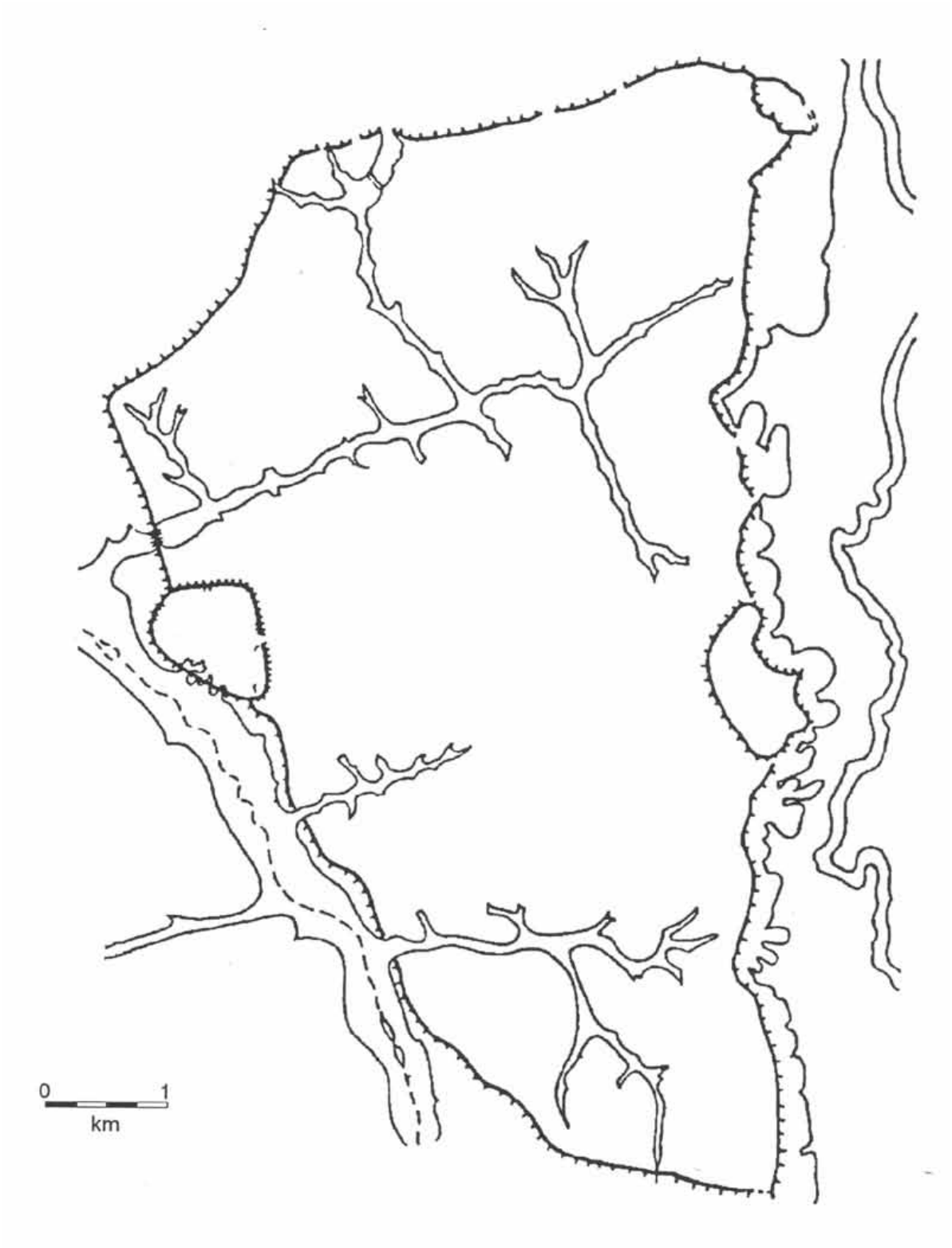

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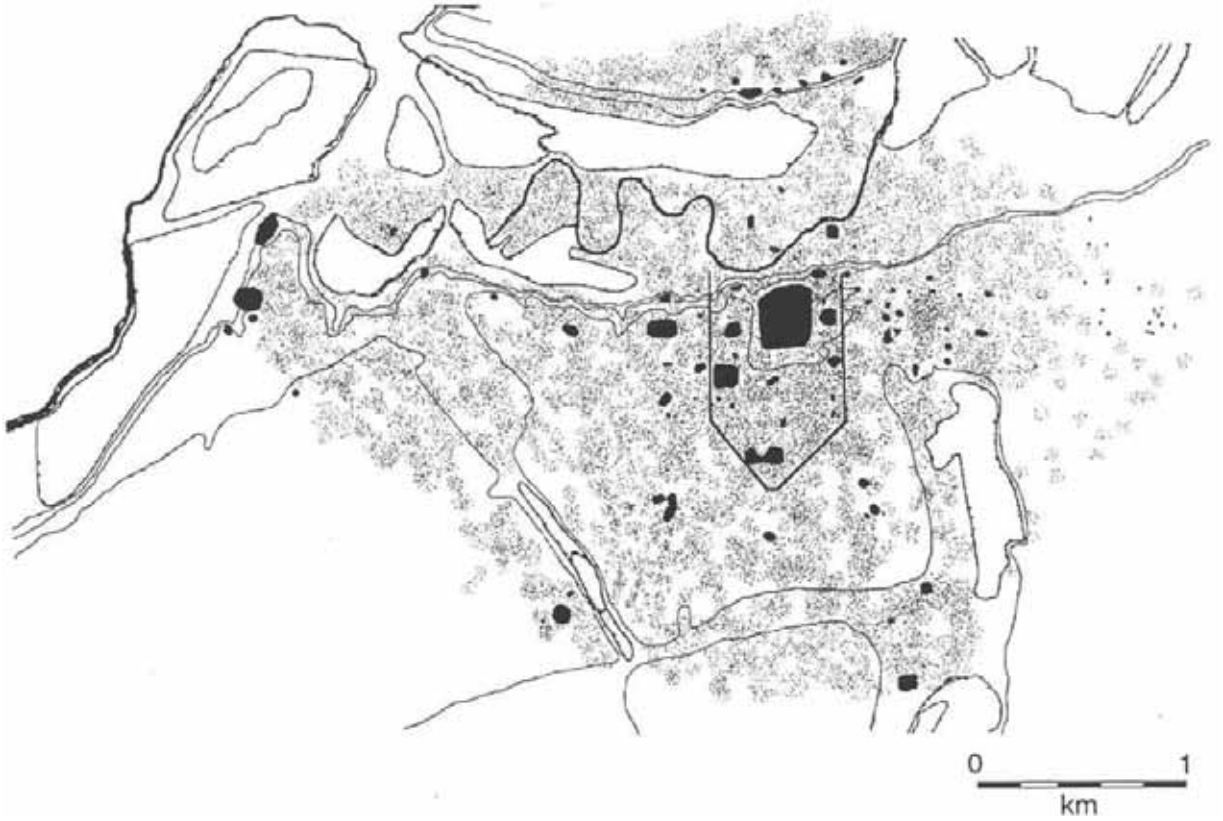

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