Summary. — Attempts by external agencies to intervene in the operation of local resource exploitation strategies frequently include reference to historical arguments. These vary in accuracy and sophistication but are nevertheless rhetorically useful since discussions of economic or environmental sustainability or degradation are substantially strengthened by historical comparisons and precedents. Focussing on examples of indigenous intensive agriculture in eastern Africa, this paper argues that relevant evidence of this sort is often unavailable or far from unambiguous. It is therefore necessary to be critical of the ways in which perceptions of the past are invoked within these discourses, and to be aware of the strengths and weaknesses of historical arguments in this regard.

Key words — historical ecology, archeology, intensive agriculture, indigenous knowledge, east Africa

1. INTRODUCTION

Many debates concerning rural development and conservation in Africa and elsewhere have focussed not on the present or future—as one might expect—but on the past. Conservationists may present landscapes as virgin territory unaffected by local populations (for reviews and critiques of which see, for example, Anderson & Grove, 1987; Fairhead & Leach, 1996); proponents of the extension or reappraisal of indigenous knowledge tend to emphasize the longevity and environmental sustainability of local cultivation techniques (e.g., Alteiri & Koohafkan, 2008; Harrop, 2007); supporters of modernization may highlight examples of local environmental degradation or stress the inadequacies of indigenous techniques in the face of perceived social, economic, or environmental crises (see, e.g., Rocheleau, Steinberg, & Benjamin, 1995; Lambin et al., 2001); and proposed interventions may rely on models of ecological or social change that are implicitly historical or which are themselves extrapolated from historical case-studies (see, e.g., Boserup, 1981; Siedenburg, 2006). As much of this research attests there is nothing new about the invocation of the past in such debates, but historical arguments remain of pivotal importance and indeed are now discussed from a range of disciplinary standpoints including ethnobiology/ethnobotany (e.g., Sillitoe, 2006), historical ecology (e.g., Baleé, 2006), indigenous knowledge (e.g., Briggs, 2005), resilience theory (e.g., Constanza et al., 2007), applied archaeology (e.g., Erickson, 2006), and through the consideration of the role to be played by property rights legislation; the latter encompassing historical perspectives owing to the need to identify where and by whom particular technologies, lands or genetic resources were first employed (e.g., Brush, 2007; Sillar, 2005).

This referencing of the past within such discussions is arguably inevitable, since any appeal to the twin concepts of sustainability and conservation invites comparisons between the contemporary and historical situations on the grounds that both refer to the need to balance short-term gains with long-term resource maintenance. Since the future is unknown, the sustainability of a system must be predicted either through experimentation or by reference to the behavior of similar systems in the past. The histories of specific economies or environments may therefore be employed as potential sources of positive or negative precedents on the grounds that if sustainability can be demonstrated in the past, then this at least suggests the possibility of future sustainability. Conversely, if a mode of resource use can be shown to have caused environmental depletion in the past, or can be likened to a past community that collapsed or suffered as a result of similar practices, then this would seem to indicate that the system in question is unsustainable. This is putting the argument crudely, perhaps, but examples of these positions persist, and will be illustrated here through the general case-study of indigenous irrigation- and terrace-using agronomies in eastern Africa.

Given that few if any environments can be conclusively described as unmodified by previous periods of human exploitation, other economic and land-use practices from Africa or elsewhere could be employed to examine this relationship between sustainability debates and historical knowledge (e.g., Fairhead & Leach, 1996; Shetler, 2007). Nevertheless, this paper concentrates on east African indigenous irrigation and terrace systems for several reasons. First, a number of these agronomies have themselves been cited as potential paradigms of sustainable development, but have also been denigrated as examples of economies on the brink of collapse through resource degradation. They thus serve to illustrate the ways in which historical arguments are marshalled to justify intervention in the name of economic or environmental stewardship. Second, related models of increasing agricultural intensification proposed by Malthus (1985 (1798)) and Boserup (1965) have proved extremely influential to developmental thinking.

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and have been applied to these agricultural systems. However, the appropriateness of these models to specific African rural economies has been questioned by what are in effect historical critiques (e.g., Börjeson, 2007; Conelly, 1994) and, indeed, the schema presented by Boserup is itself partly defended by recourse to historical and archeological case-studies (Boserup, 1981; see also Netting, 1993). Third, although no similar projects have been undertaken in Africa, attempts to employ archeological data to define and rehabilitate abandoned indigenous resource strategies elsewhere in the world have understandably focussed on structures with very high archeological visibility such as agricultural terraces and irrigation features (e.g., Erickson, 1998 (1992); Kendall, 2005). The experiences of these projects thus aid in an appraisal of the feasibility of this approach in eastern Africa, but are primarily referenced here to highlight to a non-archeological audience how these historical interpretations are constructed, and the implications of this as regards the use of historical narratives in assessments of sustainability. Fourth, since several of these agronomies have their origins in the precolonial period but persist in modified forms up to the present, they offer opportunities to explore the strengths and weaknesses of paleo-environmental, archeological, historical and observation-based sources of evidence. Indeed, lack of historical detail regarding the operation of these systems well into the 20th century means they also act as useful examples of how archeological techniques may inform reconstructions of the relatively recent past, and highlight the degree to which archeological interpretations rely on analogies drawn from historical and observational sources. Finally, given that the histories of these African agronomies remain poorly understood, they also serve to emphasize how historical arguments are employed even in the absence of good historical data.

It should perhaps be stated at the outset, however, that the focus of this paper is not on the deliberate misrepresentation of local history by those seeking to justify intervention or to secure funds (see, e.g., Ferguson 1990). Rather, the chief concern is the use of implicit or explicit historical arguments within conservationist and developmental narratives pertaining to these agronomies, with such arguments ranging from assertions that aspects of local resource-use should be encouraged or exported, to conclusions that particular practices have had detrimental consequences in the past. Although the emphasis here is on the precolonial past this issue applies equally to studies of late-20th century change, since in all such arguments the relationship between historical data and predicted future response is an act of interpretation and is therefore never unproblematic. Studies employing very different sources or evidence from a variety of disciplinary backgrounds may therefore reach very similar conclusions when attempting to translate this data into policy objectives. In short, while this paper makes no pretense to being a comprehensive review of either the historical or developmental literature pertaining to these economies, the brief overview offered here is presented to stress the need to be critical of the ways in which perceptions of the past are applied within broader debates.

2. DEGRADATION, SUSTAINABILITY, RESILIENCE, AND THE RHETORICAL USE OF THE PAST

The precolonial irrigation- and terrace-using agronomies of eastern Africa defy simple models of their origins based on environmental determinism or population-push intensification having developed in a range of ecological and social environments at various times over at least the last 600 years. Recently referred to as “islands” of intensive agriculture (Widgren & Sutton, 2004), these systems include extensive areas of agricultural terraces in the Harar and Burji-Konso areas of Ethiopia, in the Kigezi district of Uganda, in the Pare mountains of Tanzania and on the islands of Ukara, Rushinga and Mafangano in Victoria Nyanza, while extended networks of irrigation and drainage features include those at Konso in Ethiopia, at Sonjo, Pare, Meru, Kilimanjaro and Usambara in Tanzania, and at Marakwet and Pokot in the Kerio Valley, Kenya (for gazetteers see Anderson & Adams, 1988; Grove & Sutton, 1989), see Figure 1. As noted, the ability of these agronomies to support large rural populations and the use of apparently low-cost soil and water conservation techniques have led to the suggestion that they might act as paradigms for small-scale, low external input, sustainable resource use as promoted by the concept of “development from below” (Stöhr & Taylor, 1981) and by the United Nation’s Agenda 21 (UN, 1992, reaffirmed 2002). There is also the perceived added advantage that several of these areas employ “zero” tillage agriculture as endorsed by contemporary conservationist policies, and thus may have helped maintain the Eastern Afromontane “biodiversity hotspot” (Brooks et al., 2002). The irrigation system at Marakwet, for example, has been described as potentially paradigmatic on the basis of its “non-bureaucratic management” (Senyongo, 1983, p. 96; see also Moore, 1983, p. 132), while the use of stone terraces and water harvesting structures at Konso were described as one of a select few “lessons from the past” by a UN scheme for land conservation and rehabilitation in African (FAO, 1990). Similarly, the precolonial irrigation structures in North Pare have been the focus of a series of rehabilitation programmes from the early 1990s, first as a joint project by the Dutch and German development agencies SNV and GTZ (Sheridan, 2002) and now as part of ongoing initiatives by the local agencies TIP and PADEP. Similar projects have been attempted or advocated for South Pare (Yoshida, 1985), Usambara (Kasawamila & Masuruli, 2004; Sokoni & Shechambo, 2005) and Kilimanjaro (Grove, 1993; Lein, 1998) in Tanzania. In addition, the existence of forested areas within or alongside the agricultural landscapes in both Pare and Usambara has been cited as evidence of the existence and efficacy of “indigenous conservation” (Gillson, Sheridan, & Brockington, 2003; Stocking & Perkin, 1992).

Whether implicitly or explicitly, these endorsements of local practices employ perceptions of environmental and economic history despite the fact that in the vast majority of cases the histories of these areas remain fragmentary at best. As was touched upon above, this apparent paradox results from a series of interrelated arguments that require or could be substantially strengthened by the inclusion of an historical dimension. These take the form of direct and sometimes simplistic comparisons between the history of indigenous cultivation and the history of previous interventions, or between the history of African agriculture and the agricultural history of the developed world. Arguing for the potential sustainability of local practices by contrasting these with the detrimental social, economic or environmental consequences of previous attempts at modernization can certainly be seen in this light (e.g., and discussions see Adams & Anderson, 1988, pp. 529–530; Adams & Grove, 1984; Chambers, 1973), as can research which demonstrates that the Malthusian crises predicted by earlier assessments of local agriculture have yet to take place (e.g., Carswell, 2007; Rocheleau et al., 1995; Tiffen, Mortimore, & Gichuki, 1994). Studies that question whether local environments are as pristine or as historically stable as imagined within degradation narratives would also fall into this category.
In terms of the agronomies discussed here, however, the prevalence of the use of historical arguments in discussions of their future can also be attributed to high levels of landscape modification. While it may be superficially plausible to present open grasslands and forested areas as “unoccupied,” “virgin” or “natural”—that is as being without history—the same clearly cannot be said for large areas of agricultural terracing or for fields served by complex systems of irrigation channels. The crude rhetorical device of denying a local history of resource use to justify the colonial appropriation of land or to validate external intervention (e.g., Anderson & Grove, 1987; Shetler, 2007) was thus never applied to these areas, since the sheer physical presence of highly modified landscapes appears to attest to a long history of cultivation.

At their simplest, then, the use of historical arguments by proponents of indigenous knowledge might merely represent the perception of a direct relationship between longevity of occupation and the sustainability of local techniques; an approach that is apparently reflected in the UN’s stance that indigenous groups “have developed over many generations a holistic traditional scientific knowledge of their lands, natural resources and environment” (UN, 1992, p. 26.1).

Leaving aside for the moment the problematic historical assumptions contained within such statements, it is noteworthy that this line of argumentation is essentially the same as that employed in colonial period accounts and policies which acknowledged the potential longevity of indigenous agronomies but which equated antiquity with a lack of recent technical progression. Note, for example, that attempts to improve and rationalize the 250 km of main irrigation channels in Marakwet, Kenya, from the 1930s onwards included overt references to a perceived history, such as those by a Provisional Commissioner in 1933 who reported that “so far as I can judge when their more energetic and enterprising ancestors dug the furrows that are in use today” (cited by Adams, 1996, p. 160; see also Anderson, 2002, p. 272 in reference to similar comments regarding Baringo, Kenya). At this highly rhetorical level, then, allusion to the past is used to demonstrate a lack of modernity and hence a need for modernization. Yet in very general terms, the concept of indigenous knowledge as a developmental trope may work at a similar level of abstraction by viewing any evidence of prolonged occupation as proof of sustainability.

It is, of course, something of a caricature to suggest that all colonial period narratives saw these agronomies as ancient and backward or that all proponents of indigenous knowledge view them as long-lived and sustainable. Indeed, the potential benefits of aspects of indigenous soil conservation techniques were seriously explored by British colonial authorities in West, East and Southern Africa in the 1920s and 1930s, albeit with differing levels of commitment and with various concessions to local economics and politics, particular as regards the interests of white settlers (for discussion of which see Anderson, 1984; Beinart, 1984; Richards, 1985). This dichotomy may thus be something of a straw man. Nevertheless, the point to be emphasized here is not simply that these competing narratives produce opposing conclusions, but rather that they do so by reference to unsubstantiated perceptions of the past. Moreover, there are clear echoes of this approach in the application of neo-Malthusian and Boserupian models within developmental narratives, not least because both of these related schemes appear to provide an unambiguous trajectory for agricultural change and a definition of the conditions under which this change will occur. In consequence—and without wishing to include a lengthy outline or critique of these models here—there is a danger that they will be used not just predicatively but as substitutes for historical data on the grounds that the reactions of any given community to specific stimuli are assumed to be well understood (a shortcut to historical interpretation that has also proved tempting to historians and archeologists, see Morrison, 1996).

While it is recognized that these models lend themselves to the production of crisis narratives and that such narratives may in some cases be consciously employed to raise awareness and funds (e.g., Rocheleau et al., 1995), to do so is to risk having one’s broader case undermined by historical critiques. Hoben (1996), for example, highlights the prevalence of neo-Malthusian arguments in debates surrounding large-scale terrace building projects in Ethiopia from the 1980s onward, but also points out that these narratives are supported by reference to a vague and unsubstantiated past, itself “a period seldom defined more precisely than “before the present century.”” (ibid., p. 196). Note too that although advocates of indigenous knowledge are apt to view terraces and irrigation features as examples of indigenous soil and water conservation (e.g., Reij, Scoones, & Toulmin, 1996) and thus as “investments” in “landesque capital” (e.g. Widgren, 2007, pp. 62–63), the models proposed by Malthus (1985) and Boserup (1965) both anticipate that a community will only develop labor intensive technologies when prompted by stress, and both expect this to happen only at a relatively late stage in the development of intensive agriculture. The same kinds of agricultural features are thus viewed as evidence of either good or bad land husbandry: as either positive or negative precedents. Deciding between these two extremes for specific instances therefore requires detailed historical evidence.

In essence, therefore, the position here is that current deficiencies in historical data make invocations of the past in support of particular policies or paradigms somewhat rhetorical, yet this is rarely the impression received from the existing literature. What, then, is the way forward? One approach, of course, would be to initiate targeted research that aims to address historical questions raised by developmental or conservationist debates. Demands for work of this kind range from the very specific to the extremely complex: an example of the former including the call by Gilson et al. (2003, p. 384) for archeological and paleo-environmental research to test hypotheses regarding local forest management in Pare, Tanzania, while the latter is best represented by the ambition among resilience theorists to produce long-term historical models which recognize the level of interaction between social and ecological systems and that can account for non-equilibrial dynamics and for social and environmental disjunctions (e.g., Holling, Berkes, & Folke, 1998; Redman & Kinzig, 2003; Constanza et al., 2007).

However, even advocates of resilience theory acknowledge that this is more an aspiration than an immediate goal, and note that at present the problem of how to account for culturally specific and historically contingent human actions means that these tend to be equated with anomalies highlighted by the modelling process (Dearing, 2007, p. 51; Oldfield, 2007). While these and other writers thus argue that well understood historical case-studies will form a pivotal role in testing resilience models, they accept too that in some instances this necessary historical detail may be indiscernible at the scale required (as has been suggested by Brockington and Home-wood (2001, p. 475) regarding the role of pastoralist production in shaping the ecology of Mkomazi Game Reserve, Tanzania), and that subsequent changes to the social, political
or ecological environment may be sufficient to make comparisons between the historical and modern situation problematic (a view espoused by McCann (1990) in reference to a brief period of agricultural intensification in early 20th century Ethiopia). Widgren’s (1999, p. 6) initial stated aim of attempting to define a “common explanatory framework” for why some African intensive agronomies appear resilient to ecological, political, or economic shifts while others are abandoned is thus extremely ambitious, and is certainly complicated by lack of good historical data for many of the potential case-studies (Widgren, 2004, p. 11). Until such time as these histories are better understood, therefore, it will be necessary to remain wary of any claim that the history of a particular African agronomy can act as a source of positive or negative precedents, and indeed even the apparently innocuous practice of including an historical background to provide pre-disturbance baselines needs to be treated with caution.

3. THE PAST AS BACKGROUND

It is a common if not ubiquitous practice to include a summary of the history of an area as an introduction to a given case-study or environmental impact assessment. On the face of it such summaries are benign, but become problematic where poorly understood or ambiguous histories are presented as well-established facts. Furthermore, whether or not these sections are intended to be read as offering accurate socio-economic or ecological baselines for the analyses that follow, they nevertheless risk being seen as providing precedents and are therefore employed either implicitly or explicitly in support of the report’s findings.

In what is ostensibly an examination of factors affecting that adoption of “improved” traditional soil conservation techniques in the North Pare and West Usambara mountains, for example, Mbaga-Semgalawe and Folmer (2000, pp. 222–223) present a short history of agriculture in the highlands of northeastern Tanzania; an area that encompasses Kilimanjaro, Meru, Arusha, North and South Pare, and the East and West Usambaras. To do so is inherently to generalize a complex and highly varied history. Indeed, despite advocating the use of what they describe as traditional soil and water conservation methods (including furrow irrigation, terracing, zero-grazing, minimum tillage, intercropping and mulching) Mbaga-Semgalawe and Folmer imply that all of these techniques date to the early 20th century (2000, p. 322); assert that “In the beginning of the 18th century most of the northeastern mountains of Tanzania were covered in natural forests” (ibid.); state that fallowing became impossible because “By 1936 all arable land was under cultivation” (ibid.); and claim that as a result “most of the soil cover was removed, rivers and springs dried up and land productivity started to decrease due to soil degradation” (ibid.). Every one of these statements is contentious, not least because they deny the existence of a complex precolonial history of cultivation in these areas. Under such a reading local practices are therefore neither ancient and backward nor long-lived and sustainable: they are recent, crisis driven and, moreover, unable to cope with a worsening situation without external intervention. The intention in offering this summary is thus presumably to establish the historical background to the problems they seek to explore and redress, yet the result is to weaken their case through the inclusion of detail that is at best uncertain and at worst inaccurate. At the risk of doing the same by countering this position with an overly simplistic summary, it is instructive to outline briefly the extent of some of these errors.

From an historical standpoint, the uncorroborated and unusually precise dates cited for several processes are cause for concern. To take Kilimanjaro as an example, although land shortages and soil erosion were both sources of unease by the 1930s, fallowing, swidden cultivation, the use of soil conservation techniques and the clearance of formerly uncultivated land for agriculture, were all apparently practiced at this time (Curry, 1939; Swynnerton, 1949). Similarly, far from being seen as solely a problem stemming from the local African population, anxieties about increasing pressures on land and water resources were generally expressed in reference to competition between African farmers in the highlands and European owned farms and industry in the foothills and surrounding plains (Kanthack, 1938, p. 16; Lein, 1998; Swynnerton, 1949, p. 122). Moreover, in contrast to Mbaga-Semgalawe and Folmer’s suggestion that indigenous agricultural technologies such as irrigation postdate the foundation of colonial rule, various early European observers not only reported the existence and potential antiquity of the network of water channels on Kilimanjaro, but also commented favourably on its extent and technical assurance (e.g. Johnston, 1886, p. 120; New, 1873, p. 370; Swynnerton, 1949, p. 124). Indeed, despite citing Kimambo (1991) in reference to protests against the colonial imposition of bench terracing in Pare, this summary ignores Kimambo’s (1991, pp. 20, 22) references to precolonial terracing and irrigation in this area; the latter practice undertaken from at least the 18th century and possibly for up to two centuries earlier (see also Häkansson, 1995, pp. 303–304; Kimambo, 1969, p. 80; Sheridan, 2002). Parallel cases can be made for the technologically similar and possibly related irrigation systems employed in several of the precolonial polities on the southern slopes of Kilimanjaro (Devenne, 2006; Masao, 1974; Stahl, 1964, pp. 26, 211–212, 301; Tagseth, 2006, p. 495), on Mount Meru (Spear, 1997, pp. 17, 25), and within and around the Usambaras (Feierman, 1990, p. 65; Koponen, 1988, pp. 232–233 citing Holst, 1893).

Taken together, then, the use of soil and water conservation techniques has a far longer history in highland northern Tanzania than the century or so implied by Mbaga-Semgalawe and Folmer (2000). Yet, as noted previously, this historical evidence presently lacks the precision to allow simplistic correlations between apparent longevity of cultivation and agricultural sustainability. Indeed, in the case of North Pare, the suggestion that soil and water conservation techniques exist alongside examples of indigenous forest conservation has been challenged by studies which query the assumption that extant sacred groves represent relics of precolonial forests, chiefly on the basis of records of colonial tree-planting schemes and by reference to early European observations of a largely treeless landscape (Gillson et al., 2003; Häkansson, 1995, citing Baumann, 1891). The area’s reputation as a centre for iron production in the late precolonial period further suggests at least the possibility that deforestation resulted from local extraction of fuel wood (Gillson et al., 2003, pp. 373–376; Häkansson, 2007, citing Kersten, 1969, II, p. 19; Meyer, 1893, p. 223; Sheridan, 2002, p. 83, citing von der Decken, 1978 (1871), p. 17), and invites questions regarding the possibility that this process was combined with the clearance of forests for agriculture.

Criticizing individual authors within the developmental literature for a lack of historical precision is, of course, unfair, and it is perhaps worth noting that an historian is unlikely to be censured for failing to provide recommendations for the future of the area under study. Nevertheless, at some level the historical detail included in reports of this type
influences the conclusions drawn by either the authors or readers; most obviously in this case by the suggestion of an ongoing process of extreme environmental degradation over a very wide area and dating back some 70 years. Although still far from fully understood, a more nuanced understanding of the history of these areas indicates—perhaps inevitably—that the past is considerably more complex, and thus does not allow the formation of simplistic equations of cause and effect, problem and solution.

4. THE PAST AS NEGATIVE PRECEDENT

If caution therefore needs to be exercised in the formation of simple formulae regarding systemic sustainability, then the opposite—equating abandonment with systemic failure—should also be avoided. Writing from an archeological perspective Barker and Gilbertson (2000, p. 4) question the assumption that “people sowed the seeds of their own destruction [...] by developing irrigation systems that caused salinization, or by stripping the landscape for fuelwood, or by allowing their livestock to over-graze the vegetation,” and go on to observe that “In general, the debate has been characterized more by confident assertions than well-founded argument” (ibid.).

In terms of east African agriculture such assertions inevitably focus on the site of Engaruka, this being the largest irrigated and terraced agronomy to have been comprehensively abandoned prior to colonial contact, with calibrated radiocarbon dates indicating that the area was farmed between the 14th and 18th centuries AD (Laulumaa, pers. comm.; Sutton, 1998). In the introductory section to an environmental history that explores changing attitudes to intensive cultivation and forest management in the Usambara Mountains during the 20th century, Conte (2004, p. 25) thus briefly refers to this site, concluding that:

The more sophisticated and specialized the system of terraces and furrows became [...] the greater the potential for soil exhaustion, and the more precarious its owner’s subsistence situation. Ultimately, the Engaruka works proved unsustainable and their failure forced its inhabitants to migrate.

Although it should be stressed that this interpretation is not untenable and is made with reference to the archeological surveys and discussions of the site conducted by Sutton (1984, 1989), Conte’s conclusion nevertheless serves as an example of an historical case-study simplified to the point of inaccuracy, and has echoes of Koponen’s (1988, p. 383) assessment that the agronomy “ended in a complete cul-de-sac”; the implication within the wider context of Koponen’s analysis being that Engaruka offers a rare example of the local mismanagement of resources in the precolonial period. In fact, whilst anthropogenic resource depletion remains a possibility—specifically as regards a hypothesis of diminishing river levels resulting from river catchment deforestation (Sutton, 1998, pp. 24, 34)—the assertion that locally induced resource degradation led to forced desertion must be regarded as premature. Soil exhaustion or the accumulation of salts or alkalis as the result of prolonged periods of irrigation now seem doubtful as causes of abandonment (Stump, 2003, 2006), with the most likely explanation being declines in river flows as is illustrated by the presence of irrigation features fed from what are now permanently dry river beds (Sutton, 1998, p. 11; Stump, 2006). In contrast to the view that the visible remains of this irrigated landscape resulted from the short-sighted extraction of available resources, it is now clear that the agronomy developed gradually over a period of perhaps four centuries (Stump, 2006) and that it persisted during a comparatively dry period that spanned the early 16th to mid-17th centuries (Westerberg et al., 2007).

Obviously, these authors cannot be criticized for not referencing this more recent work, but from the perspective of the current discussion it is noteworthy that the summaries offered by both Conte and Koponen remove Sutton’s numerous caveats regarding uncertainty and the need to test various possible hypotheses. Doing so allows the presentation of definitive conclusions that appear to add both temporal depth and balance to their respective positions; a point that is particularly relevant to Koponen’s discussion given that his stated aim is to explore the veracity of Kjekshus’s (1977) thesis that precolonial communities in what is now Tanzania were capable of production far above subsistence level and were generally well adapted to their environments. Once again, then, it is necessary to be critical of the ways in which invocations or perceptions of the past are employed within broader discussions and to be aware of the processes through which these pasts are constructed and presented.

Indeed, it is interesting to note that Engaruka is even mentioned in reference to overstocking degradation narratives at the Mkomazi Game Reserve, Tanzania, with Brockington and Homewood (2001, p. 459) citing correspondence between a game warden and a local Member of Parliament dated 1966 in which it is stated that “In a short time this area will become like the desert of Engaruka [...]. We will shortly face the prospect of the River Umba drying up because the trees around the river have been finished off and pushed over by cows.” Clearly in this instance Engaruka’s past was not being cited as part of a case-specific background history, but it was nevertheless invoked as a precedent of what may occur if processes perceived as damaging to the Mkomazi area were allowed to continue unchecked. Regardless of the historical accuracy of this correlation between abandonment and mismanagement, the relic field system at Engaruka remains an unusually visible apparent “lesson from the past.” Watson (2007, pp. 220–222), however, cites a similar example of an alleged negative precedent at a landscape scale, though in this instance the use of images of severe soil erosion alongside descriptions of overexploitation in an NGO’s promotional literature regarding Konso, Ethiopia, would appear to be at best careless and a worse deliberate misrepresentation. As Watson points out, the degraded landscape lies outside the area currently farmed, and is mentioned within the oral tradition of one lineage of ritual leaders as having been eroded at the time this lineage was established at some as yet undefined time in the distant past (ibid., 85, p. 221). Given that local soil and water conservation techniques at Konso have also been cited as a positive precedent by the FAO (1990), this example illustrates how organizations with similar objectives might select opposing historical narratives to support the case being made.

Over the course of the 20th century this tacking between admiration and denigration of local cultivation is perhaps most obvious in reference to the agronomies on Kilimanjaro, Tanzania, and within the Kerio valley, Kenya; repeated external intervention in the latter having been justified during the colonial period by the apparently sincere beliefs of a series of Agricultural Officers who saw the indigenous irrigation system as technically impressive, but as wasteful of water, a contributor to soil erosion, and as having undergone a period of decline since its precolonial heyday (Adams, 1996). Indeed, it is interesting to note that the poor record of these colonial interventions and that of the Kerio Valley Development Authority (from 1979 onwards) were subsequently viewed as negative
precedents in their own right by the various historians, anthropologists, geographers, archeologists and development specialists who contributed to Kipkorir, Soper, and Ssenyonga (1983).

5. THE PAST AS POSITIVE PRECEDENT

As already discussed, several of the intensive agricultural systems in eastern Africa with precolonial origins have been cited as potential paradigms of sustainable indigenous knowledge despite the absence of long-term historical, archeological or paleo-ecological data. Indeed, for the majority of these agronomies, the history of exploitation is uncertain even for the late 19th and early 20th centuries, with reliable dates for inception only available for the comparatively late examples established during the 19th century at Arusha, Tanzania (Spear, 1997) and at Baringo, Kenya (Anderson, 2002). At present, then, although historical research has been able to date specific elements of these agronomies such as individual irrigation schemes (e.g., Kodalo, 2000; Tagseth, 2006), this in itself only indicates that the technology is long-lived, and does not necessarily demonstrate continuity of function. The irrigation system that later supported the cultivation of coffee as a cash crop on the southern slopes of Kilimanjaro, for example, originally developed at least two centuries earlier as a means to supply domestic water and to irrigate finger millet (Devenne, 2006; Stump & Tagseth, 2009; cf. Burra & van den Heuvel, 1987). Holling’s notion of resilience as the capacity to “absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks” (Walker, Holling, Carpenter, & Kinzig, 2004), thus faces the problem that defining these dynamics may require an essentially subjective decision as to what level of alteration constitutes the creation of a fundamentally different system to the one that preceded it. A similar concern arises from those readings of local history that see refutations of earlier negative assessments as demonstrating sustainability (see Figure 1).

This point too has been touched upon above in relation to the tendency to compare the apparent longevity of local adaptations to the perceived failures of earlier attempts at intervention; a relationship succinctly summarized by Adams and Anderson (1988, p. 333) who note that “certain indigenous sites [...] offer a model that has far outlasted any modern development.” This relationship of course applies equally to large-scale damming, drainage or relocation projects, but in terms of the current discussion is most relevant to attempts to intercede in the management of local economies, especially where external involvement was partially justified by reference to perceived evidence of locally induced environmental degradation (e.g., Adams, 1996; Kanthack, 1938). Research that empirically qualifies these earlier narratives or which highlights the political motivation or methodological assumptions behind their conclusions may, therefore, overturn previous assessments regarding systemic vulnerability. The east African historical studies that come closest to demonstrating positive presidents could thus be characterized as critiques of the application of neo-Malthusian degradation narratives to particular agronomies (Carswell, 2007; Tiffen et al., 1994), though similar research that questions the applicability of Boserup’s (1965, 1981) model of agricultural change (e.g., Borrison, 2007; Conelly, 1994) are also of relevance given the former influence of this model as regards technical modernization and the perceived need for tenure reforms to promote private ownership (Tiffen, 1996 citing Boserup, 1970). By demonstrating that earlier predictions of imminent systemic collapse dating back over half a century have as yet proven unfounded, such studies suggests that the featured agronomies may act as positive precedents of locally developed resource maintenance regimes in the face of increasing population. Thus, comparisons between surveys carried out by colonial Agricultural Officers and the recent re-examination of these same transects in Kigezi District, Uganda, show that fallow lengths—Boserup’s ready-reckoner of the degree of intensification (1965, p. 28, 1981, p. 19)—have actually been increasing over the course of the 20th century (Carswell, 2002). Governmental and NGO assessments dating to as recently as 1994 which forecast catastrophic soil exhaustion due to “poor farming practices” (Uganda Government, 1994, cited by Carswell, 2002, p. 132) therefore seem equally questionable.

This having been said, Carswell is wary of equating this reappraisal with an assessment of future sustainability, since these new data merely refute the time scales and carrying capacities mentioned in earlier forecasts and do not necessarily disprove the overall thesis that continued pressure will one day cause severe problems. This is the conclusion drawn by Brockington and Homewood (2001, p. 457) with reference to the study by Tiffen et al. (1994) which demonstrates a five-fold increase in population alongside evidence of decreasing erosion levels in the Machakos area of Kenya, despite predictions of irrevocable soil damage from the 1930s onwards. Moreover, in the course of this argument it is further emphasized that historical analyses of this sort are rarely in a position to compare like with like; a point illustrated for the Kigezi and Machakos studies through the recognition of contemporary economic options such as out-migration and non-farm incomes that were less readily available at the time of the initial forecasts (Carswell, 2002, p. 138; Murton, 1999; see also Conelly, 1994). Indeed, these and other factors are contributing in many small-scale rural societies to the erosion of customary hierarchies and to the falling credibility of supernatural repercussions for unauthorized resource use (e.g., Grove, 1993; Sheridan, 2002), both of which mean that previously effective techniques may prove difficult to replicate in the future. One can criticize the political manipulation of degradation narratives, therefore, but this does not in itself demonstrate the sustainability of local technologies as regards possible future threats, of which the most obvious are still population increases and climate change. In short, just as demonstrating that earlier predictions of environmental collapse have yet to occur does not mean this situation will be avoided indefinitely, so recognizing the political co-option of a particular narrative cannot be viewed as proof that these conclusions are necessarily unsound (Brockington & Homewood, 2001, pp. 449, 457). Positive precedents are not only harder to identify within the historic record, therefore, but they also do not automatically follow from the rejection of former negative assessments.

6. APPLIED ARCHEOLOGY AND THE ETHNOGRAPHIC PAST

The problem of how to translate past performance into predictions of future success represents a serious stumbling block for any attempt to invoke historical data in support of contemporary policies, and is certainly not avoided by drawing the more general conclusion that the level of dynamism and complexity displayed within African agricultural history suggests individuals will inevitably find workable solutions to current or future problems provided they have sufficient freedom to continue to experiment with and refine a range of
techniques, technologies and crops (Niemeijer, 1996, pp. 102–103). Indeed, although Niemeijer (1996, p. 87) advocates what he describes as “a new development paradigm” built around “a diachronic approach that is firmly based on an understanding of the past,” such a conclusion is so wide-ranging that it could be made in the absence of historical data in that it is effectively a statement that individuals in Africa generally cope to some extent. The position thus says nothing about sustainability or about relative standards of living, health or life expectancy in the developed and developing worlds, and says still less about these issues in the past.

Despite this fact, Niemeijer also endorses a more targeted approach that takes account of particularistic and culturally specific factors over the long-term such as long fallow regimes and the maintenance of delayed reciprocal relationships with neighboring communities. Such an stance has clear affinities with the emphasis among historical ecologists on the history of interaction between humans and environments within specific landscapes, and shows further similarities with historical ecology as regards the recognition that former or ongoing resource-use practices can have both positive and negative consequences for modern communities, for example, by leading to increases as well as decreases in the nutrient levels of cultivated soils (Niemeijer, 1996, p. 104; cf. Baleé, 2006, pp. 84–86). Moreover, by suggesting that this research should focus not just on the technologies and techniques employed today but on the processes by which these strategies were developed through time, Niemeijer recognizes the significance of change and adaptation as regards the identification of potential positive or negative precedents; a contention that receives support from the example of how an appreciation of the gradual development of the agronomy at Engaruka casts doubt on the assumption that its abandonment resulted from the shortsighted over exploitation of resources.

Niemeijer is therefore no doubt right to highlight to a developmental audience that some of its number may have underestimated the degree of complexity and dynamism evidenced in the historical record of Africa’s past, and in doing so critics attempts to restore an imagined precolonial stability and simultaneously counters the accusation that

Figure 1. Intensive agricultural systems with precollonial origins in eastern Africa.
proponents of indigenous knowledge take an ahistorical and potentially romanticized view of non-western, small-scale communities as homogenous, technologically static and intellectually conservative (see also Briggs, 2005, 107–109). However, by emphasizing the degree and rate of change within African economies and the complexity of intra- and inter-societal relationships Niemeijer also highlights the difficulty in gaining access to the level of historical detail required under this new paradigm. Historians, archeologists and paleo-ecologists would certainly question the assertion that “environmental change is relatively easy to document through the study of sediments, lake levels, pollen analysis, and so on” (Niemeijer, 1996, p. 94) in that it would seem to take an optimistic view of the temporal resolution of paleo-environmental reconstructions (Butzer, 1996, p. 144), ignores the problem that these proxies may record very localized effects (ibid.) over-learn the problem that documentary or oral historical sources may provide very limited data regarding the physical or technical aspects of an agronomy and its development.

The very robust and detailed case-studies of past practices required by historical ecologists, resilience theorists and by Niemeijer’s “new paradigm” are thus likely to consist of archeological, historical and paleo-environmental evidence combined with observational data drawn from research into current social and ecological systems. In fact, the practice of employing modern ethnographic observations or evidence from relatively well-defined historical case-studies to flesh-out deficiencies in historical and archeological data is an extremely common interpretive device and is arguably an essential feature of all historical reconstructions. There is a danger, therefore, that in the absence of an explicit exposition of sources and inferences, historical interpretations of this kind will be employed in misleading and circular arguments whereby ethnographic analogies are used to produce historical case-studies which are then cited within the ethnographic and developmental literature as evidence of the continuity of local practices (Stahl, 2001, p. 25). Stahl refers to the histories thus produced as “ethnographic pasts” (2001, p. 22 following Chance, 1996) and notes that these risk reinforcing the stereotype that African communities are historically static. Yet in the context of the current discussion there is an additional concern that these circular arguments will give the false impression that indigenous resource-use strategies are long-lived and hence both environmentally and economically sustainable. Indeed, although there has yet to be an attempt to revive elements of a wholly abandoned African agronomy to act as a positive precedent of local agricultural knowledge, the two projects that have attempted this in Andean Peru both emphasize this effect. Thus, in outlining the methodology and results of an attempt to re-employ Inca terraces and irrigation structures, Kendall (2005, p. 211) notes that the experience of operating aspects of this agronomy itself provided insights into historical value, observing that “the information gained in the present […] also became a feedback to help in the interpretation of the archeological data.” Similarly, Erickson’s (e.g., 1998 (1992)) description of the early stages of his raised field rehabilitation project in Peru further illustrates this point, since the first attempts to reconstruct and cultivate these abandoned features were undertaken as an exercise in experimental archeology designed to provide precisely the sort of social and technical detail that could not be discerned through the archeological data alone.

By attempting to re-run elements of now abandoned agronomies these applied archeology projects clearly treat the past as in some way paradigmatic, but they are also quite open about the potential benefits of incorporating more recent innovations, and about the need to include techniques for which there may be little or no historical or archeological information. In these instances this missing historical data includes not just social information such as how labor was organized, but also prosaic technical details such as crop rotations, following cycles, irrigation schedules and fertilization regimes. Such projects thus clearly represent an amalgam of historical and contemporary sources of data, but given the near ubiquity of historical arguments, models and allusions within attempts to define potential replicable modes of local resource exploitation, this could be said to be true of many indigenous knowledge projects.

7. CONCLUSION: ANCIENT AND BACKWARD OR LONG LIVED AND SUSTAINABLE?

In Africa, as elsewhere, perceptions of the past play a significant role in debates concerning the sustainable management of resources since any assessment of sustainability requires authoritative statements regarding the long-term consequences of a particular strategy. Conceptions of African agriculture thus rely on an historical dimension that is all too often ignored, imprecisely understood, or presumed to be somehow self-evident. Yet ignorance of this historical detail has not stopped the production of narratives which present African environments as “pristine,” “virgin” or “natural,” even where these areas have been employed for either expansive pastoralism or recurrent arable cultivation. Conversely, in those areas where the level of landscape modification clearly indicates that they have been subject to prolonged periods of permanent or recurrent cultivation, the application of conflicting models of agricultural change has led to contrasting conclusions regarding their future sustainability. The extant examples of east African intensive agriculture have thus been both denigrated and promoted, with proponents of external intervention emphasizing their antiquity in order to justify attempted improvements whereas advocates of indigenous knowledge have seen their apparent longevity as evidence of their economic and environmental sustainability. It is clearly misleading, however, to claim that local resource exploitation strategies are either unsustainable or environmentally appropriate in the absence of historical information concerning changes to the environment, climate or techniques of cultivation through time. Lack of historical depth and precision thus represents a substantial obstacle to contemporary debates that reference local economic practices, regardless of whether the discussants are proponents or detractors in respect of the value of indigenous knowledge.

Attempts to cite the history of African agriculture in defense of developmental interventions should therefore be viewed critically, principally on the grounds that this history is not sufficiently well understood at present to draw definitive conclusions, and is far too diverse both spatially and temporally to enable the formulation of simple “lessons from the past.” On the basis of current data, for example, the history of
Marakwet, Kenya, indicates that the techniques employed have allowed intensive agricultural production for at least four centuries and, as such, it might be tempting to conclude that aspects of the agronomy could be replicated elsewhere (Kipkorir et al., 1983, particularly Ssenyonga, 1983). Yet similar techniques in Arusha, Tanzania, are less than two centuries old and appear to be showing signs of strain insofar as the system requires increasing levels of labor-inputs to maintain soil fertility: the 19th century practice of rotating fields between crop production and cattle pasture having been replaced by the stallage of cattle with its attendant needs for the transportation of fodder and manure (Spear, 1997, p. 53). In contrast, the long predicted Malthusian collapse of the agricultural systems in Kigezi and Machakos have yet to occur (Carswell, 2007; Tiffen et al. 1994), though it is also noteworthy in the context of the current discussion that the use of historical arguments of this sort and the potential to predict future responses or to extrapolate to other areas have also been critiqued (Siedenburg, 2006).

At present, therefore, the state of historical knowledge regarding indigenous African agriculture is ambiguous in terms of development planning unless one takes the level of dynamism evident within these agronomies as an endorsement of the view referred to by Sillitoe (1998, p. 225) as “extreme empowerment,” that is local farmers have long demonstrated an ability to experiment with and make informed decisions about the usefulness of available technology and should therefore be given access to these resources and allowed to design their own solutions (ibid. citing Chambers et al., 1989; Scoones and Thompson, 1994, and others). As noted previously in relation to the discussion presented by Niemeijer (1996), such arguments are attractive in that they acknowledge the long history of dynamic and adaptive behavior displayed by local farmers, but the position is so vague as to be hardly an historical argument at all, and is really saying nothing more than African communities—in common with all societies worldwide—have largely muddled through to date. This is not to say that they can do so indefinitely (Brockington & Homewood, 2001). Moreover, the level of spatial and temporal variation and the extent of recent and on-going changes within these agronomies serve to illustrate that continuity of occupation cannot be equated simplistically with the concept of practice, and argues against the conclusion that the failure of large-scale interventions can be countered by promoting the “tried and tested” techniques employed by local communities (Adams & Anderson, 1988, pp. 532–535). Seen in this light the lesson to be taken from the history of local agricultural adaptations could be simply that agronomies, like ecosystems generally, are only ever provisionally stable (Behnke, Scoones, & Kerven, 1993), and that successful strategies rely on the convergence of largely non-replicable historical contingencies. Indeed, this is largely the conclusion drawn by McCann (1990, p. 133) who regards the brief intensification of sorghum production that took place in the Mazega lowlands of northwest Ethiopia in the early 20th century as an “historical accident” and that “the Mazega’s agricultural revolution is an anti-model since its success derived from a confluence of historical factors [...] rather than a set of synchronic factors which can be replicated”, the contingent dynamics in this instance being the conjunction of labor and fertile soils in a depopulated area with access to markets that remained unregulated during the period in which colonial power was being consolidated in Ethiopia, Eritrea and Anglo-Egyptian Sudan. Such a conclusion is mirrored by Anderson’s (2002) appraisal of the development of the Chamus irrigation system near Lake Baringo, Kenya, between approximately 1840 and 1920, though the re-establishment of small-scale irrigation at Baringo since the 1960s (Adams & Anderson, 1988, pp. 530–531; Anderson, 2002) demonstrates that these convergences of resources and opportunities can occur at different times for very different reasons.

Yet just as “historical accidents” can create opportunities they can also create restrictions which may lead to the “premature” curtailment of potentially successful economic strategies, as may well be the case in the Dime area of Ethiopia where terraces abandoned following conflicts with the Ethiopian empire at the turn of the 20th century were subsequently employed for slash-and-burn agriculture whereas those in nearby Konso continued to be cultivated intensively (Amborn, 1989, p. 82n). Given that oral historical and genealogical evidence indicate that the agronomy at Konso may have supported a comparatively high rural population for over five centuries (Amborn, 1989, p. 73) the possibility that the techniques formerly employed at Dime could be sustainably re-established and deserves to be explored. Equally, the recognition that the abandonment of extensive areas of agricultural features at Dime may have had external causes demonstrates the simplicity of the formula that sees abandoned systems as failed systems.

One can rightly criticize governments and development agencies for attempting to reduce complex societies and ecosystems with equally complex histories to simple cause and effect; problem and solution (Rocheleau et al., 1995). Nevertheless, it is unrealistic to expect such organizations to wait for historians to resolve these historical questions, and only an extreme optimist would wait for them to design future solutions. Yet it is equally unrealistic to expect historians, archeologists and paleo-ecologists not to comment on the false assumptions and conclusions cited within these developmental narratives, just as it is inevitable that historians and development professionals will continue to cite the discredited premises of earlier paradigms in defence of new approaches. Of course, it needs to be acknowledged that some of these questions may never be resolved, but other hypotheses can and should be tested. Referring to several of the unresolved historical questions touched upon above in reference to indigenous conservation, for example, Gillson et al. (2003, p. 384) note that “Only archeological investigation of the soil profiles of several sacred forests, radiocarbon dating of charcoal from precolonial iron-smelting sites and analysis of fossil pollen can conclusively document how and when the vegetation of North Pare, Mkomazi and Tsavo changed.” Numerous similar enquiries demanding a range of historical, archeological and paleo-environmental methods alongside the direct observation of contemporary practices could also be cited, and include repeat photography (whether from the ground, air or from satellites) to document landscape change (e.g., Boerma, 2006); the measurement of carbon13 isotopic levels in soils to reconstruct forest vegetation histories (e.g., Esthu & Högb, 2000); or simply the examination of archeological stratigraphy to investigate the historical development of agricultural systems (e.g., Stump, 2006). Since the current interest in the use of indigenous knowledge in development planning shows no sign of abating in the immediate future, this combination of contemporary and historical approaches should produce a more complete understanding of the long-term history of specific examples of African resource exploitation strategies, and in doing so may provide information essential to adequately qualify these debates.
1. The term ‘indigenous’ is problematic from an historical point of view in that it might be taken to imply a longevity and continuity of occupation that may be inaccurate, inappropriate, contested or impossible to prove (Ingold, 2000, chapter 8; Kuper, 2003; Nygren, 1999). The phrase ‘indigenous knowledge’ and its numerous variants are in common usage however, and is thus also employed here.

2. Although none of these east African intensive agronomies are included within the pilot study, they would appear to be strong candidates for inclusion on the FAO’s list of Globally Important Agricultural Heritage Systems (GIAHS), a report on the identification and protection of which recommends an ‘historical and archaeological description of the system or site’ (FAO, 2004, Annex 17) and notes that ‘A clear understanding of their history and current trends […] is essential to identify pathways of evolution that will maintain their resilience and options for the future’ (FAO, 2004, p. 1, ibid.).

3. Originally Stichting Nederlandse Vrijwilligers but now known simply as SNV Nederlandse Ontwikkelingsorganisatie or SNV Netherlands Development Organisation.

4. Deutsche Gesellschaft für Technische Zusammenarbeit GmbH.

5. Originally the successor project to the SNV and GTZ programme from which it took the name ‘Traditional Irrigation Project’, and now known as the Traditional Irrigation and Environmental Development Organisation.

6. Participatory Agricultural Development and Empowerment Project: a rural development initiative funded by the Tanzania Ministry of Agriculture and Food Security, the World Bank and other international donors.

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