Outline of an applied archaeology of Pokot and Marakwet agriculture

By Matthew Davies

(University of Oxford, UK)
Islands of Intensive Agriculture in Eastern Africa:

Introduction

For some years now archaeologists, historians, and geographers, working in Eastern Africa, have been involved in defining and studying pre-colonial ‘intensive agricultural systems’. These systems, while highly variable, are often labelled intensive in that major capital investments in land and technology are made which go well beyond the needs of the immediate cropping season. In particular there has been a focus on those investments often referred to as ‘landesque capital’ a term which encompasses things such as irrigation and hillside terracing (cont. next slide).
More importantly these areas of intensive agriculture have been viewed as ‘islands’ of high productivity and stability in contrast to surrounding ‘seas’ of low and variable productivity. This has led some researchers to remark that such ‘islands of intensive agriculture’ might offer insights and perhaps even solutions to the critical problems facing African food producers (see quote below).

Such assertions, however, are speculative and have yet to be explored in detail. While these systems may appear to be stable and highly productive over short anthropological and historical timescales a longer-term evaluation of their potential has not been undertaken. Moreover, while Darryl Stump’s forthcoming PhD may have much to add in this field, the one well studied archaeological example, Engaruka in Northern Tanzania, suggests a quite contradictory picture. A once thriving agricultural community, Engaruka is now reduced to an all but uninhabited semi-desert.

Clearly we may learn much from the short-term study of these intensive agricultural systems; for example the various corporate management systems employed might be usefully adopted within modern agricultural schemes, or indigenous soils and water conservation techniques may be usefully applied elsewhere. However, I would suggest that drawing such techniques out of their original context may be problematic if we don’t fully understand the dynamics of the original context. In particular the question of what really occurred at Engaruka has not been fully answered and an anthropogenic role in this systems decline is a distinct possibility. As such we should be wary of drawing firm conclusions concerning the merits of east African intensive agriculture without detailed longer term studies. We need then a more integrated approach which is able to identify ongoing processes of both sustainable and unsustainable agriculture over a longer timescales, linking past, present, and future.

“Our interest in these systems stems from the fact that they seem to provide historical and contemporary examples of locally-developed solutions to the critical problems in modern African agriculture: low output from traditional systems; threatened sustainability of the production systems and/or widespread degradation; and unreliable access to food”.

(Widgren 2000:255)
Engaruka (NW Tanzania)
Research among the Pokot

My ongoing research draws on the premise that Archaeological techniques provide us with a unique ‘middle-ground’ resolution with which to complement long term palaeoenvironmental research and shorter term ethnohistorical studies. However, I would argue that it is often difficult to integrate evidence based on these three approaches when the locations or sites studied are often widely distributed geographically, temporally and culturally. The difficulties in interpreting the rise and fall of Engaruka serve to emphasise this point. Current Marakwet irrigation practices may be usefully applied as an analogy to Engaruka – but surely it would be more effective to study Marakwet agriculture itself, archaeologically, historically and ethnographically. This integrated approach to the study of a ‘living’ landscape, (and we must remember that the archaeological record does not simply come into being when people leave an area but rather is under continual production) attempts to compare both the past and the present so as to identify ongoing changes in landscape use and technological practice and identify long-term concerns which may be of direct relevance to the modern food producers of that specific region. In this sense it is an attempt to use archaeology in an integrated and practically applied way.

Towards these ends I have just completed my first season of field work among the agricultural Pokot of northwest Kenya. Close neighbours to the Marakwet, the Pokot also possess a similar agricultural system based on extensive use of irrigation and limited hillside terracing. My research has focussed on the Wei wei or Tamkal valley in the northern Cherangani Hills, an area approximately 12km long by 6 km wide, and encompassing a range of elevations from 1000 to 2800 m above sea level. Rainfall is relatively high and soils generally fertile with major crops being maize, pearl millet, some sorghum, bananas and various vegetables. This area is often cited by the Pokot as their traditional homeland and is thus highly interesting from the perspective of both Pokot and indeed Kalenjin history.
The research: Wei wei valley, Northern Cherangani Hills

This first season of research has fallen into four major phases. The first has been to collect information on the current operation of the agricultural system, encompassing information on – the seasonal cycle, the management of water distribution and communal labour, farmers' concerns and problems, and current market trends.

The second has involved the GPS mapping of the irrigation system. This has documented some 60 major irrigation furrows which resolve themselves into two types: hill furrows and valley bottom furrows. Hill furrows are led off the streams which run down the valley sides and usually supply water to only one or two clan sections. Valley bottom furrows, however, are taken off the main valley bottom rivers and tend to run through the territories of numerous clans. Management and construction of these two types varies quite considerably and it seems likely that the first type, being more simply constructed and managed, preceded the second. This is partially supported by oral testimony collected as part of this course of research. Oral histories, combined with knowledge of furrows constructed within living memory, provides us with a relative chronology of construction for the irrigation system. Of most note is the distinct reorganisation of the irrigation system following the introduction of maize during the 1940s and the shift towards well watered vegetable gardens and small banana plantations – primarily focussed on the limited export/cash market.
Irrigation

(Pokot, Northern Cherangani Hills)
Hill Furrows

Valley Furrows
Hillside Terracing

(Pokot, Northern Cherangani Hills)
Expansion of cultivation over the last 100 years

The introduction of maize has clearly encouraged expansion of agriculture southwards and up slope, likely resulting in deforestation and, on lower slopes, increased erosion. This is particularly clear in the northern parts of the valley where a number of furrow sections have been abandoned and a substantial degree of erosion is apparent. A reduction or shift in the hydrology of the valley during the last sixty years is also apparent in the abandonment of numerous small hill furrows – which were constructed in the 1950s from streams which have been dry for at least ten years. It also seems that at least one major furrow has suffered from a seasonal reduction in the volume of its feeder stream. Locals blame this reduced hydrology on forest reduction in the catchment though it is unclear whether such assessments stem from local observation or local governmental intervention. However, modern tree lines, compared with those marked on the 1:50,000 maps dated to 1974 show a massive reduction in the mountain top forests.

Shifts in the irrigation system also fit well with changes in the settlement pattern as ascertained from eight survey transects, which together form the third phase of research. These transects recorded both abandoned homesteads (evidenced by the large platforms cut into the slope) and modern homesteads, and compared their ratios. In the southern parts of the valley, modern homesteads greatly outnumber abandoned ones, while the northern transects identified many more abandoned than modern homesteads. Moreover, in the south of the valley, abandoned homesteads are more often situated within modern house compounds or used maize or millet shambas, with parts of walls highly visible. In the north these abandoned homesteads are generally found in unused bush, with little house remains visible. Modern houses here also tend to cluster around the main Sigor Tamkal road near small centres, particularly shops and schools. All this points towards initial settlement in the northern parts of the valley with a gradual expansion southwards and up slope with subsequent abandonment of the lower northern slopes which appear to have suffered a much larger degree of erosion (see following slides).
Abandoned furrow sections and major areas of erosion
Small hill furrows lacking water

Dry major furrow

Reduced Hydrology?
Abandoned house platforms
Transects 1-7

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<tr>
<th>Transect</th>
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<td>Transect 7</td>
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Modern homesteads decrease 1-7
Abandoned homesteads increase 1-7
Informant’s accounts and archaeological data (see below) show that house platforms are reused. This suggests that the absolute number of house platforms (used and abandoned), per area, should give an indication of the initial carrying capacity of the landscape along each transect - independent of duration of occupation. The ratio of absolute to modern homesteads might then be a reasonable measure of the degree to which parts of the landscape have been degraded. As the diagram below shows each transect possesses a similar number of absolute homesteads per area – this suggests that initial carrying capacity along each transect was similar – but that to the north this carrying capacity has been greatly reduced. This reduction may be due to changes in rainfall pattern and most likely the shift to maize, which may be more suitable for higher and better watered environments. However, it seems unlikely that these factors alone can explain the mass abandonment of the northern parts of the valley which, under initial conditions, seems to have been highly productive in sorghum and millet. Given the vast degree of erosion in these areas it clearly seems that human activity has contributed to soil erosion and degradation in these areas which in turn has encouraged the movement of people away from the area. We might also tentatively conclude that similar degradation could occur in the currently fertile southerly locations which appear to have been occupied for a shorter amount of time (please note that these are very preliminary conclusions which will be subject to change as my data is analysed in greater detail).

The final phases of research has attempted to correlate the settlement survey data with data based on surface finds and excavation. Surface finds tentatively support the previous conclusions – with ceramics of rouletted and other types, deemed to be older than the thick, undecorated modern Pokot pots, only coming from scatters related to settlement in the northern parts of the valley. Excavation has also partially confirmed this. Three abandoned homesteads were excavated, the most southerly showing no evidence of occupation older than the last fifty years, despite being singled out by informants as one of the oldest homesteads in the area. AH 93 showed clear signs of two occupation horizons – the first unlikely to date much beyond the last fifty years – but the second, as of yet undated, was found some forty centimetres below the recent level. A thin black ceramic, different to modern ceramics was also identified with this level and may prove useful for dating at other sites. The third homestead was massively eroded and little evidence of any occupation was found. However, the vast number of hearthstones, and house kerb stones (associated with much older house types) in these areas present significant evidence of human occupation. Moreover, the vast number of grindstones found here are highly suggestive of an intensively agricultural occupation.
Absolute density of homesteads/carrying capacity

Absolute density of homesteads approx 230 per square kilometre

(Diagrams not to same scale)
Excavation of abandoned homestead AH93

AH 93

Unit 1, East facing section

Excavation of the ash midden revealed two occupation horizons
diagnostic find spots
grindstones, hearths and kerb-stones
Some interim conclusions……

While this project of research has only partially run its course a number of tentative interim conclusions can already be made. In particular it seems that initial agricultural settlement was situated in the northern parts of the valley a situation which corresponds well with ongoing expansion southwards and up slope. Occupation in the north seems to have resulted in soil erosion and depopulation as people have gradually moved to more fertile regions. This suggests that, despite irrigation and limited terracing, anthropogenic degradation has occurred and could occur in currently fertile regions. Future research will concentrate on archaeological evidence aimed at dating the timescale within which this degradation has occurred.

Of greater regional importance, this evidence demonstrates that ‘islands’ of intensive agriculture may not be as stable and sustainable as previously thought. Clearly intensive cultivation can lead to environmental degradation. In the Wei wei valley the opportunity for up slope expansion makes it appear, to the casual observer, that the area has remained fertile and densely populated, however, the large number of abandoned homesteads on the northern slopes is highly suggestive of on going processes of degradation. Moreover, this expansion is clearly leading to deforestation and good evidence of reduced hydrology is apparent – a situation which is unlikely to be sustainable in the long term.

Northern parts of the valley are highly reminiscent of Engaruka and the processes ongoing here may well serve as a good model for the Engaruka collapse. The major difference between intensive agriculture at Engaruka and both Pokot and Marakwet is the intensity of stone terracing and other constructions. It is interesting to note therefore that evidence of stone terracing and stone field clearance cairns, though scarce, only appears to occur on some of the more northerly and more eroded slopes, where enough stone has been exposed to warrant/allow for such constructions. While the ability to expand to new territory has largely negated the need to overly intensify agriculture on less fertile slopes, it clearly seems that construction in stone is a reaction to already eroded soils rather than an active attempt to conserve soils before their degradation. This in turn implies the need to protect soils long before they show any signs of degradation. Whether current Pokot methods of terracing, involving piling trash across the contour and at times simple wattle fencing, are adequate is currently unclear. These methods have surely left no trace on the eroded northern slopes, thought it is difficult to know whether they would, and thus it is unclear how effective such techniques actually are.
cairns and stone terracing
Summary

Despite the conclusion that intensive agricultural systems maybe less stable than previously proposed, the high productivity of these regions should not be ignored and with careful consideration lessons learnt in these areas might be usefully exported to other regions. Moreover, the role of such systems within the regional economy presents another fruitful area of investigation. Ethnohistorical data recorded throughout the region, including the present study, testifies to the role of intensive agricultural systems as reserves of agricultural produce and safe heavens for pastoralists at times of crisis. The common, lazy, dichotomy between pastoralists and agriculturalists clearly breaks down under intense scrutiny and it becomes clear that in the recent past there was a constant, if fluctuating, flow of pastoralists into agriculture and vice versa. This appears to be particularly true of the Pokot whose pastoral expansion of the last 150 years appears to have been fuelled by the productivity of their agricultural heartlands centred on the Wei Wei. I have argued elsewhere that the demands of such pastoral expansion, or at least the demands of participating in an exchange system based on livestock as primary transformational capital, present one of the primary factors driving and sustaining agricultural intensification. At the same time the well being of the agricultural system would have been of central importance for surrounding pastoralists and it follows from this that changes within the agricultural system may thus have significant effects upon pastoral sections. Good archaeological evidence for this relationship is currently unknown, though evidence of extensive pastoral-agricultural exchange and temporary expansions/contractions of the agricultural systems might be informative. Future research will attempt to focus on such questions – though it is pertinent to note that today pastoral sections of the Pokot often suffer at times of drought and regularly receive food aid. This seems in part due to a partial breakdown in the pastoral-agricultural symbiosis, brought about both by the introduction of the market economy, and probably by the introduction of food aid itself.

In summary there are numerous ways in which archaeological techniques, when combined with other sources of information, may contribute fruitfully to a fuller understanding of East African ‘intensive’ agricultural systems. This paper has outlined some of these ways and has presented some tentative results which will be expanded upon over the next couple of years. I hope that studies such as this will result in a practically applied African archaeology which, as discipline with a uniquely historical perspective, can act as a powerful and important source of knowledge which must be expanded upon and made more accessible to those planners and policy makers who, whether they know it or not, deal with inherently historical questions.
Select bibliography


