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### Symposium: Agriculture in Arid Environments: Archaeological perspectives

*Islands of agricultural intensification in eastern Africa: the social, ecological and historical contexts*

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#### INTRODUCTION

Two strategies of increasing agricultural production can be documented in the history and prehistory of semi-arid lands in eastern and southern Africa. One strategy is based on risk aversion through dispersal of agrarian activities over wide areas and in different ecological zones. The other strategy is based on labour intensive agriculture often based on different techniques for water control.

In the southern African context the risk aversion strategy based on dispersal of fields and pastures has been given much attention. Basil Sansom argued in 1974 that the Sotho-Tswana type of settlement pattern in the western interior areas of Southern Africa does represent an adaptation to the low and erratic rainfall. Especially the Tswana in present day Botswana and in South Africa have a history of large, concentrated settlements combined with widely dispersed areas for arable fields and a pastoral organisation reaching more than 20 kilometres from the main settlements. This settlement-and-land-use pattern was by Sansom contrasted with the settlement structure of Nguni peoples of the eastern rim of South Africa, who – due to higher rainfall and a more dissected landscape – could base their agriculture on a confined territory in each settlement (Sansom 1974, p.138 ff.).

Sansom's thesis has – on good grounds – been criticised for being environmentally deterministic (Huffman 1986). The problem with that thesis is that it operates in a historical and social vacuum. Research has shown that the highly concentrated settlements among the Sotho-Tswana, and among previous populations in the same area, does reflect social and political hierarchies rather than only a simple adaptation to a semi-arid climate. The environmental arguments can, however, not be dismissed totally on these grounds. Within an ecological context of semi-arid lands with few topographical variations, and hence few variations in precipitation, the Tswana type of

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exploitation pattern represents a production form that is able to produce a surplus for an elite.

In this paper, the other strategy of expanding agriculture in semi-arid lands will be explored. That strategy is based on investments in land, on permanency of fields and on labour-intensive forms of cultivation and land management. John Sutton has in – in a series of articles – put our attention to the different areas in eastern and southern Africa where large systems of ancient fields and furrows witness of abandoned agrarian communities with these characteristics (for an overview see Azania vol 24). In 1995 at meeting in Harare Tim Maggs presented a paper “From Marateng to Marakwet. Islands of agricultural intensification in Eastern and Southern Africa” where he presented new documentation from the Lydenburg area in Mpumalanga province, South Africa, and put it in the context of the previously known areas in (Maggs 1995). In this session reports from the ongoing research on the ancient fields at Engaruka in Tanzania (Sutton 1999) and Nyanga in Zimbabwe (Soper 1999) will be presented.

These field systems, abandoned between 100 and 400 years ago, do also have surviving parallels: areas where terracing and irrigation form part of a locally developed farming system. Marakwet in Kenya, Sonjo in Tanzania and Konzo in Ethiopia are the best known examples. An overview of this whole problem of intensified or specialised agriculture in Africa was given in a special issue of Azania in 1989 (Azania vol XXIV 1989). Since then important contributions have been published on Sonjo (Adams et al. 1994, Potkanski & Adams 1998), Marakwet (Adams et al. 1997, Adams et al. 1998). Elizabeth Watson of the Department of Geography in Cambridge has recently submitted a PhD thesis on Konzo in Ethiopia.

The cases mentioned here and a handful of others share some location characteristics. They are all located along the East African Rift. Many of these farming systems make use of the variations in precipitation and climate within short distances that is characteristic of the high escarpments along the Rift. Their locations along the Rift can however in no way be said to be simply environmentally determined. There are examples of similar environments along the Rift without any traces of former intensive agriculture. Areas of intensive farming can also be found in other types of environments in the semi-arid parts eastern and southern Africa. The distribution of intensive agriculture in the semi-arid parts of Africa is thus not a direct reflection of natural prerequisites but of a complex interaction of ecological, social and historical factors

Our empirical understanding of how such agricultural systems have emerged, developed and decayed derives from different types of situations and source materials. At one extreme there are the cases of Engaruka in Tanzania and of Nyanga in Zimbabwe, which are deserted field system with a poor to non-existent historical documentation, but with reasonable well-dated archaeological features. At the other extreme are the currently surviving, active farming systems like Sonjo and Marakwet, where, however, the historical origins are still unclear.

But into that context must also be brought in cases like the Machakos in Kenya, where a development of intensification and of increasing investment in landesque capital is currently taking place. The Swedish title of the project reported here can literally be translated with "When provisioning takes off". It closely relates to the concluding discussion in the book by Machakos case, and serves to remind us of studying the present implications and development possibilities of the historical cases (Tiffen et al

1994). A similar approach to intensive agriculture can be found in Bebbington (1997), who discusses the recent development of islands of sustainable agriculture in the rural Andes.

#### islands of intensive agriculture

The definition of *islands* and of *intensive* may both be questioned. Let me as a basis for further discussion put down three characteristics of the areas we are interested in:

1. These "islands" are characterised by agricultural systems, which for a sustained period have been able to support a larger population density than in the surrounding areas. The metaphor "Islands" is used to describe the fact that these areas may exist within a sea of less intensive shifting cultivation or of pastoralism.
2. Furthermore they have, to judge from the historical experience, been less fragile and more robust in the face of both drought and humanly induced disturbances, which is so characteristic of the African situation. Even though many of these areas are now poorer than their more expansive peripheries, they still play an important role in the food security system through traditional networks of exchange. They thus represent lessons from the past for the urgent problem of food security.
3. The high productivity of land and the robust nature of agricultural production in these areas depend on the application of different combinations of farming practices: manuring, composting, terracing, cut-off drains, irrigation and crop diversity. Furthermore, in many of the areas there is evidence of careful management of trees and woodlands. Irrigation and soil conservation are connected with investments in land – landesque capital – defined as activities on land (and vegetation), that reaches beyond the immediate needs of the coming cropping season. The latter fact is also of crucial importance for the archaeological identification of past agrarian societies of that kind.

Our interest in these systems stems from the fact that they seem to provide historical and contemporary examples of locally developed solutions to the following currently important problems in African agriculture:

- low output from "traditional" agriculture
- threatened sustainability of the production systems and/or widespread degradation
- unreliable access to food

#### The project

This paper is a preliminary report from a project based at Stockholm University, with links to the Institute of Resource Assessment in Dar es Salaam, British Institute in Eastern Africa and the National Museums of Kenya.

Through detailed studies in two living agrarian landscapes in eastern Africa the project seeks to understand the ecological, historical and social contexts of this type of intensive farming. Though the empirical focus is on these two areas we work in close contact with other researchers working on abandoned field systems or intensively farmed areas in other parts of eastern Africa.

The project thus sets as its task to find a common explanatory framework which can handle the historical questions why areas like Engaruka and Nyanga were abandoned and why areas like Marakwet persist. At the same time the framework should be able

to accommodate questions on the future potential of these areas and the mechanisms of "take off".

It is not our object to study in detail, and for their own sake, all the different farming practices that are used in these areas: terracing, composting, manuring, irrigation etc. It has now for long been acknowledged that such locally developed solutions to the problems of nutrient deficit, land degradation, lack of water etc, have a long historical tradition in Africa. We have little to add to that debate. Instead we are trying to understand the process whereby such practices are put together in a farming and social system which is capable of increasing both land productivity and food security in a sustainable way.

The questions we ask relate to different phases of the histories of the areas.

We first ask under which circumstances this intensive farming originally took off. What were the specific place-bound events and characteristics?

The second set of questions relates to the social organisation that makes possible mobilisation of labour and hence investment in landesque capital. Closely related to this are the social practices that serve to reproduce the farming system from generation to generation, while at the same time being flexible enough to cater for population increase and settlement expansion.

The third set of questions relates to the present developmental possibilities of these different areas. To what extent can they continue to play an important role in the future either as cores in a food security system or as a basis for a market-oriented development?

#### Case study 1: Mama Issara, Mbulu Highlands, Tanzania

Mama Issara is the core area of the Iraqw people. Agriculture is restrained by the dissected topography and the cultivation is entirely done with hand implements. The intensive farming system is unique in the region for its diversification and elaboration and has a history that goes back some 200 years in time. Terracing, mulching, manuring and water harvesting is practised. From Mama Issara the Iraqw have in successive waves expanded out into vast areas of Mbulu, Hanang and Babati Districts. Vesa-Matti Loiske found that the land use patterns in the core and expansion areas respectively, are strikingly different. One and the same ethnic group practises intensive, sustainable farming in the core area and is responsible for extensive land degradation in periphery of that area (Loiske 1995).

Mama Issara is a prime example of how local institutions for natural resource management have been able to uphold an intensive farming system for a long time (Loiske 1993, Börjesson 1998, Loiske, n.d.). Several factors are of importance including strong social cohesion, efficient forms of decision-making, and a tradition of communal labour co-operation. Also religious beliefs support sustainable use of natural resources in that the earth spirit is thought to punish overuse of land and trees.

The most important preliminary results from Mama Issara relate to the exchange of products between the core area and the periphery. All families participate in institutionalised food exchange involving 5-25 other families. In Mama Issara the main harvest is in January when people in the expansion areas are still planting. During this period the periphery get food from the Mama Issara area and return the same amount in July when they have harvested. While this is a form of redistribution that all benefit equally from also other transfers occur and a question deserving study

is the extent to which the Mama Issara intensive farming system is being supported by resources originating from the periphery (Loiske work in progress). The islands of intensive agriculture can thus not be seen in isolation but are manifestations of geographical division of labour.

#### Case study 2: Marakwet, Kenya

In the discussion of intensified agriculture the Marakwet area constitutes a particularly interesting case. In the Kerio Valley in western Kenya we find a system of irrigated farming which from a modest beginning some two hundred years ago has grown into a comprehensive system where the total length of furrows now reach 250 kilometres. Yet, a centralised political system has not developed. In fact no single individual or group of people have an overview of how the system in its totality works although the system encompasses more than 40 major furrows.

Indigenous technology excels as furrows traverse a steep escarpment leading water in some cases more than a thousand metres from the Cherangani Hills to fields situated in the Kerio Valley. Each furrow is under the control of the lineage, which originally constructed it while other groups lack primary rights to water without which reliable farming is not possible in the dry Kerio Valley. This situation has not resulted in a hierarchical society as could be expected given the "oriental despotism"-hypothesis which states that societies with large-scale irrigation will develop centralised orders of command which in turn will lead to despotic political systems (Wittfogel, 1957). Even if this hypothesis in its more pronounced form has been criticised and is becoming somewhat dated, it remains an interesting fact that a society with such a comprehensive irrigation system as the Marakwet is acephaleously organised.

Before the onset of each cultivation season consensus is reached regarding what fields are to be cultivated that year and how water is to be distributed. When these negotiations are concluded both those whom for historical reasons have primary rights to water and their neighbours have access to land to cultivate and water to irrigate their crops. That is the general picture. How more specifically the "owners of the water", as the local expression goes, are able to, or not able to, take advantage of their strategic position in the different systems of furrows, is a theoretically interesting question with important practical consequences (Adams et al. 1997, Adams et al. 1998, Östberg work in progress).

#### Explanations of intensification

The discussion of the causes behind the intensification can be approached from the elementary geographical question of location: Why do we find these systems in these specific places? Why here and not there?

The environmental explanation has already been discussed. The sharp topographical variations along the Rift provide good opportunities for intensive farming in semi-arid lands, but do not alone explain the location pattern. Nor is there a simple relation to the economically defined geographical variables. The location theory developed for agricultural activity puts distance to market in a central place when explaining distribution of intensive farming. In the recent case of Machakos the proximity to the market in Nairobi is one important explanation, but it is in no case the only explanation. In the case of Baringo (Anderson 1988, 1989) the market situation also seems to be of vital importance for the development of the irrigated agriculture during the 19th century. But market conditions does not play the same role in Marakwet and

Mama Issara, areas being remote from markets and which both suffer from poor communications.

A second approach to the explanation of the geographical distribution of intensive farming is the idea that islands of locally developed intensive agriculture are the remains of a formerly much more widespread type of agriculture. This explanation puts colonialism as the main force behind the desintensification of African agriculture. The islands are then seen as pockets, which have survived these developments. Though the advent of colonialism certainly in many cases led to the disruption of local farming societies it would be too simple to advance colonialism as the main force behind desintensification. An important point here is that similar wavelike movements between intensive and extensive agriculture can be found in other social and historical contexts like for example during the first millennium AD in Sweden.

The above-mentioned models of agrarian development are all based on the idea of an *even* development of farming systems in response to markets and or population pressures. I find it more challenging to start from the other side – that social systems and landscapes are the result of a geographically and socially *uneven development*.

The idea of uneven development of farming systems is supported by the fact that both the emergence and the decay of intensive farming systems seems to be a general trait in the history of agriculture all around the world. Farming systems do not evolve from simple to complex or from extensive to intensive according to some pre-set model, but are formed and changed within specific place-bound social, historical and ecological contexts.

If we accept the idea of uneven development it is also much easier to understand why intensity of agriculture is not evenly or directly related either to markets or to natural prerequisites. The islands of agrarian intensity have their own logic of development and simplistic explanatory models cannot capture their distribution or their development.

The questions of *where* and *why* remains however central for our understanding of the processes behind intensive agriculture.

#### Political economy and the development of hierarchies

In 1988 Thomas Håkansson gave an important contribution to the development of intensive agriculture in East Africa. He contrasted the Boserupian explanation of intensification with two main alternative models. Both of them are based on the idea that intensification should be more broadly understood as an effect of *pressure on production* rather than population pressure.

He saw intensification as the outcome of one or both of two influencing forces:

- political economy and the development of hierarchies
- commercial development and an increasing market production

The political economy model is mainly based on research carried out in Meso-America and in Southeast Asia. Competitive feasting and redistribution between chiefs created – within such hierarchies – a need for agrarian surplus. As has also been shown in other studies the building up and decay of such hierarchies are very dynamic processes and could indeed account for the uneven development and the uneven location pattern that the islands show. Furthermore, he argued, tribute labour

controlled by chiefs and kings can be seen as one of the ways of mobilising the labour needed for the large investments in land which are connected with this kind of intensive agriculture: irrigation furrows, stone terracing etc.

The Meso-America and southeast Asia models of hierarchies does however not fit very well with the eastern African scene of intensive agriculture. The evidence Håkansson brings from Africa is based on one case only. In Marakwet in Kenya with its large and thriving irrigation system the mobilisation of labour and the surveillance of irrigation system is based on the decentralised power of the elders and on negotiations rather than on chiefly authority and tribute labour. As far as I can gather the same holds true for Mama Issara and also for Sonjo. Labour, land rights and water rights are in these systems inscribed in a clan- and lineage-based social organisation rather than a chiefly authority.

Clans or chiefdoms?

In this connection the ideas proposed by Parker Shipton on the relation between on the one hand farming intensity and population density and on the other state- or chiefdom-oriented social structures in Eastern Africa is of interest. Intensive farming in eastern Africa is, according to Shipton, usually *not* associated with a centralised control of land, but rather on lineage and clan based land rights. In the field pattern this is associated with strips expressing the kinship structure on the ground, so that clans, minimal lineages and heirs have their definite shares on the ground. According to Shipton a more patchy system of fields is usually associated with chiefly control of land in a less intensive farming system (Shipton 1984). This is more in accordance with the Tswana system discussed in the first few paragraphs of this paper than with the intensive systems we know on the ground in eastern Africa. Shiptons conclusions and our own observations from are study areas make the hierarchy model less valid for our understanding of these systems.

As I was discussing earlier, the market arguments, which are also advanced by Håkansson, also seem to fall short in explanatory power in relation to the systems we are discussing. At least today many of the areas with intensive farming are poor and located far way from markets. In the case of the Iraqw in Tanzania even the opposite relation between labour intensity and proximity to market can has been documented. The less labour intensive agriculture is located closer to the market and is also more drawn into market production, while the labour intensive core area has poor roads and only a small share of cash crops. This does not necessarily mean that they are closed entities relying solely on subsistence production. As Loiske has shown there is – "under the surface" – a considerable amount of exchange of agricultural products between core areas and peripheral areas of the Iraqw (Loiske work in progress).

So to judge from the existing literature we have the paradoxical situation in different parts of the world that hierarchies as well as the lack of hierarchies can be associated with labour intensive agriculture -- and that both market orientated farming and subsistence farming can be connected with labour intensive farming. The common denominator between these different situations however is that there is a *geographical labour division*. The islands do not exist in isolation but are based on production and resource utilisation from a range of different economic zones based on different climates and/or different production systems. The exchange of products between different zones thus seems to be an important precondition for the existence of intensive agriculture. In the case of Marakwet and Mama Issara these exchanges take

place within the same ethnic group. In other cases exchange between agriculturists and pastoralists might form an important incentive for the specialisation. This was the case in Baringo (Anderson 1988, 1989) and might play a certain role among the Sonjo, which are surrounded by Maasai.

As to the internal social organisation – hierarchical vs. egalitarian there is a similar paradox. The connecting point here seems to be different ways of mobilising labour. The empirical material shows that labour mobilisation need not be associated only with tribute labour and social division of labour between kings and commoners, but can also be organised according to age sets within a more egalitarian social structure.

The comparison with the hierarchical model has brought into focus three important factors to study when accounting for the emergence and persistence of islands of intensive cultivation and high productivity of land:

- They all to form a part of a wider *geographical division of labour*. That exchange could take different forms and be based on a commercial development, on exchange within the ethnic group along kinship networks or on exchange between agriculturists and pastoralists of different ethnic groups.
- Mobilisation of labour is indeed a prerequisite for intensive farming. Terraces, furrows, etc need investments and repair. With an increased number of crops per year preparing the land, sowing and harvesting also becomes a bottleneck. Our case studies show that *traditional systems of labour exchange* and/or work based on *age-sets* can provide such an input of work. Large systems of irrigation and field terracing must thus not indicate a hierarchical chiefdom structure.
- Land and water rights are inscribed in a *clan-based system*. That form of property rights seems to have the possibility of both providing the stability needed for investments in land – and at the same time the flexibility to cater for fluctuations in climate as well as social and political changes. This flexible system of land and water rights is, furthermore, closely connected to the mechanisms for reproducing social organisation and mobilising labour.

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### **Litterature**

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