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THE AGRICULTURAL LANDSCAPE OF THE NYANGA AREA OF ZIMBABWE

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Introduction

Indigenous cultivation practices in Africa exhibit a very wide range of soil and water conservation methods finely adapted to local conditions of climate, soils and topography for the individual needs of a variety of crops, modified by the particular social circumstances of the cultivators.

Reij *et al* (1966) have recently documented a number of cases which illustrate something of the range of technical measures adopted, but are hardly exhaustive. Ethnographic accounts often offer more background information to put methods in context but frequently lack technical details. Physical measures include an almost infinite variety of ridging and mounding techniques suited to different soils, water conservation needs and maintenance of fertility; terracing of steep slopes which modern methods have been unable or unwilling to exploit; and water management by furow irrigation, control of run-off (water harvesting) and flood utilisation. In addition, cropping systems commonly include rotation and intercropping, while mulching and manuring are practised in some cases. Traditional methods rely on simple hand tools and hence are more or less labour intensive, but offer better productivity than mechanised agriculture.

Some documented African cases have been seen as examples of “intensive agriculture”, for example Ukara island in Lake Victoria (Allen 1965), Kofyar in Nigeria (Netting 1968), and parts of Ethiopia (Straube 1967; Hallpike 1970). There has been much discussion of agricultural intensification in reaction to the hypothesis of Boserup (1965) that intensification is primarily a response to population pressure. A number of other factors have been introduced into the equation by many other writers such as Brookfield (1972, 1984, 1986), Grigg (1982), Farrington (1985), Hakansson (1989). By definition, intensification is a relative process by which production may be increased for a given unit of land (or decreased - disintensification) as a response by a particular population to a combination of factors, usually controlled by the desire to attain perceived food security by the most economical techniques and in-puts. Intensification may involve "capital" investment in infrastructure such as terraces or water furrows, or increased investment of labour, but also entails modifications in social systems for mobilisation of labour and control of resources. Under conditions of simple traditional technology, capital investment in fact translates into labour investment also, but prior investment in physical structures may influence the direction and rate of subsequent changes, as pointed out by Brookfield (1972). It would be hard to define at what point a system could be regarded as "intensive", and in any case relevant ethnographic examples commonly exhibit a range from more or less sustainable continuous cultivation of suitable and convenient plots by intensive methods, to much more extensive occasional use of more distant fields.

Brookfield (1984) identifies innovations as the mechanism for intensification and such inovations may include new techniques, new crops or changes in social organisation, such as a degree of individualisation of land tenure implied by investment in permanent agro-technical structures. Many capital intensive systems are found in naturally difficult sites which however also have advantages such as wetness or fertile soils. Here even simple innovations may offer huge gains in productivity, and focus should be on the opportunities offered rather than supposing that people were necessarily forced into difficult environments by outside pressures (Brookfield 1986).

These discussions show conclusively that agricultural systems are dynamic, adapting to changing physical, social or demographic circumstances. As Sutton (1984) eloquently argued, traditional African agriculture thus cannot be conceived as fixed in a sort of "ethnographic present". Archaeology must therefore enter the lists to provide time depth and to document earlier systems and techniques against which to assess the processes of change. The evidence, as Brookfield (1986) points out, is essentially the "landesque capital" modifications to the landscape from which former systems of production can be inferred, although these only provide a partial and biased inventory of past practices and there is a tendency to interpret them uncritically in terms of intensification. Sutton (1985) prefers to think in terms of "specialised techniques" which are perhaps easier to define and document.

Archaeological evidence is only likely to have survived - or at least to be directly identifiable - in more or less marginal situations not exploitable by less specialised methods, where it has not been modified or destroyed by subsequent developments. It could therefore be said to be atypical of broader practices - but can there be any more "typical" evidence, given the wide range of environments and responses to them ? Any surviving evidence thus becomes relevant.

The agricultural landscape of Nyanga

The landscape of the Nyanga area of the eastern highlands of Zimbabwe and adjacent areas to the west is indelibly printed with the evidence of past agricultural activities. This takes the form of stone-faced terraces and lowland cultivation ridges, together with associated stone built settlement structures, in all covering around 7000 square kilometres (Soper 1996). While the agricultural features themselves are difficult to date, the settlement sites range from about 1400 to 1900 AD, the earlier sites having no direct association as yet with the agricultural features.

The area south of Nyanga town consists of a broad dissected plateau at around 1800m above sea level, falling relatively gently to the south-west to the main watershed between the Zambezi and Sabi/Limpopo catchments. To the east it rises to Mount Nyangani at nearly 7000m, beyond which are steep mountains and valleys into Mozambique. For about 60km north of Nyanga the highlands narrow progressively to a high ridge at around 2000m, with higher peaks and steep escarpments to east and west. To the west of this ridge, granite inselbergs form often substantial hills rising from a base level of around 1200m, while dolerite sills and dikes form lesser features. The highland range extends northwards at a lower level for another 20 or 30km while the surrounding lowlands decline to around 900m. The underlying geology is various granites, overlain by sedimentary rocks and dolerites which cap the highlands.

Drainage radiates from Mt Nyangani, major rivers being the Gairezi and Nyangombe to NNE and NNW and the Pungwe to the south. Annual rainfall is almost entirely between November and March, the average ranging from c.750mm in the northern lowlands to 1200mm or more in the highlands. Annual variation may be as much as +/- 50%.

<u>Terraces</u>

Stone faced terraces cover large areas of the highland escarpments and the slopes of foothills and detached hills and ridges mainly to the west. Some slopes have ranges of up to 100 terraces. The altitudinal range is from about 900m in the northern lowlands to around 1700m on the escarpments and in the highlands, with very little above this level, which is about the upper limit for the cultivation of traditional grain crops at the present day.

Study of aerial photographs has identified a minimum area of 22000 ha of terracing. Distribution favours dolerite soils and rocks. On the geological map sheet covering 2750 square kilometres within which the main concentrations of terracing occur (Stocklmayer 1978), over 19000 ha of terracing have been plotted, 42% on dolerite, 57% on granite and less than 1% on sedimentary rocks (not well represented in this area). However 26% of the dolerites below 1675m is terraced as against only 5.5% of the granites, most of the latter adjacent to dolerite ocurrences. The dolerites weather to red clay loams or sandy clay loams of greater fertility than the sandy granite soils. These dolerite soils however are often on steep slopes where they are thin and very stony, and terracing is necessary to clear the stones and concentrate the soil for cultivation. Terracing also provides fairly level surfaces, protects against erosion and impedes drainage to allow water percolation.

Terrace surfaces are generally narrow, commonly between 1.50 and 3m, except on very gentle slopes where they may be up to 10m wide. Fall between terraces is normally between 25 and 80cm except on the steepest slopes. Slopes of up to 30 degrees were regularly terraced, in some cases up to 40 degrees. Construction varies with geology, topography and the amount of stone to be disposed of; possibly also with date, though this remains to be established. The best terraces have substantial walls around a metre in thickness, with a double facing of large stones and a fill of smaller stones. A low lip is usually present but the wall may rise a metre or more above the upper terrace surface where there was a large amount of stone to clear. Such terraces now have a more or less horizontal profile which could be the result of soil movement since abandonment. Terraces are not precisely levelled on the contour, allowing for longitudinal drainage, so that it could not have been intended to flood them either artificially or by rainfall. Stone lined drains carried excess run-off down slope, while in some cases upstanding walls were pierced by drain holes.

This type of terrace is generally found on dolerite but occasionally also on granite. The soil is often shallow - less than 20cm up to a maximum of 50 or 60cm against the lower wall face. It is relatively stoneless, so that it must have been worked over to remove even the smallest stones during construction. The substratum is of densely packed stones in a red clay matrix in the case of dolerite, or more or less decomposed rock on granite.

In granite areas with less stone and on sedimentary argillites in the northern part of the complex, terraces are generally lower and the stonework appears to consist of no more than a simple revetment, while terrace profiles are sloping, gradients of up to 15 or even 20 degrees being recorded. The only excavated transect showed numerous stones remaining in the soil. This type may represent the rapid exploitation of less favourable soils and it is not known if it is contemporary with the former type.

The majority of terraces do not appear to have been irrigated. There are a few cases where old water furrows do traverse ranges of terraces and they may well have been used for irrigating those below, but no distribution channels have been observed and settlement sites also appear to have been served. In the case of the detached hills to the west, many of which also have extensive terracing, gravity irrigation would not have been feasible.

The chronological range of terrace building is uncertain but probably spanned at least the 17th to early 19th centuries. Dating and associations are discussed below under landscape development. The only direct date for a terrace is 200 +/-50 BP, cal AD 1618(1682,1745,1807)1825; 1834-1878 at one sigma (Pta-7601). This was obtained on tiny disseminated charcoal fragments in soil of a second phase of terrace construction in a granite area, adjoining a stone enclosure. A total of 537 sherds, mostly small and worn, were also obtained from some 3 cu.m of soil. The sherds and charcoal may derive from manuring with domestic refuse from the enclosure but this appears to date from the later 19th century and there are some differences in the pottery, so they may well derive from an earlier site, perhaps contemporary with the earlier terrace phase. In either case the date only gives a maximum age, not very useful in view of the wide calibration bracket.

<u>Cultivation ridges</u>

The second notable feature of the old agricultural landscape comprises extensive networks of ridges and ditches on the lower less stony slopes below the escarpments and extending some 60km to the west. No quantification of these has been attempted, but the total area must equal or exceed that of the terracing.

In the terminology of Denevan & Turner (1974), these are long, flat-topped linear ridges. Some, especially in wetter situations, tend to be more cambered due to the greater height and somewhat closer spacing needed for effective drainage. The features are parallel or sub-parallel linear banks, usually 7 to 10m metres wide between ditches up to a metre or so deep. They often run for several hundred metres with a more or less shallow longitudinal gradient. These occur both in areas of impeded drainage (vleis) and on the valley sides or interfluves.

An example may be described at the base of the main escarpment near Maristvale some 40km north of Nyanga town. Here there is a broad bay in the escarpment about 2km wide between high projecting spurs, and a series of streams converge across the piedmont slope. Virtually the whole of the interfluves and most of the stream valleys are scored with ridges and ditches covering around 1000 hectares. The central interfluve provides an area some 1750m long and around 500m wide with a longitudinal fall of c.60m and a maximum lateral height of around 10 to 12m. Almost all of this is occupied by ridges except for a stonier crest towards the upper end which is terraced, and a few minor areas of outcropping rock with stone enclosures. The ridges trend longitudinally down the interfluve with a broadly parallel alignment, sometimes rather braided. A similar pattern is seen on the other interfluves. At the head of this interfluve at the base of the escarpment is a furrow take-off from a small stream. There appears to be no main feeder furrow from this but water could be directed down any of the ditches, or to the occupation sites. Towards the lower end of the interfluve a furrow did carry water from a deep set of ditches diagonally across the ridges, probably to a stone enclosure on the crest. Soils here are silty sands over a sheet of consolidated rounded quartz gravel.

Other occurrences are in more specifically waterlogged areas. An example is a regularly waterlogged perched vlei on the piedmont slope a few kilometres south of the above site. Here there is a dendritic pattern of banks and ditches for maximum drainage and a section showed a metre or so of mottled sandy clay loam overlying dense black clay. The clay loam must derive by erosion from the terraced area immediately above, perhaps before terracing anchored the soil or perhaps from inefficient use of the terraces. It has then been reexploited after deposition.

Ridge size, patterns and orientation to slope appear to vary even within a single localised drainage basin and must represent a flexible system of balancing drainage and water retention under varying conditions of soil, slope, rainfall and seasonal water table. In the first case described, the primary purpose would seem to be controlled drainage, raising the cultivation beds above any actual or potential waterlogging without removing rainfall too directly. If necessary supplementary water could have been introduced to the ditches, though the water available at present would seem inadequate for any extensive irrigation. In wetter areas drainage could be more direct.

Denevan & Turner (1974) review the advantages of raised beds in general and relevant here may be: control of erosion; provision of drier cultivation conditions where there is permanent or periodic inundation or waterlogging but with some water retention in the ditches still available to crop roots; wide beds reducing the ditch area; aeration of the soil; modification of microclimate if there is danger of frost. To these could be added the variation of moisture availability across the ridge and ditch appropriate to different crops. Moisture loving traditional root plants such as

Colocasia and *Zantedeschia* would be appropriate for the wetter ditches, while sorghum, millets and legumes could grow on the ridges, with *Plectranthus* perhaps somewhere in between.

The ridging systems remain to be dated since none of the related stone enclosures mentioned above have been excavated. They cannot be later than the 19th century and Whitlow (1983) speculated that they were only abandoned with the advent of white farming but could provide no evidence. The few extant or recorded oral traditions may equally refer to recent *mihomba* cultivation ridges which are shorter, narrower, straighter and generally restricted to waterlogged environments such as wet stream banks. The intimate relationship to terraces in the Maristvale area suggests contemporaneity with at least some terracing, but it may be suggested that the large labour demands for constructing and operating both systems simultaneously on a large scale would have been beyond the capacity of individual communities.

<u>Water management</u>
Water is a critical resource in African agriculture generally and its management in favourable conditions can provide insurance against bad rainfall years and extended dry periods within a normal wet season, as well as giving the potential to extend the growing season before or after. The possibility of supplementary water supply to some ridge systems has been mentioned above, as has the general lack of evidence for widespread terrace irrigation. Terraces and cultivation ridges, even if not directly irrigated, reflect water management by controlled drainage to provide good infiltration.

Permanent streams are common in the Nyanga highlands and descending the escarpments and the potential of these was clearly appreciated as numerous old furrows have been observed, mainly in the highlands where they are better preserved by perennial grass cover. A tentative classification of these furrows is suggested:

1. Small furrows of varying gradient and length associated with occupation sites.
2. Generally well graded furrows on relatively narrow revetted shelves traversing ranges of terraces, probably used for irrigating those below but also often serving occupation sites.
3. Furrows assocated with ridging systems.
4. Well graded furrows involving more or less massive earthen banks with potentially irrigable land below, sometimes with recognisable branch furrows or ditches.
5. Furrows without major banks or stone work.

Type 1 is the commonest and most widespread in the highlands and would have served domestic requirements, livestock and homestead gardens. Some could be diverted to flush out stone lined pits used for livestock, and provision was often made to impound the resultant effluent. Only a few cases of type 2 have been recorded, both in the highlands and on the lower escarpment slopes, while the only case of type 3 known to date is that described above. Type 4 appears to be restricted to a limited area centred on the northern part of Nyanga National Park and must have been for irrigation of unterraced fields, since no terraces are associated below them and only very rarely are settlement sites served. Type 5 is thought to belong to the colonial period. The others belong at least to the 19th century and probably earlier, while examples of type 1 are likely to be associated with 17th century sites.

Authorship

The authorship of the agricultural works can almost certainly be attributed to the ancestors of the present indigenous inhabitants (i.e. before the relocation of populations consequent on colonial land policies). These are the Unyama people for the area north of Nyanga town, the Manyika to the south and the Maungwe west of the Nyangombe river. Genealogies and traditions of the chiefly families (Beach 1995) go back well into the 18th century at least, and more in the case of the Manyika, and it is surprising that more oral traditions have not survived on the construction and use of terraces and ridges. It would seem that knowledge and use of these specialised agricultural techniques was common to a number of political and dialect groupings in north-eastern Zimbabwe and should not be attributed to a single people.

Agricultural systems

The agricultural systems of the terrace builders integrated crops and animals. Cattle were almost certainly penned in a sunken stone lined pit or small stone enclosure within the homestead. In the case of pits, roofed or tunnel entrance passages would only have admitted dwarf cattle and bones of such have been recovered from the only site with good bone preservation (Plug *et al* 1997). The small enclosures in the northern part of the area however have open entrances and could have accomodated larger beasts. Pits and internal enclosures in the lowlands are relatively small, with an internal diameter normally around 3m, and around 1.20 to 1.50m deep/high. Fairly small cattle holdings are thus indicated and the height/depth rules out any substantial accumulation of manure from seasonal permanent stall-feeding, as practised for instance in parts of Nigeria and Ethiopia (Netting 1968; Hallpike 1970). Pits in the highlands are larger and deeper - usually 5 to 9m in diameter and 1.80 to 3m deep. More cattle are thus indicated above the terrace zone; the depth could have accomodated the accumulation of manure but was more likely for protection from the cold winds of winter. Goats and possibly sheep were kept in the houses, many of which have a low dividing wall with one half paved with stones (Soper 1996).

Pits and internal enclosures rarely contain any deposits beyond leaf mould and a little silting, and no dung heaps or other substantial middens have been found. Dung was thus regularly removed and must have been used for manure, some possibly being dried for fuel in the highlands where wood may have been at a premium. Pits were provided with drains and in many cases in the highlands would have been flushed out with water from furrows. Again in the highlands, small dams were often built below the homestead to catch the effluent, or ditches were dug to channel it to small hollows. Many such pit structures have radial walls which are thought to have sheltered gardens on which liquid manure could have been used. Where no furrow was available, as more particularly in the lowlands, dung must have been removed by hand and any flushing have relied on rainwater, and goat dung must similarly have been removed by hand from the houses. Domestic refuse was doubtless added to the manure.

It is unlikely that there would have been sufficient manure to fertilise the full range of cultivated land. On general ethnographic analogies, one would expect it to have been used on homestead gardens, irrigated where practicable, and on terraced or other plots in the vicinity, but rarely on more outlying fields. However there appear to be no traditions of the use of manure by Shona or related peoples in the recent past to provide any direct confirmation of this and results of phosphate analysis are ambivalent as yet.

Terracing *per se* would thus be considered a specialised technique implying only relative “intensification”, but a higher degree of the latter may be postulated in an inner zone around the homesteads, probably dependent on available water supply. The cultivation of outlying terraces, even on the more fertile dolerite soils, would have been less sustainable and a continuous process of terrace building is envisaged, with older terraces being fallowed or abandoned as fertility declined.

Lack of excavation of settlement sites associated with cultivation ridge systems inhibits any conclusions on their use as yet.

The range of crops and cultivation methods might be expected to have varied over the altitudinal and rainfall range of the complex. Summers (1958) identified seeds from Ziwa ruins in the lowlands at around 1300m. These comprised mainly traditional grains and legumes, including *Sorghum*, *Pennisetum*, *Eleusine*, *Vigna unguiculata* and *V.subterranea*, *Ricinus* and perhaps *Citrullus*. Part of a maize cob was also found but in a surface context. Seeds recovered by floatation in the present research remain to be identified but seem unlikely to add many cultivars to this list. Enquiries about traditional crops add a number of important root crops: *Plectranthus esculenta*, *Colocasia* and probably *Zantedeschia* (calla lily), as well as pumpkins and cucumbers, and there are a number of semi-wild fruits, leaf plants and oil-seed plants as well as numerous wild fruits and other plants which were harvested. It is not known when *Colocasia* was introduced but it could have been present for several centuries. The traditional variety and also *Zantedeschia* are toxic without extended boiling. Traditional cropping practices commonly involved interplanting of grains, legumes and cucurbits. It is probable that outlying terraces were devoted mainly to grain staples but predation by wild animals and birds coiuld have been a problem. Gardens and in-fields were probably used more for vegetables, roots and legumes. Here a more intimate familiarity with soil depth and quality would enable more attention to the individual reqirements of different plants.

<u>Landscape development</u>

The processes and sequence of landscape modification are not yet well understood, but it is unlikely that the terracing and ridging were the work of a large and dense population over a relatively short time period. The Unyama people, within whose territory the greatest concentrations of terracing occur, were not sufficiently important to attract any attention or record from the Portuguese who interacted closely wth the Mutapa state to the west and also with the Manyika further south. There is no suggestion of any major population dispersal from this area in oral traditions or the distribution of clan totems. Settlement pattern seems to represent loosely dispersed homesteads in village groupings. Although the stone built homesteads are very numerous and may be locally concentrated, especially in lowland dolerite areas, none appear to represent prolonged occupation and there are very few stratified sites or substantial middens. The modifications which many homesteads exhibit could be accounted for by a developing family cycle within a generation or so, though new ones might have been built and older ones abandoned within the local limits of a village area. We must therefore see terrace construction as an ongoing process over many generations among the communities of a fairly limited overall population.

The limited number of dated sites as yet enables only a tentative interpretation of the process of development of the complex, with some notable lacunae which may be real or only apparent. Thirty radiocarbon date are now available, all from the northern area from just south of Nyanga town. All those later than about 400BP have very wide calibration ranges.

It is possible that the idea of terracing goes back 1000 years or so, as Summers (1958) found Early Iron Age pottery on massive but rudimentary granite terracing at two sites, though it would be difficult to prove contemporaneity. No sites have yet been identified between the end of the Early Iron Age (? 11th or 12th century) and the earliest dated stone ruins. The latter are all in the highlands, first the occupation of relatively extensive sites on the highest peaks and ridges at altitudes over 2000m by the 14th/15th centuries, followed by pit structures now completely ruined at slightly lower altitudes in the 17th century. These sites are all above the level of terracing so that there is no direct association. Later highland pit structures tend to be lower again and are relatively well preserved, some with surviving *dhaka* (clay) walls. Their construction must have continued well into the 19th century and there may have been a hiatus in highland occupation from the earlier ruined pits, perhaps occasioned by the second severe phase of the "Little Ice Age" (Tyson and Lindesay 1992). Occupants of these sites must have been responsible for the terracing on parts of the western escarpment with which they are associated, while terracing near the top of the eastern escarpments immediately below such pit structures are also likely to be their work. In addition there are wide gently sloping steps with deep red soils on the eastern side of the highland ridge which were probably also cultivated though no traces have been observed. Further south, the banked furrows of the National Park area with their implied irrigation of unterraced fields are a local, perhaps relatively late development, probably also the the work of pit structure occupants living more or less closely above them.

In the lowlands, most of the dated sites are stone enclosures within the Ziwa ruins National Monument and range between 140 and 220BP, calibrating anywhere between the second half of the 17th century and the early or even late 19th century. Earlier sites may exist here or elsewhere in the lowlands but have not been dated or perhaps not recognised if not built in stone, so it is not known if there was any occupation contemporary with the earlier highland sites. The extensive terracing of the Ziwa area with which the stone enclosures are associated can probably be bracketed between the 17th and early 19th centuries and most of the western lowlands between the escarpment and the Nyangombe river were depopulated by the end of the 19th century when the first European travellers passed through. Further north there is a different type of homestead design with small well-built central livestock enclosures. Three dates from here are recent, 100BP or less, but a couple of dates probably from secondary context (including the terrace date quoted above), may suggest occupation contemporary with Ziwa.

In general one may suggest a continuous process of terrace construction with new terraces being built as older ones declined in fertility and were abandoned. Terracing would have concentrated initially on dolerite soils but have spread to adjacent granite areas. Alternatively more disadvantaged members of the community may have been forced into the latter. The less well constructed single-faced terraces may well be a final resort to less productive soils. Ultimately terraceable land may have run out and the fertility of homestead plots proved unsustainable, resulting in piecemeal or wholesale removal to a new site. In this way, the impressive agricutural landscape we now see could have been created with a relatively low overall population density.

The position of the cultivation ridges in this development is uncertain pending the dating of associated settlement sites. It may be assumed that some wetter lands were always exploited by terrace builders where conveniently available and that ridge practitioners resorted to terracing of suitable land within their ambit, but a large scale simultaneous use of both terraces and ridges by the same communities seems unlikely in terms of labour requirements.
Either lowland practice switched from a concentration on terracing to one on ridging (or vice versa), or each local community emphasized one or the other system according to the type of land available. While little direct research has been done in areas to the west and south-west, it may be noted that the ridging systems continue to the Rusape/Headlands area but terracing becomes more sporadic, probably concentrated mainly on the limited dolerite occurrences.
Each system was probably a parallel exploitation by related communities.

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