
Pastoralists and irrigation in the Horn of Africa: Time for a rethink?

By Stephen Sandford

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By Stephen Sandford (unaffiliated)

Abstract

There is much land in pastoral areas of the Horn of Africa that could be converted to irrigated agriculture and thus provide an alternative or additional livelihood for pastoralists. There is a long history of successful indigenous irrigation in the Horn of Africa but interventions by outsiders to involve pastoralists in irrigation in the last sixty years have largely failed. The causes for failure vary but are largely known. Many people experienced in pastoral development oppose further support by outsiders for the development of irrigation by pastoralists. This opposition ignores changes in the factors which caused past failure and in the demand for irrigation now. These changes are reviewed and attention drawn to the survival of past failures and the continuing expansion of the area of irrigation involving pastoralists. The key issues in further expansion are discussed.

The purpose of this note and the importance of the issue

This paper is not a presentation of the results of empirical research¹. It is, rather, a plea for a rethink about the potential of irrigated agriculture to be a valuable alternative or additional livelihood to pastoralists² in the Horn of Africa³. Over the last half-century pastoralists' wealth and their welfare have been in sharp decline and it is becoming increasingly urgent to find other livelihoods for many of them. In quantitative terms adoption of irrigated farming could be of very considerable importance.

The size of the pastoral population in the Horn of Africa (HOA) has been estimated at between about 12 (ICRC, 2005) and 22 million people (Morton, 2008), depending on source and on definition, although equally competent authorities have made both higher and lower estimates. The total estimated amount of irrigable (including already irrigated) land in or immediately adjacent to pastoral areas is 2.2 million hectares. Table 1 below shows the figures for individual countries. At an estimate of the population near the upper end of the range given above, and at a standard household size of 6 persons, the irrigable land/pastoral-household ratio (shown in the right hand column of the table) ranges from near-zero in Djibouti to 1.25 hectares/household in Ethiopia. These figures are extremely rough (and variable between sources and definitions of "pastoralist" and "irrigable"), but they are not wholly without foundation.

Table 1: Irrigable land and the number of pastoralists in the Horn of Africa

Country	Pastoralists (persons in millions)	Extent of irrigable land in pastoral areas ('000s has.)	Irrigable land (has)/ pastoral household (no.) ratio
Djibouti	0.1	1	0.06
Eritrea	1.7	137	0.48
Ethiopia	8.0	1,673	1.25
Kenya	4.5	173	0.23
<u>Somalia</u>	<u>5.0</u>	<u>240</u>	<u>0.29</u>
Horn of Africa total	19.3	2,224	0.69

Sources: Awulachew et al. 2007 (Table 9); USAID.2011; FAO Aquastat (Kenya) 2006; FAO Aquastat (Somalia) 2005; FAO Aquastat (Eritrea) 2005; FAO 1997.

¹ It is based on secondary sources particularly those available on the Internet.

² My working use of the term pastoralists includes not only those who are presently engaged in and largely dependent on the husbandry of ruminant livestock (including camels) in the pastoral areas but also those who, while not themselves currently engaged in a pastoral livelihood, have or had parents who did so. The term "(Ex-) pastoralist" is used to designate those who have just abandoned a pastoral livelihood or are on the margin of doing so

³ I am defining the Horn of Africa in this note as including Djibouti, Eritrea, Ethiopia, Kenya, and Somalia.

Background

Indigenous irrigation by pastoralists in the Horn of Africa

Prior to the advent of the colonial era in Africa there was already some involvement by pastoralists in irrigation. Ghebremariam, and van Steenberg (2007) and Gomes (2006) record that in Eritrea and Somalia respectively pastoral people have taken part in irrigated agriculture for at least 100 years. Adams and Anderson (1988) have shown that indigenous irrigation, often of considerable engineering complexity, involved parts/groups of the Maasai, Samburu, Pokot, Il Chamus and Turkana pastoral people in Tanzania and Kenya. Much of this irrigation appears to have lasted continuously for a century or more and some for 500 years or more. Although the involvement of any one pastoral household in irrigation may have originally been involuntary and intended to be temporary, the prolonged (but not everlasting) existence of these patches of irrigation without outside subsidy shows that these prolonged cases were successful in terms of the criteria applied to them by the societies concerned. Otherwise they would have been abandoned, not prolonged.

The examples from Kenya and Tanzania quoted show both the continuing market interactions between irrigators, pastoralists and traders and the cyclical interaction over long periods between: drought, a labour force in excess of the pastoralists' herds' ability to support it, an investment of this labour in expanding patches of irrigation, a subsequent labour shortage to maintain the irrigation structures, and a consequent need to re-enter less labour-intensive pastoralism. In some cases (e.g. around Lake Baringo in the mid-nineteenth century) the primary purpose of pastoralists' involvement in irrigation was to provide a means by which Samburu and other pastoralists driven out of pastoralism by loss of their herds through conflict could recover and build up their herds again so that they could once again become viable pastoralists. The heavy demands for labour to maintain the irrigation structures were incompatible with the demands for labour by mobile pastoralism, both in terms of its quantity and of location. In other cases this competition for labour between irrigation and pastoralism seems to have been less acute and the purpose of undertaking both pastoralism and irrigation was simply to expand subsistence production. The purpose or cause, in the past, for pastoralists to take up irrigated farming in Eritrea and Somalia is less clear, as are the views of these pastoralists about the desirability of a permanent shift from one livelihood to another.

Interventions by outsiders to involve pastoralists in irrigation ⁴

In contrast to this picture of the relative pre-colonial success of indigenous irrigation, the record of interventions by *outsiders*' (including governments, bilateral and international development agencies and NGOs) during the "development era" of the last sixty years, to involve pastoralists in irrigated crop and livestock production is widely reported as disastrous. Some of these failures occur in schemes in which the intended role of pastoralists was to be operators of small irrigated farms. In other cases the pastoralists were not expected to play any significant role in irrigated agriculture but were seriously affected by the loss of their prime grazing land and/or access to water points for their livestock (e.g. in the Middle Awash area in Ethiopia, see Getachew 2001). In both kinds of case the precise causes of the failure vary according to the circumstances of individual "scheme". These "circumstances" include the principal purpose of the scheme (and the attendant criterion for its success). A scheme might be judged a failure by one criterion or a success by another. Many schemes were a failure in terms of all the applicable criteria and simply vanished as soon as the funds for the expansion of physical structures were exhausted.

⁴ This paper frequently uses the expression "pastoralists' involvement in agriculture". Such involvement includes
(i) Being an irrigated plot-holder doing most of the cultivation by the use of household labour.
(ii) Being the "landholder" (either as an individual or as the member of a group, such as a clan) who hires out the land, either to small-holders or to a commercial enterprise to carry out the cropping operations.
(iii) Being adversely affected by irrigation (e.g. by exclusion from water or grazing area) although not participating in the irrigated agriculture.

The causes for failure by these outsiders' interventions

The most commonly cited causes of failure could be grouped into the following classes: -

- i) Technical deficiencies in design and construction of the irrigation works (e.g. in Turkana ⁵, Isiolo, and Garissa (see Farah et al. 2001) districts in Kenya) and/or in the agricultural and organisational skills required for efficient irrigated farming (e.g. the southern part of the Wabe Shebelle Basin in Ethiopia).
- ii) Unfavourable economics, due to the high initial investment in irrigation structures (e.g. Turkana and Perkerra in Kenya, see Hogg, 1982 and Adams and Anderson 1988) and/or in the unfavourable price ratios between inputs and outputs due to international or national markets factors, deficiencies in the systems for marketing output (e.g. in Garissa, see Farah et al. 2001), and for delivering inputs for individual schemes (e.g. in Turkana, see Watson and van Binsbergen, 2008).
- iii) The spread of human diseases among the pastoralists and labourers involved in the expansion of irrigated agriculture, for example the Middle Awash Basin in Ethiopia, see Kloos et al. (1981).
- iv) Incompatibility, for those households trying to practise both traditional pastoralism and irrigated farming, in the both the overall and seasonal demands for labour of the two livelihoods.
- v) The persistence of traditional values among pastoralists which give a higher status to pastoralism and a lower one to irrigated cropping. This may lead to the pastoralists targeted by the outside sponsors to enjoy the benefits of irrigation refusing to have any part in it (e.g. Middle Awash Basin in the early 1970s). Alternatively there may be a tendency for pastoral households who have ceased to be viable pastoralists due to loss of their herds through drought, disease or banditry and who initially expressed a desire to become full-time and/or permanent irrigators, to abandon their irrigated cropping and revert to being full-time pastoralists as soon as they have been able to rebuild their herd to the minimum size needed for full-time pastoralism (Turkana).
- vi) The physical incapacity of (ex-) pastoralists to do the physical work required by irrigated agriculture. The citation of this "cause of failure was" often, in the past, combined with one of pastoralists' alleged traditional contempt for agriculture (see ICRC 2005), but the erosion of this contempt (e.g. see Devereux (2006) and Getachew (2004)) focuses attention on the physical incapacity. While some differences, in physiology (see Myatt et al., 2009) or in the strength of particular muscles (Little and Johnson, 1986), between pastoralists and cultivators or other groups have been found, these do not seem to constitute a valid comparison (with traditional cultivators) of the ability to maintain a high and sustained output of agricultural labour.
- vii) A "cause of failure" of a slightly different type occurs where the failure is not one of the irrigation project not delivering on its own objectives and promises, but of the unexpected consequences ("side effects") of the project on for example, the local environment. One example is the loss of vegetation cover due to the increased demand for firewood due to the bunching of the human population around irrigation sites in Turkana.
- viii) Above all there has been inadequate legal protection for the land rights of pastoralists, who run the risk of losing, to bureaucrats (e.g. in Somalia) and to neighbouring ethnic groups or to other immigrant outsiders, the irrigated land originally or initially available to them, or of losing access to their traditional water supplies and grazing areas which are essential for their continuation as viable pastoralists (e.g. Middle Awash Basin).

The shudders of the Wise

The frequency of these failures has left a situation where many or most of those who have studied or implemented irrigation projects involving pastoralists in the HOA (the "Wise") shudder when the

⁵ Although efforts to introduce low-cost irrigation in Turkana district of Kenya are the most widely criticised of all outsider-led efforts to spread irrigation (including water-harvesting) amongst pastoralists in Kenya, Bruins et al (2005) give a much more favourable picture of it, citing in particular the high rate of functionality of the water conservation structures and citing a significant part of it as having a beneficial demonstration effect.

subject of future projects of that kind is raised. Following the shudder comes the Kantian Categorical Imperative ⁶: “Do not mix pastoralists with irrigation”. The Wise have captured the ears of some of the biggest donors who have put minimal input into irrigation by or with pastoralists. ⁷Typical of these is John Morton who has advised DFID on pastoral trends, problems and policy, but who in a 38- page final report (Morton 2008), which included a section on “other pastoral development issues not discussed in the main text”, failed to mention irrigation even once.

Typical also is Peter Little, who has written a policy brief for COMESA (the 19-country 400-million-people Common Market for Eastern and Southern Africa) on the subject of income diversification among pastoralists in which (Little 2009) he says “Pastoral areas are littered with failed development projects, particularly expensive irrigation schemes”, and it has a photograph embedded in the Brief entitled “Inappropriate economic diversification: abandoned and costly large scale irrigation projects in pastoral areas of northern Kenya” (Little, 2009). Surprisingly, in the context of north Kenya, he does not mention by far the largest (and probably the most costly) involvement of pastoralists in northern Kenya, the so-called “Mandera Triangle”. This is where the boundaries of Ethiopia, Kenya and Somalia all meet and for which a recent publication (Nyangaga et al. 2009) assesses the total irrigated area at 22,000 hectares. Irrigation in the Mandera triangle has its problems (land tenure, see Ahmed Alli Gedi (2005) for the Ethiopian side, and flooding for the Kenyan). It is, however, a very dynamic area which has shown remarkable growth, much of it self-financed, in the last two decades. It has also developed mutually very beneficial commercial interactions in fodder use between the irrigators and both more-urban-based and more-traditional pastoralists which involve 25-30,000 people (see Nyangaga et al., 2009).

I do not deny the extent of the past failures cited by the Wise or the causation attributed to them. I think that it is a pity that the Wise, in their rejection of irrigation as being an additional or alternative livelihood for pastoralists, concentrate their attention on the quite distant past. Of the seven principal causes for failure of irrigation projects involving pastoralists given above, the first three are not confined to or unusually correlated with such projects but are common to almost every kind of human endeavor. Of course, in both pastoral and non-pastoral contexts, technical designs and construction methods need to be good, the economics need to be right, and appropriate attention should be paid to the probable human health and other environmental consequences. The remaining four causes of failure are much more specific to pastoral situations. In the case of both these classes of causes for failure one needs to examine whether the nature and incidence of any of the causes that have prevented successful development of irrigation involving pastoralists has declined enough that the time has come to be much more active in involving pastoralists in irrigation.

Such an examination will determine whether it is any easier to be successful in irrigation now than in the past. That is the *supply* side. Before doing that, however we should look at the *demand* side. How strong is the need for greater involvement by pastoralists in irrigation?

The likely present and future situation in the pastoral areas of the Horn of Africa

In this section of the paper I am going to argue that the present and likely future situation in the pastoral areas of the HOA is such that the need to involve more (ex-) pastoralists in irrigated agriculture is now very strong.

⁶ A Kantian Categorical Imperative is one which is based on purely on a *a priori* principle and “without drawing on observations of human beings and their behaviour” and whose “justification cannot rely on observation.” (My somewhat loose interpretation of the Stanford Encyclopaedia’s web entry on the great German moral philosopher Immanuel Kant)

⁷ A most remarkable instance of this influence is that the USAID-funded project the ELMT (Enhanced livelihoods in the Mandera Triangle) programme in a list of more than 150 publications not one has a title implying any connection with irrigation and pastoralists

Three years ago I set out my views of the present situation in the pastoral areas of the HOA and they are easy to find on Website URL http://www.future-agricultures.org/pdf_files/Sandford_thesis.pdf They are also fairly summarised in ODI (2009) and in Moritz et al (2009). I shall only present them in a very abbreviated form here:

For many years the average level of well-being of pastoralists in the rangelands of the HOA, and the distribution of individual households around this average, have been getting worse, and they will continue to worsen. This is a consequence of the growing imbalance between humans, livestock, natural environment and the technology available to improve land productivity and of the economies of scale that ensure that poorer households fare worse than richer. The main livelihood traditionally practised is pastoralism, but the size of the existing human population, if it is to continue largely dependent on pastoralism, requires a livestock population that is larger than the natural environment can sustainably support.

If both the growth of the human population and primary dependence on a pastoral livelihood are to continue, then the net value of total pastoral output (i.e. animal products) needs to increase but without any increased grazing pressure on the rangelands arising from an increase in animal numbers. The best available forecasts of world prices do not suggest that this increase in net value will come about by rises in the prices of animal products⁸. So it will have to come in quantitative terms⁹. Although there is some scope for improving secondary productivity (yield of animal products, such as meat, milk, hides/skins and draught power, per unit of feed consumed by the herd), for example through improved animal health, this will have little effect unless the quantity of feed consumed is also increased. This will either require feed to be imported from non-pastoral to pastoral areas or the primary productivity of the rangelands (units of feed per hectare) to be increased. Although high protein feed supplements can be economically imported, the feed conversion ratios of cattle and small ruminants are such that it is normally much more economic to export the pastoral livestock to where the feed is grown in the non-pastoral areas than the other way round. But the value added then accrues to the non-pastoralists. In spite of some claims to the contrary, I do not believe that we have the technology available substantially to increase the primary productivity of rainfed rangelands. The recent and continuing decline in the welfare of pastoralists will not be halted or reversed by focusing only or principally on the pastoral livelihood.

Measures to check the *natural* growth of the human population are not dealt with in this paper. My belief is that, if humane, they will not go far or fast enough to have a significant impact in an acceptable period of time. The great unknown seems to be the extent and direction of net migration which when combined with the natural growth rate gives the overall growth rate. Homewood (2008) says that there is a lot of evidence (very little of it quantitative) that “there are far fewer nomadic pastoralists than there were 40 years ago”, but that does not mean that there is less human pressure on the rangelands. It may simply mean that the nomadic pastoralists have become “settled”, many of them practising some cropping. One of the very few bits of quantitative evidence available for HOA pastoralism relates to the Turkana. From a very low rate in the 1960s, out migration, increased substantially in the 1980s. By 1989 39% of people classifying themselves as Turkana live outside the district. We need to remind ourselves that on the assumptions: -

- That the net out-migration rate from Turkana was effectively equivalent to zero in the 1960s;

⁸ FAO/OECD forecasts for real (inflation-adjusted) world prices of livestock products in index form (where the base period, with an index score of 100, is the average for the period 1996-2007). The corresponding average index scores for the period 210-2019 are:

Beef=103; Poultry =113; Pork=94; Cheese=112; Butter=143; Whole milk powder=118; Skim milk powder=115 In all case of all the commodities except pork the average scores/prices for the period 2010-2019 are expected to be less than the actual scores/prices in the period 2007-2008.

⁹ Iimi (2007) suggests that some increase in net value can be achieved by investment in infrastructure, especially transport, which would reduce marketing costs. I agree with this conclusion. However his low estimate of the share of transport and handling costs in final price (0.01) seems to contradict this claim and I suspect an errant decimal point.

- That people classifying themselves as Turkana are from families that practised pastoralism in Turkana in 1960;
- That the natural growth rate of those classifying themselves as Turkana was 2.5% per year from 1960 to 1989;

Then a group of 100 pastoralists in Turkana in 1960 would have naturally grown to 205 people in 1989. If 40% of these have migrated this leaves 123 still in Turkana, an increase of 23% over the 1960 figure.

The key to successful pastoralism

Diversification holds the key to successful pastoralism which, in the HOA, requires, by both economic and ecological criteria, a mobile system of land use and often household herds of mixed species able to exploit different types of vegetation in widely separated locations at different seasons. Bone (2005), using an ecosystem model simulating conditions in southern and eastern Africa, has clearly shown the decline in the availability of livestock feed (and hence of livestock output) and in the condition of the vegetation resulting from spatial restrictions on animal mobility in the rangelands. A mobile land-use system requires an adequate labour force for herding and one able to respond to rainfall and other events rapidly. Households with a small herd and a small labour force, which divide their attention across several different livelihoods, will not be able to operate a competitive or sustainable mobile system of land use. This has been shown by a number of PARIMA studies (e.g. Barrett and McPeak (2006). The long-term aim should be to facilitate the passage out of a pastoral livelihood of those households which have to diversify if they are to survive at all. That is a common strategy of East African pastoral societies (Anderson and Broch-Due, 1999)

The need to diversify the livelihoods of the pastoral population

The livestock population cannot be further increased but is already too small to provide an adequate living to a human population wholly dependent on pastoralism. The burden of the resulting gap between requirements and supply falls principally on the already poor who have too small herds to sustain themselves and who consequently have to supplement their income in other ways which leave them with too little time to look after their herds properly; and their herds therefore shrink yet further. While the human population continues to grow and while we continue to be unable to increase the primary productivity of the rangelands, the already manifest non-viability of the existing pastoral system will continue to worsen unless the population is able to diversify its livelihoods.

Diversification is happening fast. Data from north Kenya (Little et al. 2008) indicate the income structure of household with different livestock endowments. As an example of these differences the poorest group (with herd size of less than 1TLU/capita) received 37% of their total income from sales and autoconsumption of livestock products, 23% from wages and 14% from trade and business. Their income measured in US\$ adjusted for purchasing power was only \$0.20 per person per day. In contrast, the richest group differentiated received 77% of their income from livestock 10% from wages, and 8% from trade and business. Their per-person daily income was \$1.05. The poor are forced to diversify out of pastoralism but the opportunities for diversification that they have are very poor, offering minimal returns.

The opportunities for diversification

Different opportunities to diversify, i.e. different livelihoods, offer different prospects for entry and different rewards once entered. It is probable¹⁰ that pastoralists in their own area or social environment have a comparative advantage, compared to outsiders, in entering the following livelihoods:

- Rainfed cropping
- Petty trade and business

¹⁰ The ensuing statements about alternative livelihood opportunities are largely hypotheses based on theory or personal experience, which have not been tested properly. On the other hand I have not seen empirical work which challenges them.

- Unskilled wage employment

Any group discrimination will work to a pastoralist's advantage in these livelihood opportunities. . On the other hand the returns to rainfed cropping in a pastoral environment are low and uncertain, while the opportunities in local and unskilled labour and petty trade will tend to be paid out of the exiting livestock based economy where total income, as we have seen, is not growing but the number of (ex-) pastoralists seeking to enter these livelihoods is. The result will be very low remuneration rates in these livelihoods.

For the following livelihood opportunities the pastoralist, particularly the poor pastoralist, will suffer a competitive disadvantage in selection for entry. This disadvantage arises from his/her relatively poor education, his linguistic skill, and to a certain amount of ethnic prejudice. These livelihoods are:

- Jobs requiring high levels of academic or professional/technical qualifications
- Unskilled jobs both in the rural or urban environments outside his own area.

In contrast to the livelihoods already listed, opportunities for an (ex-) pastoralist to enter a livelihood based on irrigated agriculture in his/her own area will be favourable, and the reward relatively attractive (for confirmation of this see the references to irrigation in the Mandera Triangle in the subsection on "Assessment of the economics prospects for investment in irrigation" later in this paper).

Some changes in the prospects for irrigation.

This section of the paper will revert to the issue of whether there have been such substantial changes in the circumstances in which pastoralism and the choice between alternative livelihoods is conducted that our past experience of the difficulties in involving pastoralists in irrigation will be a poor guide to what future experience will be.

Technical design and construction

The volume of technical knowledge acquired and made available to agencies (including governments, NGOs and other donors working at field level has increased enormously over the last twenty years, much of it made available over the internet. One example of this is the formation of a network, The international Spate Irrigation Network which is a network (at <http://www.spate-irrigation.org/spate/spatehome.htm>) of professionals and practitioners interested in spate irrigation. The network has an electronic library of research and other reports. It also produces Guidelines and Training Modules to increase practical skills in specific subjects. The absorptive capacity of these agencies at field level probably lags behind the increase in information now available to them but the quality of design and construction has probably increased, as has the awareness of the disease problems.

Assessment of the economic prospects for investment in irrigation

The generally-accepted impression of failure associated with past schemes to involve pastoralists in irrigation in the HOA implies that they provided very poor economic returns to the investment, although this return was not often rigorously calculated (for an example, not from the pastoral sector, of what a rigorous calculation of the economics of an irrigation scheme entails in the HOA see Sandford, 1973). Behnke and Kerven (2011), in a paper submitted to this conference have done economic calculations based on past actual experience that cast doubt on the economic desirability of transferring land used by pastoralists to use by commercial estates growing cotton. Clearly their paper is intended to cast general doubt on such transfers rather than being limited only to cotton. Their conclusions for the future, however, will be heavily modified by consideration of the recent (since 2009) quadrupling of the price of cotton.

In contrast to the gloomy assessment of the economics of irrigation by Kerven-Behnke, a team working for IFPRI (Liangzhi You et al., 2010) have used a standardised model, incorporating hydrographic, physical, biological and economic factors, to draw up a schedule of the extension (hectares) that could be added in different countries and regions of Africa to the areas already irrigated,

the IRR (internal rate of return) of doing so, and the capital costs of both small and large-scale irrigation projects. IFPRI's model depends on coefficients derived from past experience but its results are not founded on actual case studies. It paints a rather hopeful picture of the prospects for irrigation, in that 30% of the total irrigable area will, if developed for irrigation, yield a rate of return to investment (IRR) of 12% or more. However the total area in the HOA (as defined in this paper) calculated by IFPRI as irrigable is only 60% of the area described as "irrigable" in Table 1 of this paper, and the IFPRI total is for the whole of the HOA whereas the figures in Table 1 apply only to what is irrigable in the pastoral areas. I have considerable doubts about the usefulness of the IFPRI figures.

Another piece of evidence on the economic prospects for irrigation involving pastoralists is the impact assessment report (USAID-Feinstein-Tufts, 2010) of small-scale pump irrigation along the Wabe Shebelle River in the Somali Region of Ethiopia. The cost-benefit ratio of the project actually executed (by an international NGO) was found to be unsatisfactory. However two significant benefits, the value of the fodder grown and fed to the irrigator's own livestock and the value of the increased consumption of the irrigated crops by the irrigator's household, were both left out of the calculation of the ratio which, therefore, underrated the achievements. However the report describes the extremely dynamic performance, unconnected with the project, of the privately owned pumps delivering water to individually-farmed irrigated holdings in the same general area. While there are still serious economic and health problems this essentially private system is not only expanding but it also has found ways of arbitrating disputes between pastoralists and irrigating farmers and of equitably distributing irrigation water and its costs between holders of land close to and far from the river bank.

Incompatibility between irrigation and pastoralism: cultural values or economic returns

Several people who have studied pastoralists' involvement in irrigation stress the impermanence of that involvement as a consequence of the tendency of the (ex-) pastoralist to see irrigated agriculture as a temporary refuge where he (and ? she) can survive and build up their diminished herd prior to re-entering pastoral life. Once this re-entry is accomplished, the demands of herding for labour grow too large to continue both livelihoods, and the irrigation is abandoned. In explanation of this preference for returning to pastoralism some people put more stress on cultural values while others stress the superior returns to labour in pastoralism except in periods of crisis.

In the case of cultural values the situation appears to be changing fast. Devereux (2006) has clearly described the growing disillusion with pastoralism, principally of females but also of some young males, amongst Somali pastoralists in Ethiopia. The same sentiment, although perhaps to a less degree, can be heard among other pastoral groups in the HOA. For example in a survey of Afar pastoralists (12% of the respondents were women) in Amibara district in Afar Region of Ethiopia, Getachew (2004) found that 87% of the people surveyed denied the validity of the proposition that "It is not Afar culture to work in crop farming".

The economic perspective also seems to be shifting in favour of irrigation. This is not to claim that irrigation offers an easy life for (ex-) pastoralists but it is a better one than they expect to have by returning to pastoralism. In the Mandera Triangle, amongst irrigated share-cropping tenants on the Genale and Dawa rivers (merging into the Juba River) both on the Ethiopian side (SCF 2002) and on the Kenya side (ALRMP, 2001) of the border the dominant opinion is that they are better off, in terms of comfort, stability, access to social services and economically, as irrigating croppers than they were as pastoralists, and they have no intention of ever returning to pastoralism. In contrast to that, however, in Garissa district of Kenya Farah et al (2001) found that a majority (62.9%) of the irrigation scheme households had settled to farming in the last five years. This, Farah et al. claim, means that most of the original members had opted out of farming (and, implicitly had returned to pastoralism), thereby leaving space for these relative newcomers to take their place in this rehabilitation and that although irrigation might by itself be profitable this has to be offset against the damage it does to the efficiency of pastoralism.

Land tenure and protecting pastoralists' property rights

This is not the place for a general review about the importance of land tenure and property rights for pastoralists in the pastoral areas of the HOA. Much useful study has been published, including McCarthy et al. 2000 and a large number of studies undertaken and/or published under the auspices of IIED. Since 2000 these have been supplemented by a flow of Working Papers from CAPRI (the CGIAR System-wide Program on Collective Action and Property Rights) of which at least ten deal directly with property rights in pastoral or range areas. The points which need to be made here are:

- Land tenure does not seem to have been a significant factor in determining the success or failure (measuring these in terms of the speed at which development took place and the continuing occupation rate of the area developed) of many of the *small* irrigation schemes in which pastoralists have been involved as in the past. Such small (and relatively private schemes) are able to negotiate ways out of both internal disputes and ones with their neighbours. They are also able to draw and enforce extremely complex and detailed rules to optimise both the efficiency and equity of water use. (See, for example, Berhane Haile Ghebremariam. 2006).
- It does, however, appear to be a significant factor now in the areas where either the total amount of irrigated land is *large* enough seriously to affect access to the river by watering livestock or where, as in the Awash Valley, the Wabe Shebelle River or on the Ethiopian side of the Mandera Triangle, the traditional tenure system is breaking down and different groups are jostling to improve their claims (e.g. see Ahmed Ali Gedi, 2005, Abdurahman Ame, 2002). This leads to violent conflict and to a failure to take up the opportunities to improve economic welfare.
- Neither the traditional land tenure systems and rules, nor government legislation have been effective in protecting the land rights of pastoralists. For example in Ethiopia, government legislation (in Article 40 (5) of the Constitution and in Proclamation 456 of 2005 (Rural Land Administration and Land Use Proclamation), especially Articles 4, 7 and 9) appears to give pastoralists fairly strong rights, to continue to use pastoral land, to receive compensation if public interest requires their land for irrigation or other purposes, and to be provided with an alternative way of life. In fact ad-hoc administrative or political decisions rather than principle embodied in legislation appears to be the prime determinant of land allocations and distribution in the pastoral areas. My own experience is that, behind those administrative and political decisions, there lies misunderstanding of pastoral land use (leading to an under-estimate of what pastoralists need and an over-estimate of what is empty and available for allocation to others), lack of sympathy for pastoralists and their way of life, and a residual culture which, in spite of the legislation, sees pastoral land as being a national asset to which, unlike peasant cultivators and the land they occupy, pastoralists have no preferential claim.
- The consequence of this failure to protect the land rights of pastoralists, for example in the Awash Valley, has been substantial impoverishment of pastoral people due to the loss of their most productive riverine pastures, violent disputes with the pastoral and cultivating neighbours, and a failure to incorporate them in the new irrigated economy either as plot-holders or labourers.

Additional evidence of change favouring irrigation involving pastoralists

One piece of evidence of favourable change (but not of the cause of previous failure) is the survival of irrigation on areas developed for use by pastoralists 30 or 40 years ago and which were confidently predicted for early closure soon after their opening. But they are still in use today, e.g. amongst the Borana on the lower Waso Nyiro river (see Abdullahi Dima Jillo, 2006).

Further evidence is the general expansion of irrigation involving pastoralists. See Table 2 for a very rough estimate (guesstimate might be a better word) of the present extent of such irrigation. We cannot get a time trend by comparing it with similar data for another time in the past, as the data do not at the moment exist. There is some evidence that the total irrigated areas in Somalia-as-a-whole and Kenya-as-a-whole have declined but this is thought not to be the case in irrigated areas involving pastoralism. It should be noted that the data on which Table 2 has been constructed are from a huge variety of sources of different reliability.

Table 2 shows that the total extent (hectares) of the area which is regularly irrigated, with the involvement of pastoralists in the HOA is about 118,000 hectares of which Somalia accounts for 55% and Ethiopia for 28%. In no country was irrigated per pastoral household important. In Somalia about 27% of the total regarded as irrigable (see Table1) is in fact irrigated, and in Kenya about 10%. The other countries show much lower proportions as being already utilised.

Table 2: Area under continual irrigation in the Horn of Africa (in the early 21st Century)

<i>Country</i>	<i>Extent of (ex-) pastoralists' involvement in regularly irrigated land (has.)</i>	<i>Land regularly irrigated (has.) per pastoral household</i>
Djibouti	1,000	0.010
Eritrea	1,750	0.001
Ethiopia	33,600	0.004
Kenya	16,879	0.004
<u>Somalia</u>	<u>65,000</u>	<u>0.013</u>
TOTAL Horn of Africa	118,229	0.006

The key issues in the further expansion of irrigation involving pastoralists

As I have been reading the published and unpublished material in preparation for writing this paper three issues have been constantly returning to my mind. On the assumption that the case for greater involvement by pastoralists in irrigation is accepted:

- (i) What role is there for commercial estates? I see three advantages in their playing a role. Firstly the capital costs of irrigation usually require the growing of high value crops to pay off the debts incurred in the development phase. High value crops require careful attention to and skills in marketing. Do commercial estates have a role in providing the attention and skills require on the basis either of contracts to purchase from outgrowers - or agents' commission? Secondly the process of encouraging and facilitating the transition from pastoralism to irrigated agriculture should not be hurried. But often gravity irrigation has large economies of scale in its development. Can commercial estates, on a finite concession basis (say 20-25 years), play a role in realising the economies of scale without prejudice to the long-term aim of providing an alternative livelihood for pastoralists? Thirdly, particularly in reading the literature on Somali irrigators I have been struck by the number of references to the usefulness of experience gained on commercial estates (now not operational) in Somalia.
- (ii) The dynamism of the private sector in the development of irrigation along the Wabe Shebelle River, and in the countries on all three sides of the Mandera triangle is in strong contrast to the struggles of governments and other agencies introducing irrigation to pastoralists in the same area. The private sector has been the source of much of the capital investment (especially for the purchase of pumps). How can such dynamism be harnessed and not strangled in increasing the flow of pastoralists into an irrigation-based livelihood for (ex-) pastoralists?
- (iii) Both pastoralism and irrigation have strong elements of Common Action and Property Rights in them. That is the specialism of CAPRI, the CGIAR network. Is the work done by CAPRI being read/taken on board by policy makers handling irrigation and pastoral affairs? Has CAPRI got a special part to play in the combination of pastoralism and irrigation?
- (iv) What sort of potential livelihood do we want (ex-) pastoralists to be able to aspire to on new irrigation schemes intended for them? Is it just a bare subsistence level to be achieved by fit 35 year-old parents and their teenage children working flat-out? Or should it offer the potential to grow and so to allow either access further up the social and economic ladder or at least to permit a tolerable old age?

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