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Displaced Pastoralists and Transferred Wheat Technology in Tanzania

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This Gatekeeper Series is produced by the International Institute for Environment and Development to highlight key topics in the field of sustainable agriculture. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions of relevance to development activities. References are provided to important sources and background material.

The Swedish International Development Authority (SIDA) funds the series, which is aimed especially at the field staff, researchers and decision makers of such agencies.

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Charles Lane & Jules N. Pretty

Trade Offs in Development

There are immense pressures on developing countries to adopt approaches to agricultural development that hold a promise of increasing food production. One of the simplest and cheapest to administer involves the direct transfer of technology from a site where it is a proven success to one where it is hoped and perhaps expected to work.

This approach was typified by the Green Revolution in agricultural development. Here the single goal of increased cereal production was successfully pursued through the transfer of packages of modern technology comprising improved crop varieties, augmented by the appropriate supply of water, fertilisers and pesticides.

The result has certainly been significant: food production has risen by about 25% per person in Asia and 10% in Latin America since the mid 1960s. By orthodox measures these increases justify the means by which they were achieved.

Yet these increases in aggregate food production hide a number of costs. Sometimes production itself suffers, as when pesticides kill natural enemies as well as pests, or contaminate groundwater used for irrigation. More often, though, the impact is upon other sectors of the economy and environment. Take surface waters: nutrients derived from fertilisers encourage algal blooms, which clog up rivers and lakes as well as kill fish; and soil losses increase sediment loads, which shorten the life of downstream reservoirs, decrease the efficiency of irrigation channels, fill harbours and kill coral reefs.

Apart from affecting natural resources, intensification of agriculture also has profound effects on social structures, changing both access to resources and the sharing of benefits. In Indonesia, for example, teams of women used to harvest the rice with traditional *ani-ani* knives, and in return they received a proportion of the harvest. But with modern introduced varieties all maturing at the same time, standing crops were then sold to middle men who hired specialist male sickle-using labourers. The result was greater efficiency, but also isolation of women from the production process.

Such problems in Asia and Latin America have become familiar to many. But in Africa the impact of such transfers of technology is not so well understood. Traditional African farming systems are highly complex and diverse, and it is difficult to fit an intervention to local conditions without local help (Chambers et al., 1989). Nonetheless there have been some notable attempts: one example from the past is the Tanzanian Groundnut Scheme of

the 1940s-1950s which received much criticism (Frankel, 1953; Wood, 1950). A more recent example in Tanzania is the development of large-scale wheat cultivation, which we now discuss in detail.

Promoting Wheat Cultivation in Tanzania

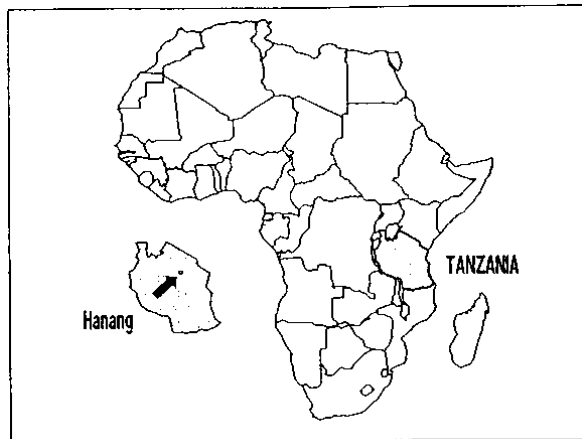
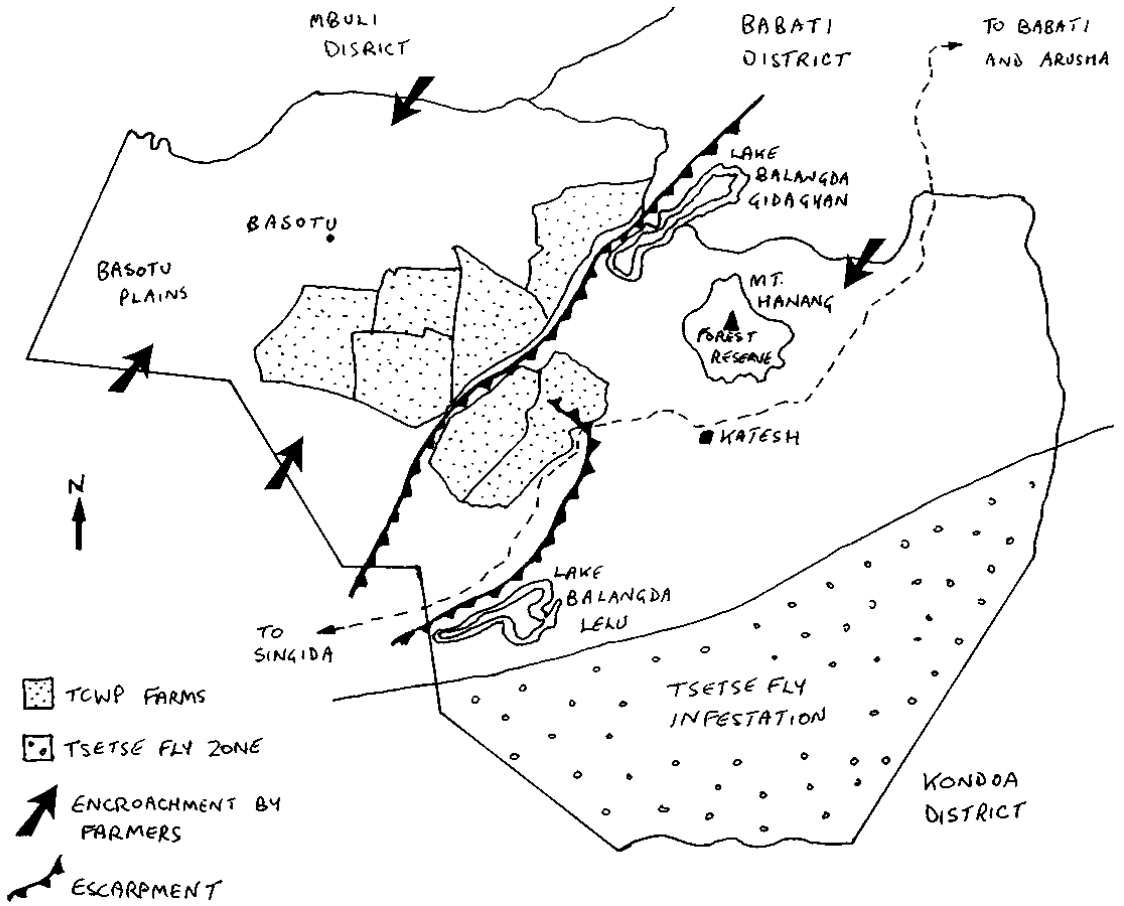
Tanzania is typical of many African countries in that it suffers from the interlocking economic and ecological stresses of falling food production per person, high external debt, and the need for grain imports to meet food security gaps, thus putting pressure on foreign exchange reserves.

The 1970s were a time of crisis. Food production per person fell about 1% each year. To make up the shortfall, Tanzania was forced to request food aid and enter world grain markets at a time of high prices. During the 1970s, food grain imports averaged 200,000 - 300,000 tonnes annually, the value of cereal imports rose tenfold and foreign exchange reserves were severely depleted (Freeman, 1982). By 1981, for example, reserves amounted to only US\$1.4 million, a level equivalent to just two days cover for committed foreign exchange requirements. As a result the country became more dependent on aid which, in 1980, accounted for 70% of Gross National Product. Self-reliance, a pillar of the nation's development strategy, was in this way undermined. It is for these reasons that Tanzanian development policy has stressed self-sufficiency in food.

Some 20 years ago the Government of Tanzania established, with the support of the Government of Canada, the Tanzania Canada Wheat Programme (TCWP) on the Basotu Plains of Hanang district in Arusha region (see Figure 1). The objective was to boost internal production of wheat, thus releasing finance otherwise spent on food imports. The area is semi-arid with an annual rainfall of about 600mm. Apart from the mountain forest on Mount Hanang, the plains vegetation is mainly woodland interspersed with open grasslands. The climate and soils are favourable to wheat cultivation.

The seven farms of the TCWP produce a lot of wheat. Yields are comparable to those on the Canadian prairies and total output in 1989 is expected to be 50,000 tonnes, representing nearly half of Tanzania's domestic demand. According to production level and financial data used by the Canadian International Development Agency (CIDA) the Programme is a success and support for this form of wheat production in Tanzania is fully justified (Nielson 1982). But a closer look at the Programme suggests there have also been some costs and losers.

Figure 1 Map and location of Hanang District, Tanzania



The Barabaig Pastoralists

The plains around Mount Hanang are also the homeland of Barabaig pastoralists, who number some 30-50,000 people in Hanang district. Most still live in a traditional manner with strong adherence to the culture and customs consonant with their pastoral way of life, one that is similar to other Nilotic pastoral groups of east Africa, such as the Maasai. The Barabaig, like many peoples who sustain a living in variable and risk-prone environments, have a tradition of respect for and understanding of the land they rely on for their survival. A group of elders recently said in an Open Letter to the Canadian People:

"We value and respect the land. We want to preserve it for all time". (Paavo, 1989)

The Barabaig economy is based on livestock production. Their herds of cattle, sheep and goats utilise the forage, water and salt licks found scattered throughout their territory. Because of the variety and scarcity of these resources, together with the vagaries of climate, they need to be in different areas at different times. To make best use of these variable resources the Barabaig have developed a seasonal grazing rotation system in which they move amongst eight different forage regimes. This includes migration up and down the Rift Valley wall and congregation near persistent vegetation and permanent water in the dry season. This can mean that some land is left free of human habitation or livestock grazing for long periods, which allows it to be preserved from overuse and conserved for times of future need.

To enable the variable use of resources it is necessary for all members of the community to have general access to common land. But this access is not uncontrolled: certain areas and resources are protected by rights and obligations for individuals, clans and local groups. This is managed by a common property land tenure system in which access to resources is assured and controlled by customary rules and institutions. In the past this has been very effective in both maximising production and conserving resources.

Land is more than a physical resource to the Barabaig. They have a unique cultural event in which highly esteemed elders are buried with a *bung'ed*. This is both the name of the burial mound and the funeral ceremony associated with it. Only those elders adjudged by their clan peers to be sufficiently worthy can be buried in this way. The deceased man's clan is forever responsible for the grave's up-keep. Clansmen will visit it for generations to appeal to their ancestor as a medium to Aset, their God. In this way the *bung'ed* acts as a lasting focus for their cultural and spiritual life. They still visit, for example, the *bung'ed* of Gitangda in the Ngorongoro crater despite being dislodged from this land by the Maasai over a century ago (Borgerhoff Mulder, et al., 1989).

Ecological Impacts of Wheat Monoculture

To grow wheat on the Hanang Plain the Barabaig have been removed from their land. The 40,000 hectares of land taken for the TCWP wheat farms was the most fertile prime grazing land. Its withdrawal from production has undermined the rotational grazing system, causing problems for Barabaig pastoral production.

Although the farms cover only 12% of the total land area of the district, the loss of this area is crucial for pastoralist production. This is compounded by the fact that other fertile areas have also been gradually taken through encroachment by neighbouring cultivators since colonial times. Thus in combination with other limits to access resulting from the Mount Hanang Forest Reserve, the salt pans of Lake Balangda Lelu and the tsetse fly infested bushland to the south of the district, it is clear that Barabaig rangelands have been severely depleted.

The TCWP farms together with other cultivation have effectively eliminated from the grazing rotation one of the eight forage regimes the Barabaig call *muhejega*. The *muhejega* constitute the most important element in the forage regime of the grazing rotation. Exclusion from these areas has denied the Barabaig access to certain important and highly productive livestock forage species collectively called *nyega nyatka*. One grass, *mejojiga* or "milk grass", which is particularly favoured by the Barabaig, has been completely eradicated from the Basotu Plains by wheat cultivation. By preventing access to these fertile areas, the whole rotational grazing system has been disrupted, effectively reducing the pastoral productive capacity of the whole district beyond the direct impact of the wheat farms. This loss has resulted in a drastic reduction of livestock numbers and a decline in production which the Barabaig say has caused them 'great suffering' (in Paavo, 1989).

The monocropping of wheat, using highly mechanised cultivation techniques, has also led to a number of potentially serious environmental problems. So far, no inorganic nitrogen fertilisers have had to be applied to the soil - the *muhejega* soils are so rich that, as yet, there has been no significant yield response. It follows that with this kind of wheat cultivation the natural fertility of the soil is now being 'mined'.

Furthermore, the soil is left bare soon after the July harvest until the time of planting in February. On sloping ground this makes the soil susceptible to rain-induced erosion when flash floods carry away the exposed topsoil. Deep gullies have been created and Lake Basotu, sacred to the Barabaig, is being silted up.

Social Impacts of the Programme

The social impacts have not, until recently, been made apparent. It has become clear that the Barabaig were not fully consulted about the Programme; some of them have been forcibly removed from the land and are prevented from following traditional routes across the farms to reach pasture, water or salt resources. Many of the sacred *bung'ed* graves have been ploughed up and are no longer recognisable.

But some impacts are more obscure. The traditional rules and institutions designed to control use of pasture resources have never been tested by such absolute shortages. It is proving difficult for the Barabaig effectively to adapt to new constraints that have been imposed. According to the Barabaig this has resulted in over-grazing the land still available to them. On the less fertile areas perennial grasses have given way to annual weeds with a dramatic loss in productive capacity of the range.

Some of the benefits of the Programme, in particular the creation of labour opportunities, were intended to trickle down to the local community. The wheat farms employ 250 people, of which less than ten are Barabaig. Water, health and education facilities are provided to the local community by the TCWP. However, to date these have not greatly benefited the Barabaig who are excluded by limited access. As a result the welfare of very few, if any, Barabaig families has actually been improved.

Pastoralists' Predicaments

Part of the problem for pastoralists is the way that outsiders misunderstand them and their production systems. Rangeland is common land to the Barabaig and individual herders move about in response to their assessments of range productivity or social needs. People who do not understand this can be misled into thinking land is vacant or under-utilised. This then becomes a pretext for assuming that pastoralists do not make best use of the land, and thus justifies their dispossession. One study of Canadian aid to Tanzania said:

"The project (TCWP) has many of the characteristics of a frontier development effort. Traditional pastoralists, the Barabegs (sic), are being displaced and absorbed into the project as labourers. Previously idle land is being brought under cultivation..." (Young, 1983) [emphasis added].

To pastoralists the land is not idle. All land is productive and used at certain times. The Barabaig understand that land needs to be left to regenerate and provide forage at times of need. Their system of land management has been shown to be economically viable and sustainable. Yet how history repeats itself. Frontier development efforts in Canada offer examples of how native peoples were displaced to enable others to farm wheat on former tribal land. Today a coalition of Canadian conservation groups are trying to preserve what little remains of native grasslands in Saskatchewan following their destruction by extensive wheat farming (Struzik, 1989). It remains to be seen whether this lesson will be heeded before it is too late to salvage what remains of the sustainable Barabaig production system and the environment on which they depend for their livelihoods.

Getting it Right at the Start

Producing food for Tanzania's growing population is a worthy goal. However, one of the major problems with projects like the TCWP has been the singular failure to use appropriate assessment tools at the appraisal stage, for the comparative analysis of technology and policy options according to real economic, social and environmental costs.

The TCWP has had a number of internal evaluations. Most of these have given great attention to the financial aspects of wheat production. Until recently these have provided a positive picture of the Programme's economic performance. A project evaluation conducted in 1980 arrived at a benefit/cost ratio of 1.59¹. The Internal Rate of Return to the capital employed in the programme of nearly 40% also indicated that it was a "very profitable investment for the Tanzanian economy" (Stone, 1982).

But more recent assessments that take account of the environmental and social costs are much more doubtful (Prairie Horizons Ltd, 1986; Michael Mascall and Assoc, 1986). The results of these studies suggest that the costs far exceed the benefits, and that there are better ways to use aid and scarce foreign exchange. As the latest official economic assessment put it:

"The results of this study indicate that wheat production on the Hanang farms is profitable from the viewpoint of the farms given the price and cost structure that have been in place, and the farms are likely to remain profitable unless major changes in costs or prices occur. However, from the standpoint of contributions to, and resources used within, the Tanzania economy the Project is shown to be uneconomic. In strict economic terms, the costs have exceeded the benefits and this is likely to continue through to the year 2000" (Prairie Horizons Ltd, 1986).

Further independent studies have since indicated that smallholder production of wheat using oxen is much more efficient at using available resources and makes more economic sense (Carter et al., 1989) .

In response to the now known risks of transferring temperate technologies to developing countries, CIDA has now accepted the principles set out in the Environmental Assessment and Review Process adopted by the Canadian government. But for such a process to work, it must be fully integrated into the whole project cycle, and not taken just as window dressing for otherwise unsound developments (Rees, 1989; Wenning, 1989). It could well be applied to the TCWP.

It appears from this that if an early economic analysis had been undertaken that examined all costs and benefits from the point of view of society as a whole, then the course of history on the Hanang Plains may have been quite different. Even now accepting the findings of such an analysis might avert further suffering and degradation. Unfortunately the initial economic analyses were restricted to financial examination of costs and returns as faced by individuals or firms from a purely commercial perspective. It is also now clear that the interests and needs of the local people were not given priority when the project was formulated.

This project is Canada's largest and longest running single agricultural aid project in Tanzania, and total disbursements of aid total at least Canadian \$75 million. After 20 years of involvement, Canadian support is still needed and is pledged until 1992. And what of the impact on supply and demand? The farms supply nearly half of total wheat demand, but wheat accounts for less than 5% of food crop consumption. Moreover, most wheat demand in Tanzania originates with the urban wealthy rather than rural poor. These gains have thus to be set against real and foregone economic losses for the Tanzanian economy, ecological losses in the Hanang Plains, as well as ecological and social costs to the Barabaig.

1. The present value of benefits exceeds the costs by a ratio of 1.59

Conclusions

The simple transfer of wheat production technology to plains of Tanzania has produced unforeseen environmental and social costs. There are lessons here that can be learned for this and future projects. In particular negative impacts can be lessened if the following conditions are met:

1. Facilitate participation of local people in project formulation.
2. Take into account the local objectives and needs together with national goals.
3. Consider local capacity, skills and knowledge before introducing foreign and potentially dependency-forming technologies.
4. Include environmental and social aspects as well as economic criteria in the project evaluation.
5. Make provisions for regular monitoring of project impacts and set aside the means to make the appropriate adjustment.

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