

ISSUE PAPER

**Dealing with Risk and
Uncertainty in Africa's
Drylands: the Social
Dimensions of Desertification**

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ABSTRACT

There are multiple causes of desertification which operate at many levels, from the way in which land is used in a farmer's field, through the impact of land tenure regulations and agricultural pricing policy at national level, to global factors, such as world trade conditions and global warming. Desertification is also linked to the larger social processes, (such as the monetisation of local economies, population growth, urbanisation, and sedentarisation) that create push and pull factors influencing resource use.

The key findings of this paper on the social dimensions of desertification are as follows:

1. Social processes and desertification

- integration of smaller social systems into a worldwide economic system has undermined local cultural, political, economic and social integrity;
- marginalisation of rural areas and the loss of local autonomy over land use management has led to increasing poverty and resource degradation for many, while others have been able to cope effectively;
- increasing commercialisation of both agricultural and pastoral production in dryland areas, while benefiting some producers, has caused further impoverishment of more marginal groups;
- increasingly violent conflicts over the resource base may demonstrate links between political or social instability and environmental degradation in some areas.

2. Local demographic and social structures

- local production systems, social organisation and living conditions are highly diverse and must adapt to great risk and uncertainty;
- members of the population particularly vulnerable to desertification are those with uncertain access to productive resources such as pastoralists, refugees, migrants, landless families and women;

- scattered and mobile dryland populations are generally very poor and have limited access to almost all government services which would enable them to improve their welfare.
- 3. Socio-cultural, economic and environmental impacts**
- traditional cultural, political and religious values have been eroded due to external impacts such as drought and monetary pressures;
 - rapidly changing patterns of mobility, such as sedentarisation, are creating adverse effects on both farmers and herders including social conflicts, economic and psychological stress from break-up of families and dislocation of individuals;
 - livelihoods and productive capacities have declined as a direct result of depletion of natural resources in many dryland regions, and such degradation is leading to increased labour demands, particularly for women;
 - greater social stratification is evident as some groups win and others lose when they are incorporated into the market economy.
- 4. Resource use conflicts, traditional institutions and political marginalisation**
- in many places, external pressures have caused a breakdown of local resource management institutions and a shift to short-term survival strategies;
 - lack of clarity over land tenure and rights has altered land use patterns and led to conflicts, with poor pastoral groups often further marginalised by agricultural encroachment and other large-scale developments.
- 5. Local-level adaptation practices**
- the diversity of local adaptation practices reflects the fact that dryland populations are continually adjusting to new climatic, economic, social and institutional circumstances;

- social groups are affected differently by desertification depending on their production systems, wealth and access to social support mechanisms;
- there are signs that the effectiveness of local coping strategies is declining with the combined impact of impoverishment, conflict, drought, famine and desertification.

6. Desertification policies and programmes

- past efforts to control environmental degradation and promote development in drylands have generally been biased towards top-down technical solutions which have failed to take into account the broader social dimensions of desertification;
- recent programmes and policies, which promise greater success, have adopted a more bottom-up approach emphasising community participation and the building of local knowledge and management systems;
- the challenge to government and donor agencies is to learn from these community participation approaches in their own programmes.

INTRODUCTION

According to UNEP estimates, there are now as many as 900 million people at risk from desertification, defined as "land dégradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variation and human activities" (UNCED 1992). While most studies concerned with this issue have concentrated on assessing the *physical* facts of desertification, less appears to have been done on the *social* dimensions and impacts.

The current debate regarding desertification in dryland regions has tended to focus on alarming global data, climatology and ecological trends, particularly since the Sahelian droughts of the 1970s and 80s in Africa. However, the accuracy, meaning and practical usefulness of these estimates of global desertification trends are increasingly questioned, particularly given the difficulty of determining the causal relationships of such complex processes.

Clearly, Africa's natural resource base is under severe pressure in particular localities, but it can not be assumed from this that all dryland regions are suffering the same degradation. A contrasting picture is provided by more regional and local level research which demonstrates the highly dynamic and resilient features of both physical systems and the human communities that make use of them. The rationality and adaptability of farming and pastoral livelihoods are reflected in natural resource management and conservation efforts upon which future policy can build.

This paper contends that conventional approaches to the analysis of desertification fail to take into account the complexity of human resource use in marginal areas. Rather than contributing to the debate on the causes of desertification, the paper sets out to disentangle the web of interconnected processes at work in dryland areas. By examining these various factors at local, national, regional and global levels a broad picture emerges of the underlying social dynamics, processes, and consequences of environmental degradation¹. The paper concludes by revealing policy implications, and suggesting future research priorities and appropriate measures that can be undertaken in collaboration with local people. The paper analyses risk and uncertainty faced by dryland inhabitants in Africa under six inter-related themes:

- social processes and desertification;
- local demographic and social structures;
- socio-cultural, economic and environmental impacts;
- resource use conflicts, traditional institutions and political marginalisation;
- local-level adaptation; and
- desertification policies and programmes.²

¹ To achieve a coherent overview some generalisation is inevitable. Boxed case studies serve to highlight local variations.

² The paper is based on an extensive literature review and annotated bibliography commissioned by UNEP and prepared in collaboration with UNRISD and IIED.

1. SOCIAL PROCESSES AND DESERTIFICATION

Desertification and environmental degradation can be seen as both a cause and a consequence of unequal development and poverty arising out of the integration of smaller social systems into a worldwide economic system controlled by the developed nations.

A broad, historical perspective of the external forces and social processes behind desertification provide a critical starting point on which to base an analysis of dryland Africa (Copans 1983). Global economic change, the monetisation of local economies, population growth, urbanisation, sedentarisation and political marginalisation are examples of some of the processes that can damage the livelihoods of marginal social groups living in these areas.

1.1 Global integration, political marginalisation, and social change

Rural societies in different parts of the world have experienced a gradual undermining of their cultural, economic, social and political integrity for hundreds of years, its impact and intensity depending on the form of European contact. Although colonialism represented a stronger form of control over the productive sectors of these societies, other regions were also integrated through the spread of trade and foreign investment (Mortimore 1989).

This integration has contributed, in many cases, to the impoverishment of rural areas through labour, resource and profit extraction. The creation and

growth of powerful urban centres has often been controlled by both external elites and transnational linkages with local groups of relatively well-off farmers, clerks, traders and civil servants who could take advantage of new opportunities. These local élites were the main beneficiaries of political independence and perpetuated the extractive process through institutions and relationships established during colonial times (Marks 1984; Galaty & Bonte 1991).

Political and economic events happening very far from dryland regions have therefore caused a gradual erosion of traditional systems and the assimilation of cultural groups into the wider society. Local social structures have been increasingly displaced and no longer have the power needed to enforce autonomous decisions about land use. Social mechanisms that reduce risk, provide social security and protect the environment (such as by asset sharing, income redistribution, maintaining reserve land capacity, fallow rotation, and transhumance) have also broken down in many cases (Franke & Chasin 1986). While in some cases this has led to increasing environmental stress, in others local communities have adapted and maintained the capacity to produce and survive (Drejer 1985; Mortimore 1989) (refer to case studies in Boxes 1-5).

1.2 Population growth and land use changes

High population growth rates of over 3% a year have characterised the 34 driest countries in the world, most of which are African (Ware 1977). Some argue that the fragility of the underlying resource base in arid regions implies a limited capacity to absorb increased numbers of people, resulting in overgrazing, overcultivation, deforestation and over-irrigation (Campbell

1974). While inappropriate land use can simply be the result of bad management and rising demand, it is more often influenced by a range of underlying natural, social, economic and political factors (such as droughts, poverty, and misplaced development aid interventions) which make sustainable resource use difficult. Over-exploitation of resources is more often a reflection of limited choices open to the poor land users, short-term responses to external pressures, and the erosion of traditional land use management practices (Ble 1992; Timberlake 1985).

Predictions of worsening degradation are based on unclear definitions which fail to distinguish between temporary declines in secondary productivity, and irreversible, permanent soil and vegetation changes (Abel & Blaikie 1989). New theory and field research increasingly calls into question the concepts of fixed carrying capacity and sustainable limits of the land (Ellis & Swift 1988; Homewood 1987). Fears of persistent impoverishment fail to take into account the ability of human societies to adapt to changed conditions (Johnson & Anderson 1988). Evidence from several areas of dryland Africa shows, for example, that growing human populations are not always damaging to the resource base (Mortimore 1989). A recent study reveals that population pressure may even be a necessary condition for the intensification of agriculture and more conservative land use practices (Boserup 1965; Tiffen, Mortimore & Gichuki 1993) (see Box 5).

Population growth is unevenly distributed, both throughout Africa and within countries. Semi-arid zones are often more densely populated than arid areas or humid areas, due to the limited resources in the former, and the existence of disease vectors which inhibit in-migration in the latter areas (Rochette 1989). A recent survey of population growth in Africa estimates that by 2010

over 50% of sub-Saharan Africa's population will be living in towns and cities (Cour 1992). Despite high rates of urban migration, many families maintain strong links in rural areas. Expanding urban economies could generate economic growth, diversification and increase income for rural populations, particularly in food production. The survey suggests that rising incomes and sustainable land management can be achieved as long as there is freedom of movement, not only between rural and urban areas, but also within regions of the continent (ibid).

1.3 Government policy-making and market integration

Involvement in world markets, worsening terms of trade, and rising debt loads have put tight constraints on developing countries. Governments are forced to focus on policies that will earn much-needed foreign exchange. Although aimed at promoting the national interest, these policies have mixed impact, some promoting conservation while others cause degradation and negative consequences for the welfare and income levels of marginal groups, particularly those living in the climatic margins (Baier 1976; Stahl 1990; Franco 1986). Government policies are often biased against the maintenance or improvement of traditional farming and herding systems. Privatisation of land tenure systems and the commercialisation of agriculture and livestock are aimed at improving productivity, but instead often accelerate degradation (Grainger 1990; Dixon, James & Sherman 1989) (see Box 3.2).

Attempts to control stocking rates in order to ensure the conservation of communal rangelands is an example of an interventionist government policy based on the flawed assumption that traditional pastoral herding systems are inefficient and damaging (Abel & Blaikie 1990). Evidence from many studies

shows, however, that pastoral land use is inherently rational and an ecological adaptation given the constraints of arid lands (Oba & Lusigi 1987). The dynamics of open-range management and indigenous land tenure systems are important foundations for the success of these opportunistic strategies (Behnke 1985; Migot-Adholla 1991). Resource degradation usually occurs when communal lands are opened to unrestricted exploitation from the outside, destroying extensive grazing and transhumance systems (Shepherd 1989).

1.4 Instability, conflict and insecurity

Political and social instability, while not a major cause, can be linked to environmental degradation in some areas. Although the use of force in competing for scarce resources is not new, some argue that the balance between acceptable and unacceptable competition has been upset, spiralling into increasingly violent and frequent conflict dubbed "green wars" particularly in the Sahelian countries of both East and West Africa (Bennett 1991) (see Box 1).

Thousands of displaced people have become "ecological refugees" in Africa, living as shanty town dwellers. In other cases, oppression by the state prompts migration, pitting different groups against each other. Competition between local populations for work and resources results in tensions and conflicts, as well as putting further pressure on the surrounding environment. Civil war, climatic variability, or unpredictable prices can cause insecurity and limit people's ability to plan for the future and invest time and resources in improving the land (Hjort af Ornas 1992).

Box 1: Greenwar in Somalia

In Somalia, a complex series of kinship groupings traditionally regulated the perpetual search for limited natural resources by different clans. As ecological conditions deteriorated, the tensions of the constantly shifting pattern of ancient alliances and rivalries over grazing and watering rights flared into open conflict in the 1950s. After independence, modern forms of government proved ineffective in dealing with the complex socio-economic regulations of the predominantly nomadic population. The unequal promotion of one kinship group's interests over others eventually provoked the fall of Siad Barre's government in 1991 (Bennett 1991). The shrinking resource base of northeast Africa is argued by some writers to be an example of how insecurity, conflict and environmental degradation interact. As systems breakdown, increasing resource stress breeds further conflict, insecurity, and ecological stress (Hurt of Ornas & Mohamed Sahn 1989; Hutchison 1991; Markakis 1993).

2. LOCAL DEMOGRAPHIC AND SOCIAL STRUCTURES

2.1 Diversity of populations

Low rainfall, highly variable climates and recurrent droughts are common features of dryland areas and have a profound bearing on the types of land use and production systems adopted by local people. Local economies are typically based on extensive use of natural resources through adaptive strategies that include diversification of productive activities and varying degrees of mobility (David 1973). The major economic activity in arid areas is nomadic pastoralism which is highly adapted to the ecological conditions characterising these zones. Transhumance, for example, is the seasonal movement between pasture ranges, either latitudinal or

altitudinal. This practice makes very efficient use of the scarce resources in arid zones by taking advantage of both fresh pastures in the rainy season, and dry season reserves near more permanent water sources. In semi-arid areas, more settled communities and mixed agricultural systems tend to be more predominant, with animal husbandry being a supplementary activity to cultivation based on rainfed crops (Leonard 1989).

The line between pastoralism and agriculture is often blurred. If an area is subject to variable and low yields, agropastoralism represents a beneficial strategy against drought by making use of livestock for subsistence while at the same time providing draught power and manure (Mortimore 1989, Toulmin 1992). Movements of people out of "pure" pastoralism into cultivation in times of extreme hardship are reversed once ecological conditions change for the better, and enough cash has been earned to reconstitute a viable herd. The specialisation and interdependence of dryland economies is also reflected in pastoralist diets which rely to a large extent on traded grains (Amadu & Kirk-Greene 1986).

Despite broad commonalities, it is important not to generalise too much about dryland populations. A wide variety of cultures, knowledge, social organisation and production systems exist, each of which has evolved distinct sets of institutions to exploit local and regional conditions³:

³ A whole range of background case studies can be found in the anthropological literature which sets down existing systems in terms of ethnic groups and relations, land tenure, political economy, resource management and use, decision-making, adaptive strategies, and socio-cultural organisation (refer to forthcoming IIED annotated bibliography *The Social Dimensions of Desertification*).

2.2 Demographic structures and social organisation

Climatic conditions and a general scarcity of resources in dryland areas means that population densities are relatively low compared with higher rainfall areas. High levels of risk and uncertainty are the norm, not only in production and the physical features that govern the environment, but also in health and child reproduction. Large extended families are one means by which drylands peoples deal with uncertainty (see Box 2).

Box 2: Risk and household size in Mali

A study of a Bambara dryland farming community in central Mali shows that more diverse and extended families (containing as many as forty to sixty people) are much better able to resist the risks of drought and illness than small nuclear family groups. Farming families must continually react to changing climatic and economic circumstances by altering patterns of crop production and investment. Larger households have strong advantages in generating and maintaining a surplus and ensuring their reproduction in the longer term through diversified income sources, economies of scale in agricultural production, and the ability to acquire and maintain productive assets. Larger households are less vulnerable to demographic risks, such as illness or death, given their greater size, and more balanced sex ratios and consumer to worker ratios. Such large groupings persist as the drawbacks to individuals from belonging to a large household, such as loss of control over their own resources, are minimized by flexible contracts defining the specific duties and benefits to be received in exchange or line with changing circumstances (Touman 1992).

Most dryland countries are at the lowest end of the poverty scale according to figures for GDP per capita and the human development index (UNICEF 1992). Indicators of the quality of life, infant mortality, and life

expectancy show clearly that human conditions in dryland areas have barely improved, and may even have declined over recent years (Cameron 1991; Benefice 1984; Mbaku 1989). Demographic data shows arid areas have lower fertility, higher mortality and more mobile populations than in wetter zones. However, the different arid regions of the world reveal a range of demographic trends (Hill 1985). Dryland areas of Asia may be able to absorb greater populations with the development of water supplies, while in Latin America, high rural outmigration of young people means declining arid populations. In Africa there are only limited opportunities in urban areas, and little access to irrigated land, resulting in more rapid growth of rural populations in semi-arid zones (Caldwell 1984).

2.3 Vulnerable social groups and access to government services

While it can be argued that desertification selectively hurts "the poorest sections of the population, the poorest of the world's poor" (Kates et al 1977), it particularly affects those groups who depend most on access to natural resources for their subsistence. They will inevitably be most vulnerable to environmental degradation and increasing shortages, as well as to famine and drought. Refugees; indigenous peoples and landless families are also greatly at risk given their lack of secure access to productive resources. These groups are politically weakest, further constraining their ability to alter or improve their situation.

Within communities, some people are more affected than others due to unequal income and wealth distribution, access to community risk-sharing networks and public support. The impact for both pastoralist and farming communities appears to disproportionately affect women and the elderly

who face increased workloads and child-raising responsibilities while men migrate out of area in search of income (Rochette 1989). However, there are very few local-level studies of the varied impact of environmental degradation within dryland communities⁴.

Dryland regions of the world tend to be geographically and politically marginalised. This is partly due to the inherent difficulties of administering scattered populations in distant and inaccessible terrain, but also the low priority governments have given such areas. The political and cultural autonomy of societies have also tended to discourage investment by the state and the provision of social services, such as health, education and veterinary assistance (Sandford 1978, Heron 1983, Gorham 1978).

Logistical problems of low population density, isolation, and mobility, as well as a distrust of government services are cited as common problems in the provision of health services. Often this is due to a lack of understanding about the unique features of communities - such as the influence of cultural and political factors, social organisation and production systems, underlying ecological impacts on health, traditional health practices and beliefs, and the role of community healers (Loutan 1990; Hill 1985; Kloos 1993). Although problems with health provision in dryland areas have been documented, the link between desertification, poverty and increased evidence of disease is as yet tenuous, given the lack of concrete data.

⁴ A study in Sudan reveals that the hardest hit are camel nomads in northern arid zones, small-herd owners, asset poor households, recent settlers, families without working members and capital-constrained female headed households (Tekulu, von Braun & Zaki 1991).

2.4 Dynamics of gender

Women in the drylands, as in most other areas, play critical roles in ensuring family survival, nutrition, education, health and sanitation (Battaglino 1988; UNICEF 1989). Women generally are constrained by lack of ownership and control over productive assets (capital, land, labour), lack of access to education and limited time. These gender inequalities may also cause greater exposure to seasonality and drought, or intensify environmental problems (Schroeder 1987). Women may be unable to respond to deteriorating environmental conditions, or undertake natural resource rehabilitation, despite a high level of awareness of these problems (SOS Sahel 1993; Wangari 1989).

Agricultural and pastoralist women face different problems. For rural farming communities the outmigration of men, whether seasonal or permanent, has important consequences for women who must shoulder more work in addition to their reproductive role (Monimart 1989). Whether the outmigration as a diversification strategy improves family living standards depends in great part on the amount of money saved and remitted back to the farm for investment into economic activities⁵. While many women suffer disproportionately, some studies show the importance of support from the larger household in cushioning the impact on women of male outmigration (SOS Sahel 1993).

⁵ The "successful" economic diversification strategies of the Baggara of Sudan, which include both male migration and sedentarisation, has had a negative impact on women who are left behind with inadequate and declining resources (Ibrahim 1984 and 1987).

In the general impoverishment of pastoral communities, women have borne greater social losses than men (Horowitz and Jowkar 1993). Male outmigration increases women's workloads and erodes their position in society as men consolidate access to cash and other resources (Joekes & Pointing 1991; Talle 1988). Widows and female-headed households face even greater difficulties given their lack of kinship ties for herd reconstruction. The progressive alienation of rangelands from community-based ownership structures through privatisation has led to the break-up of labour groups which women had access to. These constraints are compounded by other factors such as increased raiding and loss of pasture to cultivation (Hjort af Ornas 1989).

General statements about the weakness and vulnerability of women can be problematic, however, given local and regional variations and the relative paucity of available information. Much more needs to be known about gender relations in both farming and herding communities regarding land, water and livestock management in arid and semi-arid regions of Africa.

3. SOCIO-CULTURAL, ECONOMIC AND ENVIRONMENTAL IMPACTS

Local-level case studies of social, economic and environmental change in dryland communities exist for many countries, although direct linkages to desertification are difficult to draw out. Some writers argue that marginal groups within dryland communities appear to suffer most from related problems such as the erosion of traditional values, changes in migration patterns, worsening living conditions, and socio-economic decline as a

result of commercialisation (Spooner & Mann 1982). However, these negative impacts are not felt by all social groups to the same extent. A few families or individuals may actually gain new opportunities from involvement in the monetary economy (Mortimore 1989).

3.1 Erosion of traditional cultural, political, religious values

The combined impacts of environmental degradation, political marginalisation and religious discrimination can cause a gradual erosion of cultural identity, as illustrated by a case in Mexico (see Box 3.1). The pastoral economy and society of the Boran in northern Kenya have been so weakened by drought that they can no longer defend themselves against increasing raids and loss of livestock to other stronger pastoral groups, and have therefore been forced to modify their traditional diet (mainly milk and blood) to incorporate a much larger proportion of grains (Hogg 1985). Beja nomads in Sudan have a tradition of tribal collectivism. Custom maintains that women should stay at home and not work. When this group was forced to settle in towns after the 1985 drought, Beja women were placed in a difficult position. They had to live with the humiliation of not being able to maintain their culture when, for instance, they had to begin working to earn income for the family, selling in the markets formerly considered the domain of men (Bennett 1991).

While dryland peoples have seen many changes in their communities as a result of contact with other cultures, not all have been negative. New opportunities, access to information, and ideas are channelled in through radio and television or returning migrants (Guèye & Toulmin 1993).

Box 3.1: Breakdown of traditional Indian dryland farming in Mexico

The Otomi Indians of the Mezquital valley in Mexico have traditionally maintained their livelihoods in a harsh desert environment through interwoven resource use strategies, including complex techniques of gully and terraced hillslope cultivation, small livestock grazing, and handicrafts. With synthetics replacing natural fibres collected from the desert, handicrafts as a key component of the family economy have become unviable. In order to make up their food deficits and rising costs of consumer goods, families must sell labour outside the valley, disrupting resource use patterns. With children attending schools, less labour is available for herding. Women can no longer maintain the moisture-retaining terraces and harvests are declining. The spread of large-scale irrigation as a potential alternative in the area has led to increased salinisation. Deteriorating land productivity, due to the lack of labour inputs, is perpetuated by a gradual loss of the indigenous knowledge of basketry weaving and terrace-building (Johnson 1982).

3.2 Impacts on social mobility and migration patterns

Many governments have attempted to improve productivity and the livelihoods of nomadic pastoral people by settling them in agricultural or irrigation schemes. However, this has often had profound impacts on social organisation, as well as leading to greater land degradation (Salzman 1980; Baxter 1977; Little 1985b; Sorbo 1985). In some areas *increased cultivation and constricted grazing mobility in drier arid areas* has led to the abandonment of transhumance and traditional soil conservation practices such as fallowing.

Conflicts between farmers and herders are exacerbated, particularly if cultivation takes over important wet season grazing areas. Valley bottom wetlands, for example, are of major importance to both agricultural and

pastoral systems in savanna Africa (Scoones 1992). Case studies in different African countries have revealed that the withdrawal of wetlands from grazing causes disproportionately greater damage by destroying traditional extensive patterns of livestock movement and grazing.

Box 3.2: Land alienation and the Barabaig in Tanzania

The Barabaig are semi-nomadic pastoralists who have occupied the plains surrounding Mount Hanang in Tanzania for more than a hundred years. With population growth putting increasing pressure on land, farmers began cultivating the most fertile areas of Barabaig pasture. This process of creeping alienation has undermined traditional rotational grazing systems by withdrawing critical areas of land from pastoral use during transhumance. The government has compounded the problem with policies endorsing agriculture at the expense of traditional livestock production. In 1970s, the government was also directly responsible for the alienation of 100,000 acres of Barabaig land for a wheat project through a joint scheme with the Canadian International Development Agency (CIDA) and the National Agriculture and Food Corporation (NAFCO). The Barabaig suffered a rapid decline in their already low living standards due to restrictions on mobility and ensuing losses in livestock productivity. Attempts to claim customary rights to the land in the courts were met with violations of human rights. In 1993, CIDA eventually decided to pull out their aid contribution to the wheat project, although the judicial claim has still not been resolved in the courts (Lane 1991a, and 1991b).

The impact of reduced mobility or settlement for subsistence pastoralists can cause social disruption and stratification within groups (Frantz 1980, Moris 1988). As they seek new sources of income and pasture, families may split up, with some members going to rural towns or urban centres, and others maintaining the herd (Fratkin & Roth 1990; Hjort af Ornas 1990). Similar impacts have been found in studies on migration and the

subsequent social disruption for villages and families of farmers. The Government of Tanzania's policy of villagisation had the effect of concentrating people and sedentarising pastoralists, leading to increased degradation around new settlements (Grainger 1990).

Intensified migration can have knock-on effects in the areas receiving new influxes of people, leading to fragmentation of land and decreased harvests due to soil depletion (Kosmarskaya 1989). The integration of refugee and host land use patterns, such as transhumant pastoralism and irrigated agriculture in Somalia, has proved to be difficult (Unruh 1992). Population mobility and redistribution as a result of drought and desertification have also had a strong impact on the remaining areas of communal resources (Darkoh 1992). Regional conflict and refugee influxes in West Africa have strained already fragile social and economic structures, thereby increasing environmental degradation (Nnoli 1990).

3.3 Importance of socio-economic incorporation and commercialisation

High rates of urbanisation have created a growing demand for both animal and agricultural products, and a general shift away from subsistence herding and farming to more commercialised production. These trends towards greater socio-economic incorporation and commercialisation have both beneficial and detrimental effects in terms of human welfare and natural resource use (FAO 1977).

Studies in both Africa and Latin America report changes in the patterns of livestock ownership due to commercialisation, leading to greater social

stratification (Hecht 1985). Wealthier farmers, traders, civil servants and other non-pastoralists diversify their assets by owning livestock cared for by hired herders (Little 1985a). However, their profits are often reinvested outside the livestock sector, and they have a limited stake in preserving rangelands. Growth in absentee herd ownership is seen to have an increasingly detrimental effect on remaining subsistence pastoralists (Behnke 1980).

Whether market integration causes marginal groups to become more vulnerable is, however, still contested. The market economy can benefit members of dryland communities. Some pastoral groups in Africa have been able to take advantage of new markets created by growing demands from the wage labour sector in urban areas by shifting to a more commercial, meat-production based strategy. This process has also created *much-needed access to economic opportunities, particularly for the sale of labour*, as an important coping strategy for both agriculturalists and pastoralists in Nigeria (Mortimore 1989). Although still dependent on herds as the main means of livelihood, many pastoralists have been able to diversify their economic activities by trading, selling milk, and crop farming. These groups may, however, be increasingly vulnerable to economic fluctuations as they are now tightly integrated into the market (Salih 1985).

Cash-crop farming has similarly opened up opportunities for increased specialisation in agriculture with mixed results. In West Africa, for example, over recent decades farmers have shifted from food crops such as millet and sorghum to groundnuts and cotton. Although these cash crops initiated an expansion in commercial activity, again they also

produce vulnerability to commodity price declines, reduced local food production and dependence on imported, purchased food, such as rice (Grainger 1990). Previous links and exchange systems between agriculturalists and pastoralists may also be strained or broken.

4. RESOURCE USE CONFLICTS

Clarifying land tenure and property relations governing resource use is of fundamental importance in dryland areas. The breakdown of local management institutions has been a critical factor responsible for a downward spiral of environmental degradation. Land tenure has therefore risen to the top of the agenda in many parts of Africa.

4.1 Breakdown of local resource management institutions

Local institutions and indigenous knowledge have contributed to the complex land use regulations that have evolved in drylands. Although they are often overlooked by outsiders, these institutions continue to play important roles in pastoral and farming communities (Little & Brokensha 1987). While some management systems are being rapidly destroyed due to external pressures (such as government policy and the recurrence of drought), others continue to be highly effective.

Common property regimes are often controlled or owned by powerful groups (clans, families, lineages) who can enforce informal regulations over a far greater area than is possible under individual ownership. But the diminishing autonomy of local institutions over land use makes

enforcement more difficult. In the inland Niger Delta of Mali, for example, customary systems of natural resource management are being destroyed by government policies, the monetisation of the Delta's economy and recurrent drought. In the process the linkages between knowledge of resources, dependence on their sustainable production and responsibility for their management are breaking down, allowing outsiders with more short-term interests to exploit the local systems and resources (Moorehead 1991; Vedeld 1994).

4.2 Land tenure, property relations and conflicts

From the colonial period onwards, governments have sought to limit local control over land rights in an effort to promote national goals and assert central power (Anderson & Grove 1987). The vacuum left by the decline of traditional institutions has not always been filled by effective government enforcement of land rights and resource use as demonstrated by a case in India (see Box 4). In Africa, changes in the legislation and reform of land tenure have been uneven, leaving a variety of different land tenure systems in operation, some only on an *ad hoc* basis (Toulmin 1993a). Government attempts to centralise and unify land tenure arrangements fail to cater for the existing complexities and undermine the flexibility inherent in the myriad of communal land tenure arrangements.

Although privatisation has been seen by governments as a way of encouraging investment in land, it in turn has caused negative impacts, as has been shown earlier. In West Africa non-privatised solutions, such as the 'gestion de terroir' (GT) programmes, aim to involve much greater local participation in managing resources and deciding on investment

Box 4: Land tenure and desertification in India

A study of the historical ecology of Rajasthan District in India reveals how modifications to land tenure systems contributed to desertification. In the late 1950s land tenure laws were changed, allowing submarginal lands in these areas, suitable mainly for grazing, to be distributed as private holdings for cultivation. Traditional authorities that enforced rules on pasture and forest use were abolished and the new village administration system could not regulate land use or grazing. The small size of the landholdings did not allow for fallow rotations, resulting in the depletion of the land resource and falling productivity. Conservation measures on the basis of catchment areas, such as dune stabilisation, shelterbelt creation, bunding and the regeneration of range lands require collective action at the village level. The author calls for a reform of land laws to include dual tenure, a return to village authority control over individual holdings, and the formation of land users' associations for conservation activities (Jodha in Spooner & Mann 1982).

priorities (Toulmin 1993a). However, important issues such as the lack of real transfer of power to local people, limited attention to pastoral areas, and the overemphasis on land as opposed to other important sources of rural income remain to be dealt with (Painter et al forthcoming).

More equitable rights for poorer members of pastoral and farming groups need to be achieved, as well as the incorporation of indigenous land tenure systems in these reforms (Lane & Swift 1989; Mariko 1991). Flexibility in land tenure systems may be positive for some marginal groups, such as pastoralists and women, who can then assert claims to land on the basis of usufructuary rights. However, most studies show that instability and flexibility of land tenure regulations have increased social conflict between ethnic groups. Problems of land rights are particularly

acute for refugees and internal migrants who are in the process of resettlement (Fuller 1987; Unruh 1992; Oxby 1984).

5. LOCAL LEVEL ADAPTATION PRACTICES

It is generally assumed that dryland peoples have had a damaging impact on the environment. However, in many cases these communities have evolved ways of coping with risky arid environments, and indeed conserving their resources. Although the evidence for a decline in the effectiveness of these practices is not clear-cut, there are signs that certain groups are becoming increasingly vulnerable to environmental degradation. Various levels of response can be found in both herding and farming practices.

5.1 Levels of response

Strategies vary from region to region depending on the history, natural environment and peoples of the area. These strategies are also dynamic, with modifications evolving in response to gradual transformations in the environment and social context (Bovin & Manger 1990).

There is often a failure, however, to make clear distinctions between different types of response. "Traditional" adaptation practices have evolved over the long-term as a response to the uncertainty characteristic of dryland regions. Coping strategies attempt to deal with crises arising from drought, famine or marginalisation (Legge 1989). Other types of strategies have arisen to deal with environmental degradation, while some

are new adjustments to the more immediate impacts of development projects and government resettlement schemes (Helland 1980).

Traditional adaptation practices stress mobility, social cooperation and high labour inputs (Stiles 1992). Strategies to cope with crisis can be seen in the complex sequence of divestment strategies adopted by farmers in famine situations (Rahmato 1988). Depending on the severity and duration of food shortages, these strategies include constricting food intake, selling of productive assets and migration (Longhurst 1986; Malhotra & Gadgil 1988). Dryland risk management is therefore at once both complex and flexible.

5.2 Pastoralists

Pastoral strategies of risk aversion generally focus on herd modifications (diversification of species, dispersion, distribution, and expansion) to protect against heavy losses. These strategies are analogous to agricultural practices such as multi-cropping and reserve granaries in areas of risky agricultural production. Diversification of income sources vary in importance for different pastoral groups, providing revenue in normal times, and a fall-back during times of crisis. Traditional drought management incorporates a combination of livestock composition and reconstitution, migration, or even rainfed farming and horticulture (Homewood & Lewis 1987; Ibrahim & Ruppert 1991). The movement in and out of pastoral production is documented by an historical case study of the Il Chamus in Baringo District of Kenya (Anderson 1988). Communities of cultivating pastoralists using sophisticated irrigation techniques have formed, fragmented and reformed again at the same sites

throughout the nineteenth century as periods of ecological adversity set in and retreated.

Even these strategies, however, have weakened with political and economic changes following colonialism and independence discussed earlier (Swift 1973). New adaptive strategies have evolved in response to pressures, such as taking up schooling opportunities economic diversification in towns and international wage labour (Abu Sin 1982; Michael 1991; Hjort af Ornas 1980). On the other hand, it has been shown that not all groups have withstood the erosion of traditional strategies by external pressures (McCabe 1990). The combination of factors which bring about the decline of certain groups is still poorly understood.

5.3 Farmers

Dryland agricultural communities have evolved responses to risky, drought-prone environments (Little & Horowitz 1987). Economic diversification is widely used as a risk avoidance strategy, as in Burkina Faso, with the typical household earning as little as one-quarter of income in a crisis period from cropping or livestock activities, the rest derived from off-farm business, migration remittances and transfers within the village (Reardon et al 1988). Remittances from family members living abroad are also important sources of extra income. Food aid, on the other hand, is usually seen as a last resort (Khogali 1991).

Box 5: Successful adaptations in Nigeria and Kenya

A detailed study of Nigeria shows the great flexibility inherent in farming and livestock systems that allows local people to respond to changes in availability of land, rainfall and access to markets. An analogy can be drawn between the parallel resilience of semi-arid ecosystems and adaptive strategies of human communities to cope with drought, poverty and hunger. Examples of these strategies include: modification of farming practices by altering crop mixtures; alternative income opportunities such as weaving, trade and donkey hire; liquidation of assets and mobilising social networks; and purchase of food from the market (Mortimore 1989).

A case study of Machakos District in Kenya shows that population increase is compatible with environmental recovery, provided that market developments make farming profitable. Population growth combined with new market opportunities have stimulated investment and innovation, but in a semi-arid area some of the necessary capital has had to be generated from off-farm activities. Farmers have responded to environmental degradation with both soil conservation measures and changes in land use management. Despite a five-fold growth in population over the past 60 years, output per hectare has increased ten-fold. As a result the predictions made in the 1930s of catastrophic environmental damage and widespread famine in Machakos have not come true (Tiffen and Mortimore 1992).

6. DESERTIFICATION POLICIES AND PROGRAMMES

In 1977, the UNEP Conference on Desertification called upon governments and international agencies to bring desertification processes under control by the end of the century. Despite nearly twenty years of research, programmes, and a proliferation of material on the subject, this elusive goal seems no closer to being achieved. Although NGOs, national governments and international organisations have been involved in plans to combat desertification and promote development in dryland regions,

few policies or programmes are designed specifically to tackle the social dimensions and consequences of dryland degradation.

6.1 Common features of policies and programmes

Past approaches promoting development in dryland regions highlight two fundamental features: a technical approach and 'top-down' implementation. Past programmes have generally focused on single-sector, technology-based solutions to physical, rather than social problems. 'Blueprints' have been applied in a blanket fashion to complex land use systems which vary greatly depending on local circumstances. Solutions continue to be determined and implemented from above, by a ministry or donor, far beyond the household level at which the main impact of the problems are encountered (GTZ 1986).

Flawed assumptions about the nature of land use systems and poverty in dryland areas have produced inappropriate models, such as the focus on the need to "modernise" subsistence agricultural and pastoral sectors through livestock development and irrigated farming (Homewood 1992; Anderson & Grove 1987).

In arid areas, government interventions aimed at developing water resources and improving herd management have paradoxically been highly damaging due to the negative impacts of increasing sedentarisation. Boreholes make water more freely available, but no thought is given to who should control access to this water and the surrounding vegetation. While traditional systems of collective access allow for a more balanced equilibrium between dry season pasture resources and water demand,

boreholes create a permanent concentration of animal and human populations that destroys the vegetation in the area (Thébaud 1988).

Government ranches have also proven to be less productive than traditional herders in their herd management and breeding while taking over large tracts of land once used by pastoralists (Leonard 1989). New technologies, such as vaccination against rinderpest, have increased pressure on grazing resources, thereby heightening the need for more *effective land management (Grainger 1990)*. *New forms of social organisation*, such as pastoral cooperatives, aimed at improving range management have also been largely ineffective given financial non-viability and dependence on outside money and trained personnel (Johnson 1979).

In semi-arid areas, where more mixed agricultural systems are found, projects have emphasised improved cropping techniques, such as the introduction of high-yielding varieties and cash crops. However, these interventions have often proven to be economically unviable, cause abandonment of traditional land use and lead to greater food insecurity (Khogali 1991). These policies also fail to integrate the livestock and forestry components that characterise *the farming systems of these regions (Shepherd 1992)*. In some cases a direct conflict between these complementary systems is perceived and large tracts of rangelands are converted to agricultural development projects. Again, issues of social welfare such as health, education, and women's income generation are usually only included at the margins of larger desertification control programmes.

6.2 Successes, failures, and lessons

Overviews of UN, donor, government and NGO programmes to tackle desertification point to the slow progress that has been made over the past two decades and the lessons learned. The main problems seem to be a neglect of underlying factors such as uncertain land tenure, and labour constraints which limit the ability of communities to undertake these measures (Dixon & Sherman 1989).

The limitations of a technical approach which places low priority on socio-economic factors are now generally accepted. The need for participatory 'bottom-up' approaches that attempt to support local knowledge and management systems is gradually being recognised. This is shown by the recent proliferation of small-scale projects designed and implemented at the village level, mainly supported by NGOs.

Governments and international organisations are realising the success of such projects, and are attempting to cooperate and learn from them (GTZ 1986).

A review of the impact of anti-desertification projects demonstrates the importance of local participation in planning what might be done and how. There is less evidence, however, that governments, donor agencies, and NGOs have been able to respond to this challenge.

Box 6: Lessons learned from successful projects

Reviews of recent project success highlight five major lessons (Rochette 1989; Critchley & Graham 1991), summarized by Chambers as follows (in Conroy and Litvinoff 1988):

- a flexible learning process allowing projects to change course;
- putting people's priorities first;
- providing secure rights and gains for the poor;
- sustainability through self-help; and
- ensuring high staff calibre, commitment and continuity.

Participation by the beneficiaries in project design, implementation, and evaluation is now understood to be a prerequisite for sustainability for several reasons (Fountain 1993a). Firstly, it is now recognised that indigenous technical knowledge is complex and sophisticated, and can provide a useful basis on which to build interventions. Secondly, many failures of previous projects can be attributed to their lack of attention to local priorities and needs. Finally, establishing local rights and responsibilities is essential for building a pattern of long term interests and incentives to engender a sense of "ownership" by local people of project activities.

CONCLUSION

Priorities for future research and action

A re-evaluation of desertification needs to incorporate the wider context of environment, politics, socio-economic processes and linkages to the local, national and international levels (Spooner & Mann 1982). While specific aspects of dryland communities have been well-documented, their

relationship to desertification is often not clearly analysed, leaving serious gaps in our understanding.

The main problem is the lack of distinction between, on the one hand; characteristics of dryland populations related to their physical vulnerability and geographical or political isolation; and on the other, trends in environmental degradation within dryland regions and their impact on different social groups. More specifically, while there is a large body of literature that covers the basic constraints found in dryland areas, only scant material exist to document the more dynamic links between desertification and welfare trends amongst drylands populations, in other words the social dimensions of desertification.

Key priorities for future research include:

1. Land tenure and land use conflicts

A more sophisticated understanding of land tenure systems and the impact of change, such as commercialisation of production and privatisation of land, for different social groups is critical to the desertification debate. The potential role of local institutions in resource management and the containment of conflict, particularly over the remaining common property resources needs to be examined.

2. Vulnerable groups and gender dynamics

Desertification has a differential impact on dryland peoples. While some groups have shown remarkable resilience, other social groups have become more vulnerable. Research is also needed on how women's use of resources, the gender division of labour, their strong dependence on

natural resources to meet basic needs, and limited economic options may in themselves intensify environmental degradation.

3. Strengthening adaptive practices

Given that risk and uncertainty will continue to be the norm in dryland areas, strategies to deal with the unexpected (such as spatial mobility) must be supported, rather than hindered. Research is needed into how positive adaptive behaviour can be strengthened.

4. Regional research

While research on the African continent is far from complete, evidence from other regions such as Latin America and Asia should also be made more accessible. It is important that results and lessons from different experiences be shared to avoid duplication of efforts and ensure more effective programmes.

Key areas for future action include:

1. Programme design

It is clear that desertification programmes cannot be designed using economic or technical criteria alone. They must be based on local definition of problems, priorities and solutions. A more flexible approach to support sustainable livelihoods also requires a longer time frame, rather than reaction to crisis situations with piecemeal initiatives. Donors must pay more attention to the creation of a favourable policy environment by providing support to governments, rather than focusing only on project-led development. National governments will also benefit from longer planning horizons within which to establish activities.

2. Coordination

Coordination of actions at local, national, regional, and global levels is required (Toulmin 1993b). At the local level, improvement in land requires that the users have secure rights to manage the resources they depend on. At the national level, a more enabling environment must be created. Market opportunities for cash crops, for example, will provide stronger incentives for farmers to invest in land conservation and intensify agriculture (Tiffen, Mortimore & Gichuki 1993). At the regional level, redistribution of the growing population through a high level of mobility of people and goods should be supported (Cour 1992). At the global level, fundamental changes must be made to the approaches of international and national agencies to ensure they address questions of local scope and long-term sustainability.

These priorities for future research and action have as their overall goal sound natural resource management through poverty alleviation and the empowerment of local communities. This paper has tried to emphasise that not all dryland areas are badly affected by degradation. Although the world's attention has been captured by worst case scenarios, particularly in Africa, human society has shown a remarkable ability to adapt to challenges and cope with risk and uncertainty. In seeking solutions to the problems in dryland areas, there is still room for optimism, change and improvement that builds on local initiatives and indigenous systems.

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