Policy and Research into Natural Resource Management in Dryland Africa

- Some Concepts and Approaches

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Introduction

This paper looks at some of the concepts that have driven research and development policy concerning community-level natural resource management systems in dryland Africa over the last fifty years. It examines the way in which research has influenced the conception and implementation of development policy in the recent past, and the manner in which new concepts and methodologies are feeding into the development process at present. It concentrates on the resource tenure debate, and in particular on the environmental dimensions of property regimes and management systems. While the focus of the discussion is on pastoral and agro-pastoral production systems and rangeland resources in dryland areas, the basic arguments may be applied to other production systems (such as hunters and gatherers) and other resources (such as wildlife and fisheries).

The paper does not argue that there is a simple one-direction process of research feeding into policy conception and implementation. Rather, there is an iterative process where the policy environment informs concepts that lead to research initiatives which in turn may affect future policy. It is by no means true, however, that policy in the natural resource management field is informed by the full range of knowledge generated by social and economic research. Far more often in dryland Africa natural resource management policy has been informed by the beliefs

and interests of national governments and international donors, and often selective use has been made of social and economic research to buttress the arguments of decision makers.

Over the last ten years social and economic research on Africa has made significant progress in understanding how rural people make their livelihoods, the strategies they follow, and the ways in which they seek to manage their natural resources. It is now widely accepted that rural production systems are dynamic, that they insure against risk, and that they often make sustainable use of their natural resources. There is a growing acceptance that in many dryland areas environmental degradation is not caused by human activity, and that natural resources are in fact much more resilient to environmental stress and human activity than was once thought.

There is, in fact, increasing evidence to show that intensification of land use in some areas has resulted not in degradation but in maintenance and improvement of the productivity of resources. The results of the research of Mary Tiffen and her colleagues that preceded this presentation is an increasingly well-known example of this, but there are now good examples of the same process from francophone West Africa, and in particular from Senegal and Guinée (Miehe 1990, Leach & Fairhead 1994).

It is also coming to be increasingly understood that in many parts of dryland Africa population growth, the commercialisation of rural economies, the intensification of land use and the nationalisation of natural resources has deprived local communities of the ability to manage their natural resources. This has created conditions under which poorer sections of the rural population are being marginalised and the more productive resources are being captured by better off sections of society. These processes, accompanied by the weakening of the ability of many governments to administrate their territories, are creating conditions in which management of natural resources is becoming difficult. In this vacuum, 'Tragedy of the Commons' outcomes are increasingly possible.

Though possible, 'Tragedy of the Commons' outcomes are not necessary. There is now an increasingly influential body of thought that examines the nature of tenure regimes and their related management systems, analyses their reasons for failure or weakness, identifies the areas in which different tenure systems have a comparative advantage and proposes policy options for their support and implementation. Over the last two years this

debate has become increasingly influential in donor and national government circles and, on paper at least, is being promoted as the basis for future development policy.

The salient concepts that have informed this research and it's linkages to policy formulation are the theories of "property rights" and its application to 'non-equilibrium' environments, and the theory of an 'assurance problem' in promoting viable management systems. This paper briefly sets out the background of the 'Tragedy of the Commons' argument, reviews the evolution of the 'property rights' and 'assurance problem' concepts, and describes the policy agenda current thinking proposes. It concludes with a review of the methodological implications for future policy making and applied research.

The 'Tragedy of the Commons'

It is not necessary given the audience for this paper to dwell at great length on the 'Tragedy of the Commons' argument, and I assume that most people here are familiar with it. It has become a dogma of the development community in Africa that pastoralists will degrade the resources they use if they are left to their own devices. It is argued that herders own their animals individually, but the range they exploit is 'open access', or belongs to 'everyone' or 'no-one'. Herders will seek to intensify the use of a resource without competing for restrictive title to it, and without managing it, because the benefit of increasing production (adding another animal to their herd) will accrue to individuals, while the cost of degrading the resource will be borne by everyone. Since each herder follows the same strategy and invests in more animals, there is a 'tragic' movement towards over-exploiting resources in that herders are aware of the decline of pasture, but in pursuing their self interest will, or can, do nothing to prevent it.

An analytical foundation for the 'Tragedy of the Commons' thesis is that of the 'Prisoner's Dilemma' (Clark 1981, Runge 1981). This school of thought uses game theory to argue that if two competing users of a public good have a choice between two strategies of 'conserving' or 'depleting' a resource, then they will each follow the latter in the belief that if one 'conserves' the other will 'defect' in order to exploit the other's restraint and to maximise his own gain. Actors who take advantage of others restraint in this manner are known conventionally in the literature as 'free riders'.

The hypothesis that comes from the 'Tragedy of the Commons' directly links resource degradation to a 'common' system and suggests that a sustainable environmental policy will only come about through the promotion of private property and/or through coercive measures. According to the 'Tragedy of the Commons' argument the costs of exploiting the pasture are 'externalities' - costs everyone using the resource has to bear - and it logically follows that the resource will never be rationally used unless those who benefit individually have also to pay the costs of their actions. Private property achieves just such an end by 'internalising' the 'externalities' of non-exclusive resource exploitation (Behnke 1985). It is inherent in this belief that there is a fixed 'carrying capacity' for any particular piece of range. Herders left on their own will not bring this change in tenure about, thus it needs to be done by an agency outside their society, most often by the state.

The 'Tragedy of the Commons' theory argues that indigenous communal land tenure systems are an obstruction to development and management rules must be imposed to bring about sustainable land use. This argument has been enormously influential and has been used to justify policies for tenure reform that have generally meant the nationalisation and privatisation of land, land use planning, and the sedentarisation of mobile production systems.

Nationalisation of land has often had the effect of breaking open and debilitating customary management systems without providing alternative, effective stewardship (Thébaud 1993). It provokes precisely the outcomes it seeks to avoid: 'Tragedies of the Commons' where any citizen of a country has formal access rights to valuable resources and where no group of people is allowed to claim ownership. In these circumstances producers are incited to 'mine' resources because if they do not do so, someone else will. Indeed in some places it can be argued that this 'structural chaos' has been maintained by the post-colonial state as a means of raising formal and informal revenue from the arbitration of conflict (Moorehead 1991, Diakité 1993).

The privatisation of resources, irrespective of their physical characteristics, has often led to the capture of assets by rich élites and the impoverishment of more marginal sectors of the rural population (White 1992, for Botswana). In many dryland areas of Africa it has also failed to conserve or regenerate natural resources (Miehe 1990)

Land use planning and the sedentarisation of mobile production systems have worked to restrict traditional migratory patterns and lower the productivity of production systems that relied upon their ability to 'mop up' (Behnke 1994) resources that are extremely variable in time and space in dryland areas. The sedentarisation of formerly mobile communities, and the demarcation of village 'territories' have deprived these communities - particularly pastoral peoples - of the resources they need to sustain their herds, and crucially have often denied them access to resources they need as 'safety nets' in times of environmental stress (Lane and Moorehead 1994).

The 'Assurance Problem' Approach

In many ways in response to the 'Tragedy of the Commons' argument other researchers have formulated an 'Assurance Problem' theory as a means of understanding how rural communities evolve their own management systems. These researchers make the point that the assumptions of the 'Tragedy of the Commons' hypothesis are unrealistic: rural producers living in the same community often do not practice the same livelihood, thus they do not share the same interests in resources, and nor do they act entirely independently of their fellow producers.

Moreover, they point to a growing body of evidence (National Research Council 1986) that communities in the past had effective institutions to manage resources, and these institutions are in some places active and effective to this day (Ostrom 1990).

Research using this approach argues that a learning process takes place between competing but linked users of resources. Runge (1984) argues that individual decisions are conditioned by the expected decisions of others. Thus, if expectations, assurance and actions can be co-ordinated, there is less necessity for people to pursue 'free-rider' strategies: indeed, co-operative behaviour might be a utility-maximising strategy. For Runge, the institutions of society exist to co-ordinate and predict behaviour. There may be significant incentives internal to any group to develop institutions which promote voluntary co-operation, and he suggests the 'Assurance Problem' theory as a key to understanding how public goods are used and might be managed in the future.

In later work Runge (1986) adds to this by suggesting that where communities have low incomes, are critically dependent

on a local natural resource base, and face a high degree of uncertainty with respect to income streams, communal forms of tenure are cost effective and efficient. Relative poverty imposes a strict budget constraint on rural communities with regard to transaction costs (costs of policing, registering and adjudicating titles), making the management of a private property regime too costly for a subsistence economy to bear. Where the distribution of basic natural resources - in particular rainfall - is random and where income streams are uncertain, communal property systems, by allowing access to other areas, act as a hedge against environmental risk. These conditions characterise many areas in dryland Africa.

At the village level, Runge argues, production decisions by individuals are based on the expected decisions of others, and this places a premium on the importance of customs, rules and conventions that co-ordinate decisions in a community. He suggests that in differentiated rural communities a certain number of producers will have an interest in 'free-riding' on customary institutions, but that if a 'critical mass' within a community coalesces around co-operative norms, communal property can come into being. He further argues that the more homogenous a community the more likely optimal outcomes are, and the more heterogeneous, the more difficult co-operation becomes.

A wealth of evidence is now becoming available to show how customary tenure systems in Africa have been undermined by the inability of rural producers to co-ordinate their actions, and that this inability is often due to the imposition of unsuitable land tenure legislation and development policy by both donors and the post-colonial state. At the same time field work and theory is converging to show that where local producers are given the opportunity and the resources to develop their own management institutions and tenure regimes they are well able to do so.

These concepts place particular emphasis on the linkages between the physical characteristics of natural resources in different agro-ecological areas, the socio-economic structure of communities and suitable forms of resource tenure. They imply that in dryland areas characterised by a highly uncertain and risky environment communal forms of resource ownership are more effective.

They also imply that natural resource management policy, given the failure of the top-down 'Tragedy of the Commons' ap-

proach, should seek to support local institutions where they are effective, and promote them where they no longer exist.

With regard to communal resources, a number of concepts are available which enable an assessment to be made of the effectiveness of existing common property systems, and the conditions necessary for them to function. Two of the best known approaches to this are those of Oakerson (1985) and Ostrom (1990). Figure 1 indicates the conditions necessary for effective communal management of resources.

Figure 1: Conditions necessary for effective communal management of natural resources

1. There are clear boundaries to the resources in question, and the people who have rights to exploit them are clearly identified. Jurisdictional boundaries (administrative areas, community boundaries) should be linked to the physical boundaries of the resources in question.
2. There are clear advantages in exploiting the resource communally by which individuals receive a 'fair' (equitable) return for their contribution to the collective management of the resource.
3. There are rules limiting the time, place and technology used which are appropriate to the particular resource, and linked to investment in the maintenance of the resource. The rules must be simple and easily understood. Entry and exit regulations should support community interests. Sanctioned authority must link responsibility and control.
4. The people affected by the rules must be able to participate in changing them. Rules must exist which constrain the ability of individuals to act alone, if those actions create costs to other individuals, and provide remedies to those so affected by others' actions.
5. The community is homogenous and is able to impose collective decisions over all users. This implies there are few, if any, 'veto positions' held by individuals or groups within the community that can overturn collective decisions. Scale (both demographic and spatial) must be small enough to provide conformity to rules largely by informal group pressure.

6. There are effective monitoring procedures where monitors of the rules are either users of the resource, or accountable to them. Monitoring must be easy to carry out.
7. There are graduated sanctions depending on the seriousness of the offence. Sanctions are assessed and imposed by fellow users, or officials accountable to them.
8. There are low-cost mechanisms to resolve conflicts among users or between users and officials to which there is rapid access.
9. The rights of users to devise their own institutions are not challenged by external authorities. It is in fact essential that external structures, in particular the state structure and courts of law, support local institutions.

While these concepts provide good indicators of some of the social and economic conditions necessary for effective communal management they are able only in the most general way to link the physical characteristics of natural resources to appropriate management and tenure systems. Recent research and advances in the 'Property Rights' school of thought in 'non-equilibrium' environments now allow us to draw more specific conclusions and policy options for particular agro-ecological areas within African drylands.

The 'Property Rights' School

The role of scarcity in the evolution of property rights is stressed by the 'property rights' school (Behnke, 1991). In orthodox property rights theory the evolution of individual rights to land and the mechanisms to enforce such rights are related to:

1) levels of resource productivity.
2) effects of population pressure.
3) the application of rural technologies.

Under increased population pressure intensification of land use is reflected in a shift from opportunistic production systems such as hunting and gathering and herding to more continuous resource utilisation. Intensification of land use will occur mostly with regard to more productive resources.

In this theory the value of property determines the nature of the rights that pertain to it. According to an early proponent of the theory (Demsetz, 1967), common property regimes exist

where resources have low value and the cost of control over their use is relatively high. As a resource acquires greater value or scarcity, it becomes more and more worthwhile for people to manage it's use. Institutional innovations then occur to conserve it. These generally take the form of a shift from non-exclusive to more exclusive forms of access to property.

However, providing greater control over resource use incurs costs. Shifts from open to private property rights only occur where the transaction costs, or what Demsetz called the costs of "policing" is exceeded by the benefits afforded by control of a resource.

Implicit in this is the notion that there is some kind of linear progression and historical continuum in the privatisation of rangelands. It suggests that commons date from the time when there was a surfeit of resources in relation to population density. As populations increase and resources become more scarce, property will become privatised.

Recent advances in research have shown that this is not always so. Where resources are very variable in space and time (both year on year and seasonally) it is not economically worthwhile, even under conditions of population increase, to privatise resources. This is because the productivity of those resources is outside the control of human agency, where, for instance, rainfall is the determining factor. In these areas, which characterise many parts of dryland Africa, mobile production systems are more productive, which in turn imply flexible and reciprocal access systems to allow rural producers to 'mop up' the natural production of resources in different areas, in different seasons, in different years.

These tenure systems can therefore be expected to change along an environmental gradient. In drier areas, where resources are of low value by unit area, environmental variability is high, and there is the need to move in different seasons and years, management systems will be more flexible. In wetter areas where resources are of greater value, the environment is more stable, and sedentary production is possible, management systems will be more closed, and will tend towards private property. In semi-arid areas in between a combination of these management systems might apply (Scoones 1994).

The essential point to bear in mind is that dryland areas in Africa contain all these three sub-units: wetter areas of higher value (known as 'key resources'), transition semi-arid areas, and arid zones. Producers living in drylands may use all of these

sub-zones if they follow mobile strategies of resource use, other producers such as farmers may concentrate on the exploitation of one resource for their livelihoods.

It follows from this that small, high value key resources (river banks, water points, salt licks etc.) are likely to be highly contested areas, particularly in times of drought (Scoones 1994). Access to these areas are strategic for mobile producers such as herders because without them they will be unable to exploit drier areas at other times of the year, and will be unable to survive periods of increased environmental stress.

In conditions of rising population pressure these key resources come under pressure to be privatised by farmers, and yet they remain the focal point for many other producers in dryland areas whose management systems are flexible and communal. The issue of how these areas can be managed, and the relevant tenure systems they imply, is the central research and policy issue of resource management in dryland Africa today, to which I now briefly turn.

Policy and Research Implications

The concepts of the 'Assurance Problem' approach to natural resource management provide us with a framework for assessing the effectiveness of local natural resource management systems and together with the 'Property Rights' approach suggest what form these management systems might take in the different agro-ecological areas found in dryland Africa. They focus attention on 'key resources' found in the area.

There is not and there should not be any 'blueprint' available for guidance. Dryland tenure regimes, and particularly those concerning 'key resources' consist in : " overlapping claims to resources, shifting assertions of rights and continuous contest and negotiation of access rules" (Scoones 1994, 24). Whereas in the past stable social groupings based on clan, kin and tribal networks arbitrated access to these resources, nowadays their ability to do so in many places is undermined.

The challenge facing researchers and policy makers today is to understand how tenure systems in particular areas are evolving, and the diverse interests of which they are composed, in order to identify and promote new institutions which can manage the effects of environmental uncertainty so as to provide local producers with sustainable livelihoods. This implies applied research into:

*** Local Management Systems of Key Resources:**

A greater understanding of how local management systems of key resources operated in the past - in the light of the 'Assurance Problem' and 'Property Rights' concepts - is needed in dryland Africa. The research will need to examine the range of overlapping interests and rights which have developed over recent decades, and assess issues of secondary and tertiary rights of access of different rural producers to key resources. In particular, the work will need to consider the relative importance of different 'stakeholders' in the resource and examine the relationship between the importance of the resources to different producers and their capacity to control access to them.

*** The Relationship Between Customary Systems and Formal Law and the Process of Conflict Resolution:**

The early part of this paper has shown how the nationalisation of natural resources has often broken open local management systems and created 'Tragedy of the Commons' outcomes. National legislation is often an anachronistic inheritance from the colonial era which ignores both the capacity of local groups to manage their resources, and the specific circumstances under which they operate. There is an urgent need for research into 'informal' customary legal systems and the linkages that might be promoted between them and the formal system.

Recent thinking indicates that these linkages might be built up through 'procedural law' (Vedeld 1993) whereby the process of conflict resolution would provide a body of case law appropriate to particular areas which could be embodied in national law. National law could act as framework within which contesting parties could legitimately put forward claims to resources, and the administrative/ judicial institutions could process claims, establish criteria for arbitration and provide enforcement measures (Behnke 1994).

*** The Role of the State in Supporting Local Natural Resource Management Initiatives:**

Many countries in Africa with substantial dryland areas are presently involved in processes of decentralisation of power, restructuring of their economies, and liberalising their political systems. On paper the political decision has already been made to make local communities responsible for the management of natural resources. However, the practical means by which this

is to be carried out, and the institutional structure appropriate for its implementation have yet to be defined. In particular, the present day structure of government in many of these countries is woefully inadequate for supporting multi sectoral initiatives of this sort, with responsibility for these issues divided between several ministries and even greater numbers of technical agencies, who do not co-ordinate their actions (Moorehead 1994).

Applied research is needed into the co-ordination of natural resource policy at local, district and national level so that the specific conditions applying to different agro-ecological areas within a country can be reflected in national policy. The manner in which lessons learnt form local initiatives can feed into a flexible process of policy formulation is an urgent requirement.

This research will be of little use unless it entails the full participation of local producers in the research process because it implies a process of negotiation between different interests using the resources so as to establish an arena within which local producers can be assured of the actions of the other parties concerned. It is a process of active research. For it to be effective, it will need to inform the policy debate at district and national levels, and offer the opportunity to local people of having their own proposals accepted and supported by wider administrative, judicial, political, and economic structures.

The methodological implications of this approach are that researchers will need to be part of a process of consensus building in which local producers, government officials, NGOs and other interested parties are primary actors in defining goals and generating information.

By way of example, IIED is presently designing a programme of work with national NGOs in Senegal which aims to develop several natural resource management plans with agro-pastoral communities living in the Senegal River Valley. The emphasis of this work is to train representatives of local communities in Participatory Rural Appraisal techniques. Materials have already been developed in the local language (Pulaar) on functional literacy, on Participatory Rural Appraisal, on natural resource management, and on current land tenure law.

Over the next year IIED, Associates for Research & Education in Development (ARED) and l'Union pour la Solidarité & l'Entreaide (USE) plan to train representatives of communities from a Communauté Rurale - the lowest unit of development planning in Senegal - in functional literacy aimed at developing local natural resource management plans. Once trai-

ned, these representatives will draw up management plans with members of their own communities. These plans in turn will be presented at workshops bringing together representatives of the communities, Communauté Rurale officials, regional officials, government decision makers, NGOs and donors in order to feed the results of this process into national and district level policy making and draw up an agenda for the implementation of the plans. The results of these workshops will be published in the local language, in French and English, and will be distributed to the international development community.

Conclusion

Research on natural resource management using the 'Assurance Problem' approach and 'Property Rights' analysis - particularly insofar as it concerns the highly variable resources found in drylands - is only now beginning to feed into development policy. The signs are fairly optimistic that this will lead to a profound change in policy towards these areas in the short to medium term. In a series of meetings at the end of 1993 representatives of rural communities, donors, and policy makers from 13 countries in Africa agreed to re-orient their policies towards a much more participatory approach to rural development. The importance of mobility was recognised, as was the need to provide producers with secure land rights, especially to 'key resource' areas. Participants at these meetings were unanimous that more investment should be spent on the rural sector and that local institutions should be strengthened as part of the process of decentralisation.

Some donors have begun actively to promote the 'new' approach to pastoral development. GTZ, the German Government's development agency, has started a regional programme in West Africa specifically aimed at providing support to the transhumant pastoral sector in Sahelian West Africa. In Senegal, the same agency is in the process of re-designing a project that has been running for 15 years away from private ownership of ranges towards more communal, and flexible, tenure systems. In a wider programme in the same country they are now looking at ways of co-ordinating this approach in four of their natural resource management projects and feeding the lessons learnt into the Senegal Action Plan for the Environment through direct representation at Ministerial level. More and more, NGOs and others working in the field are adopting

Participatory Rural Appraisal techniques (PRA) to develop natural resource management plans for herding communities.

However, a word of warning is appropriate here. There is a danger that the development community will now believe it has finally understood the constraints to natural resource management in dryland areas and will go out and impose these ideas on local communities, much as was done in the past. This must be resisted, because if there is one lesson that has been learnt over the last several decades of research and policy implementation it is that we do not know, and that solutions to natural resource management problems will only be found through a process of practice and negotiation at the local level.

Responsibility for which type of tenure and management system (or mix of systems) should be practised in a given area should be left to local user groups. There can be no prescribed rigid model of land tenure: in different areas, tenure arrangements should be developed by the local users, who will learn at their own pace according to what is most suitable for them. As such the role of outside researchers, investors and development agencies should be facilitative, and should adopt an incremental approach to project planning which would allow adaptive management.

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