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Review of Common Pool resource Management in Tanzania

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*NRSP Production System*

Semi-arid

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#### Abbreviations used in this report

CPR	Common Pool Resources
DfID	Department for International Development
GDP	Gross Domestic Product
GO	Government Organisation
GPS	Global Positioning System
IRA	Institute of Resource Assessment
NCA	Ngorongoro Conservation Area
NGO	Non-governmental organisation
NRSP	Natural Resources
OVI	Objectively Verifiable Indicator
PRA	Participatory Rural Appraisal
SAPS	Semi-Arid Production Systems
TZ	Tanzania
WRI	World Resources Institute

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## 1. Executive Summary

### 1.1 Purpose of the project

The purpose of the project is to understand the relative dependence of poor communities on wildlife, livestock and crops and their interaction in semi-arid Tanzania. The management of rural common pool resources (CPR) in semi-arid regions is an important issue in Tanzania for many reasons:

- 80% of the country is semi-arid according to the definition used by DfID
- the majority of the people of Tanzania are poor with a GDP of \$160 (1997 at 1995 US\$, source WRI)
- agriculture accounts for 48% of GDP (source WRI)
- tourism is rapidly increasing, accounting for \$313 million in 1995-1997 (source WRI)
- most natural resources are communally owned either through State control or by customary management
- large areas of semi-arid Tanzania have been alienated for the purposes of natural resource conservation under national park, game reserve or forest reserve status
- sweeping changes are taking place in land policy with encouragement of private ownership and the introduction of village boundaries
- there are conflicts between different forms of land use in semi-arid Tanzania, for example between agriculturalists and pastoralists, and between pastoralism and wildlife conservation
- poor people can be highly dependent on CPR and can be adversely affected by changes in CPR management regime or by conflicts over access

This project defines potential researchable constraints for future components of the NRSP semi-arid production system research programme. This is achieved by a combination of field work and literature review. The field work consisted of two workshops and visits to twelve villages in semi-arid Tanzania (Fig. 1). During the field work the criteria for successful CPR management as defined by Ostrom (1990) were used as a basis for analysing the use of CPR by villagers. Literature review was of two types: theoretical aspects of CPR management, and CPR management in a Tanzanian context. The main conclusions are that water is an important CPR that can productively be a focus of research for poverty alleviation in semi-arid Tanzania. The main area that requires research is the issue of governance. This subject can be usefully informed by reference to the theoretical aspects of the economics of CPR management and by consideration of the spatial arrangement of natural resources.

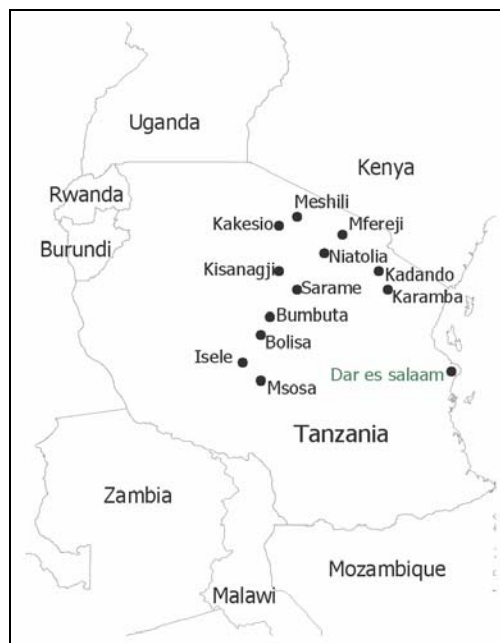


Figure 1. Location of the 12 villages visited during the field work component of the project.

## **1.2 Outputs of the project**

There are three project outputs (see project logframe in section 8):

1. Review of existing knowledge of Tanzanian CPR in semi-arid Tanzania.
2. Generate new information on the current status of CPR in semi-arid Tanzania.
3. Inform Government Organisations (GOs) and Non-Governmental Organisations (NGOs) of CPR management issues.

These outputs have been met through a series of project reports and dissemination products, together with the project workshops held as part of the research activities. The first output is met through a series of reviews which are placed into the project context in Annex A. The second output was met through the fieldwork programme, and the third output was partially met during the workshops and will continue to be met as the project disseminates its research results.

## **1.3 Research activities**

The project has six specific research activities (see project logframe in section 8):

1. Review general literature and models of CPR management. This was done throughout the project and resulted in the production of three reports on economics of CPR management (Annexes 2, 3, 4).
2. Review specific literature on Tanzanian semi-arid production system (TZ SAPS) CPRs focussing on projects in Serengeti, Mkomazi, Babati, Kondoa and Iringa. This was done at the beginning of the project and is reported in a literature list (Annex 1) and placed into the context of the project in Annex A.
3. Convene a meeting involving target institutions to identify and discuss key issues concerning CPR management in TZ SAPS. The first meeting was held on 30 November 2000. It was attended by representatives of GOs and NGOs, and successfully developed a plan for the field work.
4. Visit key TZ SAPS areas experiencing different problems and with differing cultural and environmental conditions. Gathering information from villagers and target institutions. The field work was carried out in the first quarter of 2001 with 12 villages in 6 districts visited.
5. Convene meeting with target institutions to discuss field work findings. A final meeting was held in the Institute of Resource Assessment at the University of Dar es Salaam on 7 May 2001. The meeting was well attended by academics, district officials and representatives of GOs.
6. Write and disseminate final report to target institutions. Reports have been prepared (see list of Annexes in Section 10) and are available on the web. Copies of the reports have been sent to the institutions visited by the project and other institutions with interests in CPR management.

## **1.4 Achievement of OVIs**

The Objectively Verifiable Indicator (OVI) at purpose level is:

- CPR interactions in representative sample of various semi-arid environments in Tanzania understood.

The purpose level OVI is met through the OVIs at activity level, these are:

- Draft report on general literature review. Three reports on general aspects of management have been produced:
  1. Literature review on the economics of common property resources (Annex 2).
  2. Literature view on the economic valuation of different forms of land-use in Tanzania (Annex 3).
  3. Exploring game theory as a tool for mapping strategic interactions in common pool resource scenarios (Annex 4)
- Overview report on Tanzanian semi-arid production system CPR. This report is included as the general summary report in Annex A.

- Meeting 1 report. Report completed immediately following the 30 November 2000 workshop (Annex 5).
- Fieldtrip reports. Three reports have been produced following the field work:
  1. Field work report - village profiles (Annex 7).
  2. Risk mapping in semi-arid Tanzania (Annex 8).
  3. Review of CPR institutions in the villages visited during the field work (Annex 9).
- Meeting 2 report. Report completed immediately following the 7 May 2001 workshop (Annex 6).

All reports are available on the web at:

<<http://www.york.ac.uk/res/celp/webpages/projects/cpr/tanzania/documents.htm>>

Background information to land law and downloadable legal documents are available on:

<<http://www.york.ac.uk/res/celp/webpages/projects/laws/introduction.htm>>.

### **1.5 Contribution towards attainment of NRSP purpose**

The NRSP purpose is to generate benefits for poor people by the application of new knowledge to natural resource management in six natural resource systems.

The project will assist NRSP to achieve this purpose by providing information on the researchable constraints that will lead to improved CPR management for poor people in semi-arid Tanzania. The key researchable constraints are discussed in detail in Annex A and are summarised below.

We recommend three main areas of research in semi-arid Tanzania:

- |                             |   |
|-----------------------------|---|
| Making decisions:           | Which land-use is preferable?                             |
| Institutional systems:      | Do transactions costs prevent sustainable CPR management? |
| Institutional interactions: | What are the socially optimal interactions?               |

These three areas are important because:

- Recent major changes in Tanzanian land, forest and wildlife policy have emphasised the importance of village management planning.
- Empowerment of villagers enables new approaches to be developed for improving livelihoods and sustainable natural resource management
- Estimation of returns from CPRs is not straightforward as there can be indirect use values in addition to direct use values

In addition to financial returns, economic analysis involves modelling interactions of institutions using tools such as game theory.

Other components of the project have revealed that:

- A preliminary assessment of risk perception suggests that water is the key natural resource in semi-arid Tanzania.
- Spatial arrangement of natural resources in the landscape is an important constraint to successful sustainable management of CPR.

Application of Ostrom's (1990) criteria for long enduring CPR management institutions revealed that:

- Water is generally well managed through common property management regimes.
- Many institutions, especially those for forest CPRs, are unable to adequately deal with change.
- New CPR management institutions can be successful if there is local participation in the design, implementation and monitoring of the CPR and transactions costs are low.
- Range-land CPR pose the most difficult questions for long-term institutional survival.

The project results suggest that further research on CPRs is most likely to be successful if it is focussed on water. Catchments, irrigation schemes and boreholes have defined boundaries and can be allocated sets of users with clear rules. In contrast, ecological variability of range-lands creates a highly dynamic socio-ecological system which does not fit well into Ostrom's criteria for long-enduring CPR management institutions and presents particular problems for governance that are politically difficult to overcome as responsive dynamic institutions are required to mirror spatial and temporal ecological dynamics. This is not to say that management of rangeland is not an extremely interesting and important issue, but further research under the NRSP will be unlikely to yield implementable results within the remaining lifetime of the NRSP. Of the research areas recommended by this project, general issues concerning the economics of CPR management will feed into the rangeland problem.

## **2. Background**

### **2.1 Goal of the project**

The project goal is:

- Livelihoods of poor people improved through sustainably enhanced production and productivity of natural resource systems

An important way of improving the livelihoods of poor people in semi-arid Tanzania is through improved management of CPRs as most natural resource systems in the country are common pool resources managed under common property regimes. Poor people reliant on CPRs are affected when there is conflict over rights and access to CPRs. For example, alienation of land for wildlife protection in national parks results in a loss of access to natural resources in the national park, or granting of water rights to commercial farming can deprive downstream communities of access to water. The project aimed to reach the project goal by reviewing existing information (Annex A and Annexes 1, 2, 3, 4) and conducting original research (Annexes 5, 6, 7, 8, 9) to reveal researchable constraints for future work supported by the NRSP.

### **2.2 Deriving new knowledge**

There has been a great deal of work done on semi-arid production systems in eastern Africa and in Tanzania itself. The focus of this project was not to derive new knowledge per se, but to review existing knowledge and hold discussions with a range of groups in Tanzania who are involved in the management of CPRs in semi-arid areas. The function of the review was to uncover researchable constraints and justify why these constraints should be researched under future work in the NRSP SAPS portfolio. The review took two forms, literature reviews on CPRs and field-based discussions in workshops and villages. The literature reviews summarised theoretical aspects of the economics of CPR management and it was apparent from reviews of projects and research in Tanzania that CPR theory has not been generally applied to CPR management in Tanzania. The field work revealed areas where villagers were experiencing problems, or had achieved solutions, with CPR management and pinpointed water as a natural resource that could be the subject of research.

### **2.3 Demand for the project**

There is a high demand for effective management of common pool resources in semi-arid Tanzania. The demand is based on three points:

- Most of Tanzania is semi-arid
- Most of Tanzanians are poor
- Most of Tanzanian natural resources are managed under common property systems

Poor people in semi-arid Tanzania rely directly or indirectly on common pool resources for their livelihoods. Therefore pro-poor management of CPRs is key to poverty alleviation. Each of the points above is discussed in more detail below.

### 2.3.1 Most of Tanzania is semi-arid

Most of the land area of Tanzania can be regarded as semi-arid, though the actual area to be considered for management purposes varies according to the definition used.

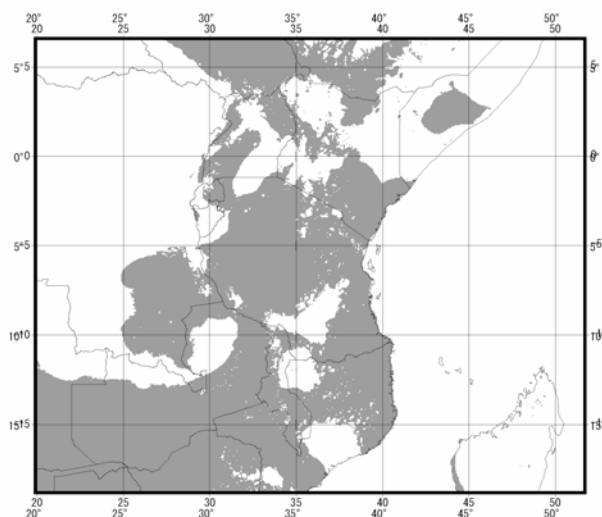
The DfID definition of semi-arid is (Fig. 2):

1. Rainfall between 400-1200 mm/year.
2. Evapotranspiration exceeds rainfall in two or more seasons.
3. Mean monthly temperature  $>18^{\circ}\text{C}$

This definition covers 829,832 km<sup>2</sup> (80% of land area) of Tanzania and includes two major vegetation types, the Somalia-Masai and Zambebian phytochoria. A stricter definition of mean annual rainfall 300-900 mm would reduce the area considered as semi-arid to 248,282 km<sup>2</sup> (26% of land area) and more or less confine it to the Somalia-Masai vegetation type. If a length of growing period of 3-6 months is used to define the production system, then this covers 392,076 km<sup>2</sup> (41% of land area) (Fig. 3).

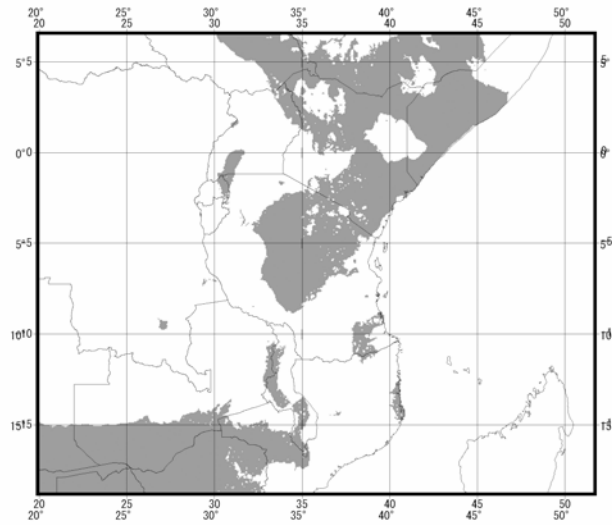
There is an argument for retaining a broad definition of semi-arid in Tanzania as people and livestock move between the Somalia-Masai and Zambebian vegetation types depending on season and level of drought. Moreover, forest clad mountains with high rainfall provide sources of water within the semi-arid area and it is important that these areas are included in overall planning for management and are not excluded by a strict climatically driven definition.

Whatever definition is used it is clear that a large proportion of Tanzania can be regarded as semi-arid, which justifies inclusion of the country in the NRSP semi-arid production system portfolio.



**Figure 2. Distribution of semi-arid land in eastern Africa based on the DfID definition of semi-arid. Seasons are defined on the basis of climatic fluctuations in Tanzania and takes into account the long-rains and short-rains. The four seasons are: December to March is the warmest period. April to May is the long-rains. June to October is driest and coolest. November usually has short-rains.**





**Figure 3. Distribution of semi-arid land in eastern Africa based on a strict definition of semi-arid. Seasons are defined on the basis of climatic fluctuations in Tanzania and takes into account the long-rains and short-rains. The four seasons are: December to March is the warmest period. April to May is the long-rains. June to October is driest and coolest. November usually has short-rains.**

### **2.3.2 Most of Tanzanians are poor**

The population of Tanzania has increased from 7,886,000 in 1950 to 33,517,000 in 2000. This rapid increase means that 45% of the population are under 15. It is estimated that in 1997 there were about 1,400,000 Tanzanians affected by HIV/AIDS with 730,000 children orphaned by AIDS (source WRI).

Tanzanians have a low per capita GDP of US\$160 (for 1997 in 1995 US\$; \$576 when adjusted for purchasing power parity) and approximately 50% of people are below the national poverty line. Semi-arid systems are subject to a high degree of climatic fluctuation, both within a year as seasonal changes and between years as unpredictable climatic events such as the El Nino bring drought and floods. Poor people living in these areas do not have the capital resources to avoid the risks imposed by fluctuations in production of the natural resource base resulting from both periodic and periodic climate variation.

### **2.3.3 Most of Tanzanian natural resources are managed under common property systems**

All land in Tanzania is owned by the State, a principle that was first established under German administration at the end of the 19th Century, reaffirmed by British under the 1923 Land Ordinance and continued in independent Tanzania. Until May 2001, when a new land law was introduced, land was administered under the 1923 Land Ordinance, which contained an important principle in its preamble:

*WHEREAS it is expedient that the existing customary rights of the natives of the Tanganyika Territory to use and enjoy the land of the Territory and the natural fruits thereof in sufficient quantity to enable them to provide for the sustenance of themselves their families and their posterity should be assured protected and preserved;*

*AND WHEREAS it is expedient that the existing natives customs with regard to the use and occupation of land should as far as possible be preserved;* Preamble of the 1923 Land Ordinance.

The full text of the Land Ordinance is available at:

<<http://www.york.ac.uk/res/celp/webpages/projects/laws/1923land/1923.htm>>.

Traditional management of common pool resources such as land, water and natural products ("natural fruits") is under common property systems with control usually vested at the village level. However, nationalisation of land by the central State has meant that land has consistently been alienated from customary control for protective reserves, such as national parks or forest reserves, or for commercial agriculture and ranching.

Inevitably there are conflicts between different land-use systems. Under customary management there has historically been conflict between different groups of pastoralists over control of grazing range, and between pastoralists and agriculturists over land use type. With formation of a central State the requirement for revenue generation has resulted in land being alienated for commercial farming and ranching. Currently agriculture accounts for 48% of GDP. Tanzania's rich and varied wildlife also led to large areas being alienated for National Parks and Game Controlled Areas. These areas are now the basis for a substantial income from tourism, a sector that increased rapidly from 1990 and earned \$313 million between 1995-97. Land alienation has caused considerable controversy and outcry. Groups that see themselves as traditional owners of alienated land are demanding access to and control of the areas concerned. In contrast, in other areas traditional owners are selling land to commercial farmers under the new land policy which aims to attract investment and increase financial returns from land, thereby alienating land from the group managing the commons as a whole.

In any conflict over land tenure and land use the poor are likely to have most to lose. The poor have much to gain from a stable and equitable system of governance of common resources.

### **3 Project Purpose**

The purpose of the project is to understand the relative dependence of poor communities on wildlife, livestock and crops and their interactions. The difficulty in conducting research to achieve the project purpose is that most of Tanzania is semi-arid, most people are poor and most natural resources are CPRs managed under common property regimes. This means that there are an enormous variety of different interactions between a wide range of components providing, and dependent on, a highly variable natural resource base. The project tackled this variety by formulating research activities that reviewed a broad literature and used a multidisciplinary team to visit six sites in markedly different areas of semi-arid Tanzania.

### **4. Outputs**

This section presents the research results. Methods are presented in Section 5 and are given in more detail in the technical annexes.

#### **4.1 Literature Reviews**

Three literature reviews have been prepared (Annexes 2, 3, 4) together with a project overview (Annex A). The literature reviews focus on the economics of CPR management. Economics is interpreted here in the broad sense to cover institutional economics, which includes aspects of governance. The complex nature of CPR management under common property regimes means that an understanding of economics and institutions is critical to designing equitable and efficient management regimes. There is a huge literature on CPR management and the three reports focus on different aspects of the economic problem: transaction costs, use of the production function approach as a decision tool, and use of game theory to analyse institutional arrangements.

##### **4.1.1 Literature compiled for the Review of Common Pool Resource Management in Tanzania. Annex 1**

A substantial list of literature has been compiled from a number of sources, both in the UK and in Tanzania. Sources include the University of York, University of Dar es Salaam and Norconsult (TZ) Ltd. This list includes literature on CPR management and semi-arid ecology as well as reports from specific projects that have been or are still operating in Tanzania. The literature has been used to provide background information for the overview report (Annex A).

#### **4.1.2 Economics of Common Property Resources. Annex 2**

Management of common pool resources under common property regimes involves significant transaction costs. Annex 2 reviews the economics of common property resource management and discusses transaction costs under different regimes. Transaction costs are the costs of negotiation, monitoring and enforcing an agreement. As there can be a large number of users of CPR, then negotiation can involve many meetings with the attendant opportunity cost of time lost to other income generating activities. Monitoring a large area can similarly take up a great deal of time, and enforcement requires effective and powerful institutions.

A practical example of the application of the concept of transaction costs can be seen by reference to the Field Report (Annex 7). In the village of Bolisa in the Kondoa eroded area the HADO project excluded livestock from the area in order to allow vegetation to regrow and thus stop erosion. The full text of the translated HADO project by-laws is available on:

<<http://www.york.ac.uk/res/celp/webpages/projects/laws/hado/hado.htm>>.

The HADO project is now finishing and costs of monitoring and enforcement have been transferred from the project to village level. In other words the village now carries the transaction costs for maintenance of the stock exclusion management regime. If these costs exceed the benefits, then the regime will break down. Discussion with the villagers revealed that transaction costs are high and it was difficult to contain free-riders on the commons. A researchable constraint is thus developing sustainable governance systems that relate transaction costs to benefits and design systems which minimise costs relative to benefits obtained from the CPR.

#### **4.1.3 Economic valuation of different forms of land-use. Annex 3**

There are many competing forms of land-use in semi-arid Tanzania, for example land could be used for agriculture, wildlife conservation, tourist hunting, pastoralism or hunter-gathering - or a mixture of all of these. In some areas of Tanzania, such as Ngorongoro and Mkomazi (see Field Report, Annex 7), certain ethnic groups consider that they have legitimate access to CPR in areas currently allocated to wildlife conservation. Issues concerning use of land for different purposes, particularly when issues of ethnicity are involved, are a matter for sovereign government policy. However, the appropriate use of valuation techniques can inform policy makers as the relative costs and benefits of different decisions. For example, Ngorongoro earns substantial revenue from tourism - how does this compare with an alternative use for pastoralism? Or in a decision on privatisation of common land - how do the benefits from commercial agriculture compare with those obtained through traditional management systems? A researchable constraint is use of the production function approach to valuation to compare different forms of land-use. Information on valuation can then be fed into the policy process.

#### **4.1.4 Game theory as a tool. Annex 4**

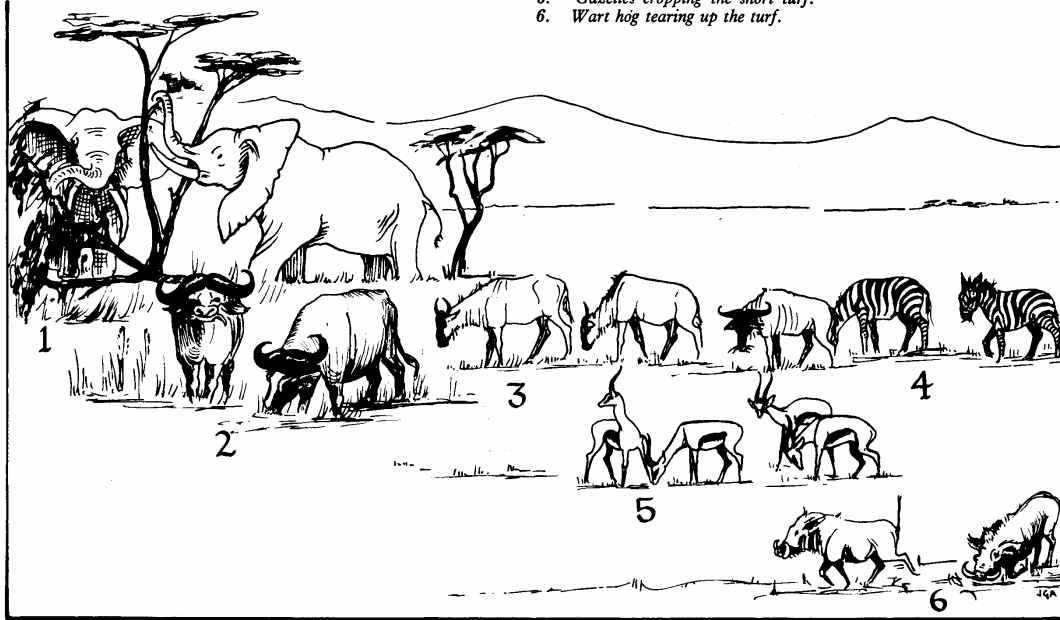
Cost-benefit approaches (Annex 3) are only one tool that can be used to inform decision-making. Analysis of institutions is central to developing sustainable forms of governance. Game theory can be used to map strategic interactions between institutions and individuals in the management of common pool resources (Annex 4). For example, in Mkomazi, Ngorongoro and villages adjacent to the Ruaha and Udzungwa National Parks (see Field Report, Annex 7 for villages in Same, Ngorongoro and Iringa Rural) institutions for co-management of common pool resources that incorporate benefits for villagers and maintain State priorities for wildlife conservation could be designed with the help of game theory. A researchable constraint is thus the application of theory, such as game theory, to practical issues of CPR management in the design of sustainable institutions that would benefit the poor.

#### **4.1.5 Ecology. Section 3 in Annex A**

The ecology of semi-arid Tanzania briefly described in the overview report (Annex A). In placing vegetation and wildlife in a management context, two alternative management paradigms "wildlife good, cows bad" (see Fig. 4) and "cows good, alienation bad" are used to illustrate the requirements for different types of research under different government defined policies.

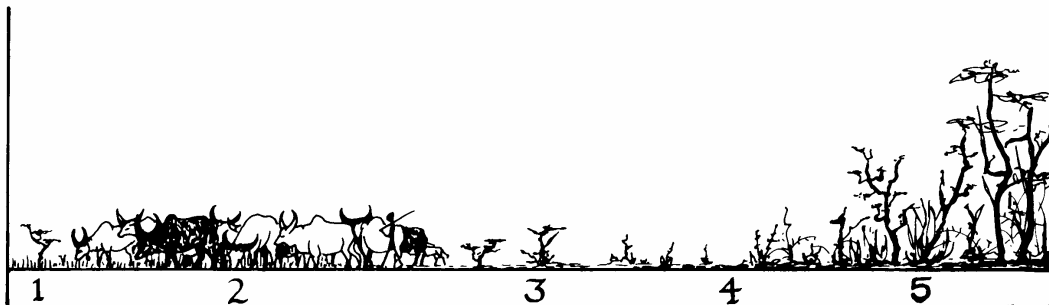
**Diagram showing the efficient use of grassland by wild animals**

1. Elephant breaking down trees and dense bush.
2. Buffalo browsing among the tall grass.
3. Wildebeest grazing the shorter grass left by the buffalo.
4. Zebra eating the grass left by the wildebeest.
5. Gazelles cropping the short turf.
6. Wart hog tearing up the turf.



**Overgrazing leading to invasion by dense bush**

1. Open grassland.
2. Large herds of cattle use the pasture indiscriminately.
3. Hard, dry compacted soil, the grass destroyed.
4. After rain weeds grow rapidly, so that the grass cannot re-establish itself.
5. Dense bush follows the weeds, and the pasture is useless.



**Figure 4. The concept of "wildlife good, cows bad" in East African rangeland management. This ecological paradigm has dominated land-use in semi-arid Tanzania for more than half a century. From Vesey-Fitzgerald 1973 pp 71-72.**

If government policy is for conservation of wildlife and vegetation to the exclusion of other forms of land use (which is the current situation in the extensive network of national parks, game reserves and forest reserves), then the researchable management questions are:

- how can wildlife and vegetation values be best maximised and captured e.g. through tourism, hunting and water catchment?
- how can the benefits be best distributed to create sustainable management institutions and for poverty alleviation?

These questions are being addressed in projects such as the MBOMIPA project adjacent to the Ruaha National Park (section 8.1.2 of Annex A) and the Ereto project in the Ngorongoro Conservation Area (section 8.1.3 of Annex A). Answers are difficult to find. Whilst there has been a high degree of success in both MBOMIPA and Ereto projects, there are some serious problems of governance that arise from both institutional failings, such as lack of knowledge of administrative boundaries, and distributional issues, such as who should retain power of decision making and who should receive benefits.

The question that arises from the "cows good, alienation bad" paradigm is essentially one of ownership. For example, in the Mkomazi game reserve (section 8.1.5 of Annex A), the lack of rights of access to grazing on the reserve has been legally challenged by cattle herders. The legal situation contains some thorny issues, such as the legitimacy of access rights to people of differing ethnic background. For example, if the Maasai are given exclusive rights to land in the Ngorongoro Conservation Area (or other protected areas) as is the case under present legislation, then on what basis can other pastoralist peoples such as the WaSukuma, or peoples that previously had access to resources in the protected area, such as the WaNdorobo, be denied access to the same resource?

These types of issues are clearly best left to Tanzanian government policy and are not the realm of natural resources research.

In general, for both of these example land management paradigms, natural resources research in the fields of institutional economics and governance could help design sustainable institutions and inform policy decisions (Annexes 2, 3 and 4). A further area of research that needs to be addressed that more directly relates the ecology of CPRs in semi-arid Tanzania is the effect of different spatial scales on management. This is important because both the vegetation and climate are highly variable, so communities need access to a range of vegetation types through different seasons in order to maintain sustainable livelihood strategies. One of the effects of climate variability is to change boundaries of resources such as rangelands. This makes certain types of CPR highly variable over space and time. The creation of stable, sustainable management regimes for variable CPRs is not possible and a certain amount of conflict and dynamism needs to be accepted in systems of governance for these resources.

#### **4.1.6 Review of Tanzanian CPRs. Annex A.**

The review technical annex is included as Annex A and contains sections written by each team member focussing on different aspects of CPR management in semi-arid Tanzania. These sections cover the general background to natural resource management in semi-arid Tanzania, ecology, institutions, demography, financial aspects, gender and researchable constraints. The review refers to literature on semi-arid Tanzania and presents brief overviews of projects working in the areas visited by the team. In common with the team's finding during the field work, established projects working on development and poverty alleviation in semi-arid Tanzania found governance to be a key constraint. In the HADO project in Kondoa the problem is villagers bearing the transaction costs of the common property management regime. In the MBOMIPA project in Iringa the problem is district authorities being reluctant to devolve power and being unaware of boundaries. In the Ereto project in Ngorongoro the problem is the distribution of resources to poorer households. In Babati it is farmers bearing the costs of monitoring and enforcement, and suffering from assignment of water rights and the depredations of wild animals. In Mkomazi there is conflict between wildlife conservation and rights to graze livestock. In Monduli there is a lack of knowledge on village boundaries and conflicts of interest between villagers and traditional governance systems. In summary, implementation of any natural resources

management programme or technical advance depends critically on designing and instituting sustainable and equitable systems of governance.

## **4.2 Workshops**

Two workshops were held during the project. The first workshop was in November and was a planning workshop for the field work (Annex 5). The second workshop held in May was to discuss results of the field work (Annex 6).

### **4.2.1 First workshop. Annex 5**

The first workshop was used to develop methodology for the field work phase of the project. It discussed general CPR management issues and emphasised the poverty focus of the project. The results of the workshop were a detailed field itinerary and design of the field work questionnaires. The field work itinerary was designed to cover a range of sites which differ in ecology and cultural influence. The questions to be asked by the team were designed to correspond to Ostrom's concepts of the characteristics of a "long-enduring" CPR management regime. The workshop agreed that risk was an issue that affected poor people significantly, and that a set of questions should be targeted on perceptions of risk. Planning from the first workshop was successfully implemented in the field component of the project (see section 4.3).

### **4.2.2 Second workshop. Annex 6**

The second workshop was held to discuss field work results and to ask the group to identify what they considered to be researchable constraints in CPR management. The following areas were identified and reflect the broad interests of the workshop participants and the wide nature of potential CPR research topics:

#### **Ecology of semi-arid areas**

There is generally a lack of information on semi-arid ecology. Research should especially focus on the productivity of semi-arid areas to establish their production potential for a variety of land uses.

#### **Management systems**

Research should focus on the different management systems, their sustainability and the awareness and capability of local institutions. Research on a larger scale could include national interactions and policies and the availability and dissemination of information on CPR management.

#### **Population interactions and conflict**

The research needs to begin with a study of population characteristics and composition before investigating the relationship between populations and CPR and population change and fixed resources. From this basis the research should look at the social interactions within and between communities. Conflict can be investigated along gender lines, between generations or ethnic groups and between the local community and the public at large.

#### **Poverty and livelihood options**

It is not clearly understood how much CPR contributes to the livelihoods and well being of local communities. Access is an important consideration as a lack of access or a poor distribution of productive resources will impact on poverty. There is also a lack of alternative long-term income generating activities and sources of capital for rural communities.

#### **Resource tenure**

This is an important issue in Tanzania with the recent changes in land laws. Security of tenure is important for security of access for local communities.

#### **Infrastructure and Energy**

Improved infrastructure could have either a positive or negative influence on sustainable CPR use. Research on alternative sources of energy and their sustainability could have long-term beneficial consequences on CPR.

### **Water constraints**

Water is a determining factor in community settlement and CPR use. Research is needed into the extent to which water is available in semi-arid areas and its suitability for livestock, agriculture and domestic use.

### **Health**

Research is needed on livestock and human diseases and their impact on populations and their current and future use of CPR.

### **Food insecurity**

Research on the role of different institutions including extension agencies, forestry and wildlife divisions, water departments and the private sector.

## **4.3 Field reports.**

Three field reports were created by the project. The largest is the village survey, which presents a detailed summary of the interviews held at village level (Annex 7). The second is the results of the risk mapping exercise (Annex 8), and the third is a review of the CPR institutions in the 12 villages visited during the field work.

### **4.3.1 Village Surveys. Annex 7**

The village surveys present detailed information on ecology, land use, ownership of CPRs and perceptions of poverty. The situation is very different in different villages. Ostrom's requirements for "long enduring CPRs" were not appropriate for certain types of CPR identified in the field survey. For example it is difficult to define boundaries to CPRs when in Babati District pastoralists from Monduli used grazing CPRs in Sarame village. This suggests that Ostrom's requirements for the creation of stable and sustainable CPRs may be too restrictive to be workable in CPRs that are spatially and temporally dynamic, such as rangeland in semi-arid Tanzania. For these types of resources, different institutions are required in which conflict and dynamism can be accommodated. Successful development of common pool resource management for poverty alleviation thus needs to be focussed on resources with clearly defined boundaries if research is to produce results which can be applied to poverty alleviation in the near future. The resource identified by this project as most appropriate for research is water.

Villagers perceptions of poverty differs between production systems and villages, for example in a system based on livestock poverty will be defined by lack of livestock, where-as in a system based on agriculture, poverty will be defined by food-security and condition of housing. More details are given in Annex A and in Annex 7 for each village visited. In general the characteristics of poor households are:

- Housing - made from mud, sticks and thatch
- Livestock - none, or few livestock
- Land - small amount, a few hectares (in the case of agriculture)
- Labour - sells labour for food or wages
- Food security - insufficient for full year
- CPR use - reliant on CPR for firewood, fish, foraging.

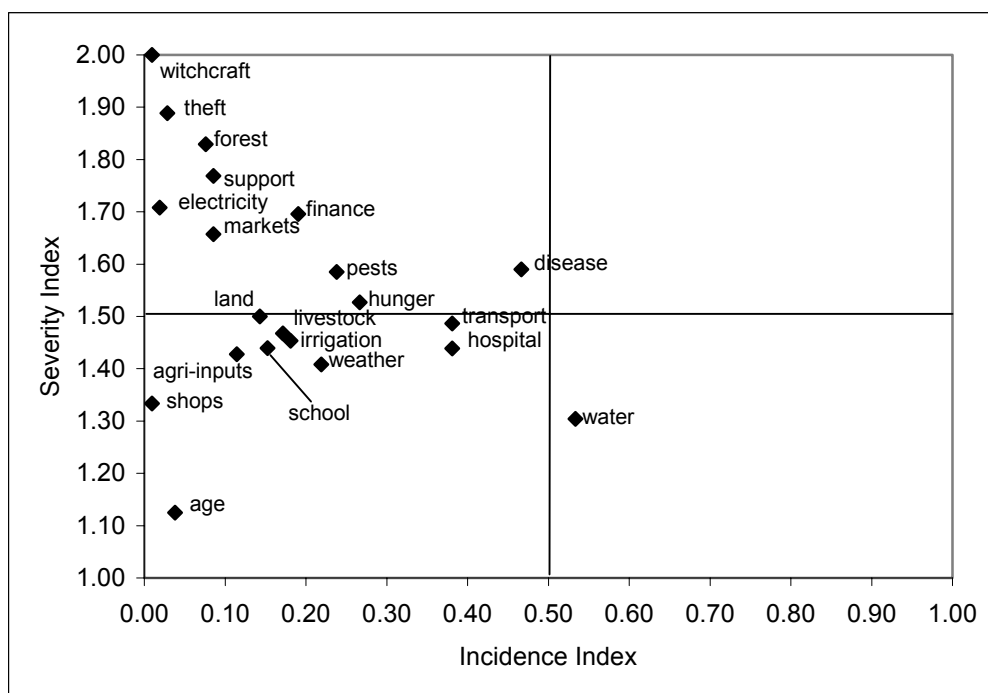
Reliance on CPR is deemed important, but it needs to be borne in mind that wealthier sections of society also use CPR extensively for grazing large herds of livestock or as a source of other products sold commercially such as timber or charcoal.

### **4.3.2 Risk Mapping. Annex 8**

Poor people are likely to be more vulnerable to risk than wealthy people. It was agreed at the first workshop that risk is a suitable specific focus in interviews at the village level. For the purposes of the NRSP risk mapping is particularly relevant as the survey might show that villagers consider risk to not be related to the natural resource base - for example health care or education falls outside the remit of the NRSP. The function of the risk analysis was not to carry out a detailed investigation of a particular risk, but rather to determine if the supply of a particular natural resource was problematic. Analysis of

the risk questionnaire produced a risk map that identified water as the most frequently mentioned risk (see Fig. 5 below). In the risk analysis 'water' covers access to water for farming, livestock and domestic use by people interviewed in the villages. Use of water sources can change over a season. For example, watering troughs for cattle may become sources of household drinking water during the dry season when supplies are low and livestock are moved to more plentiful sources, so water-use from the same source can be inter-changeable. All villagers interviewed considered themselves to be poor, though they were not the poorest of the poor as identified by the criteria determined by the villagers themselves.

Water supply is thus a key researchable constraint in CPR management in semi-arid Tanzania.



**Figure 5 Risk map overview. The higher the value of the Incidence Index, the more people are affected, so the most people are affected by risks associated with water. The most severe risks are those with an index of one, so the most severe risk is old age.**

#### 4.3.3 CPR Institution Analysis. Annex 9.

CPR institutions in the villages were analysed by reference to the criteria defined by Ostrom (1990) as necessary for sustainable CPR management regimes. The results are presented in tabular form in Table 1 (from Annex 9 and also included in Annex A). Of the 38 CPRs examined only 13 are considered robust or generally robust. The remaining CPRs are considered fragile because current management is not sufficient to ensure the continued success of the CPR and six are considered failures where management has broken down or is not adequate and open access to the resource has ensued. However, failure of CPR management according to these design principles has led to problems and degradation of resources in only three CPRs. The other three CPR failures, in Kakesio village, have not shown the problems and degradation expected if management does not fit to the design principles. Kakesio can be considered a special case where the remote location of the village and the particular management situation is sufficient to prevent degradation. The key points to emerge from the analysis are:

- Water is generally well managed through CPR regimes although institutions can be fragile when there are inadequate conflict resolution mechanisms or nested enterprises to deal with inter-village use of the same resource. Building institutional capacity between villages would serve to improve the robustness of water CPR institutions.
- Information from these villages suggests that many institutions, especially those for forest CPRs, are unable to adequately deal with change. Local population increases and the lack of suitable



farmland has put new pressure on CPR institutions that they are not adequately equipped or supported to deal with.

- New CPR institutions can be successful if there is local participation in the design, implementation and monitoring of the CPR and transactions costs are low. However, when a new CPR regime has negative impacts on livelihoods and transactions costs are high then institution failure is likely.
- Pasture CPRs pose the most difficult questions for long-term institutional survival. At present migrant pastoralists graze their cattle on a patchwork of CPR regimes with arbitrary boundaries, that do not reflect the underlying ecological system, and varied operational rules. They are generally not involved in the development and modification of operational rules and as a result conflict between pastoralists and village residents are common. However, the dynamic nature of pasture CPRs and their use means that successful management of any kind is unlikely. The focus here should be on conflict resolution rather than direct resource management.

This analysis again points to water as an important CPR where research and subsequent management intervention are likely to produce positive and sustainable results.

**Table 11. Design Principles and Institutional Performances** (adapted for Tanzanian villages from Ostrom, 1990 pp. 180, taken from Annex 9).

Village	CPR	Clear boundaries & Membership	Congruent rules	Collective choice arenas	Monitoring	Graduated sanctions	Conflict resolution mechanisms	Recognised rights to organise	Nested units	Institutional Performance
Kadando	Forests	Weak	Yes	Weak	Weak	No	Weak	Yes	NA	Failure
	Pasture	No	Weak	Weak	Weak	No	No	Yes	NA	Fragile
	Irrigation	Yes	Yes	Yes	Yes	?	Weak	Yes	No	Fragile
Karamba	Forests	Yes	Yes	Weak	Weak	Weak	Yes	Yes	NA	Fragile
	Pasture	Yes	Yes	Weak	Yes	No	Yes	Yes	NA	Fragile
	Irrigation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Robust
Mfereji	Lake	No	Weak	No	Weak	No	No	Weak	Weak	Failure
	Forests	No	Weak	No	Yes	No	Yes	Weak	No	Fragile
	Pasture	No	Yes	No	Yes	No	Yes	Weak	No	Fragile
Niatolia	Water supply	No	No	No	No	No	Yes	Weak	NA	Fragile
	Forests	Yes	Yes	Yes	Yes	?	Yes	Yes	NA	Fragile
	Pasture	No	Weak	Yes	Yes	?	Yes	Yes	NA	Fragile
Sarame	Water	No	Yes	Yes	Yes	No	Yes	Yes	NA	Fragile
	Forests	Yes	Yes	Yes	Yes	Weak	Yes	Yes	NA	Robust
	Pasture	Weak	Yes	Yes	Yes	No	Weak	Yes	NA	Fragile
Kisangaji	Water supply	Weak	Yes	Yes	No	?	Weak	Yes	No	Failure
	Forests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Robust
	Pasture	Weak	Weak	Yes	Weak	No	Weak	Yes	NA	Fragile
Kakesio	Irrigation	Yes	Yes	Yes	Yes	Yes	Weak	Yes	No	Generally robust
	Forests	No	Weak	No	Weak	No	Weak	Weak	NA	Failure
	Pasture	No	Weak	No	Weak	No	Weak	Weak	No	Failure
Meshili	Water supply	No	No	No	Weak	No	Weak	Weak	NA	Failure
	Forests	Yes	Yes	Yes	Weak	No	Yes	Weak	Yes	Fragile
	Pasture	No	Weak	Weak	Yes	No	Yes	Weak	No	Fragile
Msosa	Water supply	Yes	Yes	Yes	Weak	Yes	Yes	Yes	NA	Generally robust
	Forests	Yes	Yes	Yes	Yes	No	Yes	Yes	NA	Generally robust
	Pasture	Yes	Yes	Yes	Yes	No	Yes	Yes	NA	Generally robust
	Irrigation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Robust

Village	CPR	Clear boundaries & Membership	Congruent rules	Collective choice arenas	Monitoring	Graduated sanctions	Conflict resolution mechanisms	Recognised rights to organise	Nested units	Institutional Performance
Isele	Forests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	Robust
	Pasture	No	Yes	Weak	Yes	No	Weak	Yes	NA	Fragile
	Irrigation	Yes	Yes	Yes	Yes	Yes	Weak	Yes	Weak	Generally robust
	Game controlled area	Yes	Yes	Yes	Yes	?	Yes	Yes	Yes	Robust
Bolisa	Forests	Yes	Yes	No	Weak	Yes	Weak	No	NA	Fragile
	Pasture	Yes	Yes	No	Weak	Yes	Weak	No	NA	Fragile
	Water supply	Yes	No	No	No	No	Yes	Yes	NA	Fragile
Bumbuta	Forests	Yes	Yes	Yes	Yes	?	Yes	Yes	NA	Robust
	Pasture	Yes	Weak	Yes	Yes	?	Yes	Yes	NA	Generally robust
	Water supply	Yes	Yes	Yes	Yes	?	Yes	Yes	Yes	Robust

NA Not Applicable

? Information not available

## **5. Research Activities**

### **5.1 Literature Reviews**

At the start of the project literature was compiled from both published and unpublished sources (Annex 1). Unpublished material was obtained from project offices and the Institute of Resource Assessment at the University of Dar es Salaam. Published material was obtained from the University of York library or by inter-library loan. Literature reviews on the economics of CPRs were commissioned when field results indicated the importance of addressing issues related to valuation and institutional economics (Annexes 2, 3, 4).

### **5.2 Workshops**

The workshops were arranged to be either side of the field work. The first workshop on 30 November 2000 consisted of the research team together with a limited number of attendees with experience of CPR management and poverty issues in Tanzania (Annex 5). The aim was to discuss the field work programme, both in terms of locations visited and the questions to be asked. The second workshop on 7 May 2001 was to discuss the field work findings (Annex 6). It was held at the Institute of Resource Assessment and was attended by representatives from the District councils visited as well specialists from IRA. The workshop started with presentations from the research team, followed by group-work to identify key researchable constraints. Both workshops were moderated by Dr Mwamfupe of the Department of Geography, University of Dar es Salaam.

### **5.3 Field reports**

Field work was the most significant activity on the project and required a great deal of logistical planning. The methodology for the village surveys (Annex 7), risk mapping (Annex 8) and CPR institution analysis (Annex 9) is given in detail below.

#### **5.3.1 Village Surveys**

The fieldwork was undertaken in two rounds. The first round was completed from 19<sup>th</sup> February - 7<sup>th</sup> March 2001, the second from 12<sup>th</sup> - 23<sup>rd</sup> March 2001. The team of researchers including an ecologist, a socio-economist, a community development public health education specialist, a forester and a financial analyst undertook the study. Data were collected from villages visited in Same, Monduli, Babati, Ngorongoro, Iringa and Kondo Districts. In Ngorongoro District, the research was undertaken in the Ngorongoro Conservation Area (NCA). The information presented in the village profiles also includes some of the literature reviewed during fieldwork.

Information on CPR, livelihoods, dependency and management of resources was collected using a combination of methods including the review of documents and semi-structured interviews using a checklist of questions at district, division, ward and village level. Observations in each village noting resource use such as irrigation canals, domestic water points, farms and house compounds formed part of the information gathering exercise. A risk assessment questionnaire was also undertaken with a small number of households in each village.

A review of existing documents was conducted to provide background information on each of the study sites. This involved the review of previous project reports, books, maps and other information on natural resources and wildlife conservation held at district, ward and village level. Data and record keeping in villages was found to be poor. Detailed quantitative information on immigration, land allocation, seasonal or annual revenue from CPR use, and human and livestock numbers were either not recorded or unavailable at the time of our visit. Immigration is rarely registered and livestock counts for in-coming resource users are rarely carried out. For human population numbers, previous census data was used to provide an estimate of the current population.

Interviews and discussions were held with district, division and ward administrators and village leaders. District officials were asked specifically about the following issues:

- ◆ What officials consider to be common pool resources.

- ◆ How they allocate and facilitate management of the resources and how sustainable use is maintained.
- ◆ Institutional set-up for resource management.
- ◆ Problems and conflict resulting from CPR use and management.
- ◆ Revenue accrued from CPR, how it is derived and shared.
- ◆ How funds from CPR are managed.
- ◆ Causes of poverty and how poverty among the poor is alleviated.
- ◆ What they consider to be major problems for the communities in their area. How does the district council alleviate community problems that are related to CPR use.
- ◆ What direct benefits are derived from conservation areas that are in or around the district. What arrangements are there for deriving and sharing the benefits. How are benefits used to alleviate poverty. What institutions are there for deriving, maintaining and monitoring benefits.
- ◆ How do benefits relate to or facilitate sustainable use and management of CPR.

Key informants at village level included people with in-depth local knowledge of the key CPR issues, local institutions, and the rules and norms of resource management in the village. Most key informants had lived in the village for many years and were part of a group involved in monitoring and managing the relationship between CPR and the livelihood activities of villagers. These key informants were asked similar questions to those asked at district, divisional and ward level. However, questions were included to provide more detail about the village.

- ◆ History of the village, ethnicity, major groups, resource ownership and type of resources owned at individual and collective level.
- ◆ Process of acquiring land, access to pasture, irrigation water, drinking water supply, firewood and other resources that villagers consider CPR.
- ◆ Category of people using the different types of CPR and level of use or dependency (continuous or seasonal). What arrangements are there for continuous and seasonal use.
- ◆ Institutions managing resources.
- ◆ Rules regulating resource use and who formulates them. What are the penalties for breaking resource use and management norms. How effective are the rules/norms and penalties.
- ◆ Conflicts and conflict resolution. How costly are conflict resolution methods.
- ◆ Fees for CPR use, who charges fees and who pays what to whom. How are fees used. Who benefited from fees and why.
- ◆ How people arrange their activities.
- ◆ Occupational activities.
- ◆ Entitlements on land, whether land is owned communally or individually, land productivity and problems.
- ◆ Livestock ownership.
- ◆ General problems faced by families.
- ◆ Wealth ranking. Leaders definition of wealth classes and reasons for being poor or rich.
- ◆ Livelihoods, food security and coping strategies for communities involved in different occupational activities.

On site observations of infrastructure were held while travelling to and within the study villages to ascertain their condition and to support the information provided by informants.

The Participatory Rural Appraisal (PRA) method was the main research tool used for this study as it was most suited to the short time that the team were able to spend in each village. A cross-sectional group of village government leaders, sub-village leaders, well informed elderly people who have lived in the area for more than 60 years, youth and women were gathered by the village leaders to attend PRA discussions. In two to three places extension workers such as health personnel, livestock officers and primary school teachers joined in. But in most cases these were interviewed together with divisional and ward officers or separately in their offices so that information could be triangulated and sensitive issues discussed without tension or friction between the leaders and extension staff or between them and village residents. The same questions asked of village leaders and extension staff were asked of those who attended the PRA meetings.

In all villages the PRA meetings were followed by household questionnaire interviews which enabled researchers learn from households the situation regarding matters of livelihood, resource ownership and use, risks, perceptions of risks and coping strategies. In general, there was a high degree of agreement

between what was reported by informants at PRA meetings regarding CPR and with what was reported by informants at household level. Only minor differences were gauged. For example during PRA meetings in the NCA, key informants complained about hunger and restrictions on farming and the lack of food support by NCA authority. However, at household level in Kakesio, they reported having about more than one acre (1-5 acres) of farmland and being able to trade surplus grain with fellow Maasai in order to improve their income and reduce sales of livestock. In Meshili in Olbalbal Ward, households complained of hunger and starvation but traditional leaders reported a grain budget from the NCA authority that was rarely exhausted in each financial year. In Mfereji village in Monduli District, village government leaders at a PRA meeting reported hunger and malnutrition but householders reported restrictions on farming by the village government and traditional leaders as the cause of hunger and malnutrition.

Time lines are useful tools for illustrating past events that the community remembers as significant e.g. voluntary or forceful migration from one area to another for increased access to resources or to avoid disasters, loss of lives and livelihoods. Two tools were used to generate time-related data. These were the construction of a history of each village and seasonal calendar. A seasonal calendar of activities is a simple tool for illustrating the seasonal distribution of activities of villagers in a calendar year. Using this tool it was possible to gauge livelihood activities, reasons for in and out migration, peak periods of food stress, peak periods for conflict over resources, as well as the constraints and opportunities for coping with resource stress and resource conversion factors.

Respondents were asked to list their concerns or problems, their causes and possible solutions and the problems were compared across gender and livelihood lines.

There are limitations to the use of PRA as a method of eliciting information. PRA seeks to make applied research as relevant as possible and to make local people agents rather than subjects of research. However, PRA focuses on speed of data collection and the relevance of data from different sources triangulated for validation. With PRA, it is possible to miss out views of other groups, especially in a heterogeneous community and where resources are highly contested between groups. For example, some groups make seasonal use of resources through short visits. There is also the problem of discussing sensitive issues. It is unlikely that outsiders inquiring about a sensitive issue related to CPR and who are present for only a short time will be given accurate information by those who fear to open-up in a public discussion where a consensus has to be reached. Being aware of the limitations of PRA, the research team used a mixture of research methods and triangulated results obtained from a cross-section of respondents. Ideally a long-term systematic research programme to validate the data should follow the PRA exercise in future work at specific sites.

Ecological information was collected by observation in each of the villages visited. The purpose was to provide a general description in terms of the mosaic of ecological characteristics and how they fit together. This, along with a description of landform and infrastructure in the village would provide information on how people arrange their activities in the landscape. A global positioning system (GPS) was used to precisely locate each village and photographs were taken of important features and activities.

### **5.3.2 Risk Mapping**

Risk mapping was carried out as part of a larger rural appraisal survey of twelve villages in six districts in semi-arid Tanzania between February and April 2001. The function of the risk mapping was to obtain a general picture of the risks faced by villagers in semi-arid Tanzania to provide a pointer to future research. It was not intended to provide detailed in depth information on each of the risks. In particular the team were interested to find out if the risks faced by the villagers were primarily due to access to natural resources, or if they were of a more socio-political nature.

The method for risk mapping was taken from Smith *et al.* (2000) and adapted to the requirements of this study. Approximately ten individuals from each village were selected opportunistically to take part in the risk mapping exercise although this varied according to the time available and the availability of willing participants. Each individual was asked to identify the risks that they face in providing for themselves and their families and then rank the risks in order of severity (1 being the most severe, 2 the next and so on). A risk questionnaire was used to conduct the risk mapping exercise.

The responses were used to construct a list of different categories of risk. For each category an incidence index ( $I$ ) and a severity index ( $S$ ) was calculated to produce a risk map. The incidence index was calculated as a simple proportion from of the number of respondents who identified a particular risk out of the total number of respondents. The severity index was slightly more complex because respondents were not restricted in the number of risks they could list, so one respondent could identify three risks and another might identify five. This ordinal data was turned into a quasi-cardinal form using an index method that placed the severity of risk on a scale from one (most severe) to two (least severe). The risk identified as most severe retained its value of one while the lower ranked risks were converted onto an index scale. The severity index value was calculated from  $S_j = 1 + (r - 1)/(n - 1)$ , where  $S_j$  is the severity index value,  $r$  is the rank and  $n$  is the number of risks given. The severity index value was calculated for each individual and then the mean value was calculated from the subset of respondents who identified the particular risk. In this way the severity of the risk was separated from the incidence.

The respondents were also separated into groups according to gender and occupation. For each group a risk index was calculated for each risk identified ( $R = I/S$ ). This allowed comparison of the perception of risk between men and women and between groups with pastoral, agro-pastoral or agricultural livelihood strategies. Perceptions of risk can also be calculated for different wealth classes (Smith *et al.* 2000) but this was not attempted in this study. Smith *et al.* (2000) were able to calculate a very subjective wealth ranking based on livestock holdings for their study population of pastoral communities in northern Kenya and southern Ethiopia. However, our study population was not restricted to purely pastoral communities and as a result it was expected that there would be very different measures for wealth required for each group. During the village appraisal, villagers were asked to give wealth rankings for their village and these were found to vary considerably between villages as was expected (see Village Profiles, Annex 7). In Sarame village (Babati District) all villagers considered themselves to be poor. Therefore, it was not expected that divisions by wealth would be possible to carry out or that they would produce meaningful results.

### 5.3.3 CPR Institution Analysis

A total of twelve villages in six districts in semi-arid Tanzania were visited between February and April 2001. In each village interviews using participatory rural appraisal methods were conducted with district, ward and village officials as well as village residents (see section 5.3.1 and Annex 7). This information forms the basis of the analysis of Common Pool Resources (CPRs) conducted here as determined by the first workshop (Annex 5).

Examining the CPR systems in these villages is complex, a great many different resources were considered by the villagers to be CPRs, and many of these were under a management regime which restricted access to the resource by the villagers. None of the villages visited had less than three resources that were considered to be or managed as CPRs. All villages considered pasture and forests to be CPRs and managed them, to a greater or lesser degree, as such. In all villages water was considered a CPR although the type of system varied between irrigation in those villages that had irrigation systems, to water supplies in others. The other CPRs considered in this study were Lake Kalamawe in Karamba village and the game controlled area in Isele village.

Other CPRs were mentioned such as land for rain-fed agriculture, wildlife and game reserves or national parks. Land for rain-fed agriculture is not considered here to be a true CPR because most land is privately owned through customary tenure although in some cases the management has attributes of a CPR. For example, in Kadando the community is involved in what crops may be grown in which areas in order to increase productivity, therefore private land is managed communally. Wildlife and game reserves or national parks have also not been considered because although villagers feel a sense of community ownership of these resources, they are not involved in most cases with the management of these resources although they might derive benefits from them. For example, the residents of Karamba and Kadando consider Mkomazi Game Reserve to be a CPR because although they are prohibited access they feel that its presence helps to preserve the hydrological cycle and so benefits them indirectly. In other villages such as Sarame there are 'good neighbours' schemes in place where villages adjacent to national parks receive benefits through investment in development projects from the revenue obtained by tourism. One exception is the situation found in Isele village where the idea of community ownership has been taken a step further by the introduction of game controlled areas. The

village is responsible for managing its part of the area and derives benefits from its management efforts and this case is considered as a CPR.

The framework for examining CPRs in each village was based on the design principles described by Ostrom (1990). These principles have been derived from studies of long-enduring CPRs and are posited as requirements if CPR management regimes are to be successful.

## **6. Contribution of Outputs**

### **6.1 Contributions towards NRSP goals**

The Goal of the Natural Resources Systems Programme (NRSP) is to improve the livelihoods of poor people who are largely dependent on the natural resource base. This is to be achieved through undertaking research on natural resources (encompassing landforms, soil, water, and vegetation) using system-based approaches. In so doing, the productivity or the productive potential of the natural resource base will at least be maintained.

The research contributes towards this goal because application of appropriate management strategies of common pool resources in semi-arid Tanzania is critical for poor people as:

1. most of Tanzania can be considered to be semi-arid or at least seasonally utilised by people living in strictly semi-arid areas
2. most of the population of Tanzania can be considered poor (though note wealth ranking within villages in Annex 7, some people have large livestock holdings and it is these people who most desire access to CPRs alienated for wildlife conservation).
3. most people in the semi-arid regions of Tanzania are dependent on the natural resource base
4. most natural resources are CPRs managed under common property regimes

By identifying key researchable constraints the project will lay the foundations for developing a future research programme into management strategies for CPRs in semi-arid Tanzania.

The goal of the production system logframe is to improve the livelihoods of poor people through sustainably enhanced production and productivity of natural resource systems. The OVI of the goal are measures of change in capabilities, assets and activities. The project will contribute to the goal by defining researchable constraints for future research on Tanzanian CPRs. Appropriate future research into management strategies will result in changes in capabilities, assets and activities by reducing levels of conflict in CPR management and ensuring that access to natural resources is distributed equitably.

### **6.2 Achievements of the project**

The first workshop (Annex 5) was used to enhance the poverty focus of the project to ensure that poor people would be the main beneficiaries of the research conducted. The project worked at a series of levels:

1. Villages. Where the poor people using CPRs are located
2. Districts. From which districts are administered.
3. Researchers in Tanzania: Who will be conducting research in the next phase of the programme.

Villagers and District personnel were involved in the field work, which was conducted by a predominately Tanzanian team. District personnel and researchers were involved in the workshops. In addition the workshops involved personnel from the Vice Presidents Office.

### **6.3 Impact of outputs**

The OVI at purpose level is:

- CPR interactions in representative sample of various semi-arid environments in Tanzania understood.

The project attained this OVI through three main activities:



1. Literature reviews
2. Consultation with experts in workshops
3. Field work in twelve villages in six districts throughout the semi-arid regions of Tanzania

The project outputs are in the process of being disseminated so it is too early to judge if the project has an impact of project on thinking of research partners, stakeholders, policy approaches, and techniques.

#### **6.4 Future work**

The project is relatively short and during that time has attempted to address a complex natural resource issue. The research is currently being disseminated through a website. Copies of the project research output will be sent to the Districts where research was conducted and to the Institute for Resource Assessment. Future promotion of the research will be to:

1. Produce journal papers based on the research.
2. Write newspaper style articles covering the research findings.

The project identified the importance of economics (in a broad sense) for researching appropriate management strategies for CPRs in semi-arid Tanzania. There are two main developmental constraints to the application of economic research techniques in Tanzania:

1. Lack of literature targeted at policy makers. Specialist economics literature can be difficult to understand unless the reader is familiar with the topic.
2. Need to develop capacity in Tanzania for conducting research on economic problems such as CPR management.

Suitable follow-up actions would be to provide resources for:

1. Production of a manual on the management of common pool resources that is accessible to policy makers and administrators at district level.
2. Masters level training for potential Tanzanian researchers on economics appropriate to the management of common pool resources.

#### **7. Publications and other communication materials**

Currently all reports are under category 10 a): internal project technical reports.

**Adhikari, A. 2001.** Literature review on the economics of common property resources. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Kirby, D. 2001.** Literature review on the economic valuation of different forms of land-use in Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Perez-Cirera, V. 2001.** Exploring game theory as a tool for mapping strategic interactions in common pool resource scenarios. Mimeo. Centre for Ecology, Law and Policy: University of York.

**\*Quinn, C. H. 2000.** Literature compiled for the Review of Common Pool Resource Management in Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Quinn, C. H. 2000.** Report of the 1st workshop. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Quinn, C. H. 2001.** Risk mapping in semi-arid Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Quinn, C. H. 2001.** Report of the 2nd workshop. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Quinn, C.H.** 2001. Review of CPR institutions in 12 villages in semi-arid Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

**Quinn, C. H., Forrester, K., Kiwasila, H., Muganga, C., Pallangyo, N.** 2001. Field work report - village profiles. Mimeo. Centre for Ecology, Law and Policy: University of York.

With the exception of the report marked \*, all reports are available on the web at:

<<http://www.york.ac.uk/res/celp/webpages/projects/cpr/tanzania/documents.htm>>

In addition to the technical reports prepared by the project team, relevant Tanzanian laws have been obtained, translated or retyped, and placed on the web. Two laws are currently available. The two available are:

The Kondo District Council By Laws (Prevention Of Soil Erosion, Land And Water Preservation And Care For Trees) Of 1984.

Tanganyika Territory Land Ordinance, 1923 (Ordinance No.3 of 1923)

The web address for down-loading these laws is:

<<http://www.york.ac.uk/res/celp/webpages/projects/laws/introduction.htm>>

## 8. Project logframe

Narrative summary	Objectively verifiable indicators	Means of verification	Important assumptions
<p><b>Goal</b> Livelihoods of poor people improved through sustainably enhanced production and productivity of RNR systems</p> <p><b>Purpose</b> 3.1 Relative dependence of poor communities on wildlife, livestock and crops and their interaction understood.</p>	<p>By 2002, relative dependence of local communities on wildlife, livestock and crops and their interaction in two target areas understood.</p> <p>3.1.1 a) CPR interactions in representative sample of various semi-arid environments in Tanzania understood.</p>	<p>Reviews by Programme Manager.</p> <p>Reports of research team and collaborating /target institutions.</p> <p>Appropriate dissemination products.</p> <p>Approval of research team reports by relevant regional and district authorities.</p>	<p>Enabling environment exists.</p> <p>Weather and transport infrastructure enable effective travel.</p> <p>Local communities in areas of conflict give accurate information freely.</p>
<p><b>Outputs</b></p>			
<p>Review of existing knowledge of Tanzanian SAPS CPRs.</p> <p>Generate new information on the current status of TZ SAPS CPRs.</p> <p>Inform GOs and NGOs of CPR issues.</p>	<p>1. Month 1. Draft report on general literature review.</p> <p>2. Month 2. Draft report on TZ SAPS CPR.</p> <p>3. Month 3. Meeting 1 report.</p> <p>4. Months 3-7. Fieldtrip reports.</p> <p>5. Month 7. Meeting 2 report.</p> <p>6. Month 8. Final report.</p>	<p>Reports produced according to prescribed time schedule.</p> <p>Representatives of relevant GOs and NGOs attend meetings, are interviewed in the field, and receive copies of the report.</p>	<p>As above.</p> <p>Project staff do not develop long term illness preventing completion of reports.</p>

Activities	Milestones		
<p>1) Review general literature and models of CPR management.</p> <p>2) Review specific literature on TZ SAPS CPRs focussing on projects in Serengeti, Mkomazi, Babati, Kondo, and Iringa.</p> <p>3) Convene meeting involving target institutions to identify and discuss key issues concerning CPR management in TZ SAPS.</p> <p>4) Visit key TZ SAPS areas experiencing different problems and with differing cultural and environmental conditions. Gathering information from villagers and target institutions.</p> <p>5) Convene meeting with target institutions to discuss field work findings.</p> <p>6) Write and disseminate final report to target institutions.</p>	<p>Milestones</p> <p>Month 1. Complete general literature review of CPR management with TZ SAPS CPR as a focus of interest. Output: Report on general overview of CPR management.</p> <p>Month 2. Review of specific literature on TZ SAPS CPR completed. Output: Draft report on TZ SAPS CPR.</p> <p>Early Month 3. Successful meeting to identify and discuss key issues. Output: Meeting report.</p> <p>Month 3-7. Fieldwork. Visits to SAPS CPRs in Mkomazi, Serengeti, Babati, Kondo and Iringa successfully completed. Outputs: Field trip reports.</p> <p>End of Month 7. Successful meeting to discuss field work findings. Output: Meeting report.</p> <p>Month 8. Draft final report completed. Output: Final report.</p>		<p>As above.</p>
			<p><b>Pre-condition</b> Existing projects agree to be reviewed.</p>

## 9. Keywords

Common pool resources, Tanzania, agro-pastoralist, pastoralist, risk, economics, institutions, ecology

## 10. Annexes

### Annex A

**Lovett, J.C., Quinn, C.H., Kiwasila, H., Stevenson, S., Pallangyo, N., Muganga, C. 2001.** Overview of Common Pool Resource Management in Semi-Arid Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 1

**Quinn, C. H. 2000.** Literature compiled for the Review of Common Pool Resource Management in Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 2

**Adhikari, A. 2001.** Literature review on the economics of common property resources. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 3

**Kirby, D. 2001.** Literature review on the economic valuation of different forms of land-use in Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 4

**Perez-Cirera, V. 2001.** Exploring game theory as a tool for mapping strategic interactions in common pool resource scenarios. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 5

**Quinn, C. H. 2000.** Report of the 1st workshop. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 6

**Quinn, C. H. 2001.** Report of the 2nd workshop. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 7

**Quinn, C. H., Forrester, K., Kiwasila, H., Muganga, C., Pallangyo, N. 2001.** Field work report - village profiles. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 8

**Quinn, C. H. 2001.** Risk mapping in semi-arid Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

### Annex 9

**Quinn, C.H. 2001.** Review of CPR institutions in 12 villages in semi-arid Tanzania. Mimeo. Centre for Ecology, Law and Policy: University of York.

## **11. References**

The reference list contains references cited in this report in addition to the technical annexes.

Ostrom, E. 1990. *Governing the commons. The evolution of institutions for collective action.* Cambridge University Press

Vesey-Fitzgerald, D. 1973. *East African grasslands.* East Africa Publishing House, Nairobi.