DEPARTMENT FOR INTERNATIONAL DEVELOPMENT

STRATEGY FOR RESEARCH ON RENEWABLE NATURAL RESOURCES

NATURAL RESOURCES SYSTEMS PROGRAMME

FINAL TECHNICAL REPORT

DFID Project Number

R 7407

Project title

Assessment of current needs and researchable constraints of resource poor farmers and landless labourers in high potential production systems in Kenya

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NRSP Production System

High Potential Production System

Date

January 2000

Executive Summary

The purpose of this project was to identify researchable constraints that affect the livelihoods and farming systems of resource-poor households in the high potential areas of Kenya.

The study was undertaken using participatory techniques in 13 sub-locations situated mostly in Western Kenya where a high proportion of farmers in high potential areas live in considerable poverty. High potential was interpreted to mean climatically high potential. Sub-locations were selected to provide a spread of sites from different ecological zones, high and low soil fertility and areas which were both near and far from district towns. A total of around 200 farm households were interviewed during 6 weeks of field work which was undertaken by researchers from the Kenya Agricultural Research Institute and the University of Wales, Bangor, UK. The field work was augmented by three workshops to plan and review the fieldwork, visits to relevant research and development organisations and a review of the relevant literature, especially pertaining to participatory constraint analysis.

The main output from the project is a Study Report distributed to NRSP and about 20 relevant organisations in Kenya. An analysis of constraint ranking showed that access to and borrowing conditions of credit, cost and availability of appropriate inputs, labour bottle-necks (and the cost of hiring extra labour) and the need for developing alternative cash crops, off-farm income generating activities and adding value to farm produce by developing appropriate processing methods were the most important issues.

Farmers also believed that they lacked adequate technical knowledge and training and that they had insufficient contact with the extension services. It was concluded there was a need to step up the search for ways of improving information flow, not only from the extension services and research establishments to the farmer but also in the opposite direction so farmers can more easily express their needs and problems to the research community. Market intelligence services to isolated communities would help to reduce exploitation by middle men.

Other issues such as small farm sizes, tenure, road conditions, human health, water supply, changing climate, insecurity and cost of schooling were cited as being important contributors to poverty but were considered to be peripheral to the RNRKS mandate.

Not surprisingly issues such as soil fertility and erosion, crop pests, disease, and weeds (in that order) and livestock problems (mainly disease but also lack of fodder / grazing / feed supplements. and inevitably, AI) were among the main technical issues cited as constraints.

As a result of the work, the need for particular studies, research and pilot projects that would address these constraints became clear and these are presented in the body of the report. It is hoped that if at least some of these suggestions are implemented, the study will have made a significant contribution to the alleviation of poverty in such areas, the encouragement of economic growth and sustainable livelihoods for poor people, the sustainable intensification of RNR systems in the high potential areas of Kenya and the East African region whilst at the same time, conserving natural resources.

Background

The need

Kenya is one of the poorest countries in the world. World Bank Development Indicators[1] indicate that Kenya as 16th poorest in the world in terms of rural poverty and 11th poorest in terms of proportion of incomes less than $2 per day. It seems anomalous that many of those poor people in Kenya live in areas that have a high potential for agricultural and forest production by virtue of the favourable rainfall, temperatures, and in many areas, soils.

This study therefore was aimed at promoting sustainable rural livelihoods and developing poverty alleviation strategies for resource-poor households in the high potential production systems (HPPSs) of Kenya, in line with DFID's policy direction as set out in the White Paper (DFID, 1997) of November, 1997.

An example of the anomaly of extreme poverty in high potential areas of Kenya and some of the developmental problems and needs was expressed succinctly in a recent study of the Kamwango area of South Nyanza district, in which Oduar and Thomas[2] (1993) remarked that:

> "… climate, soils, and vegetation have the potential for strong agricultural production and development, yet despite a good resource base, South Kawango's levels of production are low; water quality is poor; infant mortality is high; health problems are enormous; and community institutions are fragmented".

These observations illustrate the plight of many of the poor in the HPPS areas of Kenya. In most of these areas, populations have increased to such an extent and land sub-division is so extensive that members of many resource-poor households, can cultivate only tiny fields and homestead gardens in an attempt to meet their household needs. Many of such farms are incapable of supporting a family. Often they have insufficient labour (and cash to hire it) to cultivate what little land they have and they are obliged to seek employment on larger farms owned by an better-off farmers, often on a seasonal basis. As a result livelihood coping strategies are becoming increasingly pressured.

This has led not only to reduced production per capita and a shortfall in relation to subsistence requirements, but also to social effects, such as increased seasonal migration to urban centres, family and social breakdown, increased insecurity and increased alcoholism. Re-settlement of the poorest people in marginal areas, where they often attempt to follow the same farming practices as in the higher potential areas, is accelerating. Such inappropriate use of marginal areas leads to increasing land degradation, household food insecurity and an accelerating downward spiral of social breakdown. There is an increasingly disproportionate workload burden for women, as men seek employment opportunities outside the area. Twenty-five percent of households in the mixed farming community are now female headed.

In terms of sustainable rural livelihoods, the balance between, or value of particular capital assets, be they natural, social, human, physical or financial, are becoming unbalanced, certain assets being rapidly degraded or even destroyed. The developmental challenge is to identify and understand the imbalances between capital assets and to target investment into key areas of support.

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[1] http://www.worldbank.org/data/wdi/people.html

There is now wide-spread agreement that the poor themselves need to be more involved in identifying research priorities. Many organisations have responded to the challenge of using participatory techniques to assess research needs that may address the constraints of the rural poor in Kenya's high potential areas. The main Kenyan actor (apart from the poor and landless in the High Potential areas) is undoubtedly KARI. The approach was discussed during the final NARP II workshop "Towards Increased Use of Demand Driven Technology" organised by KARI and DFID in 1999 (Sutherland and Mundy (eds.), (1999)). There were 8 themes to that workshop:

Theme 1: the use of participatory approaches in agricultural research;
Theme 2: risk reduction and improved household food security in mixed farming;
Theme 3: increased options for cash production through agriculture;
Theme 4: improving sustainability of mixed farming systems;
Theme 5: reducing the labour burden in smallholder agriculture;
Theme 6: social differentiation and gender in agricultural development;
Theme 7: management and funding issues, within and beyond project boundaries;
Theme 8: dissemination of information and training materials for agricultural development.

The findings were of particular relevance to this study and the above themes have been referred to frequently in the "Outputs".

However, the general philosophy that farmers need to have more influence with research planning has been developing for some time. For example, a report to the manager of the Renewable Natural Resources Strategy (RNRRS) of ODA (predecessor of DFID), on the role of socio-economic research within one of its programmes notes a general lack of reference to expressed needs in project memoranda and recommended that the choice of problems for adaptive research be based more directly on the findings from farmers, It also argues for increased flexibility in the funding of separate project identification exercises (Morton, 1995). Another example of this trend is reported in Cornwall *et al.* (1995) in which it is argued that development constraints and opportunities should be determined by explicitly identified farmer's needs, rather than by preconceptions of researchers themselves. These trends, to some extent, contributed to the proposal for the present study's emphasis on participatory approaches to needs assessment.

Initial work carried out by DFID and collaborating organisations, in the HPPSs, concentrated on generating technologies for improved nutrient cycling and crop production in the context of smallholders. These programmes have met with some level of success. For example, the expansion of smallholder dairy production (as an example of agricultural diversification) has been shown to be successful. Dairy products have provided a valuable source of household income which have particularly benefited women as well as creating rural employment opportunities for itinerant workers and landless labourers.

Despite these positive outcomes, evaluation of the current development programmes in these areas has shown that beneficiaries are often members of wealthier and more secure rural groups. A number of studies have repeatedly shown that these farmers are more willing than resource-farmers to experiment with, and if successful, adopt new technologies, particularly those that carry an element of investment or risk.

In realisation of this and in accordance with DFID’s revised policy, the research focus of the Natural Resources Systems Programme now seeks to target the most resource-poor households. These groups, which often face increasingly difficult livelihood survival strategies, are now recognised as those most in need of development support as they are often

the groups that have benefited least from previous research. The developmental challenge is to identify relevant and appropriate researchable constraints within the production systems of this targeted group.

Recent trends in the development of strategies for poverty alleviation

The background for this scoping study from the point of view of the UK government, is conveniently summarised in the Country Strategy for Kenya (DFID, 1998). In it, it is made clear that "improved productivity opportunities and living conditions for the rural poor" is one of the six key areas of development assistance to Kenya that the British government is committed to. It points out that 47% of rural Kenyans (10 millions), most of whom live in the high potential areas of the country, are food poor. About a quarter of the population live on the margins of subsistence. The document argues that initiatives are needed "to improve the productivity of smallholder farmers; to give the poor access to and security of productive assets; to improve access by the poor to the limited opportunities which currently exist for employment and small-scale enterprise …". The report notes the necessity of identifying the needs of the poor "… through participatory poverty assessments" and of developing innovative approaches to sustainable agriculture and environmental resource management. These concerns were reflected in the structure of the PRA methodologies that were employed in the scoping study.

Carney (1998) and Pretty (1999) discuss strategies for eliminating poverty through the adoption of a Sustainable Rural Livelihood approach, that is, through encouraging an improved understanding of the interrelationships between existing capital assets (social, natural, physical, economic, human), so that areas and conditions for investment in sustainable rural livelihoods can be identified. Identifying the poor is a critical issue in such focused research. The strengths and weaknesses of participatory methodologies for identifying who the poor are in the context of public services are described by Brocklesby and Holland (1998) and definitions in terms of access to the five capital assets in the context of natural resources research are discussed in Cox et al. (1998).

Barlowe *et al.* (1980) identify four constraints to development:

- given constraints which it is impossible to influence (such as climate and topography);
- flexible constraints which may be dealt with in restructuring of institutions or markets (but which would require the necessary political will);
- technological constraints
- planning and research constraints.

The purpose of this study was to identify the fourth of these within the specified context.

The need to take into account the conservation of resources in planning research strategies is emphasised by Dommen and Echeverria (1990). They argue that scientists' failure to conceptualise the mixed farming systems of low-resource African agriculture in a manner that treats conservation of resources as an output analogous to crop output has impeded research progress and its uptake.

Etling and Smith (1994) point out that the participation of local farmers and villagers is essential to identifying their needs accurately, planning and securing commitment for successful implementation of development projects.

African Highlands Initiative

The establishment of the African Highlands Initiative (AHI) co-ordinated by ICRAF since 1991 (Kebaara, 1993) is of particular relevance to the present study. The focus of the AHI is on enhancing sustainable land productivity in intensive land use systems (in the highlands) and aims to:

- generate and evaluate the diverse technical options that are needed to match highland farmers' diverse physical and social conditions;
- broaden the focus of on-farm research to encompass resource processes that occur over a longer term and over a broader scale.

Regional research themes that have been identified by the AHI include:

(1) improving the diagnosis of resource management issues;
(2) maintenance of soil productivity under population pressure;
(3) improved management systems for highland valleys;
(4) increasing the diversity of crop varieties to better fit farmers' conditions;
(5) pest management strategies from an agro-ecological perspective;
(6) research on natural resources policy.

The AHI does not specifically target the rural poor and landless in the high potential areas. Nevertheless, many of its research findings will be of relevance to research programmes which may develop out of this scoping study.

Historical perspectives

Agricultural research in Kenya has had a long history. Its contribution to the economic development of Kenya during colonial times has been summarised by Pereira (1996). Pereira points out the dominance of commodity based cash crop research before independence and describes the role of East African organisations such as EAAFRO in co-ordinating research in the region. The advent of the Swynnerton Plan in the 1950s (Tomich *et al*. 1995) with its emphasis on expanding cash crops such as tea and coffee to small-holders had a great effect on improving the lot of some of the smallholders who were in a position to take up cash crop production which was to continue after independence. This trend continued to fuel interest in cash crop research for many years. Thus for a long time, research on food crops such as maize and beans was neglected. However, over the last few decades, there has been a gradual shift in emphasis towards investigating food crops, though not primarily motivated by a desire to help the poor but by a political desire to make the country self-sufficient in food stuffs and partly because of uncertainties in the cash crop markets.

The need for agricultural research in East Africa to more effectively address the needs of small farm families was recognised as far back as the early 1980s (*e.g.* SIDA, 1981). However until fairly recently, any research prioritisation which existed, was based largely on the requirement to fulfil government policy (such as the need for national self-reliance in food stuffs or the need to boost exports) or on the perceptions of the researchers themselves.

Recent trends in research prioritisation

Over recent decades, there has been a move to plan agricultural research more rationally. This has been particularly true in the developing countries because of the perceived need to optimise research according to government policies and the limited funds available. The CGIAR organisation, the International Service for National Agricultural Research has contributed greatly to the formulation of research policy and the development of a more rational approach to research programme planning (Janssen and Kissi, 1997). They suggested

eight steps in setting research priorities:

(1) a regional review and analysis of regional development objectives;
(2) an analysis of constraints to development (and an identification of advantages that can be exploited) based on the above review and input from end-users possibly using "constraints tree" methodologies ;
(3) an evaluation of past research, based on published and grey literature;
(4) defining of research objectives;
(5) identifying possible research projects;
(6) choosing priority research projects;
(7) human resource gap analysis;
(8) prepare for implementation.

In the context of the present study, Step (4) has been set by DFID. Though one of the outputs of the study is a list of possible research projects, final selection (step (6)) will be carried out by KARI and DFID as will step (8). The Guidelines (*op. cit.*) classify constraints in the following categories:

- degradation of natural resources (soil, vegetation, *etc.*);
- land management (including sociological, land-tenure, and cropping aspects);
- components of production systems (varieties, pests, processing marketing, *etc.*);
- integration of production systems (*e.g.* integration of livestock and crops);
- organisation of commodity sub-sectors (*e.g.* seed availability, markets, storage);
- integration of agriculture within the regional socio-economic institutions (*e.g.* credit, farmer organisations).

This methodology is further developed in Collion and Kissi (1994) and outlines are given on ISNAR's web site (http://www.cgiar.org/Fora/Priority/).

Over the last three or four years, KARI, the collaborators in this scoping study, have recognised their need to strengthen their priority setting methodology (Kamau *et al*., 1997). Howard and Crawford (1997) report on a workshop held at KARI to discuss research planning and priority setting in the National Agricultural Research Systems of the member countries of ASARECA (the Association for Strengthening Agricultural Research in Eastern and Central Africa). However they, together with Mills and Karanja (1997) note that KARI's current procedures involve consultation with stakeholders mainly after researchable constraints have been identified and evaluated economically by the research planners. Lack of sufficient participation from stakeholders was identified as a weakness in Howard and Crawford's report. It is hoped that this scoping study will strengthen KARI's priority setting methodologies.

Participatory approaches to agricultural research priority setting in Kenya

Participatory approaches to agricultural research have been increasing utilised in Kenya in continuing efforts to support the diverse demands of the agricultural sector. However the number of publications on their use in researchable constraint analysis is limited.

Rapid Rural Appraisal (RRA) techniques have been found to be easily used among the many diverse groups that make up rural area populations. They were also found to stimulate increasing levels of interest and participation in development programmes, and to be a vehicle through which to integrate the different disciplines within natural resource management (Thompson and Veit, 1988). Participatory Rapid Rural Appraisal and more latterly, Participatory Rural Appraisal (PRA) techniques have been used over the past 10 years to

provide high quality information and clear pictures of community problems, opportunities and capabilities in relatively short and cost effective time-frames. As Chambers (1998) and Kabuta and Ford (1988) reported, participatory approaches have been increasingly used in Kenya in order to elicit *in situ* agricultural information directly from farmers and to plan natural resource management (NRM) strategies at the village level.

In the 1990s, participatory research tools and techniques for specific investigative resource issues continued to be developed and used in Kenya. This work represents an enabling research and development approach, based around resource economics and stakeholder livelihood analysis. Mwangi and others (*e.g*. Mwangi *et al*., 1995) recently conducted a series of PRAs to identify on-farm soil and water conservation research in 18 catchments throughout Kiambu District. Other examples include participatory studies into specific topics such as livestock health (Iles, 1994) and forest resource valuation (Emerton and Mogaka, 1996), as well as wider issues such as resource conflict management (Bollig, 1994).

Olembi *et al.* (1996) emphasise the importance that farmers' participation and a bottom-up approach to priority setting played in the Kenya-Netherlands bilateral aid programme to KARI. This concern of donors has influenced KARI policy and recently KARI has shown a greater commitment to involving farmers participation in research priority setting and in the implementation of research. Oduwo (1997) and Alembi *et al.* (1996) report on farmer trial selection and methods of involving farmers in the research planning process. This indicates the current focus of, and continuing investment in, farmer participatory action research on the part of KARI and other components of the Kenyan NARS. In both of the above examples, the power and appropriateness of the participatory process in enabling farmers to involve themselves in research and begin to control programme direction, is reported.

Limitations of the approach

A multi-country study undertaken by Braun and Pandya (1992) underscores the risks involved in a project such as this pointing out the diverse patterns of income sources among the malnourished poor, even within the same micro-regions. The dangers of looking for a "blue-print" solution to rural poverty is noted. Alleviating risk by searching for solutions to basic market failure especially in the labour markets and production instability problems are as important as direct targeting of the poor.

In DFID (1998), it is noted that natural resource degradation is caused by population pressure and weak policy implementation. Such factors are clearly beyond the realm of influence of any research outcomes from this scoping study.

The continuing role of donors in agricultural research in Kenya

The contribution that donors make to achieving the multiple development objectives of countries in sub-Saharan Africa through their support of agricultural research in the NARS environment was discussed by Muturi *et al.* (1988). They emphasised the need for donors to fund projects which had a high priority and to use technical assistance judiciously only in essential areas. They also pointed out the need for greater donor co-ordination. This is clearly relevant to this project and the investigation team will make a point of consulting with the major donors and international institutions to clarify their own plans for supporting research in the high potential areas over the next few years. Collaboration with other donors should not be a problem since as it is pointed out in DFID (1998), under the leadership of UNDP and the World Bank, donor co-ordination in Kenya is very strong.

Project purpose

The purpose of this project was to document the coping strategies and to identify researchable constraints that affect the livelihoods and farming systems of resource-poor households in the high potential areas of Kenya. It is an assumption of the project that some of the identified constraints and research topics that them suggested themselves will be implemented either by DFID's NRSP HPPS Programme and/or one or more other programmes or possibly by other donors at the request of KARI.

If this happens, the project will have contributed significantly to the goal of the project (RNRRS Programme Purpose), the sustainable intensification of Renewable Natural Resource systems in High Potential areas, to be achieved by innovative management practices.

Research activities

Selection of sites

"High potential" in this study was interpreted as high potential in climatic terms on the assumption that low soil fertility is a production constraint that technically, could be ameliorated either through inorganic fertilisers or improved land husbandry or some combination of these. The study has also excluded irrigation schemes since these involve a relatively small number of people compared to the total population living in the higher rainfall areas. This is not to say there are many people who are poor and who are farming and working on irrigation schemes. An evaluation of the constraints facing the farmers on irrigation schemes requires a separate study. For logistical and financial reasons, the coastal high potential areas also were excluded from the sample. The study was therefore undertaken in sub-locations situated mostly in Western Kenya where a high proportion of farmers live in considerable poverty (GoK, 1992; GoK, 1987).

The Project Memorandum stated that PRA surveys would be conducted in 20 sub-locations, two from each of the following agro-ecological zones: UH2, UH3, LH1, LH2, LH2, LH3, UM1, UM2-UM3 (combined), LM1, LM2 and LM3. However after discussing time, logistical and financial constraints, at the initial workshop in Kenya, it was decided that this was too ambitious and that the sample size should be reduced to 14 by eliminating UH3, LH3 and UM3 from the sample. Unfortunately, even one of these, one of the LH2 samples (Kericho), had to be omitted because of time (thus financial) constraints.

The approach was firstly to identify those districts where there were large areas of the chosen high potential agro-ecological zones. It would clearly have been a waste of resources to sample those special cases where relatively small "oases" (usually mountains such as those in Samburu) of high potential areas which are surrounded by large areas of medium or low potential areas. ***Such isolated high potential areas have their own unique problems and need to be the subject of a separate study.***

The initial selection of districts from which to sample was carried out using the Farm Management Handbook (Jaetzold and Schmidt, 1983) by determining those (pre-1990) districts with more than 480 km^2 of any of the required agro-ecological zones or alternatively those districts with the largest extent of a particular zone if there were no districts with over 480 km^2 of any of the required zones. Several districts in Central Province which satisfied these criteria were excluded for logistical reasons though Narok and Nakuru districts were retained as they were in the western part of Central Province.

One or two sub-locations were then chosen from the selected districts according to the incomplete factorial system illustrated in Table 1. The soil fertility classification was based on the fertility maps in the Farm Management Handbook. The moderate / poor to very poor soils in those maps were grouped as "poor" for our purposes and the moderate / good to very good soils were classed as "good". Maps of the combination of AEZ and soil fertility class were then drawn. The near / far sub-locations and the poor / good soil fertility sub-locations were selected on the basis of the relative distances from the (old) district HQ of the sub-locations and the dominant soil fertility. Generally, only sub-locations that were at least 90% "pure" in sample definition were chosen so sub-locations in which the desired soil fertility-AEZ combination occupied less than 90% were excluded. KARI staff were sent a list of possible sub-locations that satisfied the criteria for final selection on the basis of logistics and other factors. In the event, in most cases, the KARI staff selected those sub-locations which had been suggested. An attempt was made to select sub-locations in groups which were relatively close to each other (if there was a choice) to reduce logistical problems. A summary of the sub-locations studied and their characteristics according to the above criteria are given in:

Figure 1. Map showing position of sub-locations

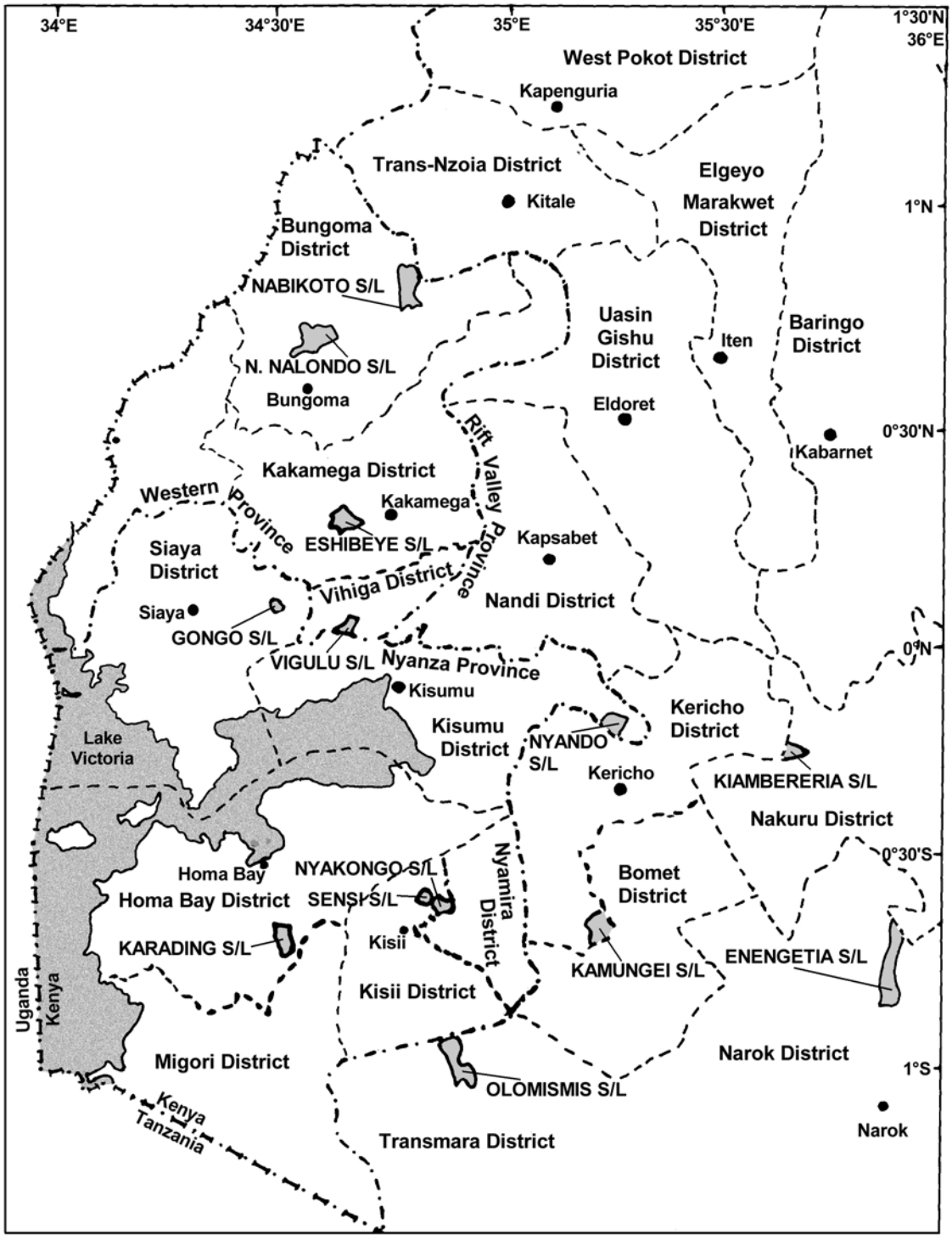

Table 2. A map of the sub-locations is presented in Figure 1.

Preliminary meetings and workshop

The CAZS team arrived in Kenya on 7th October 1999. A preliminary meeting was held with KARI staff on Friday 8th October. A initial workshop at KARI headquarters was held from 12th to 14th October. The purpose was to discuss poverty indicators, consider the methodologies to be used and to finalise logistical arrangements. During the workshop, a paper was presented by Dr. Caleb Wangia from the University of Nairobi in which his work on the identification of poverty indicators in the high potential areas of Kenya was presented and discussed (Wangia, 1999). Field work began in Kakamega on October 18th. At the end of the first week, a further workshop was held at KARI Kakamega with the aim of finalising and agreeing common methodologies to be used in the field work.

Table 1. Sampling system

AEZ	Soil fertility	Distance from district HQ	
		Near	Far
UH2	Good	Nakuru	Narok
	Poor		
LH1	Good	Kisii	Kericho
	Poor		
LH2	Good		Kericho
	Poor	Narok	
UM1	Good	Kisii	
	Poor		Kakamega
UM2 & UM3	Good		
	Poor	Bungoma	Bungoma
LM1	Good		
	Poor	Kakamega	Siaya
LM2	Good		Kisumu
	Poor	S. Nyanza	

Figure 1. Map showing position of sub-locations

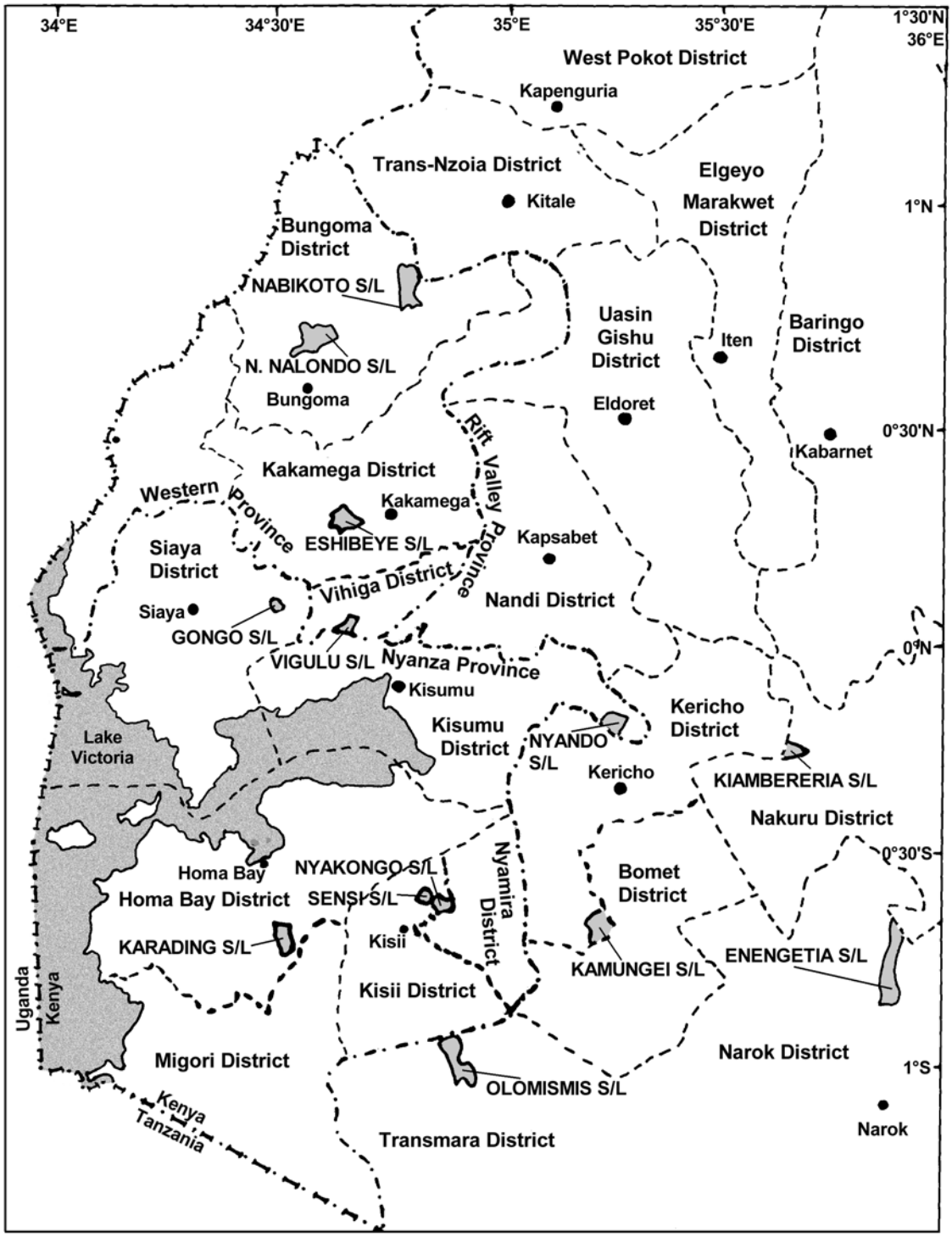

Table 2. Sub-locations visited and their criteria according to the sampling scheme

Sub-location	Location	Division	District	AEZ	Soil fertility	Distance from district HQ
Eshibeye	South Butsoto	Lurambi	Kakamega	LM1	Poor	Near (13 km)
Vigulu	South Maragoli	Vihiga	Vihiga	UM1	Poor	Far (32 km)[3]
Nabikoto	Kakukuyna	Kimilili	Bungoma	UM2/UM3	Poor	Far (29 km)
North Nalondo	North Bukusu	Sirisa	Bungoma	UM2/UM3	Poor	Near (14 km)
Gongo	Central Gem	Yala	Siaya	LM1	Poor	Far (23 km)
Nyando	Koru	Muhoroni	Kisumu	LM2	Good	Far (58 km)
Sensi	Ngenyi	Marani	Kisii	UM1	Good	Near (11 km)
Nyakongo	Manga (formerly Central Kitutu)	Magombo	Nyamira	LH1	Good	Near (12 km)
Olomismis (or Oloborsoito)	Moitanik West	Kilgoris	Transmara	LH2	Poor	Far (42 km)
Karading	Central Kabuoch	Ndhiwa	Homa Bay	LM2	Poor	Near (19 km)
Enengetia	Enabelbel	Olokurto	Narok	UH2	Good	Near (15 km)[4]
Kamungei	Sotic [formerly Techoget]	Buret	Kericho	LH1	Good	Far (33 km)
Kiambereria	Molo	Molo	Nakuru	UH2	Good	Near

Field work

The field work was carried out by over a 6 week period by researchers from the Kenya Agricultural Research Institute and the Centre for Arid Zone Studies at the University of Wales, Bangor. The CAZS team consisted of 5 researchers and a supervisor who was responsible for logistical support and managing the project finances. In most weeks, two sub-locations were visited but in some weeks, two were visited. The team visiting each sub-location consisted of 2 or 3 people from CAZS and 2 or 3 scientists from KARI. The principal KARI stations involved were Kakamega, Kisii, Njoro and Kitale.

The relevant KARI staff visited areas beforehand to ensure that farmers and key informants were aware of the survey would be available and to make provisional arrangements for the accommodation of the team.

After discussions at the workshop in Nairobi and at the end of the first week, the following structure for the survey was adopted:

day 1 meeting with district /locational officials, preliminary visit to sub-location

[3] From the old district HQ Kakamega; there are still very few facilities at Vihiga town

[4] The near and far samples for Narok and Transmara districts had to be exchanged as there no other suitable samples

day 2 meet with key informants (local chiefs, extension workers, elders) and discuss local perceptions of poverty indicators, construct community map showing key resources, select villages within sub-location that would be visited, begin to discuss history of the village using trend and time lines

day 3 split up into two teams and (a) undertake transect walk (b) start household interviews

day 4 continue household interviews; begin to abstract / summarise data and prepare for meeting on day 5

day 5 group meeting with participating households (male and female groups separately) to:

- complete time / trend lines;
- construct Venn diagram showing participants perceptions of various institutions;
- conduct livelihood mapping;
- discuss seasonal calendar indicating time when problems occur;
- identify, discuss and rank (pair-wise) livelihood constraints;
- discuss possible solutions / coping strategies and opportunities.

One week was taken out for report writing, otherwise the teams finished in one site on a Friday and began another on the following Monday.

Post-fieldwork workshop

At the end of the time allocated for field work, a one-day workshop was held at KARI-Kibos for the researchers who had participated in the field work. The aim was to discuss initial conclusions and begin to identify appropriate research activities that would address the constraints found.

Outputs

Introduction

During PRAs, villagers were asked to identify constraints to their production. At that stage there was no differentiation between researchable constraints and constraints which were not directly researchable. Adapting the classification of Barlowe *et al.* (1980), we have classified constraints into the following categories:

- given constraints which it is impossible to influence (such as climate and topography);
- government services other than agricultural services;
- agricultural constraints (including extension, marketing and credit).

A summary of the production constraints after pairwise ranking is presented for each sub-location in Table 9. In the sections that follow, extracts of that table for each theme are presented. It is difficult to compare the ranking exercise in one sub-location with the ranking exercise in another. This is because each sub-location chose different themes as the most important. Also, although there are commonalties, some sub-locations divided themes differently, for example "crop pests and diseases" were divided into "crop pests" and "crop diseases". In others constraints were mentioned that were not mentioned elsewhere. Direct comparisons are thus difficult.

However, below (Table 3) we present a crude summary carried out by creating broad categories and then looking for any topic belonging to that category in (a) the upper quartile of rank order and (b) the upper half of rank order. On the basis of both measures, the general area of credit / finance / inputs / labour / micro-enterprises scores the most involving more than half the sub-locations visited. On the basis of the upper quartile, soil problems (fertility or soil erosion) are the second most important topic and the most important "technical" problem. When considering topics in the top half of the rank order, lack of knowledge and complaints about the agricultural extension system figure as the second most important topic. None of this is particularly new or surprising.

Table 3. Comparison of relative importance of different topics considered[5]

Theme[6]	Occurring in top quarter of rank order (out of 13 sub-locations)	Occurring in top half of rank order (out of 13 sub-locations)
Credit / finance / inputs / labour / micro-enterprises	7	9
Knowledge / training / extension	2.5	8
Soil fertility / erosion	5.5	5.5
Crop diseases / pests / weeds	1.5	6.5
Livestock diseases / pests / management	2	6.0
Land size / tenure	2.5	3.5
Marketing / markets	1	3.5

[5] In villages where there were 2 groups (men and women) and in only one group does the topic "score", a score of 0.5 has been allocated.

[6] A "/" means "or".

A few comments about the data are appropriate here. The results of previous PRA studies in villages of Bungoma and Rachuonyo districts undertaken in connection with the Cow from Cow Rotation Scheme and the Bull Scheme (components of the Livestock Development Programme (MALDM?)) showed, like this study, that finance, infra-structure (roads), lack of knowledge and the lack of opportunity for off-farm employment were major constraints. However, "low milk production", feed availability and livestock diseases, were (naturally) ranked much more highly than in this study. Though, in general, the researchers in this study had no particular axe to grind, we need to be wary of the possibility that the perceptions of both interviewers and farmers may have influenced the findings.

Secondly, as we have seen, lack of knowledge was put in the top half of the rank order in 8 of the 13 sub-locations. However it is likely that there were topics about which farmers were not aware of their lack of knowledge in which case "lack of knowledge" would not have been scored.

It was thus our view that the two most important constraints were:

- **lack of funds and appropriate credit facilities;**
- **inadequate processing of research information, translation of that information into extension messages and the dissemination of the information.**

"Given" constraints

The main "given" constraint was climate. Climatic problems, particularly drought were mentioned as a major constraint in 3 sub-locations, N. Nalondo (4th out of 14, AEZ = UM2/3), Nyando (6th out of 12, AEZ = LM2), and Olomismis (ranked 7th out of 9 by women and 9th by the men, AEZ = LH2). The spread of agro-ecological zones would seem to indicate that the problem is one of soil-water management rather than critical droughts. It may also be related to poor water holding capacity of soils (which would be improved by better management of organic matter, see below). Having said that, there are reports of crop failures in 1979-80, and famine in 1984-86 and 1993-94 in Nyando and a severe drought in Nyakongo in 1983-85. However, local use of terms such as "drought" and "famine" need to be treated with caution. In some sub-locations, in addition to drought, hail and wind damage were also considered to be problems.

In some areas such as N. Nalondo the problem was explicitly recognised as seasonal as the main issue was that the second (November) rains were unreliable (though this is true throughout Kenya).

Some villagers, associated the damp, cool climate in Nyakongo with the high incidence of pneumonia in chickens (coccidiosis) and in Mona, human colds and influenza were attributed to the cold (wet?) weather between April and June.

Naturally, the main proposed "solution" to dry climatic problems was the introduction of small-scale irrigation. In Olomismis, the interviewed group of women thought that diversion of river water (as well as migration!) would help to offset the effects of future droughts and in Nyando, bucket irrigation used for supplementary irrigation was suggested. In Nyando, the group suggested that during drought, cattle could graze along the stream. This highlights the problem that cattle as well as people may experience during droughts.

Sutherland and Mundy (1999) make the following relevant points:

- Researchers lack knowledge about what characteristics farmers value in drought-resistant crops, so they are unable to design appropriate technologies that use fewer inputs and that improve productivity under different rainfall regimes. (Theme 2)

Summary - climatic constraints

Irrigation is the solution that has been suggested most often by villagers to offset the effects of drought. Other strategies obviously include the search for varieties more suited to particular climate regimes and better soil water management practices, particularly to help to obtain a better second season crop. Little is known of the effects of El Niño and other global effects on the Kenyan climate.

Government services other than agricultural services

Human health and potable water supply

In many instances, the villagers viewed their own poor health and the lack of adequate health facilities as one of the major constraints. This was the case in Vigulu [2nd out of 20], North Nalondo [1st out of 14], Olomismis (both men and women's groups) [3rd out of 9] and Kamungei (both men and women's groups) [2nd out of 9 for men, 5th out of 9 for women]. There is no apparent correlation with AEZ, though 3 of these 4 sub-locations were remote from district towns. Diseases most often mentioned were malaria and waterborne diseases (diarrhoea, amoeba, *etc.*). These diseases of course also often affect livestock. The need for water projects was mentioned in these and other sites and although this was often because of a desire to introduce irrigation schemes, it was often because they rightly believed that a more secure water supply would help to reduce their health problems. This has been made a priority by CARE in Karading sub-location.

Although not included in the rank analysis, health was mentioned at a number of other sites For example, the priest of Manga Catholic Parish (Sensi sub-location) thought that in most cases, household medical bills took priority over items such as paying children's school fees and the purchase of farm inputs (inability to meet medical expenses was also listed in group discussions as the most important of the indicators of poverty). The group at Nyakongo thought that basic healthcare (based on the cheapest drugs) would cost around KSh 500 per year for a typical family and that the poorest families would not be able to afford this.

In the area around Sensi, malaria was considered to be fatal in many cases and so contributed to the number of orphans and widows which every sub-location considered to be associated with poverty. The local press reported 300 deaths from malaria in Kisii district in 1999 alone. The contaminated water in the area sometimes caused outbreaks of typhoid. The villagers in Sensi also thought lack of clean water was a constraint to development though it was not included in the pair-wise analysis of constraints.

In some areas visited, colds and influenza were common and children often became afflicted with pneumonia, malaria, or measles. Women often had work related complaints such as muscle and bone aches. At many of the sites visited, there was no clinic in the sub-location. If facilities were available, inability to pay for medical expenses was an important indicator of poverty.

The incidence of AIDs is increasing in many of the sub-locations studied and in the area around Kisumu, it at the highest levels in the country. AIDS is now the most important factor influencing the incidence of single parent families.

In nearly all the sub-locations the women in most households have to collect water from local rivers. The time allocated to this can be considerable, often taking several hours. The need to fetch water from a local stream because of the absence of piped water was considered a poverty indicator in Nyando. Water specifically was included in the analysis of constraints in two of the sub-locations, Vigulu (ranked 16th out of 20) and Nabikoto (5th out of 12). In Olomismis, water was included under "Infrastructure" in the constraints analysis in which Infrastructure was ranked 1st (out of 9) by women and 2nd by men. In Nyakongo too, water, and health services were included in "Infrastructure" which ranked 1st in importance. However, the time line also indicated that a water project at Nyakome started in the Nyakongo area in 1997. Poor health services, water supply and sanitation (lack of latrines) were included in "Infrastructure" in Nyando where this item was ranked 4th out of 12.

Water shortage was specifically reported during the months of January to April in Mona sub-location but it was probably also true of many other sub-locations.

In Eshibeye also, lack of clean water and latrines was cited as contributing to poverty because of the associated health hazards. The Venn diagram for Eshibeye showing institutional linkages indicated that they thought that proper water supplies were inaccessible to the community.

Summary - health and potable water constraints

Inadequate health, sanitation and clean water facilities were cited by most of the sub-locations as being a significant contributor to poverty and a constraint on development. Poor health is debilitating and reduces the opportunity for work that can be invested on farm-work and other productive activities. In severe cases, the inadequate facilities can cause death and so contribute to the number of single parent families and orphans. Dry season water shortages mean extra work (because of extra distances travelled in search of water), usually for the women and may detract from proper land preparation.

Roads and transport

In most sub-locations, infrastructure, especially the poor roads was considered to be an important constraint to development. A summary of the ranking for roads and other infrastructural services is given in Table 4.

Poor roads are related particularly to the supply of inputs and the difficulty of reaching markets. At Kamungei, the breakdown of institutions such as the marketing boards has left farmers isolated. Without formal marketing channels, the remoteness of the sub-location and the ever-deteriorating condition of the main access road was exacerbating this problem and left farmers vulnerable to exploitation by private traders who had big lorries that could reach the area. During the analysis of constraints, the women's group at Kamungei decided to include infrastructure under marketing (presumably they were more concerned about physical access than resources such as electricity.

Roadside erosion was commonly seen during the transect. In discussions about possible solutions in one sub-location, villagers suggested that there could be a "cess[7]" on income from sugar cane and the proceeds used for road repair such as placing stones in potholes and diverting roadside water (where runoff is eroding roads).

In the villages visited in Eshibeye, farmers said that the poor roads meant that there was no

[7] surcharge

cane or other cash crops grown. However, the real reason seems more related to commercial interests since one of the perceived benefits for cane growers for example was that with the introduction of sugar in the 1980s, the roads were improved by the commercial companies.

Often, bridges are improvised and the poor roads are only capable of being used in the dry season.

The group at Vigulu differentiated between poor access to (presumably local) shops [which they ranked 20th out of 20] and roads which facilitated marketing [which they ranked as 4th out of 20]. This illustrates that it is trunk roads rather than local roads that need to be given priority in development programmes.

Many farmers and their wives transport farm produce on the back of bicycles. Improved simple methods of transporting small amounts of goods, perhaps with various forms of attachments or modifications to existing bicycles would help many poor farmers deliver their goods to market, though the record of adoption of such innovations is poor.

Table 4. Summary of ranking of infrastructure

Sub-location	AEZ	Soil fertility	Distance from district HQ	Rank and notes
Eshibeye	LM1	Poor	Near	Arterial roads (4 / 20); local access to shops (20 / 20)
Vigulu	UM1	Poor	Far	Water (16 / 20)
Nabikoto	UM2/UM 3	Poor	Far	Water (5 / 12)
North Nalondo	UM2/UM 3	Poor	Near	
Gongo	LM1	Poor	Far	12 / 12
Nyando	LM2	Good	Far	4 / 12
Sensi (men's group)	UM1	Good	Near	
Sensi (women's group)				
Nyakongo	LH1	Good	Near	1 / 9
Olomismis (men's group)	LH2	Poor	Far	2 / 9
Olomismis (women's group)				1 / 9
Karading (women's group)	LM2	Poor	Near	2 / 11
Enengetia	UH2	Good	Near	Access to markets : 2 / 14
Kamungei (men's group)	LH1	Good	Far	1 / 9
Kamungei (women's group)				
Mona	UH2	Good	Near	10 / 11

A number of relevant recommendations are made in Sutherland and Mundy (1999)[8]:

[8] This report is so relevant to research planning for RNRKS that summaries of the 9 themes are reproduced in the Appendix.

- "A multi-sectoral approach should be developed within a wider view of implementation. Expanding the stakeholder group to include those responsible for supporting infrastructure such as roads, credit and marketing would link these sectors to sustainable livelihoods." (Theme 1);
- "KARI should develop ways of interfacing with other stakeholders [credit, rural finance, etc promoting cash options, and in improving infrastructure for access to markets] (Theme 3);
- Communications and infrastructure still limits information flow and communication [within KARI outside HQ].

Summary - roads

1. **Poor roads were often reported as major contributor to poverty and a constraint to reducing poverty and was the primary concern with regards to "infrastructure". The problems are related particularly to the supply of inputs and the difficulty of reaching markets.**
2. **One possible area of research is to put greater effort into developing low cost forms of transporting farm produce, possibly by making use of attachments or developments to bicycles.**

Electricity supply

Lack of electric power was indicated as a constraint at Sensi, Nyando, Nyakongo and Kamungei. Apart from the obvious affect on the potential for certain kinds of agricultural processing, it also affected the ability of children to study in the evenings.

Other infrastructural facilities

In some instances, buildings such as clinics (*e.g.* in Eshibeye and Nyando), schools, sanitation (mainly latrines) and markets (both organisation and physical facilities) were considered during constraint analysis under the general heading of "Infrastructure".

Insecurity and theft

Theft was specifically mentioned as a development constraint during constraint analysis in three sub-locations: N. Nalondo (3rd out of 14); Nyando (9th out of 12); Olomismis (7th out of 9 for both men's and women's groups). The problems are particularly related not only to rustling of cattle, sheep and goats but also chickens (at Nabikoto, the theft of chickens was observed to increase around May). Clearly, not even the poor are immune.

In Olomismis, theft was rightly covered under a heading of "Community Relations" during the constraint analysis. The women suggested fencing and allocating a guard at night (interestingly the men had nothing to suggest!).

In most cases, theft seems to be a local problem, but in Nyakongo, during the 1990-92 tribal clashes, displaced people came into the area to obtain food and the influx seems to have been associated with increased cases of theft. In 1998 there was a famine during which some people died. At that time, there was some theft of crops and livestock and by 1999 livestock

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Sutherland and Mundy were the editors but there were contributions from many authors. It is referred to here and elsewhere as Sutherland and Mundy (1999) for convenience and brevity.

theft became even higher.

Summary - security

Although tribal clashes have contributed to increased insecurity and theft, there is considerable evidence that much of the greatly increased theft is by local people rather than outsiders. The breakdown in social cohesion has been a continuing undercurrent of the study that also came up during discussions about the role of co-operatives in marketing. Whilst somewhat peripheral to this report, a study of the factors contributing to the changed social dynamics may help sociologists evolve appropriate development strategies.

Education

The level of education amongst the resource-poor farmers who took part in the survey was generally very low. Many of the older respondents had not attended school at all. Of those who had, almost all had only attended primary school up to Standard 7 or 8. Of course, it must be noted that whilst primary education is provided by the state free of charge, secondary education is not and even for primary school there are expenses such as school uniforms, books and contributions to the school building funds.

Education was not considered specifically during the constraint analyses. Nevertheless, in almost every sub-location, the problem of paying school fees was particularly associated with resource-poor families. In some instances poor families kept children out of school, in others the parents could only afford to educate the children up to form 4 (age 10). In others it was disrupted because of inability to pay for consecutive years as a result of poor harvests. Very few cases of the children of poor families progressing to secondary school were encountered. The problem is exacerbated by the tendency for poor households to be those where there are a lot of children.

This has two effects. Firstly, poor families who struggle to send their children to school have little left to invest in agriculture. Secondly, the lack of or poor education (including training in trades) among the children of poor families makes them less likely to find jobs in towns and so help the household economy through remittances. When they grow up, they like many of their parents will have difficulty in reading instructions on containers of herbicides and insecticides which have implications for human health, pollution and the cost of inputs.

Socio-economic problems

Landlessness

Very few cases of true landlessness were encountered during the study. In some group interviews, people with less than 0.25 acre of land were considered virtually landless. The number in this category is probably less than 5% of families. People with such small plots are obliged to seek work opportunities usually within the community. They frequently find work weeding other people's farms, picking tea (for example) on the farms belonging to better-off neighbours, digging wells, collecting firewood, illicit brewing of liquor or charcoal making. There was no opportunity to interview the resident workers on the large tea estates but this would be a worthwhile topic for a further study. If such people do not migrate in search of work in towns the only way they can be helped is to ensure that any development of local off-farm processing of farm produce (see below) gives them priority through soft loans, subsidies or grants.

Another problem of virtual landlessness has been brought about by tribal clashes. For example, in Enengetia, Kikuyu farmers have been chased of their land and are now unable to use it. Some affected people have left the area but others have remained and these have been reduced to poverty. Technically they still own their land which is now being trespassed on. There seems little solution unless the political situation improves.

Small farm sizes

The small farm sizes were naturally cited often as one of the major constraints (8 out of 13 sub-locations) though this seems to be complicated by the fact that there seems to be insufficient labour (6 of those 8) to farm the land they already have - or rather lack of sufficient money to hire in labour when needed (see below). The ranking of both these constraints are shown in Table 5. Labour issues are discussed below. Little can be done about farm size unless people become prepared to give up their land and enter the commercial or industrial sector. At present the opportunities locally for this are small. The main strategy would seem to be to try to increase the productivity of the existing crops by familiar techniques (but which are often not adopted for various reasons). The alternatives, suggested below, is to try to introduce crops which are more valuable or develop local processing of farm produce. Marketing and other issues would be a problem that would need to be studied if these approaches were adopted.

There was circumstantial evidence that the sub-division is beginning to slow down and it is suggested that more information about this would help planners and development workers evolve appropriate strategies to deal with small farm sizes.

Labour shortages

Labour shortages were cited often during household and group interviews. At first this seems anomalous since poor families are often associated with large families and small farms. Labour shortage most frequently referred to shortage of household labour for their own farm activities but sometimes it referred to the lack of labour for hire, in some cases because the landless or family members of farmers with very small plots have left the area because of tribal clashes. Also, in recent years traditional systems of labour exchange have begun to break down and for labour exchange to have developed a more pecuniary basis. Such decline in social cohesion and customary coping strategies was often commented on.

The high incidence of female headed households among poor households (widowed or alone, often because of AIDs or because the husband or other adult male members of the family have left to look for work in the towns) means that the woman finds some tasks too heavy to perform on her own. Often the children are too young to help on the farm or there is a conflict with their education since payment of fees means both that there is less money with which to hire labour from outside and that the children are no longer available to undertake farm tasks. In some instances it seems that the censuses have recorded household members as being present when they are actually away working in towns and this may lead to misconceptions about labour availability. In other instances, illness particularly AIDs related, affects the ability of household members to work on the farm. The fact that men tend not to work on the farm as much as they might is also nothing new nor is the drunkenness which many women complained about.

Table 5. Importance of small farm size and labour availability during constraint analysis

Sub-location	AEZ	Soil fertility	Distance from district HQ	Rank[9]	
				Small farm size	Labour
Eshibeye	LM1	Poor	Near	**9 / 9**	**7 / 9**
Vigulu	UM1	Poor	Far	**9 / 21**	**18 /21**
Nabikoto	UM2/UM3	Poor	Far	**11 / 12**	
North Nalondo	UM2/UM3	Poor	Near	**12 / 14**	**13 / 14**
Gongo	LM1	Poor	Far	**11 / 13**	**7 / 13**
Nyando	LM2	Good	Far		**12 / 12**
Sensi (men's group)	UM1	Good	Near	**4 / 8**	**6 / 8**
Sensi (women's group)				**1 / 8**	**6 / 8**
Nyakongo	LH1	Good	Near	**2 / 9**	
Olomismis (men's group)	LH2	Poor	Far		
Olomismis (women's group)					
Karading (women's group)	LM2	Poor	Near		**11 / 11**
Enengetia	UH2	Good	Near		**11 / 14**
Kamungei (men's group)	LH1	Good	Far	**7 / 8**	
Kamungei (women's group)				**1 / 8**	
Mona	UH2	Good	Near		**4 / 11**

In some cases farmers referred to the fact that in the past "farming was easier" and that nowadays, farming requires more inputs and labour than in the past. This is partly because of the population pressures on the land because to maintain productivity activities such as soil conservation or incorporation of manure now have to be carried out whereas in earlier generations, farms could recover to some extent by leaving them fallow for long or short periods.

In earlier times renting or acquiring other land to supplement the land owned was much easier. It is now either impossible or very expensive to rent additional land.

Some households that said they did not have sufficient labour, rented surplus land out and produced only sufficient for home consumption.

From an inspection of the household interviews, it would seem that overall, most households use ox cultivation for primary cultivations at the beginning of the rainy season but most subsequent operations (planting and weeding) are performed manually. The variation is large. For example in Nabikoto, of the farmers interviewed, all farmers ploughed with oxen, 25% of whom hired the ox and plough. However, in Kamungei, 70% of those interviewed cultivated by hand, and most of the remainder had to hire oxen and ploughs. There is clearly an area

[9] In this and similar tables, n/m means it was ranked n^{th} out of m.

here where the development of hand planters and weeding (especially) implements may help to alleviate the labour problems.

The need to continue farm recording in order to provide greater understanding of the labour issues outlined above was reinforced in Sutherland and Mundy (1999):

> "Farmer participation in technology research, for example farmers keeping records of labour Input [Farm Recording], has increased an awareness of labour issues throughout the project cycle" (Theme 5).

Dorwood *et al.* (1997) also advocate the development and testing of farm management approaches to needs assessment including participatory budgeting, resource flow analysis, farm recording and games.

Inputs

Inputs have been included in this section since the problem that was mentioned most by farmers was that they could not afford them. However, in some cases items such as improved seeds or chemicals were simply not available (or supply was unreliable) in the locality so availability was sometimes as important as cost. In other areas, the seed that was available was unsuitable to the local conditions. Clearly, traders cannot be forced to supply to a market they consider (rightly or wrongly) unprofitable and so one solution to this dilemma may be the formation of farmer groups or co-operatives, not only to market produce but to purchase inputs as well (or to exchange inputs for crops). As already stated, poor roads also affect input supply as well as access to markets.

In general, there was a high degree of understanding of the need for fertiliser inputs to grow hybrid maize successfully. However, in some places (such as Nyakongo), there was little availability of FYM or other alternatives to bought inorganic products (see the section on soil fertility). A major problem was that poor people frequently do not have any or sufficient cattle.

There was often a "Catch 22" situation in which small farm sizes and consequent low productivity meant that there was insufficient cash to pay for farm inputs that may be used to increase production.

Several people recognised that the seed varieties available were frequently not suitable for the agro-ecological conditions. Witcombe (1999) has also made a similar point - that high potential areas are not at all uniform in terms of both physical conditions and socio-economic parameters. He concludes that blanket recommendations are ill-advised. One approach would be to develop a database (see Smith, 1999) of crop varieties describing their suitability for different conditions and characteristics such as taste.

It would be advantageous if the seed breeders concentrated on open-pollinated maize varieties the seed of which could be saved by farmers and used each year without having to buy new seed. The sacrifice of yield would be better than farmers continuously not being able to purchase new seed. Such a programme would need to be carried out by the public or NGO sector as commercial producers would find no benefit in this approach.

Some remarks made in Sutherland and Mundy (1999) are relevant here:

- KARI's policy of improving the quality and productivity of existing crops to increase their sales and to decrease the costs of inputs, resulting in cash benefits for producers (DFID, 1999 - Theme 3) need to be reinforced;
- "partnerships to assure the supply and quality-assurance of inputs [such as certified seed, unadulterated pesticides, and fertilisers] are lacking" (DFID, 1999 - Theme 3): this was confirmed by this study and needs to be addressed;

- the development of integrated pest management methods which can reduce the cost of inputs (see DFID, 1999 - Theme 4) need to be pursued;

Credit

The fact that "finance" was mentioned in constraint analyses appears straight forward: "I am poor because I have no money". However, most groups were aware that access to credit would enable them to purchase inputs or market goods in more populated towns (to meet transport costs). Here we do not want to enter into a discussion about the appropriateness or otherwise of a particular input. Access to seasonal credit for one purpose or another is recognised world-wide as an important part of rural development (Devereux and Pares, 1990; Padmanabhan, 1996; Von Pischke, *et al.* 1983). Unfortunately some households resort to charcoal making or illicit brewing to obtain extra cash but these may have negative effects (on the environment or on the activity levels of the customers!).

There were many farmers who had title deeds and so could theoretically obtain credit but chose not to because they were afraid of losing their land and often quoted examples when this had happened. For example, in Nyando, many farmers who were reluctant to take out a loan were still repaying the cost (KSh 800/- in 1967) of a soft loan for their 10 acre plots. It seemed therefore that most farmers would only be interested in taking credit if there was no danger of losing their land. In most areas, physical access to and knowledge about formal credit was almost non-existent.

The team came across very few savings and credit schemes along the credit union model. One very common scheme was the "Merry-go-Round" in which women contribute a standard amount each week to a savings scheme and after a specified amount of time one of the women receives everything in the pool. Usually the proceeds are spent on domestic requirements rather than on farm investments. In some sub-locations (such as Nyakongo) there are a number of small community-based credit union schemes as well as "Merry-go-Rounds". However, the general level of co-operation within villages or sub-locations appears to be low. Nevertheless, the team felt that an evaluation of existing savings and credit schemes either locally evolved or those being supported and facilitated by NGOs or other institutions, especially schemes that did not use land as security would give useful insights into the way forward with regards to rural credit.

Land tenure

Despite the cultural practice of sub-dividing the land between sons, this is frequently not formalised in law and title deeds are not passed on until the landowner is very old or has passed away. The absence of title deeds as collateral makes it very difficult for many farmers to obtain formal credit. There is an obvious need to accelerate the land registration exercise.

In some cases, users of land that formally belonged to fathers, estranged husbands or other relatives were afraid that they would lose the usufruct. Farmers who were in this situation perceived themselves more as tenants than owners which naturally also has implications for the way the land is managed.

Contract work

In some sub-locations (for example Sensi) some farmers had contracts with companies to grow cash crops such as French beans. However, usually only the better off farmers (with bigger farms) were considered. One complaint concerning these contracts that was heard was the conditions of the contract which forbade farmers to sell elsewhere production in excess of what was agreed in the contract.

Presently, larger operations enter into out-grower relationships only with farmers with

relatively large farms because of the cost of collection. If small-scale farmers could organise themselves into larger groups they may be able to enter into contracts with the commercial companies.

In Nyando, the sugar company advance the inputs (seed and fertiliser) for the establishment of cane fields, charge interest and then deduct these costs from the price paid to the farmer for his harvested crop. Many farmers feel trapped in an activity they would like to get out of as some observed that there was so much land under sugar that food crop production was neglected. In Eshibeye, the sugar company has a policy of supplying fertiliser to poor farmers to use on food crops such as maize but often farmers sell this "free" fertiliser for cash which is then used to solve more immediate household problems. This scheme is only available to sugar cane producers. Similarly at Nyakongo, tea inputs are controlled by KTDA, though these fertilisers are sometimes obtained on credit and then sold on or used on the other crops.

Parastatals and marketing

Farmers were often unhappy with the large cash crop parastatals (tea, coffee, sugar) because of slow collections of produce (which in some cases (tea) decayed before collection so that it became worthless) and / or payments. The problem is similar for the Cereals and Produce Board. For example, in Kamungei it was remarked that since 1989, the Cereals and Produce Board has practically ceased to function "…. nowhere to be seen".

The breakdown of institutions such as the marketing boards has often left farmers isolated and without formal marketing channels. With no formal marketing outlet this is held to be a contributory factor to poverty in many areas because of exploitation by unscrupulous traders. The remoteness of some of the sub-locations and the ever-deteriorating condition of the access roads exacerbates the problem. This leaves the farmers vulnerable to exploitation by private traders though they do obtain ready cash promptly at the roadside.

There is a need to understand more thoroughly the management problems of the parastatals with a view to helping them overcome their constraints. The possibly of finding alternative ways of marketing cash crops from small farms should also be investigated. This may be through the development of farmer organisations that can by-pass the parastatal organisations and enter into direct negotiations with the large plantations (tea for example).

One means to overcome these problems would be the reformation of village level marketing co-operatives. It seems more likely that villagers will solve the transport problem collectively than individually. This is true also of price negotiations wherein a group could exert more price control. The development of better local storage facilities that would enable farmers to keep produce until the prices were higher may also be a beneficial strategy.

The team also became aware of potential gender problems in relation to the formation of marketing groups. Presently, women rely on local markets for income from the sale of produce whilst it is the men who tend more to control goods and service marketed outside the community. Thus men may be more interested in marketing organisations and may cream off many of the benefits.

Sutherland and Mundy (1999) make some similar and complementary points to the above points:-

- "The agricultural market, policy environment and support systems have not been considered enough early in the research cycle, and they have not been monitored adequately.[Theme 3]

- "More research is required on storage and on-farm processing to add value to marketed products."[10] [Theme 3]
- "Researchers have not consulted enough with users on the cash implications of technology adoption, including market access, credit and policy issues." [Theme 3]
- "Institutions that can assist in produce marketing [and in marketing research] should be identified." [Theme 3].

Women's groups

The idea of forming women's groups that could undertake small enterprises such as marketing was not new. However it was obvious that there had been some disappointments (for example in Sensi) and mismanagement of funds. However many women showed a lot of interest in this topic and there is obviously a potential for training in group management and simple book-keeping methods.

Micro-enterprises and alternative cash crops

The low relative importance of marketing in some of the constraint analyses reflects the fact that poor people actually have very little to market but this is not to say that it should not be considered as an important topic of research.

Given the small land area of the poorest farmers in the areas studied, the only ways of decreasing poverty are to increase the production of the crops currently grown, or to grow crops which have greater value or to add value to the current or new crops, perhaps by processing. Only in Vigulu was the lack of small rural industries and other enterprises mentioned as a specific constraint and even there it was ranked 15 out of 21 in order of importance. However, at the final workshop, it was generally concluded that the development of such activities was one of the most important researchable constraints. Possible processing development may include the canning or drying of fruit or vegetables (such as beans). Juice extraction (tomatoes, mangoes) is another possibility. ABLH have already made some progress along this line using the "Organically grown" label to add further value. In addressing the landlessness and labour problem, Sutherland and Mundy (1999) makes a similar point:

> [It is necessary to] "Increase the off-farm opportunities for the productive use of labour through partnerships with other stakeholders [extension, NGOs, *etc.*]." [Theme 5].

An example of the marketing problem was encountered in Kamungei where milk cannot be transported out of the community except by private traders in small quantities. Though it used to be sold co-operatively to KCC (KSh 17/-per bottle), it now is collected on an *ad hoc* basis (depending on the condition of the road) in small quantities by private traders who pay KSh 10/- per bottle or it is sold in the local market for the same price. Villagers told the team how milk, when transported out to the road frequently had turned to 'cheese' by the time it reached the market. No-one the team spoke to had considered possible markets for butter/cottage cheese and other relatively simple forms of milk processing. Marketing of cereals, bananas, and vegetables are also a problem.

The researchers on this study also believed that it would be beneficial to consider alternative cash crops and products to those traditionally grown. For example, in Kamungei, pressure for land has led some former small scale tea growers to move into coffee and pineapples as an

[10] This study found that resource poor farmers had so little produce that long term storage was rarely a problem. The emphasis needs to be on increasing the value of the produce itself by increasing production or by changing the crop, though the sale of value added products of existing crops may also help to alleviate poverty.

alternative cropping system. This is because of the difficulties of intercropping tea with other crops.

As already mentioned above, there has also been some experimentation with the growing of French beans. However, as yet this is a very small enterprise undertaken by a handful of individuals who complain about price exploitation by the private businessmen. Research may well reveal markets for other high value food and non-food products. Other possibilities considered included cut flowers, Asian vegetables and temperate fruits (especially around Molo and Enengetia areas).

Paralegal workers

At the final workshop, the idea of training paralegal workers to help regularise land tenure issues and to help farmers get a fair deal from contractors using farmers to grow cash crops was discussed. A pilot project incorporating this was thought to be worthy of consideration.

Summary of main recommendations related to socio-economic constraints

Inputs constraints - summary

1. **Work needs to continue or initiated on ways of decreasing the cost of inputs. Possibilities of reducing dependence on external inputs include further development of Integrated Pest Management (IMP), the development of crop varieties that can be used in subsequent years by farmers (open pollinated maize or composite varieties for example), or by reducing fertiliser requirements through green manuring techniques and other ways of improving soil nitrogen and organic matter.**
2. **In order to improve the supply of seed which is suitable for various agro-ecological niches, the development of a database of seed varieties circulating in East Africa is recommended.**
3. **Ways of improving the supply of farm inputs, possibly through farmer buying co-operatives should be investigated and tested in pilot projects. This is particularly important for areas that are remote from market towns.**

Labour constraints - summary

4. **Many resource-poor farmers complain that they have labour constraints despite often having larger families and smaller farms than better off farmers. A greater understanding of the most important bottle-necks could be gained by the development and testing of farm management approaches to research needs assessment including participatory budgeting, resource flow and input-output analysis, and games. Refining simple farm recording techniques would not only enable better analysis of farm budgets and to keep track of inputs and crop and livestock productivity, it would also help the farmer to make decisions about required management changes.**
5. **There seems to be a need for the development of hand planters and weeding (especially) implements that may help to alleviate the labour problems.**

Alternative cash crops - summary

6. More trials on alternative cash crops that can be grown by resource-poor farmers in the high potential areas are required. Not only variety selection and husbandry needs to be considered but also marketing and logistical support.

Local processing of farm produce

7. Attention should be given to the development of simple and cheap methods of local processing of farm produce to add to the value. Possibilities include drying, juice extraction, oil extraction and canning. In some areas, farmers need help with honey processing and marketing.

Parastatals

8. Farmers frustrations with cash-crop marketing parastatals were commonly expressed. A greater understanding of the bottlenecks is required if the parastatals are to help the resource-poor farmers.

Groups

9. An evaluation of savings and credit groups and schemes in Kenya or even East Africa is needed. Such an evaluation would help to develop a better model for development organisations involved with communities. An evaluation of farmer-led marketing and input-supply groups should also be included. There is particularly good potential for developing women's groups if attention is paid to training in group management and simple book-keeping methods.

Paralegal workers

10. The idea of training paralegal workers to help regularise land tenure issues and to help farmers get a fair deal from contractors using farmers to grow cash crops should be evaluated and tried on a pilot basis.

Land issues

11. There is insufficient understanding of what changes, if any, have been taking place in the way that land is being sub-divided on the death of the family head. Presumably people have recognised that land cannot be sub-divided *ad infinitum* and that there is a smallest viable land size. Research on this topic would not directly contribute to ameliorating the situation directly but it may help social anthropologists and policy specialists to develop strategies to land registration and tenure issues.

12. A very specific question concerns the implications of sub-division policy of the Masai group ranches on agricultural production.

Technical training, agricultural extension and information flow

In almost every village, farmers complained that they rarely saw their local extension agent or contact had been very limited. This was especially true of farmers living in the remoter areas. In some instances this was because the agent could not get to the village because of lack of

transport. In others it seems that even when extension agents lived locally they were not always vigilant. One farmer remarked: "I know him. He is my neighbour, but I did not know he was an extension officer….". There seems to be a lack of accountability and any idea of promotion or bonuses based on performance. Despite this on the whole agents were found to be committed and skilled and the main problem was being under-resourced.

Opportunities for training outside of school such as programmes provided by the extension services are limited both by lack of central funds and by the remoteness of some of the areas. However, some farmers reported having had training on soil and water conservation or having attended courses at Farmer Training Centres such as the one at Maseno. In some instances, interested farmers had themselves contacted the extension officers for advice or guidance.

There has been a lot of rethinking recently about the extension services (MALDM, 1999) with a large amount of input from GTZ. But the problem never seems to ameliorate despite attempts over the years to adopt different approaches such as Training and Visit (T & V). Even the consolidation of indigenous knowledge will usually need outside facilitators and these must be available. The researchers at the final workshop thought it may be worth undertaking an evaluation of the various modes of extension (front line workers, radio and TV, newspapers, pamphlets distributed through schools and markets, films, farmer field schools, *etc*) to try to find which are most cost-effective. Perhaps different ways of motivating extension workers, such as prizes or bonuses or involving extension agents in the distribution of inputs or marketing outputs might be tried. However, it does seem that without considerably more financial commitment on the part of the government, farmers will continue to lack the appropriate knowledge needed to lead then out of the poverty they find themselves in.

The flow of information in general was also discussed. For example it became evident that many farmers who were living in remote areas were unaware of town prices of common commodities and were being exploited by traders. Distribution and display of up-to-date market prices in various towns would greatly reduce such exploitation.

There is still a long way to go in developing more effective ways of integrating agricultural research with extension services. Better communication is needed between the various stake-holders / actors such as KARI, the extension service, farmers, seed producers and consumers. The re-entry of KARI into the MALDM may help to achieve this. Exercises such as this study which attempt to discuss with farmers what their priorities are need to be made routine and the process made more cost-effective.

Sutherland and Mundy (1999) makes complementary points relevant to extension and linkage issues:

- "Extension services, NGOs and private-sector actors have not participated fully in the research agenda, and there has been a lack of harmonisation between stakeholders." [Theme 1]
- "Linkages need to be improved between the research process and extension and the adoption of improved technologies. Linkages between groups doing similar research should be strengthened in order to save resources. Better networking among research stakeholders [such as KARI and NGOs] would maximise complementarity." [Theme 1]
- "Current external linkages [for example, with veterinary, extension and private sector institutions could be weakened or indeed broken if DFID funding ceases." [Theme 7]

- "There is a lack of mechanisms to ensure the sustainable uptake of information, for example, closer collaboration with extension services and the use of different dissemination pathways to reach a wider audience." [Theme 8]
- "Widespread access to improved information communication technologies has been constrained by resource allocation issues, including short term funding." [Theme 8]
- "Greater collaboration with, and involvement of, extension staff in the packaging of research technologies." [is needed]. [Theme 8]
- "A lack of review and priority setting procedures for resources that are fed into publications." [Theme 8]

Summary of main recommendations - information, extension, training

1. **There is a need to evaluate various ways of communicating extension messages to find the more cost-effective modes of communication and to experiment with increased use of novel forms of communication such as TV, radio or pamphlets distributed through schools.**
2. **An evaluation of different ways of motivating extension workers other than through increased salaries should be undertaken. (Just paying them regularly and on time would help, without the need for extra funds.)**
3. **The impact of posting market prices in sub-location centres on farm-gate prices should be investigated.**
4. **The use of farmer participatory research to evaluate and refine extension recommendations, the documentation of indigenous knowledge about crop and livestock management and farmer involvement with research prioritisation should be extended and formalised.**

Soil fertility and erosion

Declining soil fertility and increasing soil erosion are largely caused by the increasing population pressure which have reduced rotation and other traditional land husbandry practices. Farmers interviewed are well aware of the problem and the causes. Soil fertility or erosion problems were cited as significant in most sub-locations (Table 6) and yield reductions attributed to declining soil fertility and soil erosion over recent decades were reported virtually everywhere. Where it was ranked separately, erosion was always considered a more important problem than soil fertility.

There seems to be little correspondence between declining soil fertility, soil erosion with either AEZ or soil fertility mapping units. However there is a tendency for the poorer households to have farms in areas with poor soils even when the soils generally in the area are good. Also deterioration of soils on resource-poor farms is worse than on better off farms. Even good soils deteriorate if not managed properly.

Whilst in some places, local methods of reducing erosion such as contour planting of bananas with cassava (Sensi) are visible, there is also evidence of unmaintained terraces. In general, the use of soil conservation methods such as trenches (cut-off drains?), planting strips of Napier (or other) grass or placing trash along the contours between crop strips, stone lines and check dams to reduce gully erosion, seem to be well known and acknowledged by the groups interviewed. In some places, they said they would undertake soil conservation practices if

they were shown what to do by the extension agents. On the whole, erosion is not taking place because of ignorance but because there are other more urgent demands on time and finance or because of shortage of labour. The fact that farms are so small also prevents the implementation of some physical approaches to soil erosion control (such as contour terraces) and may also discourage ploughing across the slope.

Table 6. Soil fertility or erosion problems mentioned during group discussions

Sub-location	AEZ	Soil fertility	Distance from district HQ	Shaded if mentioned. Rank indicated if included in constraint analysis	
				Soil fertility	Soil erosion
Eshibeye	LM1	Poor	Near	**6 / 9**	
Vigulu	UM1	Poor	Far	**4 / 21**	**1 / 21**
Nabikoto	UM2/UM3	Poor	Far	**1 / 12**	
North Nalondo	UM2/UM3	Poor	Near	**11 / 14**	
Gongo	LM1	Poor	Far	**4 / 12**	**2 / 12**
Nyando	LM2	Good	Far	**3 / 12**	
Sensi (men's group)	UM1	Good	Near	**6 / 8**	**4 / 8**
Sensi (women's group)				**6 / 8**	**1 / 8**
Nyakongo	LH1	Good	Near		
Olomismis (men's group)	LH2	Poor	Far		
Olomismis (women's group)					
Karading (women's group)	LM2	Poor	Near	**2 / 11**	
Enengetia	UH2	Good	Near	**14 / 14**	**12 / 14**
Kamungei (men's group)	LH1	Good	Far		
Kamungei (women's group)					
Mona	UH2	Good	Near	**3 / 11**	

Shaded cells indicate that the problem was mentioned during discussions (but in some cases it was not subsequently included by the group in the constraint analysis). Figures indicate that the problem was included in the constraint analysis. Figures across merged cells indicate that the group did not differentiate between fertility and erosion when ranking the soil problems.

They are also aware of the various ways of improving soil fertility such as rotations (though only households with larger farms can afford to leave some of the land fallow each year), use of compost, the application of farm-yard manure (including chicken manure), incorporation of residues such as maize stover. They also know that inorganic fertilisers replace lost nutrients but many poor households just do not have the cash or access to credit to purchase fertiliser (in Nyando, the Divisional Extension Co-ordinator estimated that 90% of local farmers do not use fertiliser even though the soil is phosphate deficient). Some, but not many farmers were using green manures. We saw little evidence of the double-dug beds (DDBs) advocated by ABLH.

FYM, including chicken manure (and "household refuse") is applied by many of the farmers, as most could not afford inorganic fertilisers or they were applied only in small quantities. However many poor farmers do not have cattle to apply significant quantities of manure though some obtain it from relatives. The farmers are often very selective in the application of FYM, and may apply it only to bananas or vegetables or "the worst areas". Is this a sensible policy? Do we know enough about the most effective utilisation of sub-optimal applications of fertilisers?

Research on all these factors is well established and is a regular feature of the programmes by KARI, ICRAF and other organisations in Kenya. However, even though inorganic fertiliser inputs can be reduced through techniques such as green manuring, one wonders if the labour implications of such innovations have been adequately considered[11]. The development of suitable cereals that were nitrogen-fixing by genetic engineering would of course go a long way to solving some of the fertility problems.

In some areas soils are deficient in phosphate. Phosphate (and other non-nitrogen requirements) cannot be increased by green manuring but FYM does help to alleviate the problem. Excessive use of DAP around parts of Enengetia is causing acidification problems.

Researchers at the final workshop believed that there should be an intensification of the present strategy of improving nutrient replenishment using:

- biomass (*e.g.* green manure such as *Tithonia diversifolia*),
- integrating organic methods with inorganic fertilisers;
- identifying improved cropping systems (*e.g.* rotations, intercropping, agroforestry, agro-silvo-pastoralism).

Waterlogging of soil and consequent reduction of yield and interference with management operations, especially the fertile vertisols ("black cotton soils") is reported in those areas where vertisols are widespread. However local methods of draining the soil such as drains around the field are also known and seem to be reasonably effective. Labour constraints are the major reason for not doing anything about waterlogging problems

The fact that the number of sub-locations in which soil problems were important did not change when soil problems in the top half were counted instead of the top quarter (Table 3) seems to indicate that soil problems were considered either high or low in the ranking. This may indicate the need for a greater degree of targeting of interventions involving soil fertility or erosion problems. Of the 6 sites where soil problems were allocated in the top half of the ranks, 4 of these occurred at the sites (7 in total) with medium-poor to very poor fertility soils and 2 occurred at sites (6 in total) with moderately good to very good fertility soils.

[11] See the comments on organic methods advocated by ABLH and the NRSP study of the topic in the earlier chapter reviewing recent strategies.

Summary of main recommendations - soil fertility and erosion

1. **There needs to be better evaluation of the labour implications of innovations aimed at improving soil fertility or reducing soil erosion.**
2. **More information is required about the most effective utilisation of sub-optimal applications of fertilisers.**
3. **An evaluation of the benefits in terms of yield and value of produce (*e.g.* the possibility of marketing produce as "Farmers Own" or "Conservation Supreme") and costs in terms of labour of such methods as composting, DDBs, and use of liquid manure on vegetables is required.**

Fuel wood and tree cover

Lack of fuel wood and trees have been considered during the constraint analyses in only two sub-locations, Vigulu and Nabikoto, where they were ranked 12 /21 and 9 /12 respectively. In some areas (such as Mona), the decline in forest resources has meant that trees have been cut for fuel on the farms. This is causing increasing problems with both availability and erosion. In Nyando, planting trees for windbreaks was thought to be necessary.

Summary - trees and fuelwood

Research on the suitability of trees for fodder and soil fertility is well developed, but it may be helpful if there was more attention paid to fuel properties of planted tree species.

Crop pests, diseases and weeds

The sub-locations in which crop pests, diseases and weeds were considered to be important constraints are shown in Table 7. It would appear that from the farmers perspective pests are slightly more important than diseases which are slightly more important than weeds. But this may reflect lack of recognition of diseases and a gender bias when talking about weeds (since weeding was mostly done by the women).

Table 7. Sub-locations in which crop diseases, pests and weeds were considered to be serious constraints

Sub-location	AEZ	Soil fertility	Distance from district HQ	Rank		
				Diseases	Pests	Weeds
Eshibeye	LM1	Poor	Near	**3 / 9**	**4 / 9**	**8 / 9**
Vigulu	UM1	Poor	Far		**Monkeys: 10 / 21** **Aphids: 18 / 21**	**Striga: 10 / 21** **Couch: 20 / 21**
Nabikoto	UM2/UM3	Poor	Far	**6 / 12**	**4 / 12**	**8 / 12**
North Nalondo	UM2/UM3	Poor	Near	**9 / 14**		
Gongo	LM1	Poor	Far	**5 / 12**		**5 / 12**

Nyando	LM2	Good	Far		**4 / 12**	
Sensi (men's group)	UM1	Good	Near	**2 / 8**		**Couch,**
Sensi (women's group)				**4 / 8**		
Nyakongo	LH1	Good	Near	**7 / 9**		**9 / 9**
Olomismis (men's group)	LH2	Poor	Far	**8 / 9**		
Olomismis (women's group)				**9 / 9**		
Karading (women's group)	LM2	Poor	Near		**Stalkborer: 5 / 11** **Weevils: 10 / 11**	**Striga: 1 / 11**
Enengetia	UH2	Good	Near	**9 / 14**	**6 / 14**	**6 / 14**
Kamungei (men's group)	LH1	Good	Far	**8 / 8**		
Kamungei (women's group)				**7 / 8**		
Mona	UH2	Good	Near	**Pests & disease ranked individually**		

The most commonly mentioned crop pests were:

- stalkborer [*Chilo partellus* (Swinhoe)];
- aphids (an increasing problem caused by *Aphididae* (*e.g. Aphis craccivora; Schizaphis graminum; Rhopalosiphum padi; R. maidis; R. insertum; Metopolophium dirhodum; M. festucae; Sitobion avenae; S. fragariae)*; they are often vectors of virus diseases such as bean common mosaic virus (BCNV), Russian aphid (*Diuraphis noxia*) is an increasing problem in Narok district;
- cutworms (an increasing problem, caused by species such as *Agrotis ipsilon* [greasy cutworm, black cutworm] on maize, vegetables, cotton? *Agrotis segetum* in vegetables, tea, other *Agrotis* spp. and *Spodoptera litura* on groundnuts?
- weevils (especially banana weevil, *Cosmopolites sordidus* and root crop weevils (*Cylas* spp.?) as well as weevils affecting stored maize (*Sitophilus zeamais*?); Striped bean weevil [*Alcidodes leucogrammus*]? Root weevils & Kangaita weevils (*Entypotrachelus meyeri*) in tea?

Other pests mentioned included:

- nematodes (especially banana nematodes, *Radopholus similis*, *Pratylenchus goodeyi* and *Meloidogyne* spp.; and nematodes on pyrethrum, Root Lesion Nematode *[Pratylenchus* spp.] and Root Knot [*Meloidogyne hapla*];
- maggots (especially the bean stem maggot, *Ophiomyia* spp.);
- blue beetle (the chrysomelid, *Cneorane* sp.?);
- termites (an increasing problem causing damage to maize, sugar cane, cotton, (fungal making termites: *Macrotermes, Odontotermes* and *Pseudacanthotermes plus Odontotermes badius* and *Macrotermes bellicosus* causing tree damage?);
- leaf miner (coffee leaf miner, *Perileucoptera coffeela* and *Leucoptera* spp., or the relatively new leaf miner affecting other crops, *Liriomyza trifolii;*
- thrips in pyrethrum (*Thrips nigropilosus* or *T. tabaci*?);

- Mites in pyrethrum (increasing problem caused by *Mononychellus* sp.? *Oligonychus* sp.? *Tetranychus* spp.? *Brevipalus* sp.? *Calacarus* sp.?)
- "silk beetles" in maize and sorghum [*Monolepta bitasciata*[12]?];
- army worm (*Spodoptera exempta* (Walk.))[13];
- caterpillars;
- birds;
- wild animals such as monkeys, wild pigs, antelopes, moles / rats (the rhizomyid mole rat, *Tachyoryctes splendens*?)

Harvested maize was often infected with weevils or maggots, which some farmers controlled by the application of ash and / or thorough drying of the maize cobs.

Of the diseases mentioned, the most widespread were:

- maize streak virus (Geminivirus, MSV);
- (African) cassava mosaic virus [ACMV][14];
- maize smut (*Ustilago maydis*).

Other diseases mentioned in several of the villages included:

- head smut (maize head smut, *Sphacelotheca reiliana*);
- maize blight [leaf blight / white blight / common blight / turcicum blight (= *Helminthosporium turcicum* Pass.)? halo blight (= *Erwinia chrysanthemi* pv. *zeae*)]
- potato blight (*Phytophthora infestans);*
- bacterial wilt (*Pseudomonas solanacearum* in potatoes? *Erwinia stewartii* in maize?);
- Potato Leaf Roll Virus (PLRV);
- Damping Off Disease (*Fusarium graminearum / F. avenaceum* in cereals? *Fusarium solani / Rhizoctonia solani / Pythium* sp. in peas and beans? *R. solani / Macrophomina phaseolina* in squash & melons? *Rhizoctonia solani* in cotton? *Aspergillus flavus / Corticium solani / Thanatephorus cucumeris* in groundnuts? *Pythium aphanidermatum* in tobacco?)
- Black Leg (*Erwinia carotovora* in root crops & tobacco? *Phoma lingam* in brassicas?)
- Leaf Spot (Angular Leaf Spot caused by *Isariopsis griseola* / *Phaeoisariopsis griseola* in grain legumes? *Cercospora* (Floury) Leaf Spot (*Mycovellosiella cajani*) in grain legumes and sesame? *Phaeoramularia* / *Alternaria citri* in citrus? *Alternaria helianthi* in *s*unflower? *Cercospora* spp. in cereals?);
- Flower Drop in temperate fruit (*Pseudomonas syringae* in tomato/fruit? *Alternaria* spp.? *Botrytis* spp.? Plant physiology?)

[12] If this is the identity of the silk beetle, there seems to be very little research about it in Kenya - or Africa generally.

[13] Only one incidence - in Nabikoto in 1999.

[14] In some villages, *e.g.* Nabikoto ACMV seems to be a fairly recent arrival (1998) but is now considered to be the main disease problem.

- Scab in plums (Plum scab [*Fusicladium carpophilum*]? Stone fruit scab / Mirabelle plum scab [*Cladosporium carpophilum* syn. *Venturia carpophila]*? *Cercospora* spp.?)
- Purple blotch (*Alternaria porri*?)
- Alternaria Blight in pyrethrum [fungal disease caused by *Alternaria* spp.]
- Root Rot in pyrethrum (*Macrophomina* sp.? *Armillaria* sp.? *Cylindrocarpon* sp.? *Phytophthora* sp.?;
- Bud disease in pyrethrum (*Ramularia bullunensis*?);
- Coffee leaf rust (*Hemileia vastatrix*);
- Finger millet blast (*Pyricularia [Ceratosphaeria]* spp.? *Magnaporthe grisea*?);
- Groundnut mosaic virus;
- Panama disease in bananas (*Fusarium oxysporum* f. sp. *cubense*).

In several sub-locations, crop pests and diseases were not perceived as major problems and occurred mainly in the short rains. 'Timely' or early planting was considered to be the most effective preventive measure in some villages. In many of the villages, farmers were complaining that they had had no extension advice about control methods or new more resistant varieties.

In some areas such as Sensi, spray teams from the co-operative used to spray the coffee (for insect pests and diseases) but this has now stopped.

The main weed problems were caused by *Striga* spp. and Couch grass (*Digitaria scalarum* L.?). Remedies adopted for *Striga* included pulling and burning, deep ploughing (by tractor), application of FYM and avoiding planting maize in infected areas. Couch is controlled by vigorous dry season cultivations and hand hoeing.

Other species included:

- *Tithonia* spp. (used as a green manure but cited as an invading weed in Eshibeye);
- "Black jack" *(Bidens pilosa)* - leaves of which are consumed as a pot-herb or relish;
- *Xanthium* spp.;
- *Stramonium* spp.;
- "Gallant soldier" (*Galinsoga parviflora*);
- *Oxalis* spp.;
- Mexican marigold *(Tagetes minuta);*
- Rye grass (*Lolium perenne*? Introduced?)
- MacDonald's Eye

Unfortunately there was insufficient time to undertake a comparison of the importance of these pests, diseases and weeds or to evaluate their economic significance in absolute terms. Very few farmers interviewed were applying insecticides and none used herbicides mainly because of lack of funds and but some cases because the chemicals were not available. The current trend of developing controls through integrated pest / crop management as is being carried out by KARI, CABI, *etc.* is clearly an approach that needs to be continued. Biological control alone of pests seem to be less favoured than in earlier years. Thus new insecticides need to be species or genus specific or to target specific stages in the life cycle.

Sutherland and Mundy (1999) make the following relevant points:-

- "In some situations, it may be more economic to promote the prevention of crop or livestock diseases for example, through vaccination]; in others, it may be cheaper to monitor disease outbreaks and treat them as they occur. Farmers and the national government may have conflicting interests on this, depending on the socio-economic and cultural context. KARI researchers must understand these issues in order to design appropriate interventions and to influence policy." [Theme 2]
- "Researchers should be more discerning about which pests and diseases are significant threats to food security and so should receive more research attention." [Theme 2]
- "There is a lack of rapid and affordable diagnostic techniques for root and tuber crops [for example, for disease diagnosis]." [Theme 2]
- "A strategic approach is still needed. It is not feasible to look at every pest and disease individually. Everything is talked of as important - at one level this is true but they are linked and treatment of one problem affects the others. [Do we need an] Integrated agronomic strategy?" [Theme 4]

Summary of main recommendations - crop pests, diseases, weeds

1. **A careful evaluation of the economic importance of various crop diseases / insects / weeds needs to be undertaken with a view to developing a more cost-effective strategy. The evaluation should include participatory as well as traditional approaches. Labour demands as well as economic losses should be given careful consideration.**
2. **Investigations into the effectiveness and economics of using local plants (for example the Mexican Marigold / hot peppers mixture advocated by ABLH) for insect control should be increased;**
3. **The benefits of other simple methods of insect control (such as storage methods, application of ash, *etc*.**

Livestock pests, disease and management

The ranking of livestock problems during the constraint analyses is shown in Table 8. People normally cited diseases and pests such as ticks as being the greatest problems but nutrition (lack of adequate grazing land or lack of supply of feed supplements) and lack of AI facilities were cited in some sub-locations.

Table 8. Ranking of livestock problems during constraint analysis

Sub-location	AEZ	Soil fertility	Distance from district HQ	Rank

Eshibeye	LM1	Poor	Near	**5 / 9**
Vigulu	UM1	Poor	Far	**Feed: 8/21** **Disease (Newcastle): 12 / 21**
Nabikoto	UM2/UM3	Poor	Far	**1 / 12**
North Nalondo	UM2/UM3	Poor	Near	**8 / 14**
Gongo	LM1	Poor	Far	**12 / 13**
Nyando	LM2	Good	Far	**6 / 12**
Sensi (men's group)	UM1	Good	Near	**2 / 8**
Sensi (women's group)				**6 / 8**
Nyakongo	LH1	Good	Near	**5 / 9**
Olomismis (men's group)	LH2	Poor	Far	**6 / 9**
Olomismis (women's group)				**5 / 9**
Karading (women's group)	LM2	Poor	Near	**7 / 11**
Enengetia	UH2	Good	Near	**Pests & diseases: 3 / 14** **Nutrition: 12 /14**
Kamungei (men's group)	LH1	Good	Far	**5 / 9**
Kamungei (women's group)				**6 / 8**
Mona	UH2	Good	Near	**Pests (no dip) : 4 / 11** **No AI : 4 / 11** **No feed supplement : 9 / 11**

As far as diseases affecting poor people were concerned, by far the most important was Newcastle Disease Virus (NDV) in poultry. In Kamungei, Newcastle Disease had apparently recently wiped almost the whole of the poultry population. Coccidiosis (caused by protozoa, *Eimeria* spp.) was another widespread and important disease which affected poultry as well as livestock. Poultry are "owned" mostly by the women. As well using the eggs and chickens (less frequently) for domestic consumption, they also sell them if there are enough. One commonly perceived problem was that the vaccination against NDV was cheap but only came in large quantities. The farmers usually lacked the necessary cohesion and management ability to organise a communal vaccination programme. Keeping the vaccine cool would also be a problem but not insurmountable and it is suggested that a project that makes use of farmer groups to organise community vaccination programmes should be tried on a pilot basis. Some farmers have tried local remedies to NDV such as a mixture of peppers and sisal juice but not surprisingly these seem to have met with little success. Mongooses were a frequently reported predator on poultry.

Other serious and common disease and pest problems included:

- East Coast Fever (caused by protozoan parasite *Theileria parva* transmitted by ticks);
- other tick borne diseases (many types causing diseases and debilitation, especially ixodid ticks; *e.g.* Anaplasmosis (tick-borne disease caused the parasite *Anaplasma marginale* and spread by *Boophilus* spp.)
- foot and mouth disease (viral infection often spread by wild animals);
- worms.

Disease among cattle is very serious in some areas and some farmers have lost all their cattle to disease. Dips for dipping livestock against ticks were absent in many of the areas visited. Where they existed the typical cost was KSh 11 per animal. Some farmers had thus adopted the more expensive option of spraying. In Kamungei we found a DANIDA supported project that had constructed a communal dip and was now being managed by a local committee. But this was the exception rather than the rule.

Less common diseases included:-

- Nagana (parasitaemia) / trypanosomiasis (caused by *Trypanosoma* spp. spread by tsetse vectors, *G. brevipalpis* and *G. austeni);*
- Lumpy Skin Disease (viral disease of cattle caused by capripoxvirus, a growing problem; same virus also causes sheep and goat pox; virus has been isolated from *Biomyia fasciata* [*Musca confiscata*] and *Stomoxys* species but many other biting fly species are suspected of being transmission agents);
- Foot Foul / Foul-in-the Foot / interdigital necrobacillosis / necrotic pododermatitis in quadrupeds [mostly caused by *Fusobacterium necrophorum* bacteria];
- swelling of lymph nodes (leukosis (induced by bovine oncovirus)? Babesiosis (parasitaemia) infection followed by infection with *Theileria*?
- accumulation (oedema?) of lymph fluids (bovine haemorrhagic septicaemia (caused by *Pasteurella multocida*)? Sometimes associated with vaccination for trypanosomiasis?)
- coughing (mycotic pneumonia in cattle? bovine respiratory disease complex (BRD-C)? contagious caprine pleuropneumonia caused by *Mycoplasma capricolum* ssp. *capripneumoniae*?)
- Fowl typhoid (associated with *Salmonella gallinarum*);
- delayed oestrus in cattle (associated with lower albumin blood values and a higher incidence of azotaemic uraemia; also associated with uterine or vaginal prolapses, lameness & copper deficiency);
- diarrhoea in rabbits (caused by *Escherichia coli,* also Coccidiosis, and rotavirus);
- anthrax;
- eye infections (often leading to blindness);
- mastitis.

In most places, farmers complained about the lack of sufficient numbers of veterinary officers or they said they could not afford the fees for the medicines and treatments since the service has been privatised. Many farmers were rather sceptical about the benefits of vaccination. However, some were using local veterinarians and drugs from local vegetation. This may be a useful line of research and KARI has already undertaken some ITK veterinary medicine

studies.

In most areas, farmers complained that there was insufficient grazing land left. In several sub-locations, farmers expressed an interest in zero grazing or feed supplements but they lacked either the knowledge or the money or both, to adopt these innovations.

Milk yields were always very low and there were very few poor farmers with improved cattle. Not only were milk yields low but fertility of cows was also often low. One exception to this general absence of improved cattle was in North Nalondo where there was a livestock development project supported by FINNIDA. The absence of AI facilities was cited as a constraint in several sub-locations.

Donkeys are often used by poor people for transport (mainly water collection) but also ploughing in some places. It may be possible to look into the possibility of improved methods of utilising donkeys for ploughing and other agricultural operations.

Goats and sheep are kept largely to supply a means of obtaining cash in an emergency. Some of the delegates at the final workshop believed that a dairy goat project would contribute to poverty alleviation. Dairy goats have lower land area requirements and production costs than cattle. However there would be a need to develop market demand.

Rustling is becoming an increasing problem (see earlier comments on security).

Sutherland and Mundy (1999) make the following relevant points:-

- "Some farmer research groups and farmer expert groups have been uncertain about their roles in the process; farmers' inputs into livestock and crop breeding have been lacking, and it is unclear at what stages they should be included." [Theme 1];
- "Collaboration with farmer research groups is generating an understanding of how to reduce risks [by preventing and controlling livestock diseases] and at the same time to increase production" [is needed]. [Theme 2];
- "KARI's livestock research focuses mainly on cattle [especially on dairying], relatively neglecting other animal species. This may bring with it an implicit gender bias, since women have limited access to cattle. However, women may sell some or all of the milk produced, perhaps justifying KARI's research focus." [Theme 2];
- "In some situations, it may be more economic to promote the prevention of crop or livestock diseases for example, through vaccination]; in others, it may be cheaper to monitor disease outbreaks and treat them as they occur. Farmers and the national government may have conflicting interests on this, depending on the socio-economic and cultural context. KARI researchers must understand these issues in order to design appropriate interventions and to influence policy." [Theme 2];
- "More research is required to understand the role of individual farm enterprises [crops and livestock] within the household farming system and the household's economy, in order to generate options that farmers can use to generate more income." [Theme 3]
- "The livestock papers [in the workshop] raise a number of similar issues that are relevant for future work:
    - Look at variables other than gender.
    - Go beyond looking at women and men as wives and husbands and consider their position in other social contexts [as sons and daughters, mothers and fathers].
    - Reconsider household categories and determine those which are appropriate in the context." [Theme 6]

Summary of main recommendations - livestock

Poultry

1. **Poultry diseases such as Newcastle disease and coccidiosis are particularly important as poultry are present in virtually every household and are particularly important to resource-poor households. There a need for the development of an appropriate dissemination (extension) package regarding feeding and husbandry / management. There is also a need for an inventory of indigenous knowledge about poultry management.**

Ticks

2. **A project is required that would develop simple methods for characterisation and identification of ticks to provide guidance to farmers and extension workers in deciding when to spray or dip their livestock. This would help resource-poor farmers to know when dipping or spraying was most important. Presently, money is wasted on spraying or dipping against ticks which are not causing serious harm.**

Ethnoveterinary science

3. **A database of Indigenous Technology Knowledge about treatments for livestock diseases should be undertaken. and made available to NGOs and other development workers. The study should include the evaluation of local herbs and other remedies. It would build on work already carried out by KARI Kisii.**

Dairy goats

4. **The possibility of developing a dairy goat sector should be investigated with particular emphasis on resource-poor farmers. The study should include an evaluation of the potential market for goat milk and cheese.**

Reflections on the methodology

The CAZS team and the biometrics staff at the University of reading believed that to adequately characterise the researchable constraints of resource poor farmers in the high potential areas of Kenya, a much larger sample than was used would have been preferable. Even the figure of 20 sub-locations stratified on the basis of climate, soils and distance from district town turned out to be over-ambitious given the financial and time constraints. A better approach may have been to be more specific about the kind of high potential area that needed to be characterised, for example good soils in the UH2 areas. Certainly, more sites would have been desirable. As it happens, most resource-poor farmers are not involved in growing cash crops such as tea and sugar, the possibilities of which are strongly related to agro-ecological zone, but are dependent primarily on maize, beans (and to a lesser extent root crops such as cassava and sweet potatoes) together with a few chickens and the study may profitably have been more commodity based also.

The team was conscious that the time and financial constraints meant that there is a lack of quantitative data, other than the pair-wise ranking of constraints. Several publications (*e.g.* Mason *et al.* 1999) outline participatory methods of obtaining semi-quantitative data for example by using size of circles to indicate degree of infestations, and marks to indicate numbers of bottles of milk produced per day. The development of similar methods and farm budget and farm management based techniques possibly needing longer term studies as outlined by Dorwood *et al.* (1997) would provide more confidence in the needs assessment

exercise. However, either the target group would need to be more precisely specified or substantial amounts of research funds would need to be set aside.

Now that specific areas of research have been suggested as a result of the field work and review of the results of this study, there is a strong case to go back to the areas and test these research topics with the villagers themselves. It may be possible to allocate different numbers of points to each topic to represent the proportional cost to the Kenyan government or donors and whether the research is open-ended or close-ended and the farmers asked to "spend" a maximum number of "points". This would indicate the farmers views about the desirability of further research work. The results of such an exercise could not alone, be used to plan the research agenda as there are so many more considerations but it would begin to let the farmers express their opinions about research constraints, options and strategies rather than the production constraints that were the main subject of this study.

Table 9. Pairwise ranking of constraints: summary of all sub-locations[15]

Sub-Location: Eshibeye (1) LM1/Poor/Near	
Constraint	**Rank**
Knowledge / agricultural extension	1
Inputs & Credit	2
Crop diseases	3
Crop pests	4
Livestock diseases	5
Soils (fertility & erosion)	6
Labour	7
Crop weeds	8
Small farm size	9

Sub-Location: Vigulu (2) UM1/Poor/Far	
Constraint	**Rank**
Soil erosion	1
Human health problems	2
Human health services	2
Soil fertility	4
Infrastructure (communications, roads, etc.)	4
Credit / finance	6
Knowledge / agricultural extension	6
Livestock feed	8
Small farm size	9
Crop weeds - Striga	10
Crop pests - monkeys	10
Livestock diseases - Newcastle disease	12
Trees & fuelwood	12
Markets (poor access to)	14
Micro-enterprises	15
Water	16
Crop pests - squirrels	17
Crop pests - aphids	18
Labour	18
Crop weeds - couch grass	20
Infrastructure (access to shops)	20

Sub-Location: Nabikoto (3) UM2-3/Poor/Far	
Constraint	**Rank**
Soils (fertility)	1
Livestock diseases	1
Finance	1
Crop pests	4
Water (irrigation)	5
Crop diseases	6
Knowledge / agricultural extension	6
Crop weeds	8
Trees & fuelwood	9
Markets	9
Small farm size	11
Credit	12

Sub-Location: N. Nalondo (4) UM2-3/Poor/Near	
Constraint	**Rank**
Human health services	1
Finance - general	2
Theft	2
Credit	4
Knowledge / agricultural extension	4
Climate - unreliable rainfall for second crop	4
Sugar cane (occupies too much land)	7
Livestock disease and pests	8
Crop diseases and pests	9
Markets	10
Soil Fertility	11
Small farm size	12
Labour	13

Sub-Location: Gongo (5) LM1/Poor/Far	
Constraint	**Rank**
Credit	1
Soil Erosion	2
Inputs & Credit	3
Soil Fertility	4
Crop pests & diseases	5
Crop weeds	5
Labour	7
Knowledge / agricultural extension	8
Cash Crops	8
Marketing	8
Farm Size	11
Livestock diseases	12
Infrastructure (roads)	12

Sub-Location: Nyando (6) LM2/Good/Far	
Constraint	**Rank**
Sugar cane	1
Finance	2
Soil fertility	3
Crop pests	4
Infrastructure	4
Livestock pests	6
Climate	6
Markets (& prices)	8
Theft	9
Trees & fuelwood	10
Knowledge / agricultural extension	11
Labour	12

[15] Beneath the name of each sub-location is given the sample specification in terms of AEZ, poor or good soils, far or distant from district town

Finance - cost of membership of self-help groups	14

Table 9. Pairwise ranking of constraints: summary of all sub-locations (continued)

Sub-Location: Sensi (7) - UM1/Good/Near			
Women's group		Men's group	
Constraint	Rank	Constraint	Rank
Small farm size	1	Knowledge / agricultural extension	1
Soil erosion	1	Crop diseases	2
Knowledge / agricultural extension	3	Livestock diseases	2
Credit & inputs	4	Small farm size	4
Crop diseases	4	Soil erosion	4
Soil fertility	6	Soil fertility	6
Labour	6	Labour	6
Livestock diseases	6	Credit & inputs	8

Sub-Location: Nyakongo (8) LH1/Good/Near	
Constraint	Rank
Infrastructure	1
Small farm size	2
Inputs	2
Knowledge / agricultural extension	4
Livestock diseases	5
Markets	6
Crop diseases	7
Livestock husbandry - artificial insemination	7
Crop weeds	9

Sub-location: Olomismis (9) - LH2/Poor/Far			
Women		Men	
Constraint	Rank	Constraint	Rank
Infrastructure	1	Knowledge / agricultural extension	1
Knowledge / agricultural extension	1	Infrastructure	2
Human health	3	Human health	3
Inputs	4	Inputs	4
Livestock diseases & pests	5	Markets	5
Markets	6	Livestock diseases & pests	6
Climate - drought	7	Theft	7
Theft	7	Crop Dis/Pests	8
Crop diseases & pests	9	Climate - drought	9

Sub-Location: Karading (women's group) [10] - LM2/Poor/Near	
Constraint	Rank
Crop weeds - Striga	1
Soils (fertility & erosion)	2
Infrastructure	2
Knowledge / agricultural extension	4
Crop pests - stalk-borer	5
Oxen	6
Livestock diseases	7
Credit	8
Markets	8
Crop pests - weevils	10
Labour	11

Sub-Location: Enengetia (11) UH2/Good/Near	
Constraint	Rank
Inputs (availability)	1
Markets (access to)	2
Livestock Diseases & Pests	3
Credit	3
Inputs (high cost)	3
Crop weeds	6
Crop pests	6
Infrastructure (roads poor)	6
Crop Diseases	9

Sub-location: Kamungei (12) - LH1/Good/Far			
Women		Men	
Constraint	Rank	Constraint	Rank
Small farm size	1	Infrastructure (roads & electricity)	1
Land tenure	2	Human health	2
Markets	3	Markets	3
Knowledge / agricultural extension	3	Knowledge / agricultural extension	4
Human health	5	Livestock diseases	5
Livestock diseases	6	Inputs (Credit)	5
Crop diseases	7	Small farm size	7
Inputs (Credit)	8	Land tenure	8
		Crop diseases	8

Knowledge / agricultural extension	10	The women's group decided to include infrastructure under marketing (presumably they were more concerned about physical access than resources such as electricity. Soil problems (erosion and leaching of nutrients) were also mentioned as were livestock diseases but these were (presumably) considered not important enough to be included in the ranking analysis. Water (for irrigation) and AI services were also mentioned during the discussion on constraints.
Labour shortage	11	
Soil erosion	12	
Livestock nutrition	12	
Soil fertility	14	

Table 9. Pairwise ranking of constraints: summary of all sub-locations (continued)

Sub-location: Mona (13) UH2/Good/Near	
Constraint	**Rank**
Finance	1
Markets	2
Soil fertility	3
Inputs (access to / knowledge about / cost of?)	4
Inability (access? cost?) to purchase drugs, pesticides, etc.	4
Labour (inadequate & cost of)	4
Livestock pests (no cattle dip for tick control)	4
Livestock husbandry (no AI services)	4
Livestock feed (no feed supplements for cattle (cost? access?))	9
Infrastructure (roads, etc.)	10
Climate	11

Contribution of outputs

Contribution of outputs to DFID's development goals

It seems anomalous that very many of Kenya's rural poor live in areas that have a potential for high levels of production, particularly in western Kenya. The high potential as a result of advantageous temperatures and rainfall is offset by high population densities that led to the existence of very small farms sizes and other social and development factors. This study therefore sought to investigate the primary concerns and causes of poverty in the resource-poor households in high potential areas over a wide area of the western part of Kenya. It has placed an emphasis on participatory approaches to identifying those factors which affect the income and livelihoods derived from their agricultural and other rural activities. After using participatory methods to identify constraints to increasing production and obstacles to reducing the levels of poverty, consultations between the research teams from KARI, the UoW, and a number of other stakeholders and actors in the area of rural development and agricultural research in Kenya took place.

As a result of the work, the need for particular studies, research and pilot projects that would address these constraints became clear and these are presented in the body of the report. It is hoped that if at least some of these suggestions are implemented, the study will have made a significant contribution to the alleviation of poverty in such areas, the encouragement of economic growth and sustainable livelihoods for poor people, the sustainable intensification of RNR systems in the high potential areas of Kenya and the East African region whilst at the same time, conserving natural resources. The aim has been to expand the number of livelihood options and opportunities that the rural poor have and to address their most pressing needs for increasing productivity. It is hoped that through these means, the study will contribute to the alleviation of extreme poverty in some of the densely populated parts of Kenya and so make a positive contribution to DFID's aim of "halving the proportion of the world's population living in extreme poverty by 2015."

Promotion pathways

In line with the logical framework, copies of the study report will be distributed to 20 organisations and research centres which are involved in development and research activities among the resource-poor farmers of Kenya's high potential areas. It will also be made available on the internet on the web site of the Centre for Arid Zone Studies at the University of Wales.

It is hoped that through the sharing of the researchable constraints so identified will enhance the contribution to poverty alleviation made by the agricultural research community in Kenya and possibly the East African region by being fed into the research priority setting agenda of the major actors, particularly KARI and DFID. If through this means, the study encourages KARI and the donor community to address some or all of the areas identified, the project will have made a direct contribution to the removal of the identified constraints.

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Acronyms used in this report

Acronym	Meaning
ABLH	Association for Better Land Husbandry
AHI	African Highlands Initiative
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
CAZS	Centre for Arid Zone Studies, University of Wales
DANIDA	Danish Development Assistance
DFID	Department for International Development
EAAFRO	East African Agriculture and Forestry Research Organisation
FINNIDA	Department for International Development, Ministry for Foreign Affairs, Government of Finland
GoK	Government of Kenya
GTZ	Gesellschaft für Technische Zusammenarbeit GmbH (German Technical Co-operation)
HPPS	High Potential Production Systems
ICRAF	International Centre for Research in Agroforestry
KARI	Kenya Agricultural Research Institute
KCC	Kenya Creameries Corporation
KSh	Kenyan Shillings (£1 = KSh 118)
KTDA	Kenya Tea Development Authority
MALDM	Ministry of Agriculture, Livestock Development and Marketing
NARS	National Agricultural Research Systems
NRM	Natural Resource Management
ODA	Overseas Development Administration
PRA	Participatory Rural Appraisal
RNRKS	Renewable Natural Resources Knowledge Systems
RNRRS	Renewable Natural Resources Research Systems
RRA	Rapid Rural Appraisal
SIDA	Swedish International Development Co-operation Agency
UoW	University of Wales