

**COMMUNITY PARTICIPATION IN THE MANAGEMENT OF TSETSE
A COMPARATIVE ASSESSMENT OF IMPACT AND SUSTAINABILITY**

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List of Acronyms

ASVEZA	Assistance to the Veterinary Services of Zambia
COCTU	Co-ordinating Organisation for the Control of Tsetse in Uganda
CPA	Crushpen Association
KRIBP	Kribhco Indo-British Rainfed Farming Project
COVECO	Community Based Vector Control Organisation
CTVM	Centre for Tropical Veterinary Medicine
DFID	Department for International Development
DVTCS	Department of Veterinary and Tsetse Control Services
EU	European Union
ICIPE	International Centre of Insect Physiology and Ecology
IFAD	International Fund for Agricultural Development
KETRI	Kenya Trypanosomiasis Research Institute
KWS	Kenya Wildlife Service
LDP	Livestock Development Programme
LIRI	Livestock Health Research Institute
NRI	Natural Resources Institute
ODG	Overseas Development Group
PCV	Packed cell volume
RTTCP	The Regional Tsetse and Trypanosomiasis Control Programme for Southern Africa
TTCB	Tsetse and Trypanosomiasis Control Branch
UNDP	United Nations Development Programme
UTRO	Uganda Trypanosomiasis Research Organisation
WHO	World Health Organisation

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EXECUTIVE SUMMARY¹

Despite decades of research and control programmes, tsetse continues to be a problem throughout much of Sub-Saharan Africa, adversely affecting human health and livestock production, and thus constraining the livelihood strategies available to millions of people. Although some gains have been made, it has become clear that conventional large-scale strategies are not sustainable in the long term due to their high cost. They are not even viable in the short term due to the financial constraints under which most African governments now operate. Bait technologies are proving increasingly popular due to their cost effectiveness, technical efficiency and low environmental impact. Since bait technologies are logistically suitable for local populations, donors and national governments are looking upon programmes with community participation and especially cost-sharing programmes as the ideal solution to the problem of sustaining tsetse control activities.

Although a commitment has been made to community participation, little has been done to examine the circumstances within which this approach is likely to be effective or the level and type of participation which may be appropriate. This research aimed to contribute to the development of a strategy to support this commitment to community involvement by developing guidelines for future programmes. It is based on an analysis of documented information on community-based control programmes and a situational assessment of seven programmes within which there has been some local involvement in Kenya, Uganda and Zambia. In addition, short visits were made to Zimbabwe (Zambezi Valley) and Botswana (Okavango) to discuss changes within their own control strategies.

Five outputs were specified in the research proposal: an analysis of levels and type of community involvement in management and control of tsetse; a comparative assessment of technical, social and economic impact given different levels and types of community management and control; an assessment of the factors affecting sustainability of impact and its relation to level and type of community management and control; a gender analysis of participation in community based tsetse control schemes; context-sensitive guidelines for the design of future programmes utilising traps and/or targets and involving local populations.

A wide range of levels and types of community involvement were seen in the various programmes covered. Regardless of the type of technology used and level of local involvement, community members were convinced that tsetse populations had reduced considerably as a direct consequence of control operations in their areas. Nevertheless only a small number of individuals participate in routine maintenance sessions and the results demonstrate the need for local organisational skills, particularly when expected local inputs are considerable. Clear economic benefits (not amounts) were identified by participants but also an improvement in quality of life due to the reduction in fly nuisance and reduced risk of sleeping sickness in some locations.

In terms of sustainability of community contributions, all programmes which required financial contributions were experiencing difficulties in fulfilling these. However, regardless of problems of one kind or another, operations requiring local labour contributions (clearing

¹ This research was funded by the Animal Health Programme of the Department for International Development (DFID) and was implemented by the Overseas Development Group of the University of East Anglia, UK. The Principal Investigator for the work is Christine Okali. Karen Barrett was responsible for implementing the research in the field and for preparing draft reports of the fieldwork. Karen Barrett will continue to work with the field data towards a PhD to be submitted in 1999 at the University of East Anglia.

the trap/target areas and maintenance of the baits) were being carried out more or less as expected in programmes which had not been discontinued. Lack of community interest was not a consideration in any of the decisions to terminate programmes. Rather, the outputs from this work suggest that it is frequently the action of external partners which leads to the termination of local action.

While a number of negative and positive factors were identified which will likely affect the sustainability of community action, these can not be ranked and sustained local action is likely to result from the coming together of a number of factors which relate to one or the other of the partners involved. As has been the case with governments and funding agencies, it is possible that community interest in control programmes will reduce over time, especially if fly populations remain low and related human and animal diseases are under control. However, communities with the required technical knowledge and organising skills are likely to be better equipped to mobilise themselves in future should the need arise.

The conclusion of the gender analysis is that women are competing with men for leadership roles in the public domain where tsetse control operations are concerned. In terms of workload, women do not appear to be overburdened relative to men although in many programmes men appear to carry out most of the tasks which might be regarded as 'technical' while women are made responsible for clearing undergrowth. However, in all programmes where local people were hired by the technical services, only men were hired and in some instances, women reported that they had not received the same level of technical information as men.

The results point to a lack of commitment on the part of the technical services to local communities taking control of the baits or of the control operation as a whole: to date, required local contributions have been minimal, especially in programmes utilising targets, and governments continue to bear most of the financial and technical burdens of control operations. Consequently, there are few examples of programmes where support has been provided for determining appropriate organisational frameworks for co-ordinating group action. In large part, while the term 'community' is used in all the programmes reviewed, it is used rather loosely to refer to the local population living in the area covered by the tsetse control programme and is not viewed as having any decision-making role in the programmes.

Limited attention has been given to the way in which decisions about the objective of the control operation and the behaviour of the technical services themselves impact on local (community and individual) understandings about contributions and programme ownership. Indeed, analyses have focused almost entirely on technical and economic issues. Not only have community aspects been overlooked, but the role and capacity of other partners who are necessarily involved in any control exercise have also been ignored and/or taken for granted.

If community-based approaches are considered essential for making bait technologies sustainable and cost-effective, available knowledge about community development should be utilised when programmes are being designed, and social development workers should be involved in programme implementation. The implications of community contributions for the design of the baits and the control programme as a whole must also be considered. Where communities are major contributors, they will determine levels of suppression and the way in which the control programme will be implemented. Under these circumstances, the main task of the technical services is to prepare and disseminate the relevant technical information which should include programme costs and identifiable economic benefits which are required for decision-making at the different levels.

The context sensitive guidelines for the design of future control activities involving local communities incorporate these outputs and include a list of significant variables which the research suggests should guide decisions about whether to initiate programmes demanding more than simply awareness on the part of local populations. At a national level these include the overall policy objective (tsetse eradication or suppression), population density and distribution, movement of population and livestock, programme costs and benefits to human health. Local level interest and co-operation will also depend on previous experience with government and other agencies, their own development priorities and the level of organisation and input required. Individual decisions to participate are determined by many other variables - perceptions of immediate and future benefits, alternative disease management strategies, levels of contributions being demanded and public pressure. The guidelines emphasise the fact that local participation may not be relevant or feasible in all situations.

The overall conclusion of this work, that community-based programmes are no less sustainable than other programmes, challenges a widespread assumption on the part of tsetse research and development workers which can only be dispelled through the implementation of well-designed programmes. Most of the programmes to date have been implemented as trials, often outside any broad policy framework on tsetse control and in close proximity to other activities with different approaches and requirements from local populations. All of these impact on programme outcomes and will need to be addressed if expected benefits from community participation are to be achieved.

1. INTRODUCTION

Many methods have been used for tsetse control in Africa since the turn of the century but in recent years bait methods, and especially traps and targets, have become increasingly popular. At the same time, there has been a shift in emphasis from complete eradication of the fly, which has proved elusive, towards suppression and sustained control.

The effectiveness of bait technology, especially traps and targets, in controlling tsetse has been well documented (e.g. Brightwell et al, 1987; Kupper and Douati, 1985; Lancien, 1991; Laveissiere et al, 1992; Willemse, 1991). However, the future of tsetse control generally is widely regarded as necessitating the participation of local communities if significant gains are to be made (Marchot et al, 1991; Salmon and Barrett, 1994; Williams and Williams, 1992). Logistically bait technology is particularly well suited to a community based approach, indeed some level of community participation is regarded as essential if the technology is to represent a sustainable and cost effective management strategy for the control of disease (RTTCP, 1995)².

In rural development generally, beneficiary involvement is widely regarded as essential if projects are to be both relevant and sustainable and there is a growing literature about approaches and strategies. In tsetse control, many different models of community participation have been tested since the first target trial in Zimbabwe in 1984. There is now more than a decade of experience with one of the earliest programmes with community involvement beginning in the mid 1980s in Bouenza district, Congo (Gouteux and Sinda, 1990). New programmes are about to be initiated through the European Union funded East Africa

² The word 'technology' is used in this report to refer to the technical components of the control operations, the traps and targets. Tsetse control programmes include these components, a design for their placement on the ground and a plan for their replacement and maintenance.

regional programme. As national governments in Africa continue to face financial crises which limit both staffing and funding, the call for community driven programmes is likely to continue.

There has been little if any co-ordination between the different programmes and no comparative assessment of the experience has been undertaken. Moreover there is no agreement about strategies and conditions for sustained community participation and linked external support for tsetse control although there is a body of opinion which suggests that it will not work. Questions about the ability of local populations to make the long term commitment required for tsetse control, to organise themselves and to make financial contributions when 'free riding' is possible (Salmon and Barrett, 1994; Swallow and Woudyalew, 1994), have followed from reports of local populations losing interest in continuing to maintain the traps and targets (Gouteux and Sinda, 1990). Even though these are fundamental issues, the approach continues to be advocated in both regional and local control programmes.

This research was expected to provide answers to some of the questions raised by the experience to date and hence to relieve apparent constraints on effective and sustainable community involvement in tsetse control operations. Based on literature review and field visits it provides a comparative review of a number of tsetse control programmes utilising traps and targets with local participation, and concludes by giving some tentative guidelines for future programmes.

Seven programmes in Kenya, Uganda and Zambia were visited for the comparative study while additional visits were also made to Zimbabwe and Botswana to discuss alternatives being considered within their own programmes (Table 1). Only three of the seven programmes were set up as control programmes. The remainder were research trials with the objective of assessing the possibility of community involvement in tsetse control. As is evident from the table, there was considerable variation between the sites in terms of population distribution and cattle ownership as well as tsetse species. Examples of the different types of traps/targets used are given in Figure 1a-f. The targets used (principally in Southern Africa) were modified forms of a model developed in Zimbabwe. Both traps and targets require constant maintenance and replacement. Targets need insecticides but are more robust than traps which require more labour for maintenance. All the programmes are comparatively small-scale and will depend on the sustainable control strategies for the long term control of tsetse.

The remainder of this report covers details of the research activities undertaken followed by the results. The results begin with an overview of the different levels and types of community involvement in programmes and the implications of these for this research. They end with a discussion of guidelines for the design of future control activities and outstanding questions. The detailed reports on the individual programmes for Kenya and Uganda are attached in Annex 1 and for Zambia in Annex 2.

Table 1. Characteristics of Projects Studied

PROJECT	Kalohotelwa Western Province Zambia 1992-1994	Zambezi Islands Western Province Zambia 1990-1997	Msanzara Eastern Province Zambia 1995-ongoing	Lambwe Valley Kenya 1992-ongoing	Busia Kenya 1992-1996	South Eastern Uganda 1987-ongoing	Bukooli County Uganda 1993-ongoing	Zimbabwe 1994-ongoing	Okavango Delta Botswana 1995-ongoing
Institutions: Implementor/ Funder	I: LDP & DVTCS F: Dutch gvt	I: LDP & DVTCS F: Dutch gvt	I: ASVEZA-East & DVTCS F: RTTCP, ASVEZA	I: ICIPE F: ODA (92-96)	I: KETRI F: WHO	I: Ugandan gvt depts (COCTU) F: EU, Ugandan gvt	I: LRI (UTRO) F: WHO	I: Zimbabwe gvt F: EU & Zimbabwe gvt	I: Botswana gvt F: Botswana gvt
Project area/ previous control	Discrete area 50km from barrier maintained by contractors	Three islands in Zambezi River adjacent to existing barrier	Previous trial in adjacent area (Muvye) where maintenance by employed staff	Technology tested in area from 1990	Previous control by gvt. Six villages in first stage, 2 in this phase	Much previous control in area	Pilot project in 2 sub-counties from 88-92. Now covers whole county	Much previous control including aerial spraying	Previous control includes aerial spraying
Tsetse	<i>Gl morsitans centralis</i>	<i>Gl morsitans centralis</i>	<i>Gl morsitans morsitans</i>	<i>Gl pallidipes</i>	<i>Gl fuscipes fuscipes</i>	<i>Gl fuscipes fuscipes</i>	<i>Gl fuscipes fuscipes</i>	<i>Gl pallidipes & Gl morsitans morsitans</i>	<i>Gl morsitans centralis</i>
Technology	656 targets - 10/km ² grazing areas, 4/km ² other areas	122, 60 & 20 targets on 3 islands respectively	Approx 3625 targets at average density of 4/km ²	64 NGU traps in thicket, 40 along Park edge. 524 planned.	40 and 60 pyramidal traps near each village respectively	6000 pyramidal traps in Oct 1996; 16,000 in 1993, 8/km ² to 4/km ²	Approx 100 monoscreen traps plus 100 tree targets in October 1996	Approx 70,000 swinger targets at average density of 4/km ²	17,000 targets in grid pattern, around or along centre of islands
Control area	140 km ² (7km x 20km)	3 islands	930 km ²	100 km ²	2 villages - 10 and 15 km ²	Parts of 6 districts	375 km ²	Along northern borders	Delta area
Partner contributions	Cash from cattle owners. Free community labour for deployment & maintenance	Free materials from project. Free community labour for deployment & maintenance	Free materials & facilitators from project. Free community labour for deployment & maintenance	Cash from community. Free community labour to make, deploy and maintain	Cash from community. Free community labour to make, deploy & maintain	Paid labour to make and maintain traps	Individuals & groups encouraged to buy materials, make & deploy own traps	Some community sensitisation to reduce theft/ vandalism	No community involvement
Local organisation involved	Existing crushpen associations	Linison with village headmen	Committees set up to mobilise community	Committee created to co- ordinate activities	Committee created to co- ordinate activities	Committees monitor trap maintenance	No organisation. Individual activities	No organisation	No organisation
Incentives for local participation	Free Berenil to positive cases				Mobile health clinic & cheap drugs	Community workers paid to make & maintain			
Population/hhs/ villages	20 villages	Total popn 1365. 7, 2 & 1 villages on 3 islands	Total popn 63,141. 14,093 hhs. 269 villages	Total popn 12,000. 1212 "homesteads"	464 & 442 households	Average popn density 100/ km ²	Total popn 239,000		Small popn to service tourism
Cattle & ownership	41 cattle owners. 300 cattle	58 cattle owners. 1022 cattle.	844 cattle owners. 4257 cattle. (5.4% of hhs)	22,600 cattle. (78.8% hhs)	52% of hhs own cattle				No cattle in Delta

Figure 1. Traps and Targets Used in the Projects Studied



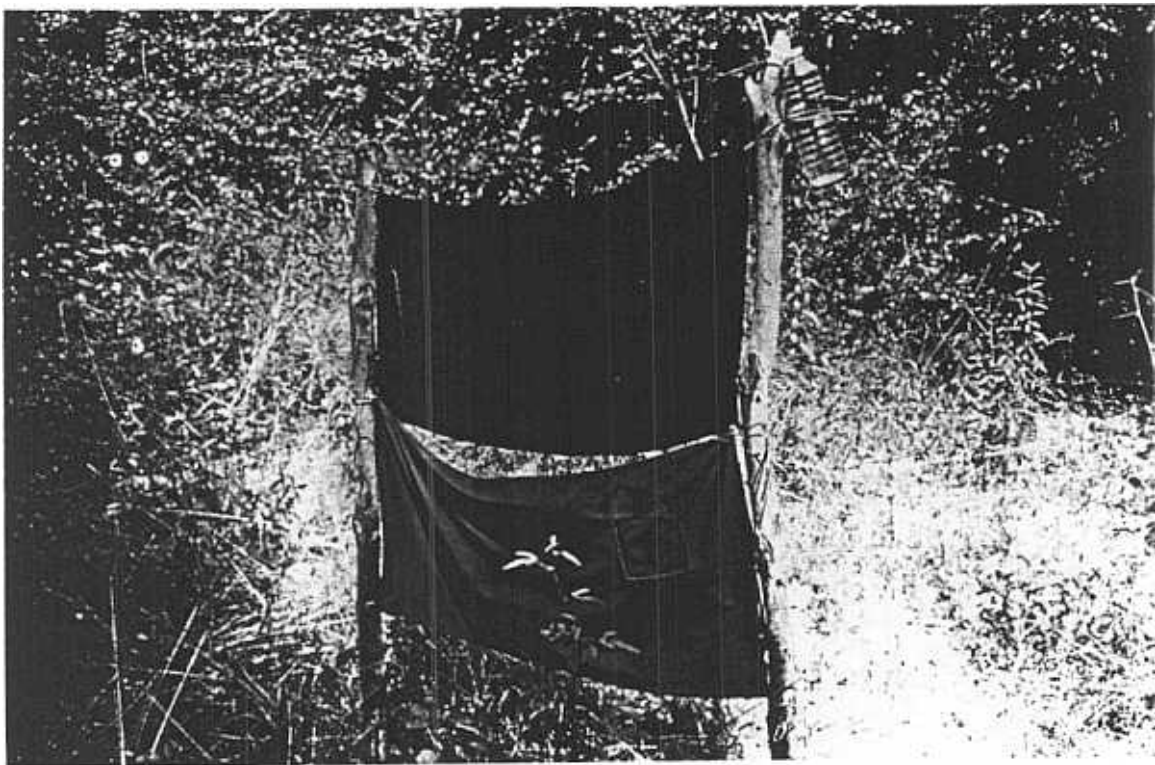
(a) NGU Super Trap, Lambwe Valley, Kenya



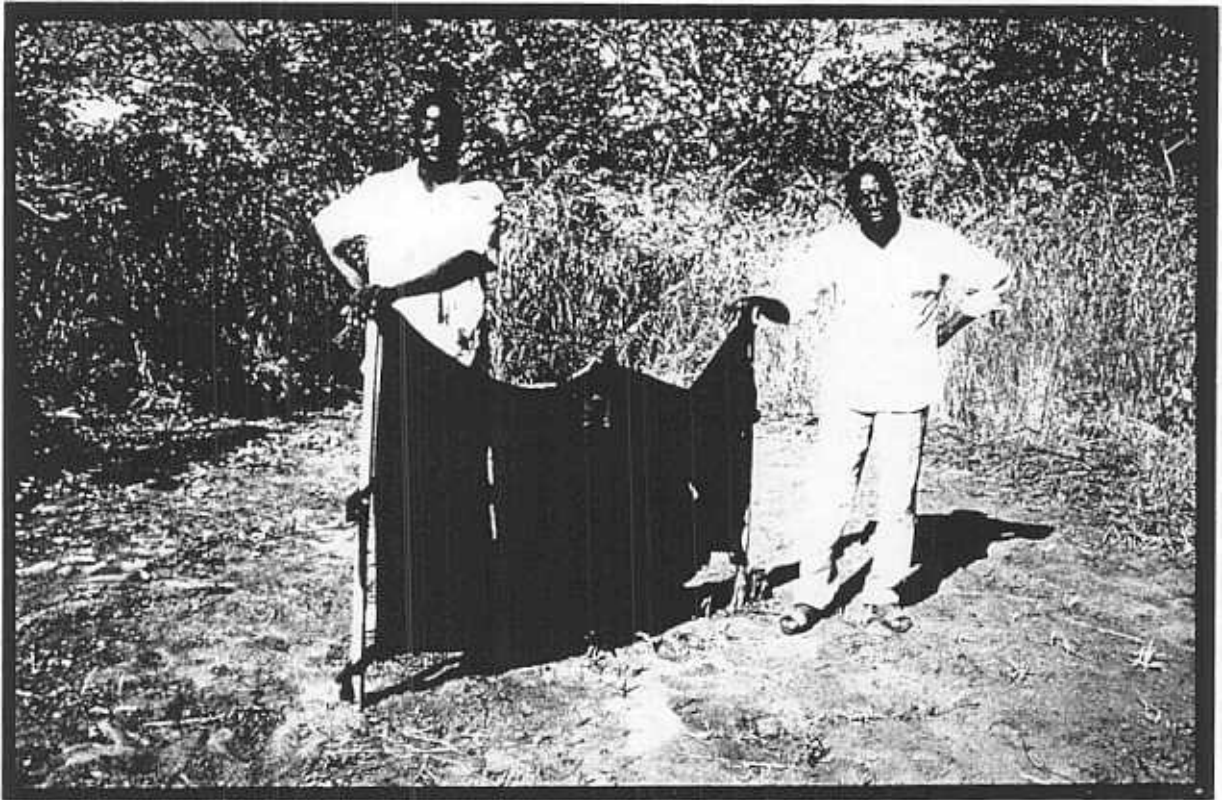
(b) Pyramidal Trap, South Eastern Uganda



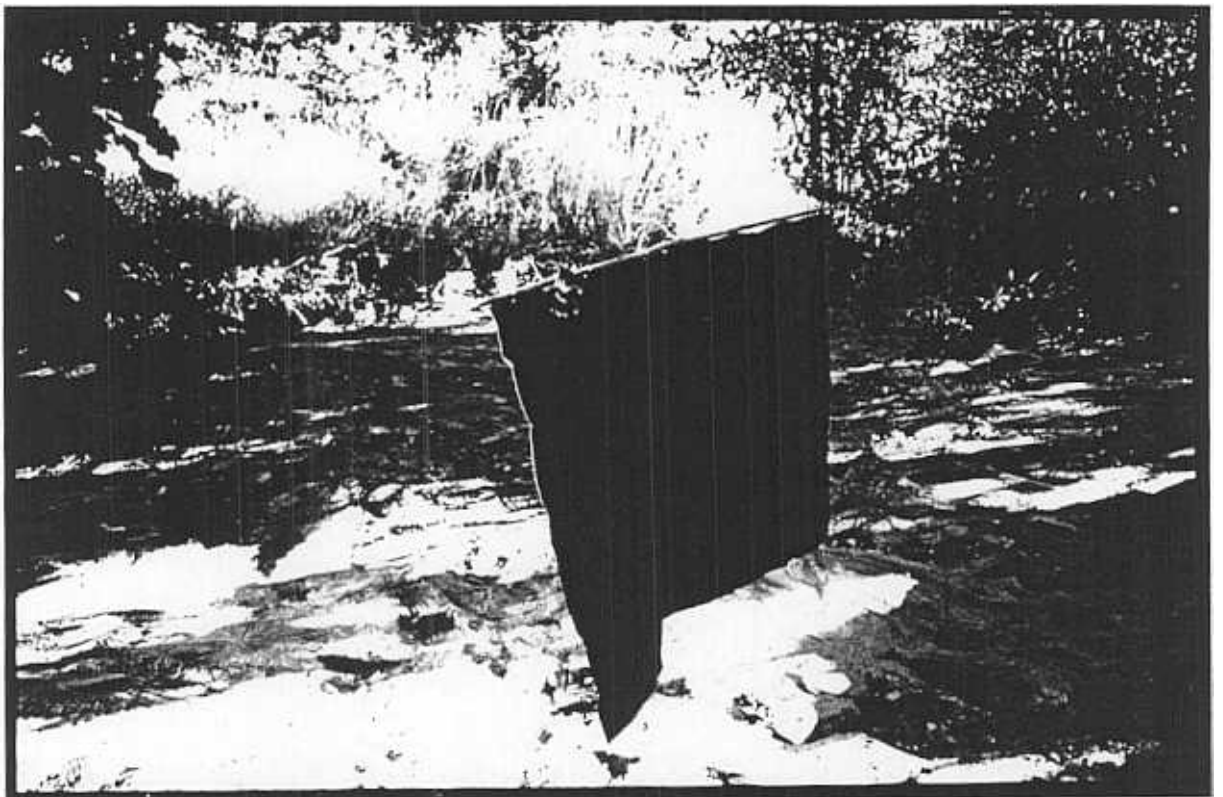
(c) Monoscreen Trap, LIRI Project, Bukooli County, Uganda



(D) Target, Western Province, Zambia



(e) Target, Msanzara Trial, Eastern Province, Zambia



(f) "Swinger" Target, Zimbabwe

2. RESEARCH ACTIVITIES

The research began with the development of an initial framework and the listing of a set of data needs (Table 2) based on a literature review and discussions. At each of the field sites, secondary data were reviewed and interviews held with a variety of stakeholders either as individuals or as groups. Secondary data in large part consisted of project reports and in most cases it was not possible to review any raw data. The details below largely refer to the primary data collected during fieldwork.

The most comprehensive study was completed of the Lambwe Valley Project between June and September 1996 (Map 1). Extensive observation of the activities of the community and of the International Centre of Insect Physiology and Ecology (ICIPE) including meetings, trap maintenance/deployment and tsetse/tryps monitoring was undertaken. Interviews were held with ICIPE personnel, local government personnel and members of the local community. Thirty-five detailed interviews were conducted with community members from five blocks including men, women, cattle owners, non-cattle owners and members, non-members and officials of the tsetse control organisation. In addition, informal discussions were held with many other local people. Most community interviews were conducted in Luo, through an interpreter, although some were in English.

In order to ascertain people's perceptions of the benefits they and others have gained from the tsetse control operations a "participatory" stakeholder analysis was undertaken with the majority of the interviewees. Unfortunately, no project data were available for comparing with the stakeholders' assessment of the economic benefits of the control programme. A gender study was also undertaken for this project (Ssenyonga, 1997). A large part of this work involved a re-analysis of data which had not previously been disaggregated by gender but additional information was also collected using a questionnaire.

Only a brief visit was made to the research programme of the Kenya Trypanosomiasis Research Institute (KETRI) at Busia, Kenya (Map 2). Here, two group meetings were organised at Rukada and Apatit villages by the KETRI technical assistant who had previously worked on the project in order for discussions to be held.

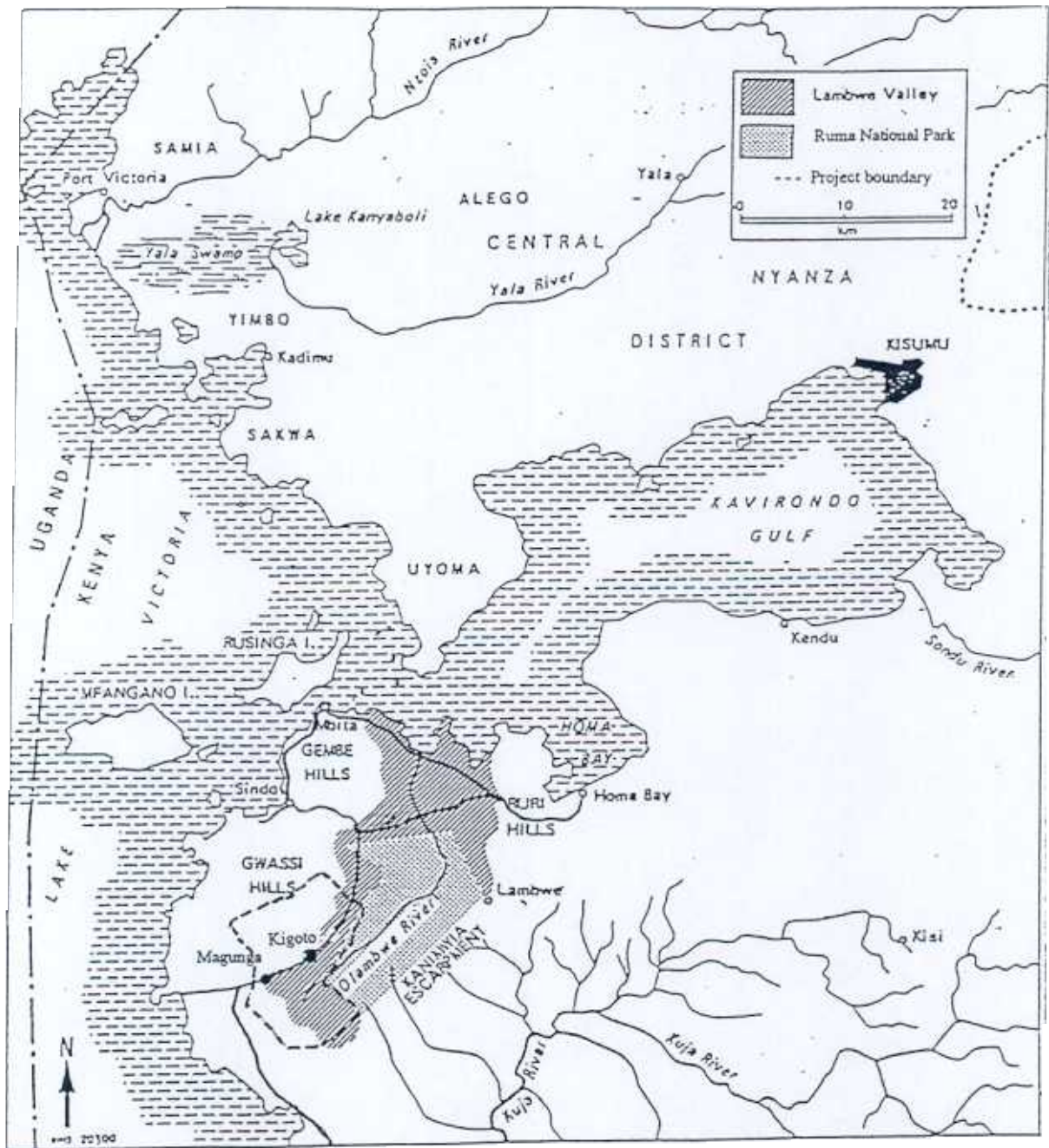
In October and November 1996, two projects were covered in South Eastern Uganda, the Government Control Programme co-ordinated by the Co-ordinating Organisation for the Control of Tsetse in Uganda (COCTU) and the Livestock Health Research Institute (LIRI) Project. The government control programme operates in six districts, Iganga, Kamuli, Jinja, Tororo, Mukono and Palissa (Map 3). Literature research and interviews were held in Entebbe, at the Ministry of Agriculture and COCTU, in Jinja at the project management office of the Sleeping Sickness and Trypanosomiasis Control Project for South East Uganda, and in Iganga at the District Entomology Department of the Ministry of Agriculture. Subsequently community interviews were undertaken in Namugongo Sub-county, Kamuli District. The secondary data studied included COCTU annual reports and the minutes of monthly technical field staff meetings (two such meetings were also attended).

Primary data were obtained mainly from interviews conducted with project personnel (senior and field staff) at the above offices and from both semi-structured interviews and informal discussions with community members in the locations visited and local community workers engaged in tsetse control/sleeping sickness activities. A stakeholder analysis was also undertaken with these interviewees. A total of fifty-three interviews were conducted in two of Namugongo's seven parishes. Again, a range of households were visited (i.e. male and female headed households, cattle and non cattle owning households, and households with and

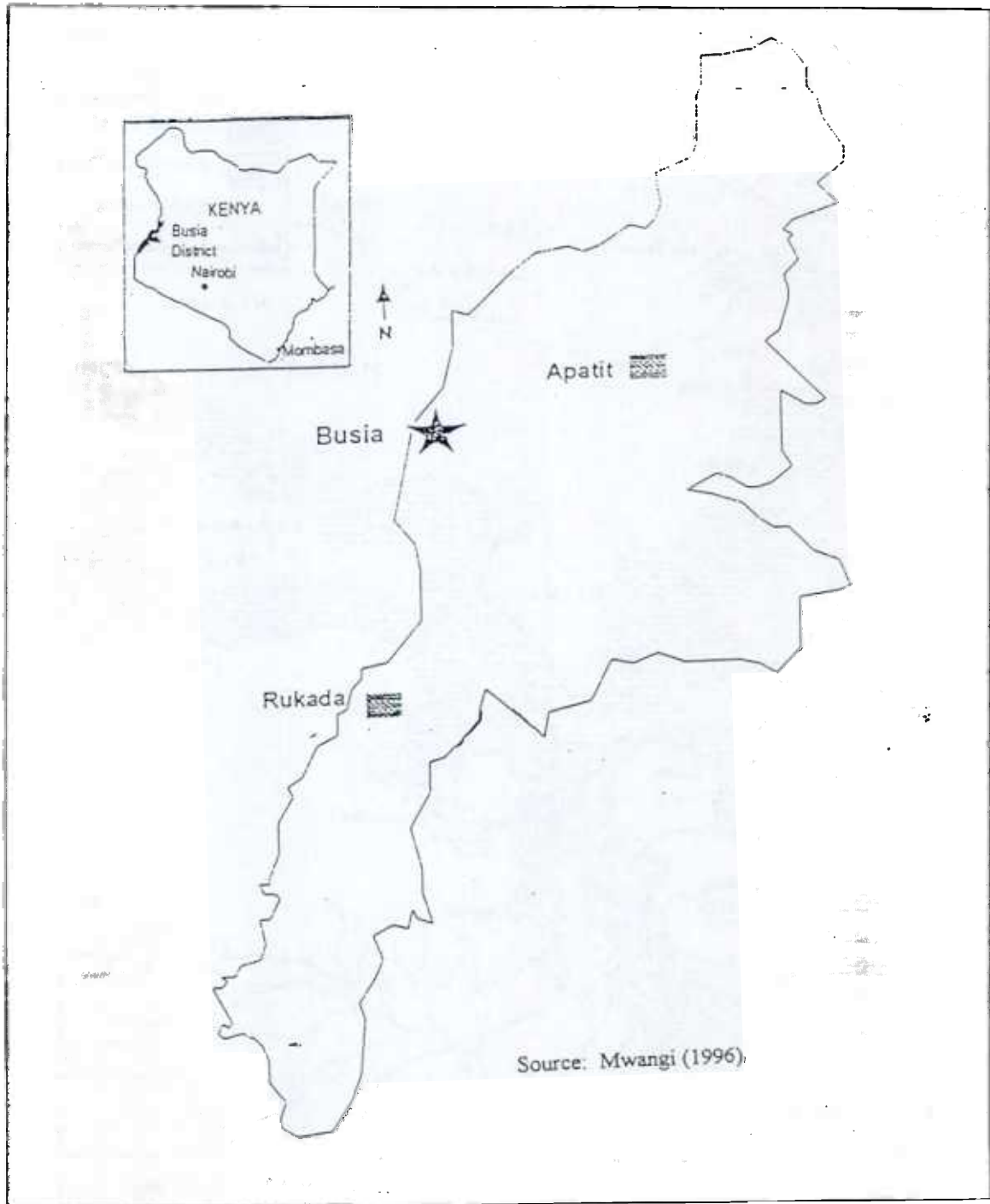
Table2. Suggested Vital Data Required for Comparative Study of Tsetse

RESEARCH FOCUS	SPECIFIC DATA/QUESTIONS	SOURCE
TSETSE CHALLENGE Level and distribution of challenge and how this has changed	Tsetse numbers and distribution Tsetse infection rates Livestock infection rates/disease incidence Sleeping sickness incidence Fly numbers generally	Previous studies on the areas/ historic information Pre and post implementation surveys by projects Local population
LIVESTOCK What livestock are kept and how has this changed	Types and numbers of livestock Uses (meat, milk etc) Who owns/uses cattle and how many Livestock problems/diseases Livestock distribution/grazing patterns Livestock production	Project data Official data/surveys Local people
LAND USE How is the situation changing	Settlement history Land ownership and distribution of holdings Land use	Official maps, census data etc Local information
POPULATION Distribution compared to tsetse challenge	Overall numbers and distribution	Official census. Project/community
PROJECT DETAILS	When set up and what purpose/aim. What activities engaged in pre this project (ie other control/research). Trap data - numbers, location etc. What assistance provided to community. Extent of monitoring of tsetse/tryps levels. Training provided to community. Any inducements/incentives to participants.	Project staff Project reports Extension workers Community
LOCAL PARTICIPATION Actual participation Perceived benefits Actual benefits	Tasks involved - types, regularity, duration Actual maintenance/management of traps/ targets - quality Who provides labour - men/women; - cattle owner or user or not, and herd size; - wealth group; - where live/farm/graze Does this change at different times of year Who provides financial support: - mhhs/fhhs, - cattle owners, users or not, - wealth group; - where live/farm/graze What financial support - cash kind When donate - once year or more Why do they participate -what benefit do they get from the technology	Project monitoring data Community records Community interviews Observation
COMMUNITY ORGANISATION	What other local organisations exist - type, purpose, membership, rewards/penalties etc Organisation structure for tsetse control - who set up, how decide on structure, what is structure, how elect members, who are office holders, any positive incentives or punitive powers/how enforce decisions.	Local community members Minutes/records of community meetings Observation

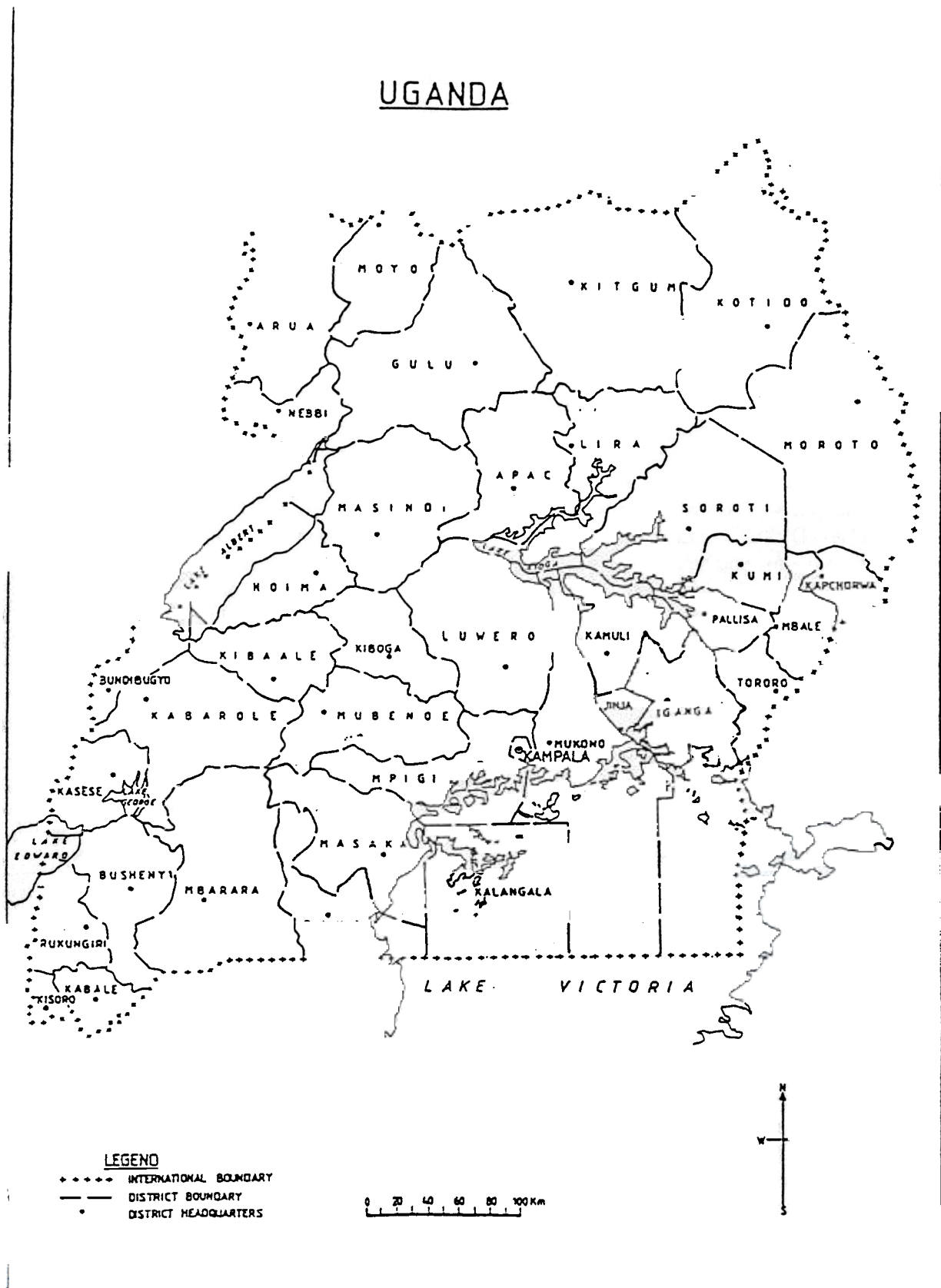
Map 1. Position of Lambwe Valley in Western Kenya



Map2. Busia Project sites in Western Kenya



Map 3. Location of the Government Control Project, South Eastern Uganda



Source: 1991 Population and Housing Census of Uganda. The Project is located in the six districts of Iganga, Kamuli, Jinja, Tororo, Mukono and Palissa.

without traps on their land) plus the local headmen. Interviews were held with individuals or small groups, depending on who was present, and were conducted in Basoga, through an interpreter.

At Ibulanku Sub-County, Iganga District where an outbreak of sleeping sickness was suspected, a screening session (for both cattle and humans) was observed and a community sensitisation session and interviews for locally recruited staff witnessed.

The LIRI Project is based in Bukooli County of Iganga District and the research here was less intensive (Map 4). Project staff were interviewed, as were other officials involved in the work - a community health educator and a women and youth affairs officer. Field visits, accompanied by some of these officials, were made to three villages and further discussions were held with one women's group, staff at Nabukalu sub-county headquarters and at a local primary school. A community drama presentation was also attended. Again, numerous traps and tree targets were visited.

The work in Zambia covered two programmes in Western Province: a control operation on the Zambezi Islands and the Kalobolelwa Trial (Map 5), and one in Eastern Province, the Msanzara Trial (Map 6). Meetings were held with the respective donor agencies involved (the Livestock Development Programme [LDP] and Assistance to the Veterinary Services of Zambia [ASVEZA]) as well as with the Department of Veterinary and Tsetse Control Services (DVTCS) in Lusaka and the Regional Tsetse and Trypanosomiasis Control Programme for Southern Africa (RTTCP) in Lusaka. Field research was conducted in the three Zambezi Islands of Mbeta (the largest), Mwaamba and Sangala. Semi-structured interviews were held with both individuals and groups using a checklist of topics to be covered. On Mwaamba, an entire target line of twenty-three targets was seen while elsewhere only *ad hoc* visits were made to a few target sites.

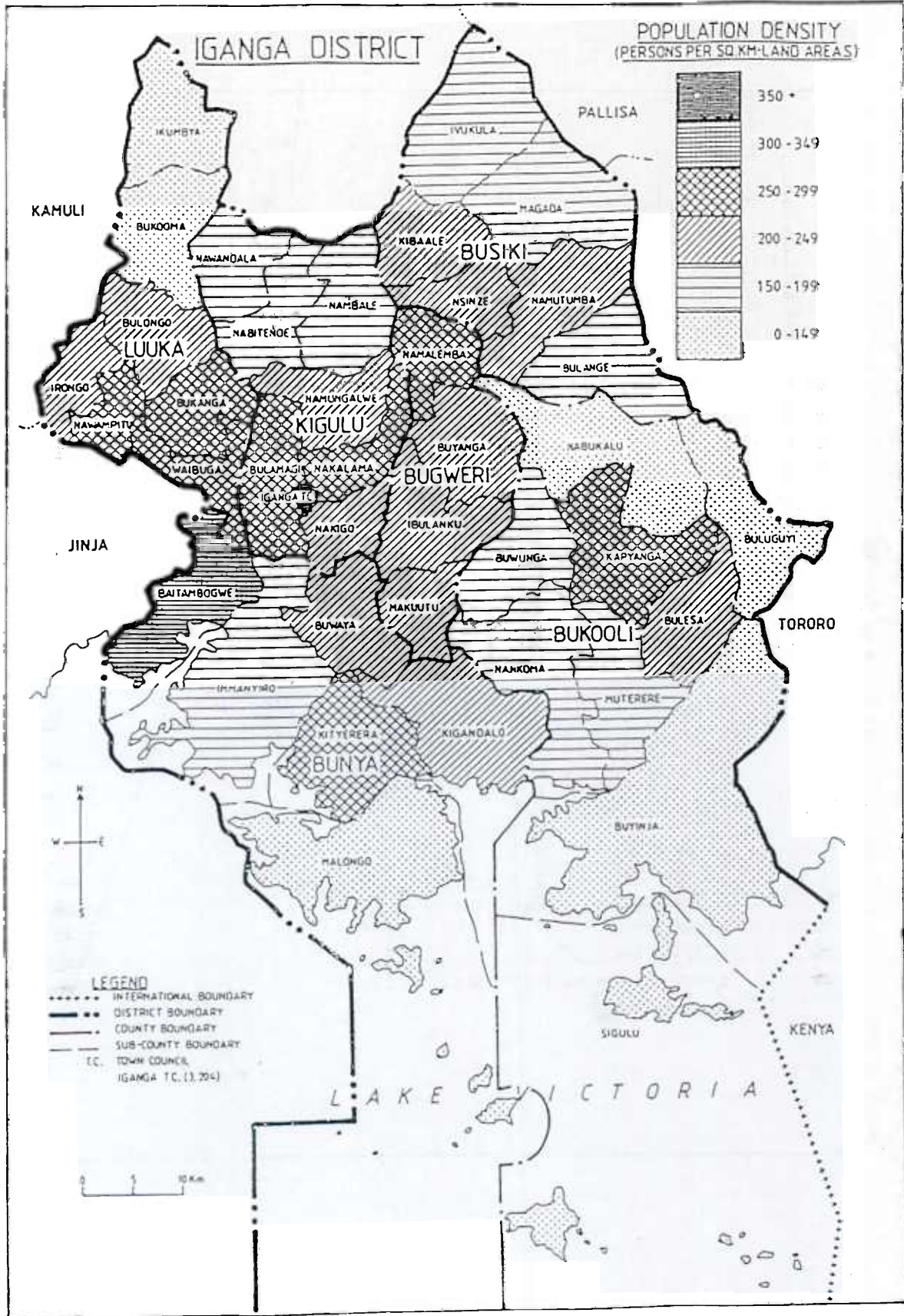
The majority of the research on the Zambezi Islands was conducted on Mwaamba Island, where interviews were held at ten (of c. twelve) villages. On Mbeta, one group interview was held with members from one village and on Sangala a group at one of the two villages on the island was interviewed.

The fieldwork in the Kalobolelwa Trial area was conducted in April/May 1997, more than two years after the trial was terminated. Although several of the key players were no longer available, interviews were held with a range of stakeholders including Crushpen Association (CPA) officials and members, non-cattle owners, village headmen, household heads - both male and female, married and unmarried men and women, government and LDP staff, the local councillor and safari lodge operators. Group and/or individual interviews were held in all villages within the trial area, and in six villages in adjacent areas to the south.

The same research approach was used in the case of the Msanzara Trial as in the locations in Western Province. Fieldwork was carried out in two village groupings representing the two main ethnic groups in the area and in four villages located along the Great East Road where problems with local participation have been experienced since the trial commenced. Due to ongoing discussions about the future of this programme and the fact that these had not been officially shared with the community, it was not possible to discuss all issues freely with community members as in the other locations.

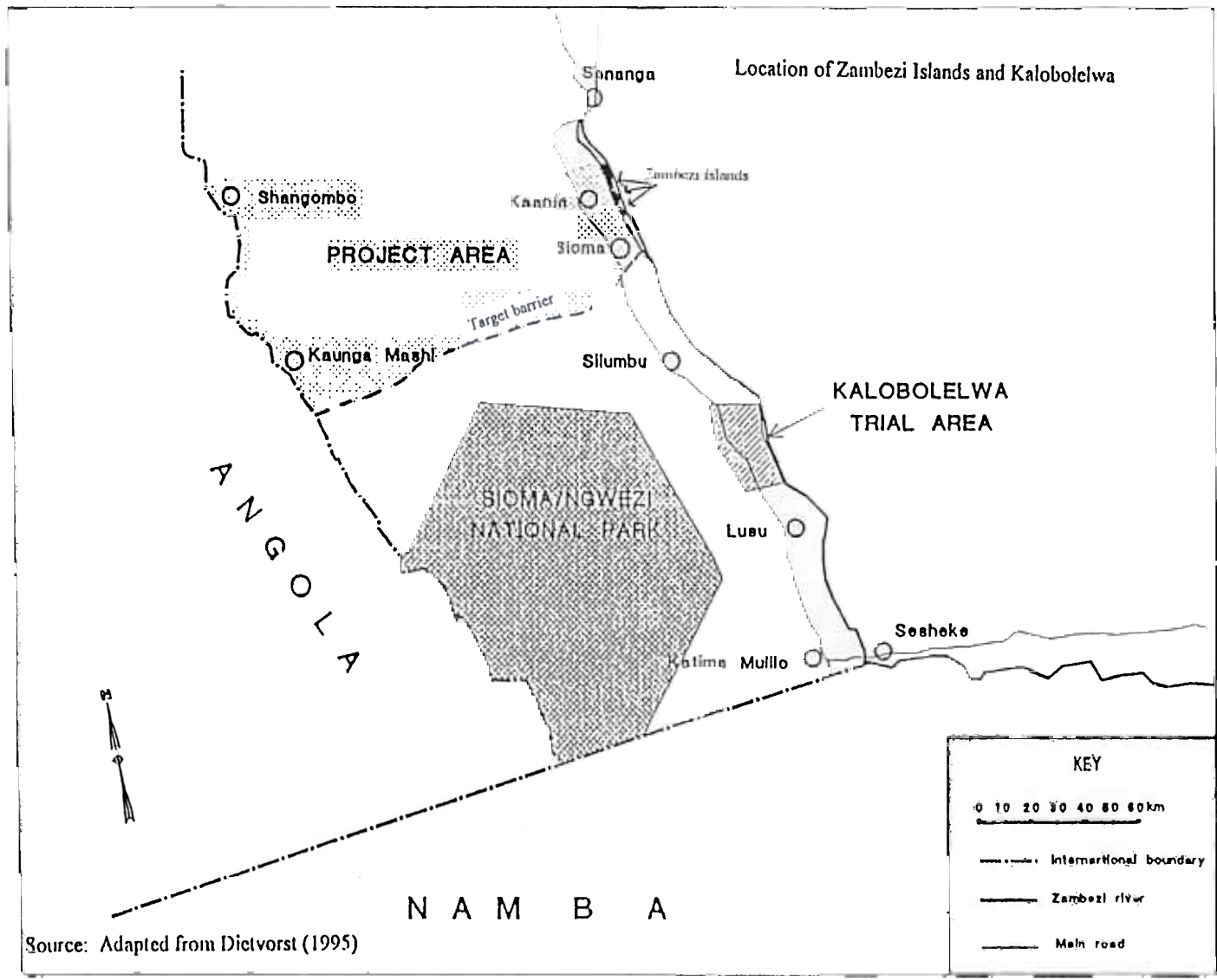
A week long visit was made to Zimbabwe in March 1997. Detailed discussions about operations and strategy in Southern Africa were held with the Regional, Technical and Training co-ordinators and the Strategy Analyst of the RTTCP in Harare. Following meetings

Map 4. Location of the LIRI Project, Bukooli County, South Eastern Uganda



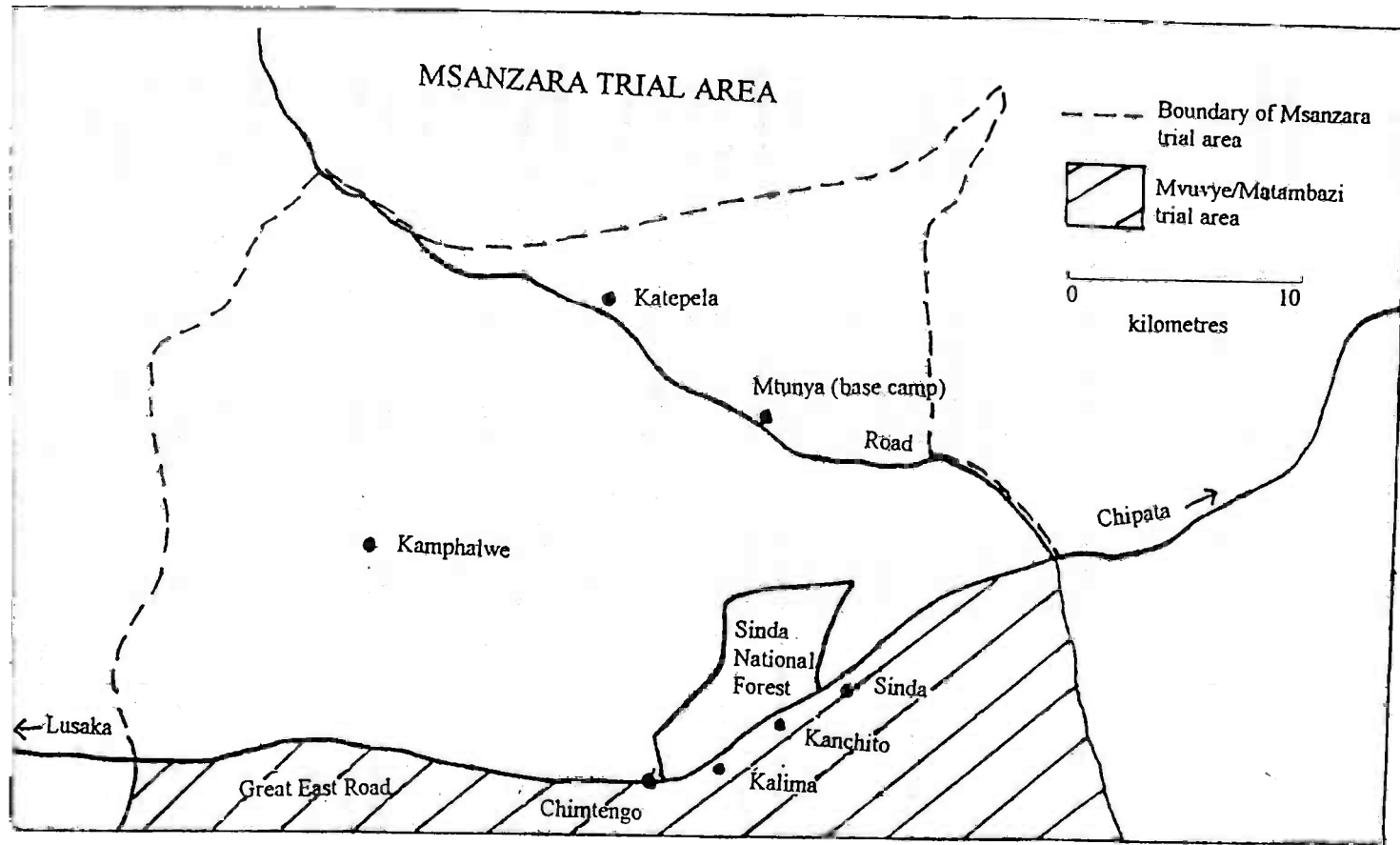
Source: 1991 Population and Housing Census of Uganda (Iganga District)

Map 5. Target Control Operations in Western Province, Zambia



Source: Adapted from Dietvorst (1995)

Map 6. Location of Msanzara Trial Area. Eastern Province, Zambia



with the Director and Operations Director of the Tsetse and Trypanosomiasis Control Branch (TTCB) in Harare, a field visit was made to view operations in the Zambezi Valley (Mashumbi Pools Camp). Target maintenance/ replacement activities, undertaken by government teams, were observed and discussions were held with tsetse control staff and two groups of local community members. In addition to secondary data obtained from the RTTCP and TTCB, literature was also obtained from the Centre for Applied Social Science of the University of Zimbabwe, Harare.

In June 1997, a brief visit was made to the Okavango region of Botswana for discussions with the Tsetse Control Department in Maun. Targets and monitoring traps in the Okavango Delta were inspected and one of the few villages in the Delta was visited.

3. RESULTS

Levels and types of government and community involvement in management and control of tsetse

Tsetse control programmes using traps and targets which have been initiated to date, including those visited for this research, have involved local populations in various ways. These include the creation of local awareness about the importance of the baits in controlling the problems of tsetse and trypanosomosis, in order to reduce theft and vandalism (Ghibe Valley, Ethiopia; Zambezi Valley, Zimbabwe); the provision of traps/targets or component materials by governments or other agencies, with local communities undertaking partial or total responsibility for trap/target construction, deployment and maintenance (Msanzara, Zambia; Zambezi Islands, Zambia; Vavoua, Cote d'Ivoire); the employment of local people to deploy or maintain the technology (COCTU co-ordinated project in Uganda); the hiring of private contractors to maintain target barriers (Senanga West, Zambia); the provision of technical assistance following local requests, with community responsibility for financing control measures and undertaking all deployment/maintenance activities with minimal outside facilitation and support (Lambwe Valley, Kenya; Bukooli County, Uganda). Several programmes have required communities to make financial contributions to either wholly or partially cover the cost of the traps and targets in addition to placing and maintaining traps in the field - Lambwe Valley, Kenya; Busia, Kenya; Kalobolelwa, Zambia; Bukooli County, Uganda. Materials are then made available for purchase by the technical agency involved, the only exception being the project in Bukooli County, Uganda where the traps are manufactured from locally available materials. In large part programmes utilising targets have required the least contributions from local populations who have had no control over the technology that is constructed entirely from non-local materials (cloth, insecticide etc.).

The range of contributions from local populations and the type of external support given are presented in Figure 2. Expected local contributions have been minimal and this is acknowledged by communities themselves. In interviews few complained of onerous duties even though individuals are rarely paid for contributing labour. The most common community level tasks have been to organise meetings to mobilise villagers to participate in maintenance sessions or to appoint individuals who would contribute labour for maintenance either with or without assistance from technical support staff. Furthermore, it is rare for community members to have any significant input into decision-making about where traps/targets should be placed. Two programmes stand out in this respect, Lambwe Valley and Bukooli County. In the Lambwe Valley, the initial trap placement strategy was designed by researchers. Following community training, trap deployment decisions were made by the community. In Bukooli County, although advice is offered by technical staff, location decisions are made mainly at an individual rather than at a community level.

Figure 2. Type of Participation by Communities and Partners

Type of external support	Type of community participation/ contributions	Level of community organisation required	Projects Reviewed
Training & information ; support in determining appropriate organisational frameworks	Provide all inputs ; make decisions on control operation, implement and co-ordinate all activities	MAX	Lambwe
Inputs supplied with costs wholly or partially recouped	Financial contribution for traps/ targets or components; free labour	↑	LIRI (not a 'community' programme) BUSIA
Inputs other than labour provided free	Provide free labour		Kalobolelwa
All inputs supplied free and work undertaken by technical/ govt. services and/or with local hired labour	Tolerate traps/targets and maintenance teams in local area		Msanzara Zambezi Islands
			MIN

Note: The type of organisation required for providing each of the inputs from both external institutions (government or other) and communities will vary.

In other programmes, while new 'tsetse committees' were formed, these appeared to have been less important than existing local leaders/ headmen in determining the outcome of the programmes. In one instance (the COCTU co-ordinated programme in Uganda), local community members interviewed were not even aware of the existence of the committees.

Negative social impacts were especially evident in two programmes (Kalobolelwa and Busia). In one case the control operations were usurped by a local councillor while in the other, local participants were dissatisfied with financial arrangements.

In spite of the variation in commitment demanded from community members and the difference in maintenance input required for targets and traps, in all the programmes only a small number of individuals participate in the routine trap/target maintenance sessions. The results from all the sites demonstrate the need for organisational skills, particularly when expected local inputs are considerable.

No programmes have data which would enable them to determine the economic impact of tsetse control operations although these impacts are considered especially important where local financial contributions are demanded. In a number of locations, participants were unaware of the cost of the control operations, the design of which was controlled by the technical services.

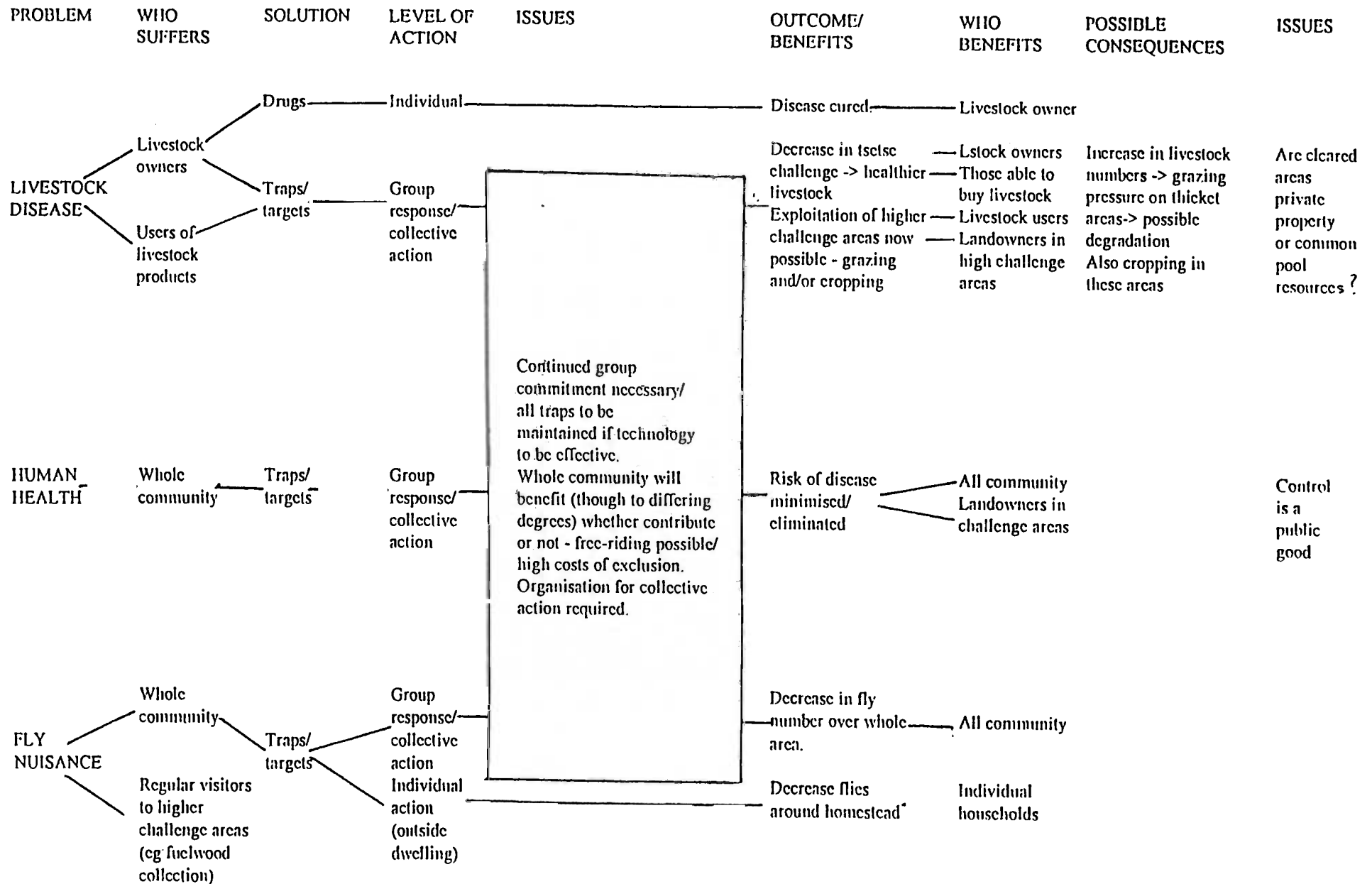
In making impact analyses it is often assumed that economic returns (in the form of increased livestock or livestock products and reduced costs of disease treatment) will be the most significant determinant of individual and community willingness to pay for control operations. In the Zambia programmes, clear economic benefits (not amounts) were identified by participants e.g. improved animal health and reduced drug use, increased number of oxen for hire and increased milk output. Similar benefits were quoted in Lambwe Valley, Kenya, together with improved human health. In Uganda the reduced risk of sleeping sickness was regarded as the most significant benefit of control operations. In all locations, however, the improvement in quality of life due to the reduction in fly nuisance also featured prominently as an important beneficial impact. The logic of these arguments is presented in Figure 3.

The sustainability of tsetse control operations and its relation to level and type of community management and control

In terms of the sustainability of the programmes studied, some have been or were in operation for only a short period of time and conclusions about sustainability are not easy to make. However, all three programmes which required financial contributions (Lambwe Valley, Kalobolelwa and Bukooli County) had or were experiencing difficulties in fulfilling these. In one, Lambwe Valley (started 1992), participants were fully aware of the financial costs of the control operations and were considering mechanisms for future funding. In Kalobolelwa, while funds had been collected, no-one appeared to know the cost of control operations. Nevertheless, even though the trial had ended (after only 2 years of operation), efforts were made to collect funds to encourage the technical services to restart the programme. In Bukooli County (first phase started in 1988), both groups and individuals had invested in traps but the numbers were considered to be inadequate.

In terms of the care of the trap/target areas and maintenance of the baits themselves (operations in which local people were expected to make labour contributions), excluding the two programmes which were terminated by the implementing agency (Busia and

Figure 3. Implications of Impacts of Tsetse Control on Livestock Disease, Human Health and Fly Nuisance for Community Action



Kalobolelwa), in only one other case (Zambezi Islands) was there obvious total lack of interest at the time the research was undertaken. Here again, although adequate local labour had been provided, the technical services had made a decision to discontinue the programme because alternative target lines covering these sites had been installed elsewhere. In one other, the COCTU co-ordinated programme, minimal clearing of the undergrowth around trap areas was done and could be attributed to the fact that mixed messages had been sent to the local community: tsetse committees had been formed to organise free labour to clear undergrowth at the same time as local men had been hired to do the work of maintenance. Elsewhere (Lambwe Valley, Bukooli County, Msanzara) regardless of problems of one kind or another, maintenance was being carried out more or less as expected.

There are certainly instances where, after a period, traps/targets have not been maintained (or have not been protected from theft) including at Nguruman in Kenya (one of the most well known experiences) and in Bouenza district, Congo (but also elsewhere). While the specific problems associated with each of these apparent failures are not discussed here, they raise questions about the sustainability of community level participation. A number of factors (positive and negative) will likely affect the sustainability of programmes with some level of community involvement and one or the following were identified in the different programmes reviewed:-

Negative factors for sustained community action:

- sudden withdrawal of an important resource (incentive schemes) by external partners with no negotiation with local communities
- project staff take major responsibility for decision-making, organising project activities and controlling resources - traps/ targets and supplies (i.e. no sense of local ownership)
- limited knowledge about the technology within the local community
- local community has experience or knowledge of control programmes with different requirements (mixed messages)
- poor trap/target location in relation to settlement and or to population movement/access
- inadequate attention to local organisational capacity (community susceptible to political interference etc.)

Positive factors for sustained community action:

- materials/ inputs for traps/targets locally available (accessible but also relatively cheap if local funding required/expected)
- strong local organisation with a core of enthusiasts
- some level of continuing mobilisation/ motivation from outside (especially if programme not linked with a strong local organisation)
- community education programme integral to the implementation programme
- use of community workers with skills in community education/ mobilisation

Sustainability of community action is not dependent on a single variable and it is impossible to rank those identified in this comparative study. Sustained local action is likely to result from the coming together of a number of factors which relate to one or the other of the partners involved.

As is evident from the list, the sustainability of local action in the programmes considered is highly dependent on the action of the other partners in the process. In the case of the programmes considered in this research, it was the action of these other partners (the

government technical services) which led to the termination of local action rather than a loss of interest on the part of the communities themselves⁴.

As has been the case with governments and funding agencies, it is possible that community interest in control programmes will reduce over time, especially if fly populations remain low and related human and animal diseases are under control but also if development priorities change. However, communities with the required technical knowledge and organising skills are likely to be better equipped to mobilise themselves in future should the need arise (Lambwe Valley and Bukooli County).

Gender analysis of participation in community based tsetse control schemes and relation to sustainability

The main gender analysis was completed for the Lambwe Valley Project (See Ssenyonga, 1997). This included a gender differentiated analysis of a) participation in trap construction and maintenance b) control over resources, and c) enjoyment of benefits. The overall conclusion of this analysis is that women are competing with men for leadership roles in the public domain where tsetse control operations are concerned. In terms of workload, women contributed more time to trap making than to trap placement and maintenance and 'senior' women participated more than 'junior' women. In terms of financial contributions, women made a significant proportion of these if account is taken of the fact that they own the poultry which were substituted for cash contributions. At the same time, women in this area have full control over dairy products which they can sell without informing their husbands.

In all programmes where local people were hired by the technical services, only men were hired. In one programme (Zambezi Islands), the headmen appeared to be relying almost entirely on female family labour over which they had control for completing maintenance tasks required by the community (clearing the undergrowth around targets). Elsewhere in the Zambia programmes, both men and women were involved in providing free labour but invariably, men completed tasks which might be categorised as 'technical' while women cleared the undergrowth. In some instances, women reported that they had not received the same level of technical information as men. While it may not have been intended, the attached poster also suggests that it is women who will do the task of clearing (Figure 4).

Regardless of these comments, it is relevant to note in conclusion that the stakeholder analysis completed in the Lambwe Valley indicated that benefits were perceived to be widespread within the community (Table 3) and men and women appeared to be in agreement about these. In the Zambezi Islands the women indicated that the work was not arduous and did not take long (and was not continuous throughout the year as in the programmes with traps).

⁴ Mosse (1995) for example describes how local participation begins to break down as project staff take over the organisation of activities. He describes villagers as retreating into their more familiar role of 'passive beneficiary' at which point 'they begin strategising to maximise short-term benefits from wages, subsidies etc.' (p17)

TOUT LE VILLAGE



Table 3. Perceived Benefits of Tsetse Control in Lambwe Valley Project

	ICIPE researchers	ICIPE field staff	Government	Kisabe/block officials	Members	Non-members	Men	Women	Cattle owners	Non cattle owners
ICIPE field staff	Successful work and assured pay	Assured pay. Good experience	Lower tsetse control costs.	Higher incomes.	Knowledge to control tsetse.	Benefit most since are free riders.	More land for cultivation in thicket. More cattle.	Firewood collection easier. More milk.	Reduced drug costs.	More assistance from cattle owners.
Kisabe/block officials	Happy their research successful and helped people	Happy their extension succeeded.	More revenue from area. Easier access to organised group.	Glad to help community.	Happy work succeeded. Same as rest of community.	As members but because of members.	Healthy cattle & people. Higher livestock productivity.	More milk. Donkeys for transport.	Higher cattle productivity. Healthy animals. Larger herds.	More/cheaper assistance from cattle owners. Human health
Members	Happy their research successful and helped people.	Happy their extension succeeded.	Lower tsetse control costs. Area developed.	Praise from gvt and community. Glad to help community.	Healthy livestock and humans.	As members but will thank members. Regret they did not help.	Healthier animals.	More milk.	Higher cattle productivity. Larger herds	Cheaper assistance from cattle owners. Human health
Non-members	Glad research worked and helped people.	Happy their extension succeeded. No benefit.	Higher productivity from area.	Happy to help community.	Healthy animals and people.	As members but did nothing to help.	Healthy people. Healthy animals.	More milk. Healthy children.	Higher cattle productivity. More animals for dowry.	Cheaper assistance from cattle owners. Human health
Men	Happy their research successful and helped people	Happy their extension succeeded. Friends in community.	More revenue from area. Lower tsetse control costs.	Happy to help community.	Healthy animals and people. Glad to help community.	As members but because of members. Feel guilty did not help.	Healthy people and animals. More wives/dowry.	More milk. Donkeys for transport.	Larger herds. Higher cattle productivity.	Cheaper assistance from cattle owners. Human health
Women	Happy their research successful and helped people	Happy their extension succeeded.	Lower tsetse control costs.	Happy to help community. As members/community.	Healthy people and animals. No disease.	As members but because of members/will thank them.	Healthy people and animals.	More milk. Healthy children.	Higher cattle productivity.	Cheaper assistance from cattle owners. Human health

Table 3. Cont.

	ICIPE researchers	ICIPE field staff	Government	Kisumu/block officials	Members	Non-members	Men	Women	Cattle owners	Non cattle owners
Cattle owners	Happy their research successful and helped people	Happy their extension successful.	Lower tsetse control costs More revenue from area. Access to groups.	Happy to help community. Praise from community & govt.	Healthy people & livestock. Happy they succeeded.	As members but because of members. Will thank members.	Healthy cattle. Healthy people. Higher livestock productivity.	More milk. Healthier families. Donkeys for transport.	Healthier & more productive livestock.	Cheaper assistance from cattle owners. Human health
Non cattle owners	Happy their research successful.	Happy their extension successful.	Higher productivity in the area.	Happy they controlled tsetse.	Healthy animals and people.	Same as members but feel guilty.	Healthy families.	More milk.	More productive cattle.	Cheaper/easier assistance from cattle owners.

Context-sensitive guidelines for the design of future community control activities

The context sensitive guidelines (Okali and Barrett, 1998) for the design of future control activities involving local communities incorporate these outputs and include a list of significant variables which the research suggests should guide decisions about whether to initiate programmes demanding more than simply awareness on the part of local populations (Table 4). At a national level these include the overall policy objective (tsetse eradication or suppression), population density and distribution, movement of population and livestock, programmer costs and benefits to human health. Local level interest and co-operation will also depend on previous experience with government and other agencies, their own development priorities and the level of organisation and input required. Individual decisions to participate are determined by many other variables - perceptions of immediate and future benefits, alternative disease management strategies, levels of contributions being demanded and public pressure. It is suggested that there is only one variable which is common to all the levels, human health, and this is a significant motivating force largely because all community members are at risk.

They conclude with suggested steps to be taken when planning a strategy and include the possibility that local participation may not be relevant or feasible in all situations. The steps begin with a decision about the objective of the control operations: eradication or suppression. Although there is a considerable measure of verbal agreement in most countries that suppression is now the only realistic option in most situations, in reality there continues to be confusion over required or possible suppression levels and this has implications for the level and type of community involvement expected. It would seem to be essential to accept that this will be determined by communities themselves if they have any considerable input (financial and labour) into and control over the operation. The next decision, possibly to be taken at a different level, relates to technical options for different types of locations - and the associated tasks, needs and requirements with, possibly, different levels of suppression. With these in mind, the full range of possible partners and stakeholders can be defined and an analysis of likely incentives required for reaching different levels of involvement by these different stakeholders. Using this approach, planners might arrive at a whole series of partnerships - some possibly even excluding community participation - and a whole range of sites where control programmes can be initiated.

4. OUTSTANDING QUESTIONS

There are obviously many questions which have not been answered and were not even considered in this research but which have a bearing on decisions regarding appropriate tsetse control strategies. Our central interest was to review the way in which community participation was being incorporated into a variety of very different programmes. In large part, those seeking lessons in approaches for organising sustained group and independent local effort (beyond simply mobilising community members to contribute labour when called) will be disappointed. Nevertheless, these cases provide lessons about the cost of participation to community organisers. Certainly many locally-specific variables affect the process of group formation/community organisation - settlement pattern, social heterogeneity, social stratification and factionalism, extent of seasonal migration, local history of co-operative efforts etc. One of the more relevant reports within the context of a development programme is provided by Mosse (1996) reporting on the experience of the British Rainfed Farming Project (KRIBP). However, he concludes that it is not the continued

Table 4. Significant Variables Determining Decisions to Initiate or Participate in Community-Based Tsetse Control Programmes

VARIABLES	LEVELS OF DECISION-MAKING		
	District/National	Community	Individual
Overall policy objectives	X		
Previous experience of external assistance		X	X
Links with outside agencies		X	
Population density/distribution/movement	X		
Alternative disease management strategies			X
Costs: Technical Advice	X		
Cash			
Labour			X
An organisation		X	X
Perceived immediate and future benefits:			
Human health	X	X	X
More land			X
More livestock			X
More productive livestock			X
Status/power			X
Fly-free env.			X
Public pressure			X
Development priorities	X	X	

Notes: A cross indicates a strong association; the individual and community levels may coincide, for example in the case of a 'livestock-owning village'.

existence of a group or of a particular structure which is important but the ability to organise when the need arises.

We are also aware of the ongoing changes in public administration within the countries covered by this work but have not specifically addressed issues connected with the decentralisation of public services, including the technical arms of the ministries. Under these changed circumstances, our comments regarding the need to consider different levels of decision-making, including at the local level, would seem to be very relevant. With respect to community contributions to a variety of government and non-government initiated programmes, warning signals have already been given in some locations that the pressure on local populations may be too great.

Tsetse clearance discussions have always been closely linked with discussions about land use planning and this subject has also not been covered by this research. Only one programme explicitly sought to control land use in any way, the Kalobolelwa Trial. Within the Kalobolelwa Trial area local communities were exhorted to control the influx of cattle. Other programmes have been monitoring land use (within Kenya for instance). Many donors are now demanding that land-use plans are a comprehensive part of any tsetse control operation on the understanding that areas cleared of tsetse are at risk from land degradation. However, it is worth noting that where land use plans have been drawn up in order to maximise the benefits of tsetse control whilst minimising potentially damaging environmental consequences, plans have largely been made without any serious consideration being given to local knowledge and experience. In general, therefore, local communities in these locations are required to manage the resources within a framework of controls and restrictions reflecting the needs and interests of other groups. A number of the points raised in this paper, therefore, about the role of different stakeholders in tsetse control generally are also applicable to the issue of land use planning.

Finally, in spite of the significance attributed to tsetse control in most livestock papers, journals and even national policy statements, few governments have a national tsetse control policy and a strategy. Few governments have the funds to sustain any national programme and many designated tsetse control staff are now working in other government departments. Zimbabwe and Botswana are unique in having national policies with the latter even being in a position to provide all necessary funds. Much of what was and is currently being done elsewhere has been driven by external funds and appears as isolated programmes. Thus, ongoing programmes, even programmes within part of one country, are different and some appear to be run almost as personal programmes. Many programmes are trials which never blossom into full control programmes. The success of well-designed programmes in future will depend on these issues being addressed.

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REPORT ON FIELDWORK CONDUCTED IN KENYA AND UGANDA

June - November 1996

LAMBWE VALLEY, NYANZA PROVINCE, KENYA

SOUTH-EASTERN UGANDA

BUSIA PROJECT, WESTERN KENYA

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INTRODUCTION

Tsetse and Trypanosomosis in Kenya and Uganda

"The pestilent tsetse-fly will still infest the shores of the great Lake, but it will find no more victims on which to play its malevolent part. Sleeping sickness has ceased to be the dominant scourge of this territory and the disease has now been reduced to a merely sporadic scale. Continued vigilance, however, is essential, and the recrudescence of sleeping sickness can only be averted by the consistent and vigorous maintenance of those preventive measures which have already proved efficacious." (Bell, 1909).

In 1901 a major epidemic of sleeping sickness occurred in the Busoga area of South Eastern Uganda, which claimed up to 300,000 lives (Mbulamberi, 1990). There is some dispute as to whether the cause of the disease was *Trypanosoma brucei gambiense* or *T.b.rhodesiense* (see Koerner et al, 1995 & Gibson, 1996) although it is now widely accepted that various socioeconomic factors precipitated the outbreak. Over the course of the following decade the colonial regime instigated measures to control the spread of the disease, in particular the relocation of large numbers of people away from the lakeshore. Since that time tsetse and trypanosomosis control has continued intermittently in the area and is still on-going. The vector is *Glossina fuscipes fuscipes* and the parasite *T.b.rhodesiense*.

In spite of the optimism expressed at the turn of the century, South Eastern Uganda, the Lambwe Valley and Busia District of Kenya are all areas of longstanding tsetse control programmes whose main driving force has been and continues to be, the eradication of human trypanosomosis (sleeping sickness). Expenditure on trypanosomosis control has primarily been devoted to the control of sleeping sickness through the elimination or reduction in the number of *Glossina*; namely *G.fuscipes* and *G. pallidipes*. South Eastern Uganda and Busia lie within the same tsetse fly belt, the main species being *Glossina fuscipes fuscipes* while the main species in the Lambwe is *Glossina pallidipes*.

Each of the locations covered by the projects reviewed here have seen a number of earlier programmes: as many as 50 vector control programmes have been undertaken within the Lambwe. A large number of programmes have been implemented as tests or research activities by research organisations e.g. by KETRI (the Kenyan Trypanosomiasis Research Institute) and LIRI (the Livestock Health Research Institute) in Uganda while others have been control activities implemented under the direction of government departments.

Thus, in Kenya, while at least 19 districts are known to be tsetse infested, apart from research, little vector control work was undertaken between 1940 and 1991 and since 1970, the government has worked almost exclusively in Nyanza and Western provinces, where the problem is most severe. Work elsewhere has been ad hoc and carried out on a small scale (Davies, 1992). No formal control strategy ever existed in Kenya although more recently a strategy has been formulated as part of the European Union funded regional tsetse control activities including Kenya, Uganda, Ethiopia and Tanzania. In Kenya, the Zoological Services of the Veterinary Department of the Ministry of Agriculture is responsible for implementing control operations while KETRI is responsible for research activities.

In Uganda, control efforts have concentrated on areas to the south although sleeping sickness is also a problem in North Western Uganda where it is caused by *T.b.gambiense*. The current unrest in Northern Uganda and Southern Sudan has exacerbated the situation and the number of cases appears to have increased. Tsetse are also present at lower densities in other parts of Western Uganda. Control efforts in Uganda have been interrupted by various political upheavals but are now co-

ordinated by COCTU (Co-ordinating Organisation for the Control of Tsetse in Uganda) and implemented by the Ministry of Agriculture (Veterinary Services and Entomology Departments) and the Ministry of Health. Tsetse and trypanosomiasis research is additionally undertaken by LIRI, previously known as UTRO (the Uganda Trypanosomiasis Research Organisation).

Insecticides have always been a major form of vector control in both Uganda and Kenya although their use is now restricted. Previous vector control operations have included host destruction and removal of people from affected areas, clearance of vegetation (first by manual and later by mechanical means), ground and aerial spraying and the use of traps. The main means of control of animal trypanosomiasis has been through the use of trypanocidal drugs which were first introduced in the 1940s and are used to-day in each of the areas covered here.

THE LAMBWE VALLEY PROJECT

METHODOLOGY

Field research for this project was undertaken during the period June to September 1996. Much secondary data was examined. This consisted primarily of quarterly and annual progress reports produced by ICIPE for NRI, although the raw data on which these reports were based was not available.

The primary data collected during the fieldwork was gathered mainly by means of interviews with various stakeholders. Semi-structured interviews were held with ICIPE personnel (both research staff and field staff in Mbita and Nairobi), local government personnel and members of the local community. In total 35 detailed interviews were conducted with community members from 5 blocks. These included men, women, cattle owners and non-cattle owners and members, non-members and officials of the tsetse control organisation. In addition, informal discussions were held with many other local people. Most community interviews were conducted in Luo, through an interpreter, although some were in English.

In order to ascertain people's perceptions of the benefits they and others have gained from the tsetse control operations a "participatory" stakeholder analysis was undertaken. This exercise was conducted with the majority of the interviewees. Although some economic data have been collected by ICIPE, these were unavailable and there was, therefore, no project data with which to compare the stakeholders' assessment of the economic benefits of the control programme.

In addition, extensive observation of both community and ICIPE activities was undertaken during the fieldwork. The researcher attended nine trap maintenance/deployment sessions; five block meetings; part of an extraordinary general meeting for all members of the community's tsetse control organisation; one ICIPE-hosted official visit to the project and one of ICIPE's periodic tsetse/trypanosomiasis monitoring sessions (5 days).

Throughout this report the term 'community' refers to the population within the defined project area of 100 km², a total of approximately 12,000 people in 1800 homesteads and 44 villages. This corresponds to the definition used by ICIPE.

BACKGROUND

Project Area

The Lambwe Valley is situated in Suba District, Nyanza Province in the west of Kenya. The Valley floor lies at about 4000 feet above sea level and covers an area of approximately 350km². The Valley has a history of tsetse infestation (*Glossina pallidipes*) with both human and animal trypanosomosis dating back to the beginning of this century. The Ruma National Park occupies 120km² of the Valley and provides both a suitable tsetse habitat and a reservoir for trypanosomosis in the form of the game animals. The thicket vegetation which used to cover much of the Valley floor (see Swynnerton, 1936) is now restricted mainly to the Park itself and to the Nyaboro thicket which lies outside the Park's south-western boundary. Settlement is dispersed throughout the Valley and in places land is cultivated right up to the Park boundaries.

The present population of the Valley is primarily of the Luo ethnic group. The Valley was settled in the 1960s as part of a planned settlement scheme and many settlers came from the shores of Lake Victoria. Subsequently, large numbers left due to the presence of tsetse and the prevalence of trypanosomosis. However many returned when the WHO-initiated tsetse control activities commenced around 1970 (Wellde et al, 1989). Although Gambian sleeping sickness in the area dates back to the early 20th century, the more virulent Rhodesian form was first identified in the Valley in 1959 (Baldry, 1972). Since that time there have been various epidemics, the most recent in the period 1981-1984. Records from Alupe Sleeping Sickness Hospital, Busia District, to where cases were referred when the Magunga Clinic stopped treating the disease, indicate that the last recorded case of sleeping sickness from the Lambwe Valley was in 1990.

Project History¹

The ICIPE project commenced in 1992. ICIPE are a research organisation with no mandate to conduct tsetse control operations within Kenya. The project was originally funded by the then Overseas Development Organisation (now the Department for International Development) of the British Government through the Natural Resources Institute (NRI). When NRI funding ceased in March 1996, ICIPE continued with their monitoring activities using their own funds in addition to an IFAD grant.

The project area covers 100 km² in the southern part of the Valley, adjacent to the Ruma National Park, and extends from Lwala in the south to Olando in the north-east (Map 1²). The largest village in the project area is Magunga, where the senior chief for Gwasi Division is based. ICIPE maintain a modest field station in the village of Kigoto.

Prior to this project ICIPE had carried out a trial to test the efficacy of the NGU trap within Lambwe Valley. The NGU trap, which was developed at Nguruman, south-west Kenya for the control of *Glossina pallidipes*, is constructed of blue and black fabric, netting and a plastic bag in which the flies are caught (Figure 1a). The trap is odour-baited with cow urine and acetone and no insecticides are used. Since it is a relatively simple technology it was considered by ICIPE as appropriate for use by local communities. This trial commenced in 1988 when traps were placed in Nyaboro thicket and apparent fly density reduced from 200 to less than one fly per trap per day within 8 months (ICIPE,

¹ Unless otherwise stated, specific details regarding project activities have been drawn from the annual progress reports submitted by ICIPE to NRI during the period April 1992 to March 1996.

² See main report for figures, tables and maps.

1996). The local population were impressed with the apparent success of the technology and approached ICIPE for a permanent trapping programme to be established in the area.

After some negotiation the current community based trial, which was studied for this research, was started. The trial had a number of objectives, the primary one being to demonstrate that “*the community can, relying on its own resources, manage tsetse and trypanosomiasis using the NGU trap*” (ICIPE, 1996). Other objectives included the provision of a framework for the dissemination of NGU trapping technology, the assessment of the impact of a reduction in trypanosomiasis on livestock productivity, crop production and land use and the training of extension workers. The research was to include social, economic and technical elements. Since the major focus of the project was to be community participation it was agreed at the outset that sufficient resources should be invested in this regard. Therefore a series of steps were drawn up, beginning with the training and mobilisation of the community. The community were to be responsible for purchasing trap materials, making, deploying and maintaining the traps; ICIPE were to provide training and technical assistance to the community.

Whilst ICIPE was undertaking its trap trial in Nyaboro thicket, KETRI was conducting a trial of impregnated targets within the Ruma National Park and reductions in fly catches of up to 99.21% were recorded (Opiyo et al, 1990). Targets continued to be deployed within the Park, with varying levels of maintenance until 1996 when the responsibility for control here was handed over to the Kenya Wildlife Service (KWS).

Community Training and Mobilisation

Fundamental to the ICIPE programme was an appreciation of the need to provide the local population with information. The first stage was the selection of a catalytic group of 42 farmers by ICIPE in conjunction with the community. The intention was for this group to be trained by ICIPE personnel and government staff and for them to subsequently train other members of the community. Topics such as tsetse biology and ecology, transmission of trypanosomiasis, methods of tsetse control, trap manufacture and placement, and community organisation were covered. This catalytic group, together with ICIPE personnel, then held a series of 35 meetings with the community in order to disseminate this information and to mobilise the community.

Community Organisation

The community decided to set up a dedicated organisation to manage the control operations. The control area was divided into 15 blocks, each containing 2-4 villages. Within each block there was a tsetse control committee comprising a chairman, vice chairman, secretary and 7-9 trap managers. Each block registered individually with the Department of Culture and Social Services as a self-help group and paid a registration fee of Kshs150. Each block was responsible for mobilising members to join the organisation, deploy and maintain traps. Above the block level was a central co-ordinating committee which was also responsible for liaising with ICIPE and other outside bodies with regard to the tsetse control operations. This committee, called Kisabe (an acronym of the two sub-locations in the trial area), has 18 members drawn from the 15 blocks.

Block level elections were held in June 1993 and the Kisabe committee was elected by members in July 1993. According to their constitutions, the term of office for the committees is one year and it is the responsibility of the chairmen/women to call elections. A second election for Kisabe committee members was not held until September 1996. Block level elections were also held in most blocks around this time.

Trap Deployment

A total of 493 trap sites were selected by community trap managers in consultation with ICIPE technical staff in January 1994. A three phase trap deployment plan was devised: Phase 1 - 16 transects to be cut through Nyaboro thicket along which 64 traps were to be placed; Phase 2 - 120 traps along the boundary with Ruma National Park; Phase 3 - 309 traps to be deployed throughout the remainder of the project area, predominantly in the foothills. Deployment sessions were scheduled to take place on Wednesday and Saturday mornings, with representatives from all blocks expected to participate. Trap deployment commenced in July 1994, together with regular trap servicing sessions.

All the 64 traps were placed in the Nyaboro thicket during 1994 and phase 2 commenced in 1995 when 20 traps were placed along the Park boundary. Although 20 further traps were deployed along the boundary in July/August 1996, phase 2 has not yet been completed, nor has phase 3 started. Weekly maintenance sessions therefore consist of one group of individuals from all blocks working in Nyaboro thicket, with the Park boundary traps being maintained by individuals from the three blocks in which they are placed.

Fund Raising

The community within the project area had to purchase trap materials - blue and black cloth, netting, polythene bags, staples and bottles for the cow urine, although the first 35 traps were made during training sessions and the materials for these were provided by ICIPE.

A one time registration fee of Ksh20 was payable by each individual wishing to become a member of the organisation. At the end of 1994 there were a total of 656 registered members. A homestead capitation fee was also sought from members. This was to be payable in cash or in kind (usually a chicken). Subsequently other forms of fund raising have been used, such as occasional *harambees* (fund-raising events) and the donation and sale of maize or sunflower crops. By March 1996 a total of Kshs88,641 had been raised (this included some donations from outside sources).

The Role of ICIPE

ICIPE's role was to train the farmers, to provide technical assistance when required and to monitor tsetse and trypanosomosis levels and project activities, initially on behalf of the funding organisation. The monitoring activities were considerable and led to much activity within the control area.

In order to monitor trypanosomosis levels, ICIPE purchased a sentinel herd of 60 animals which were distributed to 15 farmers, selected by Kisabe, who were to manage them with their own herds and would benefit from milk produced. Positive trypanosomosis cases within both the sentinel herd and these farmers' own herds were treated with Berenil. Daily milk offtake and births and deaths were also recorded by the 15 farmers for these herds.

Community participation in the weekly maintenance sessions and block and Kisabe meetings was also monitored.

RESULTS

Participation

Membership

Up to June 1997 there were 720 registered members of the Kisabe organisation, from a total population in the study area of 12,000 from 1800 homesteads, ie an average of 1 member per 2.5 homesteads. One block, Nyamadede, had sought only one member per homestead whilst other blocks registered members as individuals; indeed it was not uncommon to find a homestead with 2, 3 or even 4 registered members. Sanjweru block, which is adjacent to Nyaboro thicket, has 68 members from 34 homesteads and all but one homestead has joined.

Nevertheless, throughout the project area there are many homesteads which have no members in the organisation. Although from evidence of the stakeholder analysis (Table 3), the majority of individuals recognise the benefits of the tsetse control programme and the contributions of their neighbours, they are still reluctant to join. Many reasons were cited. Inability to pay the Kshs20 registration fee was quoted by several non-members (all elderly, relatively poor individuals); the intention to join in the future was also expressed by two non-members. A lack of information about the project was also cited as a reason for non-membership. The registration fee is set at a relatively low level, and is regarded by the Kisabe committee as within reach of most individuals and/or homesteads. However it is payable in cash and it may be this rather than the amount which restricts payment. With regard to lack of information, it is difficult to believe that this could affect membership. The project is very visible within the community and knowledge of the tsetse trapping activities and expected community contributions is widespread. Overall the project profile is high; many meetings have been held, dissemination has been extensive, maintenance sessions occur every week and ICIPE continues to visit and still brings visitors from Kenya and elsewhere to the area.

Labour/Time

Community responsibilities included the purchase of trap materials, the manufacture, deployment and maintenance of the traps and making all decisions with regard to trap placement, replacement, fund-raising etc. ICIPE data demonstrate that the time spent on these activities, but especially trap maintenance, has been considerable. This corresponds with observations made from 9 maintenance sessions attended during the present study between June and September 1996 and can be partly explained by the way these activities are organised.

On each occasion a core of 7 members were joined by a varying number of other members. Participants arrived individually or in small groups over the course of a couple of hours while the Senior Trap Manager determined which transects had to be cleared or traps were to be serviced and divided those present into small groups to complete these tasks. This was usually done within 1.5 hours when the groups reassembled at the central meeting point before departing. By this time even more members had usually arrived. An average of 20 persons attended each session, including these late arrivals. Both men and women attended the sessions and whilst men outnumbered women, the core group which attended most sessions comprised 3 women and 4 men. All attendees were also cattle owners, although their herd sizes varied from one to 60 plus cows. The majority of attendees were also trap managers or other committee members although some ordinary members did attend.

The original intention had been for maintenance sessions to be held on Wednesday and Saturday mornings, although interviews suggested that Saturday sessions were never well attended³ and were officially stopped some time in 1996. It was, however, the intention that these be reinstated early in 1997.

Those attending maintenance sessions predominantly came from the blocks closest to Nyaboro thicket, i.e. Nyaboro, Sanjweru, Kigoto and Seka. Although members from other blocks did attend (indeed, one of the regular attendees was from Sangla and another from Pundo), their numbers were much lower. This is perhaps not surprising in view of the distances involved. To walk from parts of Olando, Ugoro or Oma to Nyaboro thicket would take in excess of 2.5 hours; to participate in a maintenance session would therefore take up much of the day. When people from these areas did attend, the trip was usually combined with other activities, such as business in Magunga. The time commitment involved from homesteads closer to the thicket was much less and regular participation therefore not such a burden. Furthermore the risk from trypanosomosis infection was also greater in these blocks as well as those which bordered the Park.

Soon after the first traps were deployed along the boundary with Ruma National Park the responsibility for servicing these traps was delegated to the members of the blocks in which they were situated. This reduced walking time but also ensured that maintenance was still done satisfactorily in Nyaboro thicket.

The extent to which traps and transects were maintained varied throughout the control area. From observation during the fieldwork it was noted that the two main transects, which were also major paths, were kept well cleared although the other transects were not in such good condition. Similarly, the condition of the traps was not uniform, with traps along the main transects and those along the edges of the thicket, closest to homesteads, being in a reasonable condition. The traps within the thicket were not so well-maintained; vegetation needed clearing, cloth needed replacing and bottles were broken, missing or empty. Many traps had also been removed due to their poor condition, the intention being to replace them when new traps were available.

Overall, whilst initial transect cutting and trap deployment was undoubtedly very labour intensive, the subsequent work of trap maintenance did not appear to be unduly arduous. During interviews, however it was pointed out that in the wet season, when the ground was often water-logged and the vegetation denser, maintenance became more difficult. The wet season was also a season of peak on-farm activity and participation was consequently reduced at these times. Since, as already noted, only a small number of individuals were regularly involved, for them, trap maintenance alone represented a considerable amount of time. This was seen as a potential problem early in the programme and it had been suggested that each block appoint a rotating maintenance crew consisting of 3 to 4 members each week. Nyamadede block had attempted to instigate a rota system, but this was not functioning. Other blocks indicated that the decision to participate was left to individual members, although a rota system was seen as a good idea.

Meetings

The time commitment with regard to organisation of and attendance at meetings varied. Committee members faced a potentially greater burden since they were expected to organise the meetings and to mobilise the community - encourage existing members to participate and persuade new members to join. At the outset of the project a large number of meetings were held in order to sensitise the population and to develop the organisation structure, and meetings continue to be held. A total of 169

³ The Seventh Day Adventist Church is very active in the Lambwe Valley so many community members attend church on a Saturday morning. This is likely to have impacted on participation in Saturday maintenance work.

block meetings and 104 Kisabe meetings were held between April 1993 and March 1996 - approximately 3 per month at Kisabe level (ICIPE, 1996).

During the period of fieldwork a series of “mobilisation” meetings were initiated by Kisabe, with each block scheduled to hold a meeting in order to refocus attention on the trapping programme - to remind members of their responsibilities, to generate funds and to recruit new members. Five of these meetings were monitored. Of these, two were cancelled - one due to the weather (heavy rain) the other due to a low turn out. Apparently meetings are frequently cancelled due to poor attendance: attendance obviously requires a considerable time commitment at both Kisabe and block levels. Even though formal discussions are short, each meeting can take up to two or more hours: people arrive sporadically and pleasantries and gossip have to be exchanged. Some blocks have regular meetings (perhaps one every 2 or 3 months) whilst others have not had a meeting for over a year. Like the maintenance sessions, attendance varies with some few individuals attending most meetings.

Fund-raising

The homestead capitation fee was almost always paid in kind, normally a chicken but sometimes maize or sunflower oil, rather than in cash (Ksh150). The chickens were bought by ICIPE. The aim had been for this fee to be collected as and when funds were required to purchase additional materials for traps, although this was expected to be annually. Most members claimed to have donated only one chicken since 1993 and one admitted donating none.

In addition to local contributions, donations have also been received from various external sources (well-wishers, visitors etc). To date 35% of total funds collected are from donations compared to 16% from the membership registration charge, 43% from the homestead capitation levy and 7% from *harambees* (Ssenyonga, 1997). Donations have proved a significant source of income.

However, the lack of traps observed in the thicket in 1996 suggested that there were insufficient funds available to purchase materials. The aim of the mobilisation meetings held mid-1996 was to generate more funds in order to purchase the required materials.

A widely held view amongst Kisabe committee members was that in the long term the community would be unable to sustain contributions at a sufficient level to fully cover the costs of the traps. Kisabe were therefore considering alternative means of generating income in order to ensure the continuation of the trapping programme. One suggestion was the sale of the processed oil from community plots. The proceeds of this operation would be used to purchase trap materials and also possibly to pay an allowance for trap servicing. Funds were to be sought from donors to purchase an oil press for processing.

Management

Responsibility for decision-making rests primarily with the Kisabe committee, which decides on overall deployment strategy (in line with the 3 phase plan laid down at the outset) and mobilisation strategy. On-going decisions concerning the traps - servicing, deployment and manufacture of new traps - are predominantly made by the Senior Trap Manager, who is a member of Kisabe, perhaps aided by one or two active trap managers. Block committees continue to be responsible for mobilising their own members and raising funds. They also deal with block disciplinary matters, which may then be referred to Kisabe if considered serious (such as the case of the farmer who sold one of ICIPE's sentinel herd animals).

Therefore, although the structure of the organisation appears to be decentralised and each block is individually registered as a self-help organisation, many decisions are made by the Kisabe

committee. In fact, due to a decline in Kisabe meetings, many decisions are now taken by a small number of key officeholders - in particular the chairman, the coordinator and the senior trap manager. The management burden on these individuals has therefore become considerable. The burden felt by other officials, in particular block chairmen is also potentially large and some have undertaken their duties more conscientiously than others.

The Impact of the Tsetse Control Programme

Benefits of Tsetse Control

As was envisaged in the original ICIPE proposal, the impact of any control programme extends beyond the technical considerations of tsetse flies and animal and human trypanosomosis. It also extends beyond the members of the organisation and certainly beyond livestock owners. For example women claim they have gained from an increase in milk, either for sale or consumption, and men from healthier cattle and larger herds (Table 3).

This exercise indicated that there were few differences in the perceptions of the various stakeholder groups of the benefits gained by the different groups; for example the responses given by both cattle owners and non cattle owners were similar under all headings. The benefits of tsetse control are therefore very transparent and recognisable by the community. The only exception was the views of the community with regard to the benefits to ICIPE staff, which were highlighted as job satisfaction and altruism, whereas ICIPE staff, mentioned job security and good experience as their own benefits.

Both members and non-members of the organisation quoted that although non-members had benefitted, they "*feel guilty that they have done nothing to help*", and "*they are like children who benefit from their parents, they have benefitted from the members*". There is, therefore, a clear recognition that non-members have been "free riding" on the contributions of members. It is important, nevertheless, to note a lack of resentment on the part of the members, only a feeling that non-members just require further education and persuasion so that they too will participate in future.

Impact on Tsetse

The impact of the traps on tsetse populations has been significant, results showing that up to 99.9% tsetse suppression was achieved (ICIPE, 1996). Catches have remained at a very low level with frequently no tsetse being trapped, e.g. during monitoring in August 1996.

The perceptions of the community corresponded with these data - "*we used to catch 20, 30 or even 50 per trap at the start of the project, now we only see one or two each Wednesday*". Prior to the trapping, tsetse were commonly seen within Nyaboro thicket - indeed it had been necessary to walk around there waving branches in order to avoid being bitten - and in other areas, particularly in the wet season.

Traps are widely regarded as an effective technology, by both members and non-members of the organisation and certainly many people remember earlier techniques. Only 2 people (both non-members) argued that aerial spraying was a better method.

Impact on Trypanosomosis

Trypanosomosis challenge fell by 91.0% between April 1993 and June 1995, whilst trypanosomosis infection in cattle declined between 84% and 60.6% in high and low challenge areas respectively. Overall cattle health also improved over the period analysed as evidenced by the decline in animals with a PCV (packed cell volume) of less than 24% (All figures from ICIPE, 1996).

The perceptions of the local population within the project area are largely in line with this assessment. As a consequence many cattle owners reported increasing herd sizes due to improved calving. Those without cattle also recognised improvements in cattle health and mentioned the increased availability of milk and oxen for cultivation. The number of donkeys was also observed to have increased along with improvements in the health of other animals, in particular dogs. With regard to human sleeping sickness the view amongst the community was that the traps had significantly reduced the risks of the disease although records at the sleeping sickness hospital at Alupe show the last recorded case of sleeping sickness from the Lambwe Valley was in 1990 - ie 4 years prior to the introduction of the traps in the area through this project.

Social Impact of the Control Project

The social impact of the project has been significant. A new organisation was developed and has been operational since 1993 and the Kisabe committee has since been used as a conduit for other development/agricultural initiatives (eg the Sisal Board of Kenya introduced exotic dairy cattle into the area, to be fed on sisal waste).

As noted, a small number of individuals are known to be particularly active and knowledgeable with regard to the trapping technology and have gained considerable respect from their neighbours. These individuals and their families have also been affected domestically due to the time they devote to their committee duties and, in particular, to trap servicing sessions.

DISCUSSION

The influence of ICIPE on the tsetse trapping activities of the community has been extensive. At the outset of the project, ICIPE were responsible for providing technical assistance which included training and advising on the organisation. The continued presence of ICIPE for research monitoring purposes impacts on the community-based control operations. For example, the ICIPE vehicle is a familiar sight and is often used on an informal basis to transport people to and from servicing, meetings and to transport materials etc. By purchasing the chickens collected as homestead capitation fee, ICIPE spares the community potentially difficult marketing problems in a location where transport is limited. Chance remarks by ICIPE technicians such as, "*haven't seen you at servicing for a while*" also encouraged some people to attend servicing sessions and, in general, committee members appear to rely on ICIPE to make suggestions rather than being proactive themselves.

The presence of the sentinel herd and the administration of Berenil to positive cases within the 15 linked herds has also had some unanticipated impacts. Although not part of the original plan, when the monitoring team are in the project area, sick cattle belonging to members, and even sometimes to non-members, are brought to them for testing. If the animals are found to be positive they are usually treated free. This practice is not widespread but 4 individuals did mention free Berenil treatment as influencing their decision to become members of the organisation.

Although, therefore association with ICIPE appears to be regarded as desirable and conferring some sort of social status, it also has other effects which may or may not be necessary and/or desirable in a project of this kind. It is certainly not possible to anticipate the impact of a complete withdrawal of ICIPE from the area. However, it is anticipated, not least by the community themselves, that their own implementation of trapping activities will become more difficult. At the same time, there was also a determination within the membership that tsetse trapping would continue with or without ICIPE - "*we would feel their withdrawal, but it is our own project and it is not ICIPE's project. We would just continue*". Knowledge about the technology, tsetse and trypanosomosis has been

disseminated, among the trap managers in particular, but also more widely within the community, and this should provide a strong basis for the continuation of the programme.

Evidence from elsewhere suggests that agreements with local populations about responsibilities, contributions and decision-making tend to become confused and begin to break down as project staff take over the organisation of activities (Mosse, 1996). In Lambwe Valley, it is likely that the failure of ICIPE to withdraw completely has restricted any necessity on the part of the community for further activity. It has therefore proved difficult to assess the conditions required for sustained participation and essential longer term external inputs.

The issue commonly arising in discussions about the provision of public goods, is the position of free-riders and the detrimental effect they have on collective action. Insofar as the tsetse control activities within the project area are concerned, this does not appear to have been a significant factor determining participation. Certainly participation is not widespread - both in terms of membership of the organisation and participation in servicing activities - but tsetse populations are currently under control and the prevalence of trypanosomiasis has reduced significantly. Members interviewed expressed the desire that others would become more active and that more people would become members, but there was no sense of resentment or indication that the actions of the "free riders" would deter themselves from contributing in the future.

Current participants perceive the benefits they receive from their participation as providing sufficient incentive to continue their efforts. It was recognised that the benefits of a tsetse-free environment are enjoyed by the whole community, but co-operating with the group also produced individual benefits. Participating therefore represents a rational choice, regardless of others' inactivity, since the personal gains are great and extend beyond directly tsetse-related benefits to such things as enhanced social status. Similar findings have been made in other areas of collective action (see Uphoff 1996).

Nevertheless, problems are beginning to surface and the challenge for the community will be to address these difficulties and arrive at a sustainable outcome. More traps are needed if phase 2 is to be completed and a barrier along Ruma National Park is to be deployed, as well as the on-going replacement of existing, worn out traps. However, a review of the trap deployment strategy has not been made by the Kisabe and it is not clear whether the observed lack of trap maintenance within the thicket is a sign of the collapse of group based action or merely a consequence of reduced fly catches.

Problems have been experienced with generating sufficient funds. The Kisabe committee have been considering fund-raising options which do not rely solely on contributions from individual members, such as the mooted sunflower oil scheme. They have, therefore recognised the weaknesses of the existing method of fund collection and appreciate that a strategy for fund-raising is needed. The option of relying on another outside agency would not appear to be sustainable.

However, it must be borne in mind that fly numbers have significantly reduced and indeed are rarely seen, both within the project area and Ruma National Park, so the deployment of further traps may not be necessary at present. Although the NGU traps are undoubtedly effective, the activities of KETRI, and now KWS, within Ruma National Park must have had some impact on the level of challenge in the project area: while these targets were observed to be in a poor condition, tsetse numbers within the Park remain low (Mihok, ICIPE, pers.com). If tsetse populations were to build up again in the future, again, following Mosse (1996), the main issue would be the ability of the community to respond/ organise, when the need arises.

Trap managers are those primarily responsible for servicing and also for training other members of the community and ordinary members often indicated that they had not been trained so they could not participate. The committees felt that more training was required if increased participation was to be

achieved, but no sessions were planned, due to a lack of trap materials or an expectation that ICIPE should organise further training.

The burden of labour contributions has been carried by a relatively small number of people, compared to the size of the population in the project area. Although more individuals participated in the original transect cutting and trap deployment, regular servicing is attended by few. Furthermore, maintenance sessions seem to be haphazardly organised in terms of work undertaken and duration of time spent on activities. Nevertheless the maintenance was observed to have been largely satisfactory and most traps and transects were reasonably well cleared. Large numbers of people are not required every week and for much of the year the servicing is not particularly arduous.

The rota system which was proposed has not been implemented in any block, although in theory it should reduce the labour contributions expected from individual members significantly. However, the management cost of implementing such a strategy would be considerable.

It is not the actual difficulty or duration of the work which has proved to be a problem, but rather the placement of the traps in relation to the distribution of population in the area and thus the journey time involved in attending a maintenance session. The distance from the far blocks to Nyaboro thicket is undoubtedly a disincentive to their regular participation. The allocation of responsibility for the traps to the adjacent blocks should ease this problem in those areas.

However, maintenance sessions, and indeed meetings, cannot be viewed solely as tsetse control functions. Rather they must be seen in the wider context of social action/interaction. Although the need for more participants was regularly mentioned, to date the tsetse control activities have been undertaken reasonably satisfactorily. Is the existing "core group" of active participants viable for sustainable management, therefore? It appears that a grouping, which looks quite different to that which was originally intended, has formed spontaneously: an open group whose boundaries are fluid but whose core remains the same. The tsetse control activities are now embedded in this small group. This has occurred in other situations of collective action, although such groups are usually based on existing exchange relationships - based on kinship, residence etc (Mosse, 1996). In this case the core group are not necessarily connected by family or village ties, but rather have unconsciously formed a new "unit" within the community. Furthermore, the organisation and activities have evolved and adapted to meet the needs and the capabilities of the community rather than strictly adhering to the original project design, such as the rejection of the rota system and the abandonment of Saturday servicing. A dynamic social process has therefore taken place since the inception of the project.

Participation levels in terms of labour/time may look low, but have sufficed to date; financial contributions, however, have been less satisfactory. At this stage, whether the structure which has evolved to manage the tsetse control programme is sustainable cannot be clearly ascertained. However, current activities appear to be sufficient for present tsetse challenge levels and the knowledge certainly exists within the KISABE to mobilise the community should the need arise.

SOUTH EASTERN UGANDA

Two projects were covered in South Eastern Uganda, the Government Control Programme coordinated by COCTU and the LIRI Research Project.

METHODOLOGY

Research was undertaken in South Eastern Uganda during October and November 1996. For the government control programme, literature research and interviews were held in Entebbe, at the Ministry of Agriculture and COCTU, in Jinja at the project management office of the Sleeping Sickness and Trypanosomiasis Control Project for South East Uganda, and in Iganga at the District Entomology Department of the Ministry of Agriculture. Subsequently community interviews were undertaken in Namugongo Sub-county, Kamuli District. The secondary data studied included COCTU annual reports and the minutes of monthly technical field staff meetings (two such meetings were also attended).

Primary data was obtained mainly from interviews conducted with project personnel (senior and field staff) at the above offices and from both semi-structured interviews and informal discussions with community members in the locations visited and local community workers engaged in tsetse control/sleeping sickness activities. A stakeholder analysis was also undertaken with these interviewees in order to gauge their perceptions of the benefits to them and to others of tsetse control operations. A total of 53 interviews were conducted in two of Namugongo's seven parishes (Bugonza and Butege). Purposive sampling was undertaken in order to ensure a range of households were visited (ie male and female headed households, cattle and non cattle owning households, households with and without traps on their land, plus the local headmen). The sample was arrived at in conjunction with a local councillor and shop owner. Interviews were held with individuals, couples or small groups, depending on who was present. Interviews were conducted in Basoga, through an interpreter. A large number of traps were also inspected in the area.

In addition, the researcher attended a screening session (for both cattle and humans) at Ibulanku Sub-County, Iganga District where an outbreak of sleeping sickness was suspected and the trapping programme was to be implemented for the first time. Interviews for community tsetse workers in Ibulanku Sub-County were also observed.

Fieldwork was also carried out in Bukooli County of Iganga District, where a community based tsetse control research project is being conducted by LIRI. Project staff were interviewed, as were other officials involved in the work - a community health educator and a women and youth affairs officer. Field visits, accompanied by some of these officials, were made to three villages, one women's group, Nabukalu sub-county headquarters and a local primary school. A community drama presentation was also attended. In addition, numerous traps and tree targets were observed.

THE GOVERNMENT CONTROL PROGRAMME

BACKGROUND

Project Area

The government tsetse control programme in South Eastern Uganda operates in six districts - Iganga, Kamuli, Jinja, Tororo, Mukono and Palissa (Map 3); the former three districts correspond to the area previously called "Busoga". Historically this was the homeland of the Basoga people and they still represent the majority of the population of the area.

Iganga and Kamuli districts, which cover 4,823 km² and 3,332 km², had populations of approximately 946,000 and 485,000 respectively in 1991⁴. Average population density is 196.1 per km² in Iganga District and 145.6 per km² in Kamuli District. The majority of households are engaged in small scale farming, growing food and cash crops of banana, maize, sweet potato, coffee and cotton. Livestock do not provide the primary source of income for most families, although the majority of households keep small numbers of pigs, goats and/or cattle. Natural vegetation is a savannah - forest mosaic traversed by small swamps (Semakalu et al, undated), but much has now been cleared for cultivation and settlement.

Tsetse fly (*G.l.f. fuscipes*) are widespread throughout the area. They favour riparian habitats and *Lantana camara* bushes, although it has also been suggested that they have become peri-domestic in their behaviour, breeding in coffee and banana plantations (Okoth, 1982). As mentioned above, many tsetse control methods have been used in the past, all organised on a centralised basis by government agencies and only partially successful. However, local people also undertake measures themselves to reduce the risks of trypanosomosis, by chopping down bushes, in particular *Lantana camara*, from around their homes.

In 1976 an outbreak of sleeping sickness was reported in Iganga District, which subsequently spread to Kamuli and Jinja Districts, followed by Mukono and Tororo Districts. The annual incidence of the disease in Busoga peaked in 1980 (8464 cases) and again in 1987 (6674 cases) (Mbulamberi, 1990) after which the current trapping programme was instigated.

Project History

In 1986 COCTU was set up with the aim of establishing and co-ordinating an integrated approach to tsetse and trypanosomosis control in Uganda and subsequently an approach was formulated which also entailed the involvement of local communities. Both Health and Agriculture (Veterinary and Entomology Departments) Ministries were involved, together with research organisations, in order to ensure a truly integrated approach.

The main components of the strategy were tsetse control using trapping technology, medical screening of the local population and veterinary screening of local cattle. The trapping component of the programme was co-ordinated from its inception until 1995 by Dr Jannick Lancien, a French scientist who had previously worked in West and Central Africa. The traps used were of pyramidal design, constructed of blue and black cloth and mosquito netting with wooden or plastic rods as support (Figure 1b). Traps were impregnated with Deltamethrin insecticide, although they also work without being impregnated. The traps were either hung from trees or from specially constructed frames.

⁴ All population figures have been taken from the 1991 Population and Housing Census of Uganda.

Since its implementation, the programme has been funded at various times by the EU, the WHO and the Ugandan Government. At its peak, over 14,000 traps were in place, covering a total area of 5,850 km². In September 1996 this had decreased to 6,139 traps, in line with the reduction in trypanosomiasis challenge in the area. However, constant monitoring throughout the area ensures that the programme can respond to changes in tsetse numbers and distribution; as trap numbers are reduced in one area the programme may be initiated in another if sleeping sickness cases and/or fly numbers appear to be increasing.

Tsetse Control/Entomological Component

In 1988 two workshops were established, one in Bugiri, Iganga District and the other in Namugongo, Kamuli District, which were responsible for the manufacture of the traps. The employees for these workshops were recruited locally - 2 in Bugiri and 15 in Namugongo. The traps were then distributed by the technical team in accordance with the deployment strategy drawn up at the monthly technical meetings of the Sleeping Sickness and Trypanosomiasis Control Project for South East Uganda. This meeting comprised technical staff from the Veterinary, Health and Entomology Departments, UTRO and COCTU.

Traps were deployed at a density of 8 per square kilometre in high risk areas and had to be replaced at 8 monthly intervals. Records were maintained and the trap density was usually reduced to 4 per square kilometre after 3 years, if conditions permitted.

Within each sub-county, community workers (trap caretakers) were recruited to be responsible for trap maintenance and deployment in conjunction with the technical teams. These community workers were paid a small salary and provided with equipment such as a bicycle and gum boots.

Committees were formed at district, sub-county and parish levels as and when trapping activities commenced in these areas. District committees comprised senior officials such as the District Veterinary Officer and the District Medical Officer. At sub-county and parish levels, members are elected to the committee by the community; their role is to liaise with the technical teams and particularly the trap caretakers. Villagers are expected to help with trap deployment and clearing around the traps regularly. Mobilisation for this is undertaken by the trap caretakers and the parish level committees.

Medical Component

Due to the seriousness of the sleeping sickness problem in South Eastern Uganda, from the outset much emphasis was given to the medical component of the control strategy. Twenty health centres were set up and equipped for the control of the disease in the endemic areas (Semakalu et al, undated). "Sleeping Sickness Aids" were also recruited in each affected sub-county; they were paid a salary and given a bicycle; it is their job to travel around the sub-county, checking on the health of local people and taking blood samples where necessary. These samples are checked at the local health centres and the sleeping sickness aids pass on the results and advise people where to seek treatment. This process is termed passive surveillance.

Wherever an outbreak of sleeping sickness is suspected, active surveillance will also take place. This involves an integrated team, with a medical component, visiting a sub-county, setting up a mobile clinic and taking blood samples from whoever attends. This usually occurs in conjunction with the onset of a trapping programme in the area.

Meetings

Despite the widespread knowledge about the tsetse control operations, only a minority of people indicated that they had ever attended any meeting called to discuss the issue. Fourteen (13 men and one woman) said they had attended meetings when the programme was initiated in the late 1980s, but only four had been to any meeting since then. Thirty two people, however, claimed that neither they nor anyone from their household had been to any meeting on the subject.

The intention had been for parish committees, trap caretakers and sleeping sickness aids to call regular meetings to mobilise the community for trap clearing and to be aware of the problems of sleeping sickness. The committee members interviewed claimed that regular meetings had been held when trapping commenced, with reasonable attendance, but that their frequency and attendance dwindled as the programme became more established and that no meetings had been held for some years. The chairman commented that he did not know if he was even still the chairman or if there was still a committee.

In Ibulanku, the researcher observed the first meeting held there by the control programme. The meeting, which had been pre-arranged and advertised by the local council, was attended by 26 men and one woman (the sub-county had a population in 1991 of 28,289). A presentation was given by members of the technical staff about the control programme - sleeping sickness, tsetse, control methods and community participation, ie what was expected of the local people. This was followed by the election of officers to the sub-county tsetse control committee. Most, though not all, of those elected were present at the meeting - others were chosen in absentia. Since all those elected were men, it was felt that a female member of the committee was required, so one was duly elected. The meeting was then advised that interviews for the posts of trap caretakers would take place in Ibulanku in one week's time and people were asked to spread this information widely throughout the sub-county to ensure sufficient applicants. The entire proceedings were very top down with little interaction between the presenters and the audience apart from the elections.

Two of the monthly technical field staff meetings were attended. These involved presentations on the various components of the programme, together with a report from COCTU. The meetings represented a valuable channel of dissemination and ensured that information on trends was both shared and regularly reviewed. This in turn enabled the control programme to respond to changing situations both effectively and promptly.

Impact of the Tsetse Control Programme

Benefits of Tsetse Control

Without exception, all members of the community interviewed cited a significant reduction in the incidence of sleeping sickness as the primary benefit of the tsetse control programme. So overwhelming was this perceived benefit, that the stakeholder analysis undertaken in Namugongo revealed no other benefits to any stakeholder group. This is probably not surprising. Prior to the traps, periodic sleeping sickness epidemics had occurred and everyone knew someone who had suffered from the disease. The area has a long history of sleeping sickness and tsetse control to alleviate this problem is regarded as highly beneficial. Sleeping sickness obviously poses a risk to all members of the community and no difference was identified in the way different groups had benefited.

Other related benefits were revealed in the more detailed interviews held. Apart from the obvious distress of the disease itself, its impact on the productivity of both men and women and the costs of hospital fees were regarded as additional burdens of sleeping sickness. Interestingly, though, some

of those attending the meeting in Ibulanku remarked that a benefit of the trapping programme was the opportunity to earn an allowance and also to be respected in the community. The improvement in the health of livestock, particularly cattle and dogs, and the consequent decrease in veterinary treatment costs, was also recognised as a benefit, although only mentioned by eight respondents.

The control programme has proved highly effective in terms of reducing the incidence of sleeping sickness, although the disease remains endemic in the area. Throughout the period since 1988 as the disease "hot spots" have shifted, control efforts have moved to new areas. The programme is designed to respond to changes in the fly and disease situation which are indicated by the on-going monitoring activities carried out by the various components - medical, veterinary, entomology and research - and from reports of field workers, particularly medical staff, working throughout the area.

Monthly meetings of the technical field staff ensure that information is regularly shared between departments and that decisions made about the control strategy are implemented as quickly as possible. The responsibilities of the various components are distinct, communication appears to be good and overall, the integrated approach of the programme, therefore appears to work very well.

Impact on Tsetse

The impact of the control operations on tsetse populations has been significant, with apparent fly density reducing by 95% after 8 months of trap deployment (Semakalu et al, undated). In Namugongo, for example, in October 1996 an average of 0.015 flies per trap per day were recorded; in 1990 this figure was 0.1 (earlier figures were not available). However, within the sub-county, fly distribution is uneven and in some parishes flies are very rarely caught.

The community in Namugongo agreed with this assessment and everyone commented that fly numbers had declined and tsetse were no longer seen. Previously they had been present even around homesteads and were recognised because of their nasty bite. However, 10 individuals also mentioned that tsetse seemed to be increasing again - they were seeing them more often, particularly in bushy areas. This was blamed on the reduction in trap numbers and it was felt necessary for more to be deployed.

The traps were regarded as an effective technology for reducing tsetse numbers and assurances as to their continuation (and no further decline in trap numbers) were sought by the community. Spraying was also regarded as having impacted on tsetse populations and 27 responses expressed a hope that this would also be resumed, in conjunction with the trapping programme.

Impact on Trypanosomosis

The reduction in human trypanosomosis since the inception of the programme has been considerable; in Busoga the number of confirmed cases fell from 6674 in 1987 to 148 cases in 1995. Sleeping sickness continues to be a problem in the area and Iganga District continues to represent the highest risk area.

The perceptions of the local community clearly corresponded with these figures. The reduction in sleeping sickness has been significant and highly visible. The community are very knowledgeable about the symptoms of the disease and what to do if these manifest themselves. The education campaign has therefore been highly effective and the on-going medical activities of the control programme have proved able to rapidly respond to possible increased incidence of the disease in any area. However, during a meeting of the technical field staff in November 1996 it was commented that

too many of the confirmed cases were late cases⁵, indicating that surveillance and education/awareness activities must be improved, and individuals should be encouraged to seek medical assistance earlier. In Ibulanku there was considerable confusion, particularly among the younger members of the community, about the differences between sleeping sickness and Aids. The latter is a serious and growing problem in the area and much attention has been given to health education on the issue. It is therefore uppermost in people's minds. Sleeping sickness, although a health problem, has not affected Ibulanku seriously for at least the last 10 years and its causes and symptoms were not well known, at least to younger people.

With regard to animal trypanosomosis there was less data available. However, the perceptions of the local community were that animal health had improved, productivity increased and there was less need to seek veterinary assistance than in the past. Improved livestock health was also mentioned by non livestock owners as an important impact of the trapping programme. The severity of the human sleeping sickness problem in the past, however, has meant that more emphasis has been given to the impact of the control programme on human trypanosomosis than animal trypanosomosis.

DISCUSSION

Although a "community based" activity, this control programme was never intended to be placed in the hands of local people. The actual involvement of local people in the programme is minimal and communities would be incapable of continuing any of the control activities without significant external support. With regard to the trapping programme, trap caretakers have been employed to undertake most of the tasks and there is little knowledge within the community about the work involved. Although people have been sensitised about the role of traps etc, there has been little attempt to engender any feeling of local ownership of the technology: in some cases people have been forbidden from touching the traps. It is not surprising, therefore, to see traps located very close to homes which are ineffective due to small, easily rectified faults (such as being wrapped around a tree, or with a stick support missing). Clearing around traps was also not being done satisfactorily; indeed there was considerable confusion as to whose responsibility this actually was. The message about community responsibility for this activity had either been forgotten, or people had lost or never had any interest in participating in this work. Likewise the commitment of the sub-county and parish tsetse committees towards mobilisation had also dwindled.

Fieldwork in Namugongo may not have provided an accurate picture of the current situation in other areas, although it does indicate some of the problems likely to be encountered with regard to the sustainability of local involvement in this way. Although it is often argued that the apathy of people towards participating in tsetse control activities increases as the control measures take effect and the risks of trypanosomosis recede, this does not appear to be the case here. Despite the length of time since sleeping sickness was a severe problem, individuals continue to diligently clear *Lantana* bushes from around their homes and fields in order to reduce favoured tsetse sites. They, therefore, continue to regard tsetse as a potential risk. It is more likely that the distinct lack of "ownership" and the knowledge that there were people employed to do the work undoubtedly played an important part in demotivating community members from participating in trapping activities once the initial novelty of the programme wore off.

⁵ Human sleeping sickness has two distinct stages. In the early stages the trypanosomes are in the blood and symptoms include fever, intense headache and often a chancre. In the late stage the trypanosomes have entered the nervous system and the earlier symptoms become more severe, accompanied by inter alia sleeplessness and weight loss.

In Ibulanku, where traps are currently being deployed, the message to the community was similarly confusing. On the one hand, at the initial meeting, the need for local community support for and participation in the programme was stressed, on the other hand, 16 individuals were to be recruited - and paid - to care for the traps. The perception that these workers should be responsible for all trap activities, including clearing, will be difficult to dispel.

Despite the apparent lack of enthusiasm for clearing around the traps, the effectiveness of this particular technology has been proven and people are keen that trapping should continue. The impact of past sleeping sickness epidemics remains a vivid memory for many and this has undoubtedly facilitated sensitisation. However, in areas such as Ibulanku, where sleeping sickness has not historically been so severe, the interest of the population in the programme may diminish more rapidly than in Namugongo, for example. The severity and extent of the current Aids problem could well exacerbate this situation by providing an alternative focus for people's concerns. An effective and on-going public awareness campaign about the trapping may be even more vital in such circumstances.

Although concerns about local participation in this programme might be expressed, the central feature of the programme is a centralised, top down, government funded organisation which relies for its success on continuous field based data and close co-ordination between a number of ministries and departments. The programme strategy is not one which relies on continuous trapping throughout an area but rather one which moves in response to changing challenge. It is difficult to conceive of local involvement in a continuous sense in such a context.

While the programme has been successful, all the evidence supports the view that a continuous, long-term programme will be necessary. The sustainability of the current programme design depends on a continuous flow of funds from outside the project areas. Much of the funding for the control efforts has come from external donors and it is anticipated that this will be the case for the future, although the Ugandan Government has funded the programme in the interim. As a significant public health issue, the campaign against sleeping sickness is likely to continue to attract funds. However, the overall cost of the current programme has been significant, for example Lancien (1995) quoted the annual cost of the traps alone at US\$72,000 in 1993. Traps now cost approximately US\$10 each (Obayi-Avucha, per.comm); so with 6,139 traps deployed and being replaced every 8 months, the annual cost of traps amounts to US\$81,850.

In addition, the amount of logistical support and co-ordination required just for the trapping component is considerable - manufacture and distribution of traps, co-ordination of field staff, collection of data etc, all over a relatively large geographical area. At the current time these issues are all handled centrally (in Iganga). The success of the trapping operations, therefore, depends to a large extent on the maintenance of sufficient capacity within the Iganga office. The medical component, on the other hand, is more decentralised: there are clinics for treatment of sleeping sickness and diagnostic facilities/capabilities distributed throughout the area. The same is true for veterinary services. Nevertheless, continuation of adequate staffing levels and provision of materials - all dependent on continued funding - is necessary if the programme is to survive. Without such outside support the programme is unsustainable.

THE LIRI RESEARCH PROJECT

Project History

The LIRI research project has had two distinct phases⁶, a pilot phase commencing in 1988 and running until 1992 based in Kapyanga and Nabukalu sub-counties, Bukooli County, Iganga District. The second commenced in 1993 and is still on-going and operates in the whole of Bukooli county (Map 4). Both phases have been funded by the WHO and implemented through LIRI (previously UTRO), under the direction of one scientist, Mr J Okoth.

The concern in both phases has been to develop trapping technologies suitable for community participation, promoting these technologies and assessing the possibilities for community participation in tsetse control. Okoth has been interested for some time in designing traps, which are low cost and use local materials, making them suitable for community ownership (Okoth, 1985). A monoscreen trap was developed and tested for use in this research project (Okoth, 1991). The trap consists of all locally available material - a blue and black screen topped with conical shaped netting and a small cylindrical collecting container with trap supports made from local branches/twigs (Figure 1c). No insecticide is used.

The pilot project covered two blocks, one served as an experimental area where trapping would be carried out (Nabukalu) and one as a control area (Kapyanga) (Okoth et al, 1991). A group of 10 (later 15) local people were trained in tsetse biology and ecology, sleeping sickness transmission, control methods, trapping and community participation. These individuals set traps around their villages and recorded trap catches. They were then involved in educating and sensitising local leaders (chiefs and Resistance Council members) through a series of seminars. Having gained the support of the local leaders, seminars were then held in the villages. The community decided to organise the purchase and making of traps around groups of three households and some individuals decided to make their own traps. Cattle owners were also to contribute together, depending on size of herd, in order to place traps at watering holes while women were to be encouraged to contribute towards traps to be placed at wells/boreholes. The cost of the traps at that time was Ush 1600 (US\$4.2). When the pilot project ended, 168 traps had been deployed. Unlike other traps, the monoscreen traps are designed to be deployed on a daily basis - put out early in the morning and brought in in the evening. This supposedly increases their lifespan whilst still being in place at times when tsetse are active. If no tsetse have been caught in a trap for a period of seven consecutive days, owners are advised to move it to another area.

The current project has the overall objective of “studying the feasibility of integrating community involvement in tsetse control into primary healthcare systems in Uganda”. In this phase more attention is given to mobilisation and sensitisation. As in the pilot phase, people are encouraged to buy materials and make traps either individually or in small groups. In addition, the painting (blue and black) and impregnating of tree trunks to act as tsetse screens has commenced. Paints are provided by the local council at sub-county level (LC3) and the work is done by LIRI staff. There were 113 painted trees by October 1996.

Other government-paid, local community workers are involved in this phase, such as the county health educator and the officer in charge of youth and women’s affairs. The original group leader is now the “general manager” of Bukooli county project and is engaged in mobilising community participation, in conjunction with the government officials. Primary schools are visited and drama has been utilised to spread the message about the need for trapping (by both the Bukooli County

⁶ Funding has not been continuous throughout both stages of the project and there have therefore been gaps when there was no work going on in the field.

tsetse control actors group and by two women's groups). By October 1996 there were 93 traps in the area.

Another development has been the establishment of COVECO (The Community Based Vector Control Organisation) as a non-governmental organisation founded by Mr Okoth. COVECO is based in Tororo and its aim is to mobilise and involve the rural community in vector control on a self-help basis. Tsetse/sleeping sickness control is covered by the organisation, which employs a small number of technical staff to train people about trapping technology, and to sell traps or materials. Individuals can become members of COVECO, for a small fee, and can then access COVECO expertise and advice. The precise division of responsibilities between COVECO and LIRI in the field is unclear.

The area covered by this project is within Iganga District and, therefore also potentially subject to trapping by the government's tsetse control programme. Although government traps were not installed in Nabukalu and Kapyanga sub-counties at the outset of the LIRI project, they have subsequently been included and trapping has also occurred in other parts of Bukooli County.

RESULTS

Participation

As mentioned above, much emphasis has been given to educating and mobilising the community about the risks posed by tsetse. A particularly important development has been the involvement in the project of existing community workers (health educator and youth and women's affairs officers). These individuals have incorporated tsetse and trapping messages into their normal work routines, ensuring that extension is both widespread and on-going. Considerable attention has been given to community extension efforts: the original group was trained to pass information to their neighbours and to groups of local leaders; community drama groups have developed and performed plays to disseminate the message to their neighbours; and children have been encouraged to teach their parents about tsetse control.

There appeared to be a high level of awareness about the project and the need for the community to own their own traps. The drama, for example, proved extremely popular and the performance attended by the researcher attracted a large and attentive crowd. The message was clear and this appeared to be an effective and enjoyable means of dissemination. Similarly, the children in the primary school visited demonstrated an understanding of the tsetse problem and how to make traps.

Despite the attention given to education and its success in raising awareness, mobilising the community to buy and make their own traps has proved more difficult, with relatively small numbers of traps actually having been deployed (currently only 93 in Bukooli County, an area of 375km²). Of these traps, 32 are individually owned while 61 are owned by groups (12 by primary schools, 10 by women's groups, 22 at water points and 17 by community groups). Individuals or groups who had invested in their own traps were happy with the technology and pleased that they no longer had to rely on the government to take control measures. They felt they now had the knowledge to be able to protect themselves and their families to some degree.

In some areas the presence of the government's pyramidal traps had deterred local ownership; there was obviously no need for them. In two villages visited the government traps were no longer operational, having been either removed or become dilapidated. Nevertheless, since people felt that tsetse numbers had gone down, they had not been replaced by locally owned traps. A small group of local leaders, however commented that because of the LIRI project, they had the necessary

information and knowledge which would enable them to mobilise themselves in the future if fly numbers and sleeping sickness increased.

Impact on Tsetse and Trypanosomosis

It was impossible during this research to determine the impact on tsetse and trypanosomosis of the monoscreen traps. The government control measures will have had a confounding effect in some areas and in others, there was no data available to assess impact. However, as far as the community are concerned, the monoscreen traps catch tsetse flies and are regarded as an effective and successful technology.

DISCUSSION

The LIRI Project contrasts sharply with the government project. The underlying rationale of the LIRI project centres around the assumption that due to economic and logistical difficulties, donor-funded tsetse control cannot be sustained in the long term making it essential for local communities to acquire the capacity to undertake control measures themselves. Appropriate technologies have thus been developed and control strategies disseminated which it is hoped will prove to be sustainable. By incorporating existing community workers into the mobilisation strategy it is anticipated that sustainability, at least of information dissemination, will be facilitated since these staff will continue to work in the area when the research project ends. As community workers, they are skilled at community education and mobilisation and are well placed to promulgate the tsetse message in the course of their normal duties. Furthermore, the way in which community members themselves have been involved in mobilisation/ education appears to be successful and should aid sustainability. The extension effort in primary schools should ensure that the concept of tsetse control is understood by the younger generation.

The apparent success of the education strategy and the enthusiasm of the community has not, however, translated itself into a commitment to buy materials and make traps. Although those with traps appear to be happy with their purchases and the effects they have had, there is still some reluctance on the part of others to invest in their own.

Due to the confounding effect of the government project, it is again difficult to draw clear lessons from this project. However, the monoscreen trap is cheaper than the pyramidal trap and the materials are all available locally; it thus appears to represent a technology appropriate for community use. If tsetse control is to be genuinely managed by local populations such cheap technological options are essential for the strategy to be sustainable. In addition, local education, which is at the centre of the project, is critical if communities are to take action themselves.

BUSIA PROJECT, WESTERN KENYA

METHODOLOGY

The researcher attended two group meetings organised on her behalf by the Kenyan Trypanosomiasis Research Institute (KETRI) technical assistant who had previously worked on the project. One meeting was held at Rukada village: 18 people were present (15 males and 3 females), including the chairman of the village tsetse committee and 7 other committee members. The second meeting at Apatit was initially attended by just three individuals, the tsetse committee chairman, treasurer and an ordinary member; a village elder and another committee member arrived half way through the meeting. This meeting was also attended by a local community health worker employed by KETRI. At both meetings the KETRI technician was present and participated, answering questions posed by the attendees or elaborating on answers given by them.

BACKGROUND

The "Busia Project" was undertaken by KETRI in Busia District, Western Province of Kenya, between 1992 and 1995. Subsequently district boundaries were altered and new districts created so that one of the villages studied by the project now lies in Samia District, whereas the other lies in Teso District. However, this report will continue to refer to the area as "Busia District" (Map 2). Pyramidal traps constructed of blue and black fabric, similar in design to those being used in the government programme in South-Eastern Uganda, were used in this project (Figure 1b).

Busia District is in the extreme west of Kenya, bordering Uganda (Tororo District) to the west and Lake Victoria to the south-west, with the tsetse fly belt of South Eastern Uganda extending into the District, the main species being *Glossina fuscipes fuscipes*. The area experienced a severe outbreak of human trypanosomosis between 1987 and 1990 and it remains endemic at a low level. Animal trypanosomosis is also a problem, with a prevalence of 6.8% in cattle being recorded (Okech, et al, 1991), and cattle act as reservoirs of human sleeping sickness. At Alupe, near Busia Town, KETRI run a Sleeping Sickness Hospital to which patients are referred for treatment from many parts of Kenya.

The Busia project was a research project undertaken by KETRI with funding from the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. The project had two distinct phases. In phase one the objective was to assess the socio-economic factors affecting the implementation of community-based tsetse control (Kamara et al, 1994). Six villages within Busia District were selected for study during this phase and interviews, focus group discussions etc were held to elicit information. These were followed by community education regarding tsetse, trypanosomosis and the need for community based tsetse control. Posters were displayed and drama presentations were performed. The willingness of households to contribute labour and/or money to tsetse control was assessed; 57% of respondents indicated they would contribute labour and cash, 28% only labour, 10% only cash and 3.9% said they were not prepared to contribute labour or cash (Mwangi, 1996).

Phase two⁷ of the project aimed to implement a pilot programme in two of the six villages - Rukada and Apatit. Following entomological surveys in the area, a series of village *barazas* (public meetings) were held at which the objectives of the project were introduced, further community education undertaken and tsetse committees elected. This was followed by committee-organised *barazas*, the mobilisation of the community to contribute resources, training of selected people, trap site selection and manufacture and deployment of traps. KETRI collected the contributions made as payment for the traps.

Most of the details about phase two of the project have been obtained from Mwangi (1996)

The Rukada village (actually 5 closely located villages) area covered 10km² with 289 households whereas Apatit area covered 15km² with 161 households. With a trap density of 4 per km², 60 traps were required in Apatit and 40 in Rukada. Trap deployment commenced in April 1995.

The research team divided the villages into blocks (six in Apatit and four in Rukada) and block leaders were elected by the residents. The role of block leaders was to allocate duties to block residents and to record data for KETRI. The intention was that every trap would be checked daily by block residents. There were 6 to 12 traps per block. Unfortunately traps were placed along the river and many were destroyed when the river flooded. Many others were destroyed by rats.

During phase 2, following requests from the local community, a mobile clinic staffed by the KETRI sleeping sickness hospital in Alupe was present at the KETRI-organised *barazas*. The villagers were to be given prescriptions at wholesale prices by the clinic. This clinic was intended to encourage people to attend *barazas* and to participate in the tsetse control activities.

The KETRI research team completed their studies in August 1995 and left the area. Meanwhile, the community were expected to continue with their tsetse control activities.

RESULTS

Participation

According to data collected by KETRI, actual contributions of both labour and money were lower than those quoted in the phase 1 (willingness to contribute) study, except for money contributions in Rukada (see table below).

Table Willingness to contribute resources for tsetse control

	Apatit	Rukada
Willing to contribute money	73%	40%
Actually contributed money	60%	61%
Willing to contribute labour	93%	80%
Actually contributed labour	67%	71%

Source: (Mwangi, 1996)

Since the KETRI research team left the area, participation has dwindled in both villages and when visited in September 1996 there were no traps deployed. In Rukada it was stated that most had been destroyed by rats or swept away when the river flooded (most traps had been placed along the river). A number had also been burnt when the surrounding areas were being cleared. Although it was reported that a few traps still remained, when one of these was visited there was no trap in place, just some shreds of fabric, with no evidence of any clearing having been done for some time. In Apatit the meeting reported that many traps had been destroyed by rats and some had been stolen while the remainder were removed by households within the blocks who were keeping them in their homesteads until it was decided what should be done.

At the meeting in Rukada it was reported that the tsetse control committee had held their last meeting at the end of August 1996 and that a general meeting for all members should be called in order to discuss the future of the project. The last such general meeting was held in August 1995, ie when the KETRI researchers left the project area. It seems that since the principal KETRI researcher left, there

has been no KETRI presence in the area - *“we have been abandoned by them. Even if they came once every 2 or 3 months, this would motivate us”* commented the chairman. According to the attendees at the meeting, KETRI’s withdrawal had been sudden and unannounced, leaving them not knowing whether or not to continue. Nevertheless, they expressed a wish that the project should continue and that they would continue to contribute, although they would like more assistance from KETRI.

In Apatit there was no indication amongst those attending the meeting that their tsetse control activities would continue. There was a feeling of resignation about the project - it had ended and people were not interested in anything continuing. No trap servicing had been undertaken since the KETRI team withdrew, nor have any meetings been held. Although it was reported that the majority of households had made some financial contribution towards the project, only a small number had paid the agreed amount and there was no intention to collect further funds. Indeed it was commented that *“people really believe that the project was for KETRI and Damaris and Tom [KETRI researchers], not for them”*; the objectives of this “community-based” project thus having been misunderstood.

In both locations dissatisfaction was expressed about two aspects of the project. First, the medical services were regarded as an essential part of the programme and when these were no longer provided, people felt that were not getting anything in return for their participation. Secondly, people felt that KETRI had taken funds from the community and given nothing in return and did not appear to appreciate the fact that the funds were taken as part payment for the trap materials which had been supplied. Although the chairmen and other committee members in both villages recognised this, they said that the community generally had misunderstood and believed that KETRI owed them money/materials.

Impact of Tsetse Control

In both Rukada and Apatit the attendees at the meetings indicated that the traps had successfully reduced tsetse numbers and improved cattle and human health, all representing significant benefits to the community. In addition, in Apatit, an increase in knowledge about tsetse flies, the symptoms of sleeping sickness and livestock treatment (since they had seen the drugs which KETRI used and could buy them themselves) was mentioned as a welcome benefit. The attendees at this small meeting had all been to KETRI training sessions. In Rukada several individuals also mentioned that they had acquired knowledge about what drugs to use to treat livestock for trypanosomosis and that this was beneficial.

DISCUSSION

Although this project was a research trial rather than a control programme, it was intended to be a “community based” project and there was commitment to this objective. The community education and dissemination efforts prior to trap deployment successfully increased knowledge about tsetse and trypanosomosis but failed to deliver the message that this was to be a community owned programme. There was no apparent sense of ownership of the scheme amongst the community visited: the project was seen as KETRI’s and nothing had been done subsequent to KETRI’s withdrawal. This was more obvious in Apatit (a less populated and more dispersed community with more traps to deploy and manage) but even in Rukada no action had been taken since the researchers left the area. While the incentives were given by community members as justification for the cessation of interest, all projects include some incentives and perhaps additional reasons must be sought to explain the lack of interest shown.

A number of possible reasons can be proposed but possibly one of the more important relates to the short term period of project activity in a location with a long history of tsetse control programmes which had no demand for local participation. Also, unlike the case of the other programmes covered in Uganda and Kenya, the implementing organisation, KETRI, simply left the area.

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REPORT ON FIELDWORK CONDUCTED IN ZAMBIA

February - June 1997

ZAMBEZI ISLANDS, WESTERN PROVINCE

KALOBOLELWA COMMUNITY PARTICIPATION TRIAL, WESTERN PROVINCE

MSANZARA CONTROL TRIAL, EASTERN PROVINCE

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INTRODUCTION

This report presents findings from field studies undertaken in Zambia on three tsetse control programmes with community involvement in control activities. It forms part of a larger comparative assessment of the impact and sustainability of community participation in the management of tsetse control in seven programmes in Kenya, Uganda and Zambia.

Tsetse and Trypanosomosis in Zambia

Tsetse infest between 40 and 60% of Zambia (RTTCP, 1995) in two major fly belts - the common fly-belt in Southern and Eastern provinces and the Kwando/Kafue fly-belt in Western Province and trypanosomosis seriously constrains livestock production throughout these areas. Tsetse control in Zambia has historically been undertaken by the government through the Department of Veterinary and Tsetse Control Services (DVTCS) of the Ministry of Agriculture, Food and Fisheries. Various methods have been utilised including ground and aerial spraying and the use of targets. The way in which the target technology has been implemented reflects the way it is used in Zimbabwe where it was originally developed. Targets are deployed in a series of parallel lines which act as fly barriers and are maintained on a quarterly schedule from a central source.

Financial constraints facing the Government of Zambia have become increasingly severe and funding for tsetse control has been affected (eg funding for Choma/Kalomo control operations ceased in 1995). In 1996 an Agricultural Sector Investment Programme (ASIP) was introduced which, among other things, formalised the privatisation of routine tsetse control activities (Thakersi, 1996) and in recent years, other agencies have become involved in both tsetse control and research.

The Regional Tsetse and Trypanosomiasis Control Programme for Southern Africa (RTTCP) and the Belgian programme, Assistance to the Veterinary Services of Zambia (ASVEZA) (previously called the Belgian Animal Disease Programme) have concentrated their work on the common fly-belt. The RTTCP commenced operations in 1988. Their work in both Southern and Eastern Provinces has involved trypanosomosis and tsetse surveys and various research projects, mainly using targets, although a large scale field trial using insecticide treated cattle was due to commence in Eastern Province in 1997 (RTTCP, 1997). ASVEZA have been involved in tsetse control and research in Eastern Province for at least a decade, also using targets.

The Dutch Government, through the Livestock Development Programme (LDP), have been involved in providing technical assistance and part-funding of tsetse control operations in the Kwando/Kafue fly-belt in Senanga West District of Western Province since the 1980s. Again targets have been the technology used. Since 1991 private contractors rather than government employees have been used to deploy and maintain targets in the Western Province.

Fieldwork for these three Zambian programmes was undertaken during February to June 1997. While in Western Province, Mongu was the research base and the research was completed with the assistance of the Livestock Development Programme. In order to investigate the Msanzara trial, the research in the Eastern Province was completed in close co-operation with DVTCS and ASVEZA in Chipata.

THE WESTERN PROVINCE

The Western Province of Zambia borders Angola to the west and Namibia to the south, and is dissected by the Zambezi River, which runs north to south. Tsetse (*Glossina morsitans centralis*) disappeared following the rinderpest panzootic of 1896 and only started to reinvade the area in the 1950's (ZLL, 1996). Aerial spraying was used to control tsetse in the 1970s and targets were first used in 1986. By the 1980s the flies had extended northwards as far as the Matebele plain, covering much of Senanga West and East and Sesheke districts, bringing with them the problems of trypanosomosis. The Sioma Ngwezi National Park, situated in the south west of Sesheke District, protects large numbers of game which are ideal hosts for trypanosomosis.

When targets were first used in this Province in 1986, the swinger style target, developed in Zimbabwe, was used. The design has been modified over time and the targets are now constructed of blue and black cloth hung between two poles and baited with MEK and octenol and impregnated with deltamethrin (Fig 1d¹). In general, the targets used have become simpler and cheaper eg the substitution of regenerating poles for metal frames. Target design trials are constantly being undertaken in Kaanja.

Target operations were concentrated in Senanga West and phase one entailed the deployment of targets over a 3,050km² area. Phase two extended the control area and approximately 8,000km² was cleared and a permanent target barrier established to prevent fly reinvasion. In the 1990s the barrier was extended into Senanga East District. Target deployment and maintenance work was undertaken solely by government teams until 1992 when private contractors first became involved. All target activities, and indeed tsetse and tryps surveys, in Western Province are now carried out by private contractors, hired by the DVTCS.

Target theft and vandalism was a problem from the beginning of the operations and an extension element was introduced into the programme in 1989 in an attempt to create awareness about the value of the targets. In 1990, an element of community participation was introduced following requests from communities on the three Zambezi Islands of Mbeta (the largest), Mwaamba and Sangala. Similarly, the Kalobolelwa trial was established in 1992 in Sesheke District of Western Province also following local requests for assistance.

The Western Province is sparsely populated, mainly by people of the Lozi ethnic group, with settlement concentrated along the Zambezi River and other water courses. Annual rainfall lies between 650-800mm and soil quality is poor. Maize is the main subsistence crop grown but cattle, which are predominantly the local Barotse breed, play a significant role in the economy of the area, providing draught power, manure and a means of generating cash (Beerling, 1986). Indeed, it is pointed out both in documentation and by the people themselves that without the cattle they would not be able to sustain a livelihood in the Province.

The population on the Zambezi islands is more concentrated than elsewhere in the tsetse-infested areas of the Province and this is reflected in the numbers of cattle and people covered by the two programmes considered here (Table 1). Thus only 300 cattle were enumerated by the Department as within the long (20km) and narrow strip covered by the Kalobolelwa trial although a larger number than this was suggested from the field visits. The information on cattle ownership is difficult to interpret since cattle are generally enumerated under the village head regardless of actual decisions about use.

See main report for figures, tables and maps.

The villages within the Province tend to be small and made up of members of one extended family with a male head. This was particularly true on the Zambezi Islands where what was termed a "village" was basically a single family homestead with perhaps only 10 residents with a headman. Reference is also made to sub-villages and in discussions it was not always easy to determine the unit being used. Although therefore numbers of villages are indicated in the text and in tables, these vary between documents and new villages are constantly forming.

Throughout the report, the term "community" is used to refer to the people living within the defined project area and is thus in line with the definitions used by the various projects. The term *induna* refers to the official customary (Royal establishment) head of a number of villages.

THE ZAMBEZI ISLANDS PROGRAMME

METHODOLOGY

Secondary data produced by both the LDP and the DVTCS on tsetse control and related activities in Western Province was reviewed. This included numerous project reports and proposals which contained both technical and socio-economic information on the tsetse control activities.

Primary data were collected from government and other technical personnel, and from individuals and groups living in the control areas. Interviews and informal discussions were held with various staff (both LDP and DVTCS) including technical advisers, extension and tsetse control staff (past and present), veterinary officers and private contractors. These staff were based in Mongu and Kaanja (the main field centre for tsetse control operations in Western Province), as well as in other locations.

Field research was conducted in the three Zambezi Islands of Mbeta (the largest), Mwaamba and Sangala. Semi-structured interviews were held with both individuals and groups using a checklist of topics to be covered. On Mwaamba, an entire target line of 23 targets was seen while elsewhere only ad hoc visits were made to a few target sites.

The majority of the research on the Zambezi Islands was conducted on Mwaamba Island, where interviews were held at 10 (of c.12) villages. On Mbeta, one group interview was held with members from one village and on Sangala a group at one of the two villages on the island was interviewed.

BACKGROUND

Location and Organisation of the Target Programme

The Zambezi Islands are situated to the east of the tsetse control operations in Senanga West (see Map 5) and very close to Kaanja, the headquarters of the tsetse control operations in the Province. What happened in the islands must be viewed, at least partly, in the light of their close proximity to Kaanja and other trials in the vicinity, both historically and at present.

For the Zambezi Islands target programme, it was agreed that targets would be provided from Kaanja (ie by the government) if the local population agreed to provide labour for their deployment and maintenance. No local financial contributions were sought. Training was given and work commenced in the same year. A total of 202 targets were deployed (122, 60 and 20 on the three islands respectively). The local community were asked to be responsible for regular clearing around the targets and for helping technical staff during their routine visits for target maintenance/replacement. Some community members were hired as casual labourers to assist the technical teams. No

maintenance equipment was kept in any of the villages and villagers were to inform Kaanja staff of any problems that arose outside the scheduled visits.

The control programme was still in place when the islands were visited in 1997 although by that time the DVTCS considered the targets to be superfluous since the main tsetse barrier had shifted further East, effectively protecting these islands. The communities had yet to be advised that the targets would no longer be replaced when they wore out.

RESULTS

Participation

The situation with respect to target maintenance appeared to be different for the three Zambezi Islands. On Mwaamba where the greater part of the research was carried out, two target lines had been put in place with a total of 60 targets, and one of these was visited. None of the 23 targets visited were in working order. Only two of the total still displayed cloth although both were damaged. The majority consisted of only one or two poles or a broken bottle with no other components. Three sites had nothing visible at all. None of the sites appeared to have been cleared recently with several showing so much vegetation growth as to make them indistinguishable from the surrounding bush. Only two targets were checked on Mbeta, the largest of the islands. Both sites were rather overgrown and neither target was complete. All reports suggested that there had been considerable target theft on this island which was very busy and had considerable traffic passing through. On Sangala, the smallest island, the target at the only site visited was found to be perfectly in order. Missing targets on all three islands were attributed to theft and vandalism. Although everyone, including Kaanja staff, expressed concern about this, the last servicing session to be undertaken by government staff aided by community members was scheduled for November 1996 but did not take place and this partly explains the lack of target equipment observed. Clearing around the targets should have preceded this maintenance.

According to respondents, when the targets were in place, maintenance was carried out by individuals who were selected by the headmen in each village. The main burden of target maintenance fell on women who were made responsible for clearing the vegetation around the target base. A small number of men helped with cutting of poles and replenishing bottles, although it was not clear whether these were the same men paid as casual labourers since these activities were carried out when the government team visited. However, the women said that their work was not particularly arduous and the headmen would try to select different women (usually his daughters or daughter-in-laws) each time to spread the workload.

Respondents from six Mwaamba villages noted that target defects used to be reported to staff in Kaanja as soon as they were observed, but Kaanja only responded at the usual servicing times. This deterred them from reporting faults regularly. One village had suggested that a small supply of cloth, sachets, bottles etc should be kept on the islands so that the community could repair targets themselves. Nevertheless, they insisted that maintenance had only become less rigorous when theft became a major problem and this had only recently happened. The only suggestions offered to resolve the problem involved Kaanja staff providing some sort of protection service: *“Can the government send a watchman to protect the targets? I don’t know what we can do. We are helpless.”* The community had not held any meetings to discuss the problem nor attempted to resolve it themselves.

The community understood that the targets were only on the islands because they had requested them, but despite this they appeared to have had little stake in the technology. The targets were

brought from Kaanja, serviced largely by Kaanja staff and reports of faults were to be made to Kaanja. During interviews the comment was often made that the clearing should also have been done by Kaanja as happens in Senanga West : *“Why do we have to look after the targets? On the mainland the government do everything. But here they are making us do it”*.

On Sangala Island, attitudes appeared to be very different and people were still motivated to look after the targets which they saw as theirs. However, there are only two closely-related villages on this island. In such circumstances the organisation required to manage the targets would be easier to achieve and the schedule easier to enforce. Although Mbeta and Mwaamba islands were larger, no separate organisational structures had been established to oversee maintenance: the headmen of the individual villages were responsible only for their own targets.

The Impact of the Tsetse Control Programme

Benefits of Tsetse Control

The benefit of tsetse control was always indicated as an improvement in cattle health. Even non-cattle owners remarked that they benefited from the healthier cattle which was why they did not object to participating in occasional target maintenance sessions. There was no difference between the benefits perceived by men and women.

Impact on Tsetse and Trypanosomosis

There was widespread acknowledgement by both men and women that the targets had resulted in a dramatic decrease in the number of tsetse flies. Nevertheless, people were convinced that there were flies around, even if they could not see them, and therefore that the targets were still needed. Although it was widely known that target lines had been placed in Senanga East the community generally believed that these had no impact on tsetse populations on the islands.

Trypanosomosis surveys revealed a reduction in positive cases from 6.1% before the targets were deployed to 0% afterwards, although occasional cases still occurred, with cattle coming into contact with tsetse from Senanga East (Mate, 1994). The islanders themselves reported a very rapid reduction in trypanosomosis after target deployment, and subsequently much healthier livestock.

DISCUSSION

After seven years of using targets, the control operation on the Zambezi Islands has largely broken down in spite of apparent continued enthusiasm on one island, Sangala, and continued interest in the other two islands. This enthusiasm and interest continues in spite of the apparent failure of the government to fulfil its own commitments. This is in stark contrast to the situation which prevailed when the targets were first installed, when all parties involved appear to have been very enthusiastic (Mate et al, 1991). In fact the targets were maintained by both parties for some years, during which time tsetse and trypanosomosis challenge reduced. Although the government intends to end its input into the islands, this was not widely known and could not explain the almost total absence of viable targets. And, although the fact that communities elsewhere were not making any contribution to target maintenance was raised in discussions, this was known when the work started.

While this was regarded by Kaanja staff as a community-based programme, it is significant that once the request for targets had been made, the community was given only minimal responsibility and the technical aspects of the control programme remained totally in the hands of technical staff. The targets were checked and parts replaced in the same way as was done elsewhere, on a scheduled basis

by a technical team from Kaanja with some assistance from locally paid casual labour. The only task left in the hands of the community was that of clearing the vegetation around the base of the targets since this needed to be done more regularly and could not, therefore, be fitted into the pattern of maintenance schedules. Village headmen were given the responsibility of organising this work. As noted, the headmen allocated this task to women who, because of the character of the villages, were invariably close kin. Reference was made to community training but since the community task was limited, this was minimal and essentially involved demonstrating how the targets worked and all targets were placed within the same year of the community request.

At the level of the whole community, the work involved in clearing vegetation under the targets was not a problem. It may have been a problem for the women although this was denied. It is interesting to note that while each headman was individually responsible for a small number of nearby targets, all appeared to have resorted to the same means for getting this task done, to allocate the task to women whose labour they controlled.

Although target maintenance was a problem which might have been resolved had the community been in a position to replace parts themselves, perhaps the greatest problem was target theft. No-one was able to say why this problem had arisen only recently but it appeared to be widespread and certainly not limited to the larger island. Staff of the Tsetse Control Department talked of the need to raise public awareness. However, it is difficult to argue that the population did not know the value of the targets. Although targets had been introduced relatively recently in these locations, there is a history of tsetse control operations here which resembles that in other tsetse infested areas and people are aware of the impact of tsetse control. Aerial spraying is certainly remembered as an effective killer of the fly and benefits continued for some time after operations ended. The most common argument is that it simply reflects the reduction in the problem of trypanosomosis. Given the efficacy of targets and the fact that they had been in place on the islands since 1990, fly and disease levels would have been low for some years and the incentive on the part of everyone to continue to clear around and to protect the targets would, therefore have reduced long ago. In this case, however, it is almost certain that the loss of interest by the DVTCS team has not gone unnoticed and its failure to undertake the last scheduled service must have contributed significantly to the decline in community interest in protecting the targets.

THE KALOBOLWA TRIAL

METHODOLOGY

The fieldwork in the Kalobolelwa Trial area was conducted in April/May 1997, more than two years after the trial was terminated. Secondary data which had been collected by the project teams was studied and LDP and DVTCS staff who had been involved with various control and research activities in the area were interviewed. Data collection was undertaken again using semi-structured interviews, informal discussions with community members and observation.

Interviews (group and/or individual) were held in all villages within the trial area, and in 6 villages in adjacent areas to the south from Lusu to Mutanda. Although several of the key players were no longer available, in particular the Ilwendo Crushpen Association (CPA) chairman and secretary, interviews were held with a range of stakeholders, both individually and in groups, during the course of this study. These included CPA officials and members, non-cattle owners, village headmen, household heads - both male and female, married and unmarried men and women, Department of Animal Health staff, LDP staff, the local councillor and safari lodge operators.

BACKGROUND

The Kalobolelwa trial area was located approximately 60km south of the existing tsetse control barrier in Senanga West, and was 7km wide by 20 km long, adjacent to the Zambezi River and covered two Crushpen Associations, Kabati and Ilwendo. To the west of the area lies the Sioma Ngwezi National Park. The trial was planned to run for only 2 years and ended in 1995. Although it was initiated in response to requests from local communities, it had the dual purpose for the Department of assessing the possibilities for community participation, and, of investigating the economic feasibility of using a higher target density to achieve satisfactory tsetse suppression levels in an area which, due to its shape and location, was subject to continuous tsetse infestation. After two years, the Department concluded that the target lines were inadequate to control tsetse since their analysis showed that disease incidence had not reduced.

Materials were made available by the government on a quarterly basis, that is on a schedule which fitted the practice of central provision of targets elsewhere. Unlike the case of the Zambezi Islands however, cattle owners in the two crushpen associations were asked to contribute financially towards the targets on a per head of cattle basis and the community as a whole was expected to be fully responsible for target deployment and maintenance. The Tsetse Control Teams checked that the targets were properly maintained.

The Tsetse Control teams determined that the crushpen associations should be the avenue through which the scheme should be organised and set the amount of financial contributions and from whom they should be collected. The level of financial contribution from cattle owners was officially pegged at the Samorin price at the start of the trial and contribution levels were never officially increased over the trial period. This amount did not cover the cost of the targets even at the outset.

The community took responsibility for controlling cattle movements within the area. In order to maximise the benefits from the targets, the farmers within the trial area had agreed that they would not risk infection by taking their cattle outside the area. Cattle which were on loan to farmers outside the trial area were therefore recalled at the start of the programme. Furthermore, cattle from outside the area were prevented from coming into the trial area to graze and this was enforced by means of the introduction of fines, authorised by the local *induna*.

A total of 656 targets were placed at an average density of 10 per km² in grazing areas and 4 per km² in other areas (Dietvorst, 1995). In order to monitor the efficacy of the targets, regular trypanosomiasis surveys were carried out and cattle were tested monthly. Positive cases were treated with Berenil at no cost.

RESULTS

Participation

Participation in the trial in the sense of servicing and maintaining the targets by the community varied considerably between the two crushpen areas.

In Ilwendo, maintenance of the targets was divided between the villages, each village or group of sub-villages being allocated a certain number of target lines (1 or 2 lines). How work was organised was then determined by the individual headmen. However, both cattle and non cattle owners appear to have regularly participated in clearing operations as expected. It was commented that the work was not too often nor too arduous and that because of the visible benefits of the targets, in general, people did not object to contributing labour. When problems occurred with people not clearing their lines at the right time, warnings were always heeded. Some villages remarked that women had not been involved in the clearing or maintenance of targets and therefore were also not involved in any meetings to disseminate information about the project. A number of women commented that they had wanted to know more but were denied access to information by the men. In other villages, however, women were involved in clearing, although these women also remarked that they were not given as much information as the men. Overall, however the Ilwendo inhabitants believed that they had participated as required and had controlled livestock movement in accordance with the agreement with the Department.

The Ilwendo community appeared to be united and well organised and evidence for this can be seen in the way in which the community had been able to organise itself for other activities. For example, there are two very active People's Participation Groups in these villages. These groups are part of the People's Participation Service which is a non-governmental organisation operating in the Western Province which aims to promote self-help projects. Local groups, like this Ilwendo group, are formed with the assistance of local facilitators. In Ilwendo, the group is involved in making and selling local items such as brooms and milking stools. Money raised is used to purchase consumer items such as watches and soap which are then sold in a consumer shop. Funds raised are shared between members and there were no reports of problems in this respect. The Ilwendo villages were also able to maintain their independent position when approached by the Kalobolelewa Councillor who was a key stakeholder in this project. These actions on behalf of Ilwendo must be seen to be at least partly a consequence of the fact that the villages covered by this CPA are all closely related and the *induna* has considerable respect and influence.

There are no People's Participation Groups in Kabati and no interest has been shown in forming one. Furthermore, there were a number of pre-existing local disagreements which were exacerbated by the CPA handling of cash contributions for the trial. Finally, since the Kabati area borders the farm of the Kalobolelewa Councillor he was able to exert his influence on events there. Hence, community participation was organised on a different basis in Kabati. The most significant difference followed from political interference by the local Councillor who organised Food for Work (maize) for target maintenance from the outset. Consequently many people volunteered to work. However, maize supplies ran out and not everyone received the expected payment. When the Food for Work programme ceased altogether, participation by non cattle owners also ceased and labour contributions in the Kabati area were insufficient to adequately maintain the target lines. People in Ilwendo also

commented that in Kabati “*everyone wants to be an induna*” and thus there is no effective organisation there to ensure maintenance is carried out. In Ilwendo the people had resisted the Councillor’s overtures and refused to take part in the Food for Work initiative, the local *induna* commenting “*why should we be paid to do something which is for our own benefit?*”.

Although some respondents in Kabati commented that the Food for Work policy was a mistake and should never have been implemented, other individuals were still expressing strong feelings about being expected to work for nothing even though the trial had ended two years earlier.

With regard to financial contributions, as might be expected given the context created by Food for Work in Kabati but also by the activities of the People’s Participation Groups in Ilwendo, this was easier in Ilwendo than in Kabati. Nevertheless, both CPAs reported varying degrees of difficulty they would have had in increasing contributions from the initial level of ZK40 per animal. While in interviews, larger amounts, from ZK90 to ZK500 per animal, were said to have been requested, nobody paid more than ZK40 and overall, by the end of the two year period, no funds were being collected by either of the two CPAs. Cattle owners argued that they did not object in principle to funding the targets but found it difficult to come up with sufficient cash at the right time. Since the trial ended the cost of Samorin and Berenil has increased considerably and although respondents did not know the real cost of targets, they believed that they would be cheaper and just as effective as the trypanocides.

Although the Department staff did not plan for the trial to last longer than 2 years, the trial did not end because of these community problems within the trial area and indeed, there has been considerable enthusiasm expressed both within and outside the area for the work to continue. Inhabitants of the villages outside the trial area were well aware of the positive impact of the targets and even in the villages closest to Ilwendo, ie Malembutuka and its sub-villages, respondents commented that there appeared to have been a reduction in tsetse in their areas as a result of the targets.

Outside the trial area, there have been spontaneous attempts to mobilise people to approach the technical services to work in their area. Following the initiative of cattle owners and headmen, including those from Ilwendo itself, cattle owners in the 7 villages reaching south from Lusu to Makai (approx 20km) donated cash which was taken to the Veterinary and Agricultural Assistants in Kalobolelwa in an attempt to persuade the authorities to extend the control area. Since the money was returned no action has been taken. One “doctor” of alternative/herbal medicine with a considerable cattle herd also attempted to mobilise others. Non-cattle owners also perceived benefits from the targets and indicated that they would be happy to undertake maintenance operations.

As is clear from the proactive role taken by Ilwendo headmen and cattle owners in encouraging others to approach officials, Ilwendo farmers were very keen for targets to be reinstated. They clearly appreciated that the size of the previous trial area meant that the targets were not as effective as they should have been and that the area needed to be extended. For this reason they had themselves proposed an extension of the target lines as far south as Katima and had contacted the headmen of the villages in this extended area. This had led to the collection of funds. However, concern was expressed about the participation of Kabati since the people of Ilwendo were convinced that the failure of Kabati farmers to maintain their target lines properly had led to the trial being terminated.

Ilwendo contrasted with Kabati where the majority of those interviewed were quite disillusioned about the target programme. Although appreciating the benefits the targets brought, many feel that they should be paid to do the work. At the same time, the local Kalobolelwa Councillor continues to advise everyone that they need not contribute anything since the Tsetse Control Team plans to extend the target barrier to Katima in any event. Meanwhile, the CPA Chairman and Treasurer have lost the

trust of a large part of the community and people would no longer be prepared to pass their contributions to them.

Within the trial area a tourist lodge - Mutemwa Lodge - has been established in the last two years. The Lodge operators commented that if tsetse control were to recommence then they would like to be involved. They remarked that although they have not seen any tsetse in the Lodge area, they have been seen in the Game Park and they would not wish tsetse to reinvade the Lodge area to “*bother the tourists*”. They therefore see themselves as stakeholders in any future control programme and would be prepared to contribute to control operations.

The Impact of the Tsetse Control Programme

Benefits of Tsetse Control

The community was unanimous in its appreciation of the benefits of tsetse control. The major direct benefits perceived were twofold. First was the significant reduction in trypanosomosis levels, cattle were thus much healthier and more productive, and farmers were having to spend less on veterinary drugs. The benefit of free Berenil to treat positive cases was also mentioned by some cattle owners. This obviously distorts to some degree their perceptions of the targets and portrays the trial more favourably than if they had had to bear these costs themselves. Non-cattle owners also mentioned that they found it easier to hire healthy oxen for ploughing and transport and it was sometimes even possible to purchase milk, which was a rare occurrence prior to the trial.

The second benefit concerns the fly itself. The community was unanimous in its positive appraisal of targets for reducing the numbers of tsetse and thus for making the trial area a more pleasant place to live - people could go about their business without being bothered and bitten by flies.

Impact on Tsetse

There was absolute consensus amongst the respondents within the two crushpen areas and in the immediate surrounding area that the targets had been successful in terms of reducing tsetse numbers and trypanosomosis levels. Farmers commented that only a few weeks after deployment there was a noticeable difference in fly levels and it was not too long before tsetse disappeared completely from the trial area. Previously they had been bothered by the flies even in the villages but this had changed dramatically once the targets were installed. Although there had been no immediate change in this situation once the trial ended, people in both Kabati and Ilwendo areas remarked that the flies seemed to be gradually returning. They also expressed concern that when the elephants start to come down to the river from the Park in the dry season, accompanied by tsetse flies, there would be nothing to prevent the problems of trypanosomosis starting again.

Impact on Trypanosomosis

With regard to trypanosomosis, cattle owners were also convinced that the targets had been effective in reducing levels of infection; cattle had rapidly become healthier and more productive. A number of farmers mentioned the free Berenil provided by the project for positive cases as a clear benefit, but they also considered that the number of sick animals had decreased. Non cattle owners also commented on the healthier cattle in the area, as well as healthier dogs, as a result of the lower incidence of trypanosomosis. Since the trial ended, the incidence of cattle disease and cattle mortalities had risen and this was attributed to trypanosomosis although this was not confirmed.

The perceptions of the local communities regarding the impact of the targets contrasts significantly with the analysis of the monitoring data collected during the trial and the views of the Tsetse Control

staff. Trypanosomosis surveys revealed that the disease persisted within the area although a meaningful assessment of the impact of the targets could not be made because of insufficient baseline data (Dietvorst, 1995). Nevertheless, the Tsetse Control Advisor believed that, due to the persistence of the disease, there was no reason to doubt that the targets had failed to achieve a satisfactory reduction in trypanosomosis. He also believed that despite the increased density of targets (10 per km²), the small, attenuated size of the trial area meant that it would be extremely difficult to suppress tsetse challenge to a satisfactory level. Other reasons have been offered to explain the difference between the survey data and farmers' assessments. It has been suggested that cattle from outside the trial area were included in the tests or that cattle inside the area became infected whilst grazing outside the area protected by the targets. Although plans had been made when the trial started to restrict grazing movement, this was more difficult than expected: it transpired that part of the land inside the trial area was designated as a "communal grazing area" and farmers in neighbouring areas objected to their cattle being denied access. One village mentioned that they had been fined by the Ilwendo CPA for continuing to use these areas.

DISCUSSION

The Kalobolelwa Trial is a complex programme that required considerable local co-operation in the form of financial and labour contributions, but also in the form of control over livestock movement. In terms of community organisation, the decision to work through two existing associations and customary village heads rather than through new committees or a new organisation, contrasts sharply with the approach taken within the Lambwe Valley Project for example. The decision to link the financial aspects of the control exercise with the crushpen associations (cattle owners) and other aspects of the programme with the community as a whole appears to have been a reasonable strategy in the sense that some of the benefits of tsetse control were seen to be widespread, connected with more general problems of fly nuisance for example or the need for draught animal power, while others were linked directly with livestock ownership. There were also no obvious objections raised about the actual maintenance work which was not simply passed on to one particular social category. On the other hand, membership of the crushpen association was limited to men and not all cattle owners were members. In addition, the number of animals involved is small compared with the number of targets (2-3 targets per animal). Although both locations experienced similar problems with meeting financial contributions, they differed in the way in which events unrolled and the project demonstrates the need to recognise differences in local organisational capacity and to provide the necessary support.

The experience of this particular trial highlights the fact that these tests of new approaches are taking place within a context of development and interventions which are being carried out on the basis of a whole other set of assumptions and expectations about local and external contributions. The impact of this context can be negative or positive and can be used by local political leaders and others to serve their own purposes. Clearly it is the coming together of a number of variables e.g. local organisational capacity and external intervention giving mixed messages, which determines outcomes. This is an issue of local agency which has been well researched in other situations and the experience gained should be informing the technical programmes which are engaging directly with local people.

While some respondents argued forcibly that the targets would be cheaper than trypanocides, this response must be seen in the present economic context of the declining value of local currency and removal of subsidies, but also in the local context of non-availability of veterinary drugs. Although the government Veterinary Assistants are permitted to sell drugs, the Veterinary Assistant for Kalobolelwa does not do so and farmers within this area must, therefore, travel over 40 kilometres to Sesheke town or to Katima Mulilo in Namibia to purchase them. This is a difficult undertaking in an

area with limited transportation facilities. In addition, free Berenil given during the Trial was still in peoples' minds and no-one knew the real cost of the targets and there had been no actual meetings held with the community to clarify these. This in a context where the technical services appeared to be constantly seeking to eradicate the flies in an area with a high risk of re-infestation. As the community themselves pointed out, for example, there is an annual movement of wildlife passing along the river during the dry season and customary grazing areas do not necessarily correspond with designated project areas. This obviously raises problems of exchanges between local populations and would hardly seem to be solved by simply implementing fines.

Regardless of the apparent positive community participation in Ilwendo in particular but also throughout and beyond the trial area, for a continued programme of target interventions, the technical concerns raised in connection with this programme are very real. In the end, it was the technical considerations which influenced the decision to terminate the trial.

THE EASTERN PROVINCE

The tsetse-infested area of Eastern Province is part of the common fly belt which extends from Mozambique into Zimbabwe. Trypanosomosis constrains the use of cattle in the Province but East Coast Fever is also a problem. Tsetse control methods have included game elimination, vegetation clearing and ground and aerial spraying. Targets were introduced in 1988 and trials commenced in the same year.

Control operations are the responsibility of the DVTCS and the ASVEZA provides technical support. The RTTCP has been heavily involved in research in this Province since target operations were introduced. Unlike in the Eastern Province, no plans are in place to involve private companies in tsetse control operations.

The first trial to test the efficacy of the targets was started in 1988 by the Belgian Animal Disease Control Project (now ASVEZA) in Mvuvye/ Matambazi, an area of 400km² located south of the Great East Road. The RTTCP set up a similar trial in an adjacent area of 600km² and took over the ASVEZA trial in 1991. All activities, including target maintenance, were carried out by DVTCS staff and casual labourers were recruited especially for this purpose. The targets proved successful with tsetse numbers declining and animal health improving. Farmers in the neighbouring Msanzara area saw the improvement and in 1993 local leaders approached the Department for assistance in setting up a similar target programme in their area. As in the Western Province, the Department saw this as an opportunity to introduce a degree of community participation into tsetse control and the Msanzara Control Trial started in 1995 with RTTCP funding and implemented by the DVTCS and ASVEZA. The trial was initiated to test the feasibility of community participation in tsetse control operations whilst alleviating the trypanosomiasis burden, and to check reinvasion pressure on the Mvuvye/Matambazi control area (Chilongo, undated).

RTTCP funding has now ceased and a five year plan is being prepared for gradually handing over all activities to the community. The first stage will be to discuss these plans with the Paramount Chiefs of the area before informing the whole community of their intentions. During the period of the research reported here the community were unaware of these plans.

The targets used within the trial are another variation on the original Zimbabwe model. They are made from black cloth, impregnated with insecticide, and baited with phenol sachets which are inserted into a pocket on the target, and acetone in bottles placed in the ground approximately 2 metres from the target (see Fig 1e). They are supported by two poles, preferably bamboo and are deployed at an average density of 4 per km².

The Eastern Province is more densely settled than the Western Province, villages are in general larger and wealthier and crop production less risky. Average population density is 66.5 persons per km² with settlement in villages which are spread fairly evenly throughout. Most of the inhabitants belong to the Chewa or Nsenga ethnic groups. Average rainfall is 900 to 1000 mm per annum and the soils are good. The average area cultivated per household is 2.5 hectares (Elyn, 1996). Livestock kept include pigs, goats and chickens and a small proportion, 5.4%, of households keep cattle. As elsewhere in the Province, agriculture is the main economic activity and within the Trial area the major crops grown are maize, groundnuts, cotton, tobacco and sweet potatoes. At the same time, there are alternative income-earning opportunities, especially trading for the villages which lie close to the Great East Road.

THE MSANZARA CONTROL TRIAL

METHODOLOGY

The same research approach was used in the case of this Trial as in the locations in Western Province. Fieldwork was carried out in Kamphalwe and Katepela village groupings and in five individual villages, Kanchito, Chimtengo, Kalima, Sinda and Sheketani which are part of other groupings (Map 6). Kamphalwe and Katepela village groups were selected since they represent the two main ethnic groups of the area, Nsenga and Chewa respectively. The other villages were chosen since they are all located along the Great East Road where problems with local participation have been experienced since the trial commenced.

Due to ongoing discussions within the government about the future of this programme and the fact that these had not been officially shared with the community, it was not possible to discuss all issues freely with farmers as in the other locations. Possible future increases in local contributions and the level and extent of community participation in other control programmes were, therefore omitted.

BACKGROUND

Location and Organisation of the Msanzara Control Trial²

The Msanzara Trial is situated in Petauke and Katete Districts of Eastern Province, north of the Great East Road, the main highway running eastwards out of Lusaka going to Chipata and on to Malawi. To the north of Msanzara lies the Luangwa Valley, parts of which are designated as national parks - South and North Luangwa National Parks - both of which are home to large numbers of large mammals. The Valley is also heavily infested with tsetse flies (*Glossina morsitans morsitans*). The Trial covers an area of around 930 km² and approximately 3625 targets are currently in place (Chilongo, undated). The area included in the trial is the largest of the three Zambia programmes considered in this research and covers more villages, people and animals (Table 1).

The trial area was settled in 1942/3 as part of a resettlement scheme organised by the colonial authorities. All reports suggest that at the time tsetse and wild animals were abundant, which is presumably why the area was not settled. Various forms of tsetse control have been undertaken since that time reflecting the pattern elsewhere in the Zambia.

Following consultation between the Department and local chiefs, the Msanzara Control Trial commenced in 1994. The community agreed to supply labour to deploy and maintain the targets, while the Department of Veterinary and Tsetse Control Services and ASVEZA were responsible for providing materials and for technical supervision. Although the community currently only contributes labour towards the control operations, the intention is that in future they will be entirely responsible for funding and running all activities.

Maintenance of the targets (replenishment of odours and replacement of cloths if necessary) was initially undertaken every 3 months but was reduced to every 6 months in 1996 following modification of the target specifications (quantity and release rate of phenol in sachet, larger bottles for acetone).

² The population and target data used in this section were taken from AZVEZA data. They were collected by ASVEZA at the beginning of the Msanzara trial.

The 269 villages listed within the area were divided into groups of neighbouring villages. A tsetse control committee was elected for each group and made responsible for organising the routine target maintenance activities. The committees were also responsible for ensuring regular checking of targets between maintenance sessions. No structure was put in place to facilitate co-ordination or even contact with regard to target activities between the village groupings.

Target materials, provided free by the DVTCS and ASVEZA, are delivered to the 12 local stores located throughout the Msanzara area when routine maintenance is due. Three facilitators and a technical assistant, hired specifically for this work, sensitise and motivate the community to complete maintenance operations on time and effectively. At six monthly intervals they visit each of the village groupings to remind them to organise a session, often even suggesting dates when these should take place. Although, therefore maintenance sessions are organised by the tsetse committees, it is the facilitators who initiate them.

Katepela village grouping is made up of 14 villages and is located towards the northern end of the trial area. It has a population of about 2,167 people and is responsible for maintaining 103 targets. It houses the central store for two other village groupings and is mainly populated by people of the Chewa ethnic group. Kamphalwe village grouping is situated on the western side of the control area and comprises 7 villages. The grouping has a population of approximately 1308 but is responsible for a similar number of targets as the Katepela village grouping, 97. The people here are mainly of the Nsenga ethnic group. An average of 9% of households own cattle within the two village groupings.

The four villages of Kanchito, Chimtengo, Kalima and Sinda are situated at the southern end of the trial area. Kanchito, Kalima and Sinda are situated along the Great East Road while Chimtengo straddles the road itself. They are, therefore located close to the previous target trial area of Mvuvye/Matambazi where target maintenance ceased in 1996. The villages are also located close to the Sinda National Forest, an area which is protected from unrestricted local use. In the past permits were sold to farmers for grazing their cattle within the forest but these are no longer available. Forest officers interviewed said they could not remember ever having sold such a licence but pointed out that people living along the edges of the forest graze their cattle inside the boundaries. If they are caught they are either given a warning or fined. Cattle are confiscated until the fine is paid. Permits are available for firewood collection. Officially these cost ZK180 for one headload of wood for home use although people are usually allowed to collect 2 or 3 headloads for this price. Some of the target lines for which these villages are responsible lie within the forest boundaries.

Each of these villages has its own tsetse committee (ie they each represent an individual “village grouping”). The total population and numbers of targets for which the community are responsible are as follows³:

Village	Population	Numbers of targets
Kanchito	450	49
Chimtengo	416	33
Kalima	386	32
Sinda	350	36

Cattle ownership is lower than in Katepela and Kamphalwe, with only 3.1% of households owning cattle.

³ The figures quoted for the four individual villages were disputed by the village headmen who claimed much larger populations.

RESULTS

Participation

The numbers of people who participated in maintenance sessions are only available for some of the sites for the first four sessions (1995/96) and even then, these are difficult to interpret because of the wide variation within sites⁴. The particularly large numbers recorded for the second session in all but Sinda, suggest that something other than actual target maintenance was happening at this session: participants exceeded the numbers of targets:

Village/Village Grouping	Population	Households	Targets	Cattle Owners	Participation in 1995/6 Maintenance Sessions			
					1st	2nd	3rd	4th
Katapela	2167	534	103	72				
Kamphalwe	1308	576	97	28				
Kanchito	450	115	49	6				
Chimtengo	416	186	33	?				
Kalima	386	64	32	5				
Sinda	350	?	36	?			65	

Katapela Village Grouping

The targets in the Katapela area were found to be in good condition and the areas around them had been well-cleared. Although many of the targets were situated close to main pathways, there was no evidence of any theft of target components. The tsetse control committee in Katapela divided the targets between village groups at the outset of the project, with each group being responsible for the maintenance of approximately 20 targets. Each group is comprised of both men and women and is led by two committee members. When a servicing session is due a note is issued by the tsetse committee to each of the village headmen who then advise the villagers when a session will be taking place and where to meet. The individual groups decide how to divide the actual servicing work between participants. In most of the groups, women are responsible for clearing around the targets, whilst men cut fresh poles if required and may help with clearing if sufficient men participate. It is always the men who are responsible for replenishing sachets and bottles and for replacing cloths.

It is largely cattle owners who participate in the maintenance sessions. The chairman complained that it is difficult to persuade people to get involved and non-cattle owners are increasingly reluctant to help. Nevertheless, as in the sites in the Western province, most people interviewed felt that maintenance is not a particularly arduous task and usually only lasts a few hours. Although the task could be completed in less time if more people participated, it is not regarded as a heavy burden.

With respect to checking of targets between the routine maintenance sessions, this task also falls to a small number of people; although the whole community is encouraged to report faults, this rarely happens. Faults which are found can only be rectified if there are replacements in the stores. When visited, spare bottles and acetone were available but not target material to replace damaged cloths.

⁴ No data on numbers of community members participating in maintenance activities were collected after June 1996.

Kamphalwe Village Grouping

As in Katepela, the village headmen in Kamphalwe village grouping are responsible for informing the population about maintenance sessions and for encouraging them to participate. Again, only a small number of people actually participate in the maintenance sessions, although again it is acknowledged that the time taken to service the targets is not great. Several of the more active committee members are non-cattle owners, but generally it is the cattle owners who are more involved. In Kamphalwe one female committee member plays a role in replenishing chemicals, replacing cloths etc, otherwise these tasks are done exclusively by men, women only being involved in clearing target sites.

In Kamphalwe the targets were in a much worse condition. Many were torn or badly damaged and bottles and sachets were empty although the target sites had been cleared. Despite this evidence to the contrary, the tsetse control chairman, committee members and a number of other respondents said that there were no problem with participation and that the targets were well maintained. When pressed about the condition of the targets, the chairman pointed out that there were no replacement cloths available at the stores. With regard to replenishment of chemicals, which were available within the villages, this was planned but was not when the sites were cleared.

Materials for the Kamphalwe targets have to be collected from the store at Chilabila, some 8kms or so away. The chairman, vice-chairman and several committee members complained that this was too far and since no transport is available they have to hire oxen at a cost to themselves to collect the materials. This was regarded as a major shortfall of the programme and one which prevented them from fulfilling their duties adequately and accounted for example for the fact that reports of target faults were only dealt with at normal maintenance times.

Unlike in all other sites visited, concerns were raised at these two sites about the materials used to construct the targets. The problem of bamboo poles was raised many times in both Kamphalwe and Katepela. The poles are attacked by ants and there are problems replacing these with bamboo, which can only be found at some distance from these areas. Although other poles are used as replacements, it was remarked that the community have been instructed by project staff that bamboo is best. Consequently, the community had requested transport to take them to areas where bamboo can be collected.

At both locations individuals were reluctant to admit that they did not participate in the tsetse control activities. However, they were always ready to offer explanations as to why their "neighbours" did not join in. These usually related to their lack of cattle ownership and their belief that only cattle owners should participate. It was always admitted that the tasks of target site clearance etc were not too demanding and that their "neighbours" should therefore be prepared to help.

Kanchito, Chimtengo, Kalima and Sinda Villages

The level of participation in these four villages in the early sessions appeared to be similar to those in the other two sites given the lower numbers of targets to be maintained. However, perceptions about participation were very different than in either Katepela or Kamphalwe. The proximity of the Mvuvye trial has significantly affected people's perceptions of what they should and should not be expected to do. Target maintenance is regarded as the government's job; there is a widely held view that veterinary department staff are being paid to do nothing if they delegate maintenance to the community. In some interviews this feeling was very strong and people were vehemently opposed to doing the "government's work". In Kanchito, one young man mentioned that previously he had been employed to look after the Mvuvye targets but was now being asked to do the same work in Msanzara for nothing. Although village headmen and tsetse committee chairmen appreciated the need for the community to participate in target activities, they also expressed the view that the work

should really be done by the government. With this degree of opposition to participation it is hardly surprising that problems have been experienced with the control efforts in these communities.

Participation was lowest in Chimtengo, where it appears that the majority of target maintenance tasks are carried out by three individuals - the headman, the tsetse committee chairman and vice-chairman. In Kanchito and Kalima, although there is opposition, a number of community members, almost exclusively cattle owners, participate. In Sinda, where there is a larger proportion of cattle owners, the group interviewed indicated that there had been an increase in numbers of people participating and no more were required.

As in Katepela and Kamphalwe, the village headmen and the tsetse committee chairmen are responsible for encouraging people to participate. Meetings are held when information is received from the facilitators that maintenance is due and villagers are requested to attend maintenance sessions. Most people admitted that they attended these meetings but failed to then go on to help look after the targets. However, it was observed that the traditional structures within some of these villages appears to be breaking down. In Chimtengo, for example, the headman did not appear to be very influential or to be taken seriously. Younger people in particular appeared to have little or no regard for the authority of the headmen or other elders and were not inclined to respond to the call to participate in target activities.

The maintenance activities are usually divided by gender, with women being responsible for clearing around the targets and men cutting poles and replacing target materials. Several of the target lines for which these villages are responsible lie within the Sinda National Forest. The targets are therefore situated in an area where the local community do not regularly venture (although the regulations are flouted to some degree, people are not supposed to use the forest for grazing or for collecting firewood). This makes maintenance more difficult in that it cannot be combined with other routine activities and regular checking of targets is also unlikely to be carried out. A visit to the forest and inspection of 8 targets found them all to be in a very poor condition, needing both clearing and replacement of poles and/or cloths.

Impact of the Tsetse Control Programme

Benefits of Tsetse Control

There was much agreement amongst cattle owners in all sites that improved breeding of cattle as a direct consequence of improved animal health, had significant benefits. Herd sizes were increasing, more milk was available for consumption and sale, ploughing had improved and incomes from hiring out oxen, especially for transport, had increased. At the same time, savings had been made on reduced purchases of veterinary drugs although it appears that the use of both Samorin and Berenil is still fairly widespread. Approximately 50% of the cattle owners questioned said that they still bought these drugs, albeit less often than before the targets were deployed. Berenil is regarded as something of a tonic; farmers administer it to cattle if they appear to be tired or have been doing heavy work. Samorin is used to maintain good health or as a preventive measure. Two farmers indicated that they had purchased supplies of both drugs as a precaution against future illness.

Cattle owners in Katepela and Kamphalwe believed that non-cattle owners benefited because they are no longer bitten by tsetse flies and they now find it easier to hire oxen. It was also mentioned that they would now be encouraged to buy their own cattle since the risk of trypanosomosis had reduced to almost nothing. Indeed, one cattle owner said that he had only bought his ox after the targets came for this very reason. A number of cattle owners who keep some of their cattle in tsetse free areas such as Chikalawa, some 60+ kilometres to the south of Katepela, commented that they had brought their cattle back. Others indicated that they were waiting a little longer before making such a move.

On the whole, non-cattle owners at these two locations agreed with this assessment. Approximately half of those interviewed mentioned improvements in the health of their other livestock as the major benefit of tsetse control. Not being bitten by the flies was also considered a benefit. In Kamphalwe half of the non-cattle owners reported finding it easier to hire oxen for ploughing and transport, although several also said that the price had increased. In Katepela, shortages of oxen for hire were reported. Only one non-cattle owner, a young, newly married man, mentioned that he was hoping to buy cattle in the future since it was now a less risky and expensive undertaking because of the targets. There was a definite feeling amongst the non-cattle owners, however, that cattle owners had gained more from the tsetse control than they had themselves. This was also true of both male and female non-cattle owners interviewed in the four villages along the road. Here, non-owners had difficulty in pinpointing benefits although the absence of flies and thus the benefits of not being bitten were mentioned. They also were of the view that cattle owners were the main beneficiaries of the programme. The only exception to this view were the village headmen and tsetse committee chairmen or officials, some of whom did not own cattle.

Impact on Tsetse

Monitoring data for the Msanzara trial area reveal that apparent density of tsetse declined from an average of 5 flies/fly round before to 0.01 flies/fly round ten months after target deployment. Trypanosomosis incidence also declined, from 39% to 8% (Chilongo et al, 1997). The Provincial Tsetse Biologist commented that before the trial commenced tsetse surveys revealed that tsetse densities were not uniform across the whole of the Msanzara area; nearer the road approximately 30-40 flies per month were caught, whereas further north up to 300 flies per month were caught. The impact of the targets has therefore apparently been more dramatic away from the road.

The assessment of the community was positive in all the sites visited. Without exception the inhabitants of Kamphalwe and Katepela acknowledged there had been a decrease in tsetse numbers and attributed it to the introduction of the targets. Everybody agreed that there had been a remarkable decline in tsetse and that the area was now a much more comfortable place to live. Prior to the targets the flies were frequently found in the fields and even in the villages, causing a constant nuisance. A number of farmers reported that now tsetse were only to be found very rarely and then only in forest areas; they had not disappeared completely. Targets are regarded as an extremely effective technology which had quickly rid the area of this problem. The population in the villages along the road were able to compare the present situation with that when targets were deployed in the Mvuvye area. Their view was that the earlier trial had not impacted significantly on tsetse populations or cattle health in their villages although it had had a positive impact in the villages in the Mvuvye area. They even indicated that the Sinda National Forest, which had previously had very high tsetse densities, was now virtually tsetse free.

Impact on Trypanosomosis

At all sites reference was made to improved livestock health, and hence less veterinary drugs were needed as a result of tsetse control. At the sites along the road, reference was only made to cattle whereas the population within the other two locations also emphasised improved health of dogs, goats and chickens. Cattle owners also maintained that cattle were breeding better and more calves were surviving although many non-cattle owners, both male and female, maintained that although the situation had improved, there was still a shortage of oxen to hire.

DISCUSSION

Here as elsewhere, enthusiasm for tsetse control is widespread and local opinion attributes the present comparatively tsetse free environment to the target programme. The benefits are well understood and appreciated although there is a clear difference between cattle owners and other community members.

In terms of expected community participation in tsetse control operations, the Msanzara Trial sits between the Zambezi Islands programme and the Kalobolelwa Trial. The labour for target maintenance is similar for all three programmes but here the community is left to collect the materials and to carry out the maintenance themselves rather than in collaboration with a technical team from the outside. The community receives support from the facilitators and technical assistant and, while this is probably a very important stimulant to action in a situation where maintenance is now only carried out twice each year, it is the community itself which completes the technical task. How can we interpret the problem faced by the headmen of increasing the numbers of people actually participating in the maintenance operations and the complaints about the burden of collecting the materials?

From observations at the target sites and discussions with headmen, tsetse committee officials and community members, theft does not appear to be a problem, the maintenance work is done, at least at the required 6 monthly intervals, and does not appear to be regarded as tedious. Servicing sessions are held only two times per year and even with current levels of attendance, activities are usually completed by midday. Nevertheless, the task falls to a comparatively few individuals who are largely cattle owners. Even though people at Katepela and Kamphalwe appear to be more enthusiastic, the level of participation (understood here as the number of people who attend maintenance sessions in relation to the number of targets) in these two village groupings is more or less the same as at the sites along the road.

Certainly the sites vary and this variation is important to consider when developing a strategy for more significant community involvement as is planned in the case of the Msanzara Trial. The variation is a function of a number of variables including present cattle ownership, previous or present experience of community organising, the social standing of the headmen who form the link between the tsetse committee and the community in general, and who are responsible for advertising that maintenance sessions are due and for persuading people to join in. In villages where the headman does not command respect (as appeared to be the case in Chimtengo) or does not seem to be interested in tsetse control (as in Kanchito) effective co-ordination and motivation will be difficult.

Other obvious variables are the geographical position of the particular site and previous experience. While most of the targets within the whole trial area are readily accessible, those within the Sinda National Forest are not and a clear strategy is needed for locations such as these if local people are to be responsible for maintenance. Previous experiences and contracts are always a point of reference for local populations. Even though these might appear to negate the possibility of community action on different terms, as in the case of the villages in close proximity (social and physical) to the Mvuvye project, the lesson from elsewhere would appear to be rather that more time would need to be spent negotiating with such communities before initiating action, rather than anything else.

The concerns expressed about more widespread participation by headmen and committee members in the light of the work done should perhaps be seen as a statement about the effort required to organise communities for even minimal tasks. Certainly the tsetse committee members, particularly the chairmen and storemen, have a greater role to play than others (co-ordination of activities and collection and distribution of materials) but again, this happens only twice a year. However, it is probably easier to allow a few enthusiastic individuals, or simply to rely on the few individuals over

whose labour one has control (as on the Zambezi Islands) or even to simply rely on ones own labour (as in Chimtengo) than to spend time calling meetings and negotiating with reluctant individuals and groups who will probably always be there.

With respect to the transport difficulties reported, perhaps this complaint needs to be seen as part of the way in which local communities negotiate with outsiders. Our visit was obviously taken as a good opportunity to request assistance; people from Kamphalwe regularly go to Chilabila for all kinds of reasons and presumably could, at the same time, collect the necessary target materials.

This is the only case study where local people appeared to be trying to negotiate with the technical people on the tool (the target) itself; it was suggested that that bamboo poles which were not locally available might be replaced by other material. The fact that the design and materials used for the targets has implications for possible community control is not surprising and ultimately, if the community here is to take full control of the technology - the tool itself and the required organisation - inaccessible material will be replaced and new forms of organisation will likely be introduced.

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