Increasing Community Resilience to Drought in Makueni District: the Sakai Community's Experience, Kenya

The Centre for Science and Technology Innovation

and

The Ministry of State for Development of Northern Kenya and Other Arid Lands

Arid Lands Resource Management Project

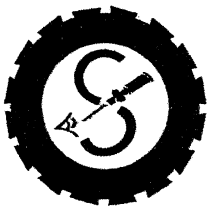

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Table of Contents

Item	Page
Introduction	3
1.0 Climate Variability and Change- Sakai Sub-Location	4
1.1 Project Mobilization	6
1.2 Local Knowledge and Gaps on Climate and Weather	9
1.3 Project Interventions and Preliminary Results	10
2.0 Key Lessons	13
Acknowledgements	15

List of Figures and Tables

Figure 1: GIS Map of Sakai Sub-Location	4
Table 1: Major Sources of Water for Domestic Use	7
Table 2: Household Ranking Questionnaire	8
Annex 1: Rain fed Cropping Calendar	16

Introduction

It is widely acknowledged that climate change currently poses one of the greatest challenges to all forms of life and socio-economic development. Anthropogenic climate change is caused by the emission of greenhouse gasses, generated by essential activities such as energy production and consumption, agriculture, motorized transport among others. Climate change threatens to undo decades of poverty reduction and development that have been achieved in many countries.

Low and middle-income countries are more vulnerable to the impacts of climate change due to their high dependence on natural resources and low capacity to adapt. Limited financial, technical and institutional capacity, relatively low levels of economic development and rampant poverty mar effective adaptation to climate change, especially in Africa.

Climate change impacts include unpredictable weather and seasons; increased frequency and intensity of droughts, floods and wind storms; warmer temperatures, resulting in heat stress, rapid melting of polar ice caps and glaciers; and sea level rise. These are affecting human health, biodiversity, economic and livelihood activities such as agriculture, tourism and infrastructure, mainly negatively. Climate change impacts are already being felt in many parts of the world, and are likely to worsen in future.

Many parts of Kenya are already experiencing unpredictable weather, more frequent droughts- often followed by floods, as well strong winds (particularly at the coast). Given that about 80% of the country is classified as Arid and Semi-Arid, climate change poses additional threats to water availability, agriculture and food security, human and animal health, biodiversity, transport and tourism among others.

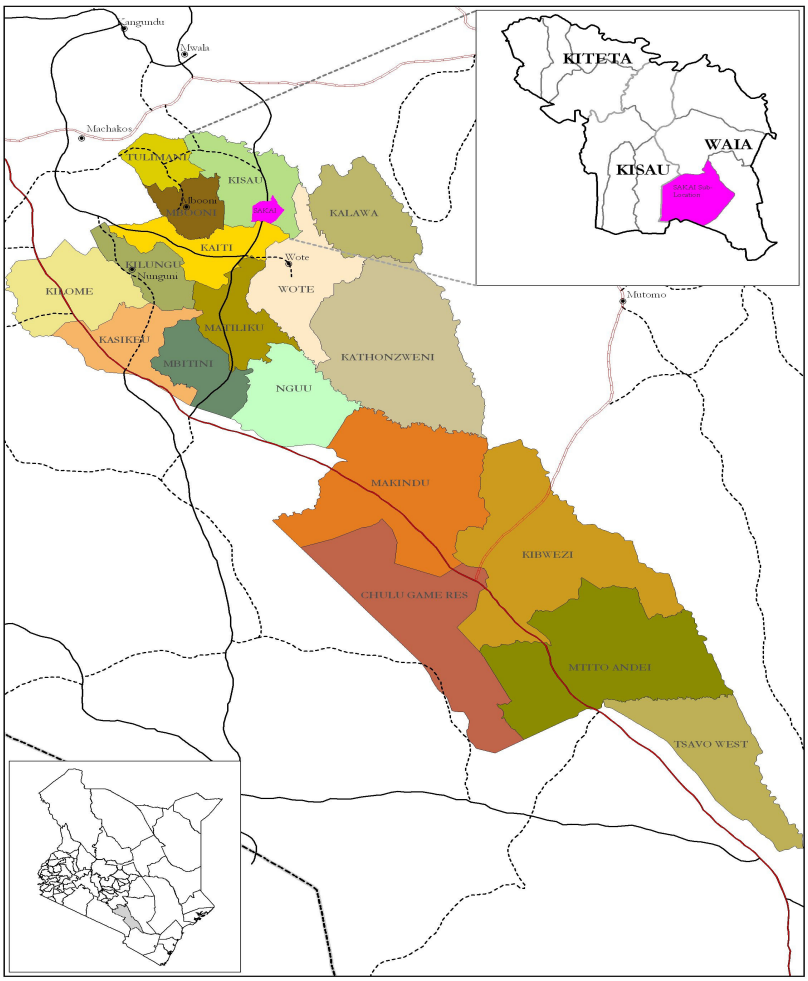
Adaptation to climate change, and its mitigation (where feasible), are crucial for the achievement of sustainable development. In many developing countries, including Kenya, many communities have been adapting to variations in weather and environmental changes. In view of the additional threats and stresses caused by climate change, effective, context-specific and timely adaptation has become, and will continue to be more vital.

In this paper, the experience of a community that is adapting to increased drought in one of Kenya's Arid and Semi-Arid Districts in shared. The process, successes and challenges are highlighted. It is hoped that community based adaptation practitioners, local communities, researchers, policy and decision makers will find useful lessons from this experience.

1.0 Climate Variability and Change- Sakai Sub-Location, Makueni District

Sakai Sub- Location is situated within Waia location of Kisau Division, Makueni District in Kenya's Eastern Province. It covers an area of approximately 24.5KM^2 and has a population of about 4800 persons, who mainly conduct small scale, rain-fed agriculture and livestock rearing (CSTI 2006[1]).

Figure 1: GIS Map of Makueni District showing the location of the Project Site (Sakai Sub-Location)



Source: CSTI 2006

The area experiences two rainy seasons namely the long rains (March to May) and short rains (October to December). According to area residents, up to the 1970s, both the long and short rains seasons were reliable, and the community used to plant and harvest twice a

[1] Centre for Science and Technology Innovations. Progress Report on the Design of the Project titled '**Increasing Community Resilience to Drought in Sakai Sub-Location, Makueni District'** (May 2006).

year. However, from the 1980s onwards, the long rains have been unreliable, leaving the community with one dependable annual harvest.

The area's vulnerability to climate vulnerability and change is exacerbated by the community's heavy reliance on crops such as maize and beans, that are very sensitive to drought. In addition, natural resource degradation, inadequate provision of social services and under investment are key challenges facing the area.

Major manifestations and impacts of climate variability and change in Sakai include early onset and cessation of the rainy seasons, frequent and prolonged droughts, frequent and more severe water shortages, and famine. These lead to:

- *Household food insecurity which manifests itself as hunger, starvation, food rationing and poor nutrition;*
- *Conflicts as a result of competition for access to scarce natural resources, especially water ;*
- *Inadequate water for both household and farming activities;*
- *Inadequate fodder and pasture for livestock;*
- *High food prices, and low livestock prices. The latter drives down income from livestock business;*
- *Children drop out of school to help in search of water or undertake selling of livestock;*
- *People and livestock become more vulnerable to diseases because of poor nutrition;*
- *Development activities stall because the available incomes have to be spent on purchasing food.*

In view of the challenges posed by increased drought in Makueni, which are bound to get worse with continued climate change, a pilot project aimed at increasing the community's resilience to drought was initiated in Sakai in 2006. The *Sakai* pilot project is part of a regional project on '***integrating vulnerability and adaptation to climate change into sustainable development policy planning and implementation in southern and Eastern Africa' (ACCESA),*** funded by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP), and the Governments of Netherlands and Norway. The African Centre for Technology Studies (ACTS), International Institute for Sustainable Development (IISD), and United Nations Environment Programme (UNEP) provide technical oversight to the regional project. The Sakai pilot project is being implemented by the local community together with the Centre for Science and Technology Innovations (CSTI), and the Arid Lands Resource Management Project (ALRMP).

1.1 Project Mobilization

The CSTI and ALRMP teams commenced by conducting a review of existing literature on physical, environmental and socio-economic issues in Makueni district. Makueni District was selected because of its size, high population density, unique dryland characteristics and devastating impact of past droughts on the communities. Parts of the district that are most vulnerable to drought were identified. A reconnaissance study was conducted to identify the most suitable area for project implementation based on various criteria, including vulnerability to drought, existing local institutions and organizational structures, and the community's willingness to actively participate in a project. Sakai sub-location was chosen because it is representative of the other locations of Makueni District in rainfall pattern, soil type, crops and vegetation cover; it has a high concentration of population that provides an opportunity for maximizing project impacts; the sensitivity of the community's livelihood activities to drought; ease of access; potential for upscaling project interventions; and on-going related activities in the area, such as drought management activities of the Arid Lands Resource Management Project, among others.

Further research was conducted to collect baseline physical, demographic and socio-economic data to establish the characteristics, needs and priorities of area households in the face of climate change induced drought. The household surveys revealed that farming was a major source of income followed by casual labor. Those who rely on farming as a source of income depend on it entirely (100%). Five percent of the households depend on remittances for a large proportion (80-90%) of their incomes. They are vulnerable to large scale shocks such as climate change induced droughts, because remittances are not consistent, and depend on capability and goodwill of the remitters. About 10% of the households engage in small scale businesses that provide about 50%- 75% of their incomes. When it comes to household expenditure, 70% of the residents spend between 50-98% of their incomes on food. It is notable that about 54.7 % of the households do not have enough to eat. Seventy two percent of the households spend between 5-10% of their incomes on health; 51% spend between 10-30% of their incomes on education. Expenditure on personal items is also limited to 5-10%. (See reference 1).

In terms of availability and access to water, the most common sources of water for domestic use during dry seasons are seasonal rivers/streams, wells, boreholes and sand dams. This is confirmed by the 89.4% of the households whose major source of water during the dry season are the seasonal streams/rivers (see Table 1). Although during the wet season rain water harvesting is a significant source for 46.7% of the households, rivers/streams are still dominant water sources. Wells on the other hand account for 16% of the sources of water during the wet season (See reference 1). Generally, average distance to watering points is approximately 4KM, round trip during dry spells (CSTI 2008[2]).

[2] Centre for Science and Technology Innovations. Progress Report on the Project titled ' **Increasing Community Resilience to Drought in Sakai Sub-Location, Makueni District'** (June 2008)

Table 1: Major sources of water for domestic use

Source of Water	Frequency	Percent
Rivers/streams	67	89.4
Wells	6	8
Boreholes	2	2.6
Total	75	100

(Source: CSTI 2006).

Key problems identified by the community included unpredictable weather (especially rains); frequent droughts that exacerbate water shortages, poor water quality, crop failure, loss of livestock and famine; high cost of good quality agricultural seeds; insufficient wood fuel for domestic use; poor quality infrastructure that negatively affects access to markets and poverty. To address these problems, the community, together with the project team identified various feasible interventions.

The pilot project was developed with a goal to increase household food security, reduce poverty through improved livelihoods, and facilitate integration of climate change adaptation into policies related to disaster management and sustainable development of arid and semi-arid lands. Objectives of the pilot project are:
1. To increase household food security through increased livelihood resilience and reduced vulnerability to drought.
2) To reduce poverty through improved livelihoods.
3) To facilitate integration of climate change and adaptation into policy development and planning.

A number of activities were planned in consultation with the local community. Through them, the project sought to demonstrate how to enhance resilience to drought and reduce vulnerability to climate change, reduce poverty, and improve livelihoods.

In 2006, a major project mobilization meeting was held with the community. At this meeting, they were briefed on plans of pilot project and each village was requested to nominate twelve households for a further selection process. The ranking questionnaire below was then administered to the sixty farming households nominated.

Table 2: Household Ranking Questionnaire

Name of Household: _____

Village: _____

Demonstration site score card

Question	Maximum Score		
	1	3	5
Do you prepare land before planting?	No	Sometimes	Yes always
Do you practice dry farming?	No	Sometimes	Yes always
Do you plant and utilize drought escaping crops – millet, sorghum, cow peas etc.?	Never	Some of them	All
Have you undertaken soil & water management on your farm?	No	Very little	Yes
Ready to give 1.3 acres of your best land for demonstration?	Not ready	Part of it	Yes
Ready to follow recommendations?	No	Few	All
Source of income	Employee	Partly on farm	Only from farm
Do you rely on famine relief/	No	Always	Partly when dry
Who does the farming?	Husband	Both	Wife
Are you ready to allow for a field day demonstration on your farm?	No	Partly willing	Very ready

Based on the ranking from the questionnaires and taking into consideration the population of the villages, 40 households that scored above 50 points were selected to host the initial project demonstration sites. This was after suitability of their farms was verified. The selection was as follows: 9 households in Kathamba, 9 in Kithiani, 7 in Muiu, 8 in Linga and 7 in Thongoni villages. Selected farmers signed a Memorandum of Understanding, that spelt out terms and conditions of collaboration with the project.

Priority in selection was given to those farmers who were:-

- implementing soil and water conservation activities on their farms;
- planting drought escaping crops;
- who are women and do the actual farming and;
- able to understand technical extension services instructions, advice and recommendations.

For purposes of managing and implementing the demonstration activities, each village appointed a committee of three people to coordinate the farmers in their respective villages. Reporting relationships were also established.

1.2 Local Knowledge and Gaps on Weather and Climate

During the collection of baseline information in Sakai, data on local knowledge on climate and weather was collected. This data revealed that 97.3% of the households recognize two seasons of rainfall as their main planting seasons. They identified increased frequency and intensity of drought, early cessation, irregular distribution, and delayed onset of rains as common problems in the area (see reference 1). This awareness provided a good entry point for the project team to create awareness about climate change, and its potential impacts on the area.

About three-quarters of the respondents were aware of indigenous/traditional methods of forecasting rainfall, including traditional weather indicators. Forty one percent receive weather information from traditional sources, including traditional weather forecasters. Of these, twenty eight percent use this information for seed selection; thirty six percent use it for tilling, terracing and repairing agricultural land; and twenty nine percent use it for planting. Eighty eight percent of the respondents receive weather information from other sources including radio, television, newspapers and agricultural extension officers. About 65% of the respondents acknowledged that they received weather information in good time. It was noted that additional information such as dates of the onset, cessation and duration of rains as well as suitable crop and seed varieties for any given season would be useful.

Whilst traditional sources of weather information have been useful, and are widely accepted among the community, it was noted that they are not adequate in terms of providing medium and long term climate predictions. In addition, they have not provided sufficient detail to enable community members properly plan and sustain their agricultural activities. The project has endeavoured to fill this gap by augmenting traditional weather information with scientific weather forecasts. The team has been downscaling scientific weather forecasts for the sub-location, and communicating this information in agricultural terms. To be precise, community members have been trained on appropriate use of weather information. In addition, they are regularly provided with information detailing the expected dates of the onset and cessation of rain, duration and amount of expected rainfall, suitable crop and seed varieties for a given season, and dates for land preparation and sowing among others. Various channels of communication are used. They include village meetings *'barazas'*, radio, local newspapers, brochures, newsletters and cropping calendars. While timely, appropriate and comprehensive communication of weather forecasts has been useful, there is need for data on medium and long term climate predictions for the area. This would be useful in preparing the community for likely changes in future climate. It is envisioned that further strategic collaboration with the

IGAD Climate Predictions and Analysis Centre (ICPAC) and the Kenya Meteorological Department would be instrumental.

1.3 Project Interventions and Preliminary Results

A situation review revealed that drought is the most prevalent disaster that negatively affects the country. Arid and Semi Arid areas pose a huge challenge to the developmental plans of the country, as a large percentage of the population contributes negligibly to advancement of the whole country. Given that most parts of East Africa are predicted to get drier and warmer, adaptation to these changes are necessary to reduce vulnerability and enhance resilience in response to observed or expected changes in climate and its impacts.

A review of national policies on national disaster management and sustainable development of Arid and Semi-Arid lands showed that they strive to improve the welfare of the vulnerable groups. However, insufficient political will, insufficient human resource and organizational capacity for implementation, and socio- cultural factors such as reluctance of communities to embrace new livelihoods, have made it very difficult to achieve the objectives of the policies.

It is important to integrate climate change considerations into relevant policies and promote adaptation measures through awareness creation, research, relevant and targeted capacity building, construction and maintenance of infrastructure such as dams, introduction of suitable technologies, including suitable agricultural seeds, promotion of natural resource management practices (such as agroforestry), and diversification of livelihood options.

Upon participatory selection of the initial pilot project farms, the interventions described below were initiated.

To reduce the loss of crops occasioned by unpredictable rainfall, the technical experts in the project team, comprising of representatives of the IGAD Climate Prediction and Analysis Centre (ICPAC) in conjunction with the Kenya Meteorological Department (KMD), those from the Arid Lands Resource Management Project and the Ministry of Agriculture, have been “downscaling” scientific weather forecasts for the sub-location, and communicating this information to the community in agrometeorological terms regularly. Downscaling involves conversion of the national seasonal forecasts, operationally provided by KMD, into local community and sector relevant information. This entails the provision of local sector specific advisories based on the seasonal outlooks. Examples include advice on types of crops to plant, how many different crops to plant based on the uncertainties within the forecasts, and water harvesting among other activities. By doing so, the team has been able to provide useful weather information for the sub-location – especially when compared to the provincial seasonal weather forecasts normally provided by the Kenya Meteorological Department which cover a large geographical area.

In addition to downscaling, appropriate interpretation, packaging and timely communication of weather forecasts to the community members, other project

interventions include training of community members on appropriate agricultural practices and animal husbandry; identification, retrieval, selection, bulking and storage of good quality seeds. In addition, training on pest control, post harvest storage and management has been done. Demonstration sites have so far been established among 640 households, who have also provided with good quality seeds, to show the benefits of use of weather information in agricultural planning as well as application of proper agricultural practices. These farmers have been conducting farmer to farmer training, and distributing good quality seeds from their farms to other farmers in the area. Project interventions have been upscaled quite well in the area, with about 80% of the area farmers adopting these practices by the second planting season (CSTI 2007[3]). In addition, training on the use of weather forecasts for agricultural planning was conducted by ALRMP in Kibwezi and Kajiado districts during the last two seasons; that is, October to December 2007, and March to May 2008.

A cropping calendar that incorporates traditional knowledge on weather and farming practices has also been produced in English, and will be translated into Kiswahili and Kikamba (the national and local languages respectively). It outlines suitable agricultural and livestock production activities to be undertaken during the rainy and dry seasons. It also highlights the importance of early land preparation, selection of appropriate seed quality and variety, and conservation of livestock feed. The cropping calendar provides guidelines for planting that take into consideration possible rainfall forecast scenarios under different soil types. It provides information on appropriate crop types, seed varieties, planting dates, as well as depth and spacing of seeds. In addition, guidelines on land preparation, application of manure, pest and disease control, weeding, crop rotation, grain selection, packaging, storage and transportation are provided. It aims to enable farmers in Sakai and other areas with similar agro–ecological and livelihood characteristics to make decisions that will result in appropriate farm operations and high production levels. An extract from the cropping calendar for Sakai is contained in Annex 1 of this paper.

To enhance perennial availability and accessibility of water, two sand dams namely *Kwa Dison* and *Kwa Ndeto* have been constructed. They are designed to form a partial barrier across a river/stream, which traps sand and water as the river/stream flows. Sand dams are suitable for the area because they conserve water that the community can draw and use domestically and in the farms during dry seasons. There are plans to also drill shallow wells to conserve water. To facilitate this, the project has purchased an Auger. Training on operation and management of these water conservation infrastructure has been provided to 57 members of the local community who are expected to undertake maintenance of this equipment. Three super money saver and two money maker micro-irrigation pumps have been purchased and will be soon installed in each of the five project sub-locations. These will pump water from the shallow wells (and drilled holes) and channel it to the farms' directly for irrigation or to the overhead water reservoirs for drip irrigation.

In an endeavor to diversify the economic livelihoods of the community, five selected self-help groups have been strengthened through provision of training on entrepreneurial skills and financial management. The groups, which proved to have clear vision and good leadership, developed business plans outlining their business objectives, and planned entrepreneurial activities, including establishment of tree nurseries, table banking, rope

[3] Centre for Science and Technology Innovations. Progress Report on the Project titled ' **Increasing Community Resilience to Drought in Sakai Sub-Location, Makueni District'** (December 2007)

manufacture, and trade in kerosene. The micro-credit scheme was launched in August 2008, and will be monitored continuously. It aims to enhance alternative income generation and complement farming as an income generating activity.

Planned activities include the establishment of drip irrigation systems in the area. So far, a survey has been conducted. Three super money saver and two money saver micro-irrigation pumps have been purchased. These will pump water from the shallow wells and drilled holes, and channel it to the farms' directly for irrigation or to the overhead water reservoirs for drip irrigation. Other plans include construction of biogas digesters to improve the use of organic fertilizer.

In terms of outreach and policy engagement, information on the pilot project is regularly updated on the project website (www.csti.or.ke). In addition, several papers have been prepared based on the project's experience and presented at various national and international meetings. Two project brochures and a video documentary showcasing field level activities have been produced and distributed. Plans are underway to use the video documentary as a tool for further awareness creation, peer learning, as well as policy engagement. Policy briefs highlighting the importance of integrating climate change adaptation into sustainable development policy planning and implementation, drawing on lessons from the pilot project will be produced.

At district and divisional levels, relevant policy makers from the Ministries of Environment, Agriculture, Social Services, Water, Planning and National Development and Finance have been engaged in the project through the Arid Lands Resource Management Project. Downscaling and communication of seasonal weather forecasts are currently being upscaled to 28 other districts where the ALRMP works. This is a key success that has the potential to positively impact a large area of the country.

In terms of national policy influence, the project has informed, the revision of the National Disaster Management Policy, which took into account, and incorporated climate change and adaptation issues.

2.0 Key Lessons

The concept of climate change is still fairly abstract among many people. In Sakai, there is a general awareness among community members that the weather has been changing, and that these changes are increasingly affecting their lives negatively. However, it is widely perceived that these changes are caused by other factors such as punishment by God, and degradation of natural resources such as forests. They have not yet been linked to increased emission of greenhouse gases (especially by developed countries). There is need for simplification of information on the science of climate change and greater awareness creation among local community members, policy makers and other practitioners.

Communities in the area have been adapting to changes in weather and the environment for a long time, and have demonstrated that adaptation is doable. With changing climate, the scale of adaptation efforts has had to increase. In addition, it has become necessary to augment indigenous coping strategies with science-based knowledge and introduce various modern technologies for adaptation. It is important to link adaptation to local development in order to encourage active stakeholder participation.

To improve the probability of success, consultative and participatory approaches should be adopted at all stages of the project cycle. This promotes a strong sense of ownership and enables all stakeholders to learn as they work together. In addition, it enables early identification of challenges and provides room for exploring the most cost effective and efficient ways of addressing them.

The key to effective community based adaptation to climate change is proper utilization of weather and climate information (which needs to be communicated in a meaningful way, and timely manner). Therefore, close collaboration with meteorologists should be fostered. Additionally, diversification of livelihood options and demonstration of the tangible benefits of adaptation are crucial. Improvement of agricultural yields, quantity and quality of livestock, access to good quality water, household incomes, environmental quality and human health in changing weather conditions are a clear indication that the community is effectively adapting.

Anecdotal evidence from Sakai shows that agricultural yields have improved since the project began. According to one of the farmers, he was provided with 2 Kgs of good quality, drought-resistant maize seeds purchased by the project. He utilized the knowledge and skills gained through training, as well as weather information provided and planted them. He harvested 50Kgs of maize at the end of the long rains season in 2007. Out of his harvest, he selected 6Kgs of good quality seeds and planted them during the short rains of the same year. Out of this, he harvested 400Kgs of maize.

Since the completion of the first sand dam (*Kwa Dison*) in mid 2007, community members have already began to realize benefits such as easy access to potable water which is now available in close proximity. This water has so far been used for domestic purposes, and cultivation of kitchen gardens. The farmers have been recording data of the quantities of their inputs and outputs across the seasons. A follow up household survey will be conducted, and data will be analyzed by the project team. A comparison will be made against the baseline data, to provide clear scientific evidence of project impacts.

To sustain and upscale adaptation projects successfully, it is crucial to involve relevant government ministries and agencies in the project from inception. In the Sakai pilot project, the Arid Lands Resource Management Project, housed within the Ministry of State for Development of Northern Kenya and Other Arid Lands, has been an instrumental partner. Through the ALRMP, relevant government representatives have been engaged at divisional and district levels. They have also enabled upscaling of interventions to other ASAL districts. The ALRMP may also continue implementing project interventions in Sakai after the current funding phase ends.

Integration of climate change adaptation into national policies has so far been a major challenge.
It is noteworthy that the project has so far not influenced other key ministries such as Agriculture, Water, Finance, National Planning and Environment at national level. The project team plans to present its outcomes to policy makers in future. In addition, a strategy for policy engagement is being developed by the executing agencies. The project implementing team will also be trained on the application of appropriate tools and methods for policy engagement and influence. It is expected that the knowledge and skills gained will enable the project team to inform and influence more policies positively in future. Another challenge is the lengthy process of policy review, and exogenous factors that affect policy change such as political interests, and prevailing economic priorities among others. Currently, the Kenya Government acknowledges climate change as a significant challenge to national development. A National Climate Change Office is being set up and will be charged with the task of formulating a national climate change strategy on adaptation and mitigation (where feasible). Lessons on the process of implementing a community based adaptation project, and impacts of adaptation can be drawn from the Sakai pilot project's experience.

At field level, challenges that have been encountered include: effective community mobilization (especially for construction of the second sand dam), high costs of construction materials, sudden attacks of crops by pests and diseases, and erratic weather.

The Sakai pilot project offers many good, practical lessons on community based adaptation, that are applicable to most Arid and Semi Arid areas where mixed agriculture is practiced. Although several challenges have been highlighted, it is generally accepted that the project has succeeded to a large extent thus far. It would be useful to compare the experience in Sakai with that of other areas where the project is being upscaled to in future. This will build on the body of knowledge on the application and adaptation of diverse tools and methods in community based adaptation to climate change and policy integration.

Acknowledgements

We would like to express our sincere gratitude to the Global Environment Facility (GEF), the Governments of the Netherlands and Norway for funding this project. We would also like to thank the United Nations Environment Programme (UNEP) for developing the regional project, which the Sakai pilot project is part of, and acknowledge their role in providing technical oversight to the regional project.

The African Centre for Technology Studies (ACTS) and the International Institute for Sustainable Development have played an instrumental role in the management of this project. Their technical support is appreciated.

Sincere thanks also go to our close partners, the Arid Lands Resource Management Project (ALRMP) and members of the Sakai pilot project community. The Arid Lands Resource Management Project has been a crucial link to the Sakai community and relevant Ministries in the Government of Kenya. In addition, the drought management experience and co-financing brought into the project by the Arid Lands Resource Management Project, and the cooperation and dedication of the Sakai community have tremendously contributed to the success of this project.

Last but not least, we would like to thank the Government of Kenya for providing the much needed support in form of human resources, and for authorising the implementation of this project.

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Annex 1: Rain Fed Cropping Calendar

Calendar for rain-fed crop production activities

A typical agricultural calendar in the project area has the following seasons and activities:

Short dry season (January to mid March): Activities undertaken during this season include harvesting of the short rain crop, in January for pulses and February to March for cereals; land preparation for planting for the long rains season; and planting of the long rains crops at the onset of the rains.

Long rain **season** (late March to mid May): Main activities during this period include continuation of planting, in April; first weeding, when weeds cover the crops; pest and disease control; and second weeding, in early May.

Long dry season (mid May to mid October): Major activities during this period are harvesting of long rains crops, from June to July; soil and water conservation activities, in July, August and early September; post harvesting management, in July to September; harvesting of late maturing pigeon peas varieties, in August; land preparation / application of manure, in September to mid October; preparation of tree planting holes, in August; and tree planting, at the onset of short rains.

Short rain season (mid October to late December): Activities undertaken during this period are planting of the short rains crop, from mid-October; weeding, when the weeds cover the crops; pest and disease control for specific crops such as cow peas, green grams and maize, in early December, when farmers notice signs of pest attacks.

RAIN – FED CROP PRODUCTION CALENDAR