

Community Based Adaptation to Climate Change in Africa (CBAA)

February 2010



OYOLA AND WAKESI IN KENYA: LOCALS ADAPTING TO EFFECTS OF CLIMATE CHANGE

Judi W. Wakhungu, Elvin Nyukuri, Dan Ongor, Charles Tonui



Series editors:

Judi W. Wakhungu, Joan Kariuki Kung'u and Charles Tonui

Adaptation has become part of the discourse of global warming and is now widely recognized as a fundamental and necessary response to the threat posed by the climatic changes that will occur, or are already occurring due to past and present carbon emissions (UNFCCC 2007). A new statistical analysis has estimated the global-scale net effect to climate change on crop yields for the world's six most widely grown crops. According to this study, "the historical temperature-yield relationships indicate that at the global scale, warming from 1981-2002 very likely offset some of the yield gains for wheat, maize and barley). From technological advances, rising Carbon Dioxide and other non-climatic factors had minimal effects on the yields for rice, soy, and sorghum. (Lobell and Field 2007). This shows how most countries in Africa that highly depend on such commodities are facing the adverse impacts of climate change both in terms of food security and human security.

In Kenya, droughts and floods have become more frequent and intense. The country has also seen increased average temperatures, more extreme hot days, and colder nights, successive crop failures, as well as the spread of vector-borne diseases like malaria to places where the disease is not known to be endemic. These climate driven changes affect resources critical to the health and prosperity of Kenya. For example, the 1999/2000 *La Nina* droughts resulted into 4.7 million Kenyans facing starvation, while the effects of the 2008/2009 drought could be worse with unofficial reports putting the number of people facing hunger at some 10 million. These impacts and others portend a worsening of the situation in the future given that the global green house gases (GHG) emissions are continuing unabated.

At the local level, efforts are being made to document how communities are responding to these challenges. Here we focus on two communities, Oyola and Wakesi peoples

who reside on the fringes of Lake Victoria in the Kano Plains of Western Kenya. The African Centre for Technology Studies (ACTS), in partnership with Uhai Lake Forum are undertaking an action research and testing an adaptation tool called Local Options for Communities to Adapt and Technologies to Enhance Capacity (LOCATE) methodology to document the findings.

Methodology

Participatory rural appraisals and focus group discussions were carried out in two villages; the peri-urban Oyola village near Kisumu town and the rural Wakesi village. The community villages have been able to identify forms of climate vulnerability, including changing the land use patterns and farming methods. The project used the Local Options for Communities to Adapt and Technologies to Enhance Capacity (LOCATE) methodology to assist vulnerable communities to design and implement community based adaptation projects to climate change. The participatory approaches used by the community to identify their physical vulnerability are explained in the following section.

Community Based Map

This map indicated the community's geographical boundaries, major resources such as rivers and social features such as churches and schools. The community members took a lead in this exercise through guidance by the study team.

The community was asked to select from among themselves, a person lead in the process of drawing the map. A farmer first gave a descriptive narrative of the boundaries of Oyola village by naming homesteads that mark the boundary as well as physical features that also act as boundary markers such as roads and rivers and social amenities such as churches and schools.

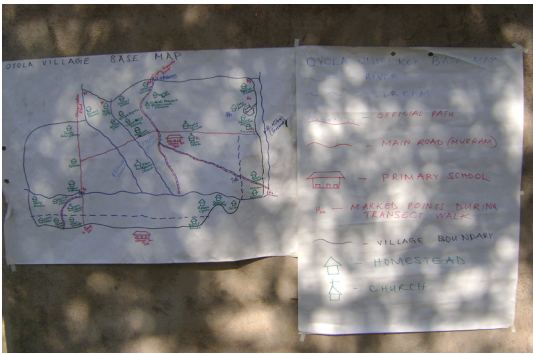


Figure 1: Hand-drawn community based map of Oyola village

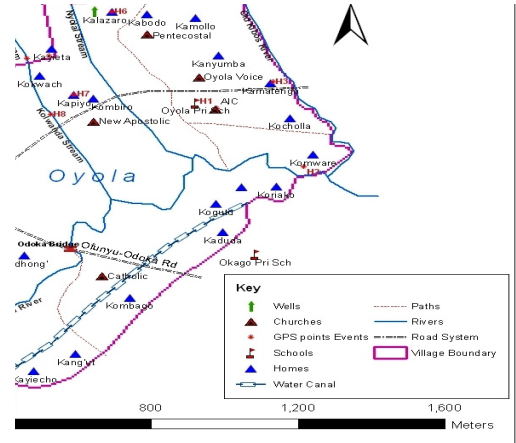


Figure 2: Geographical information System (GIS) map of Oyola village

Problems	Opportunities
<p>Floods</p> <p>Droughts</p> <p>Poor and inaccessible roads</p> <p>Insufficient safe water for drinking</p> <p>Poorly drained soil</p>	<p>Building of dykes along River Mahenya Straightening river Mahenya to allow water flow effectively</p> <p>Planting of trees and grass along the river bank of for river bank protection.</p> <p>Opening of more access roads and murraming the existing ones</p> <p>Establishing boreholes, water tanks for trapping brain water and water pans</p> <p>Opening up of water channels.</p>

Table 1: Summary of the problems and opportunities identified by the community

Flood hazard map

The study team guided the community in drawing the flood hazard map from the base map and indicated areas most affected by floods, areas that have been destroyed by floods in the past, intensities of flood, how flood water flows, flood evacuation routes, homes and houses vulnerable to floods, homes of the old and handicapped who may have difficulty to be evacuated during floods, flood warning areas and the evacuation centres. The community took lead in this exercise through guidance by the study team.

In the flood hazard map, the major source of water that floods the Oyola Village comes from River Mahenya. This river meanders

and cuts across the village. Apondo stream and Nyolal streams act as outlets of River Mahenya. Once River Mahenya breaks its banks, the water flows along Apondo and Nyolal streams which eventually flood the village. Other floodgates were found to be near such homes as Kaliech, Kabodo, and Kalazaro. Whenever floods occur, the first affected community members alert others by shouts of “Mahenya omwomo! Mahenya omwomo!” meaning River Mahenya has broken its banks. The floods in Oyola village seem more of flash floods because it takes a short time but the impacts are catastrophic, causing deaths and destroying property.

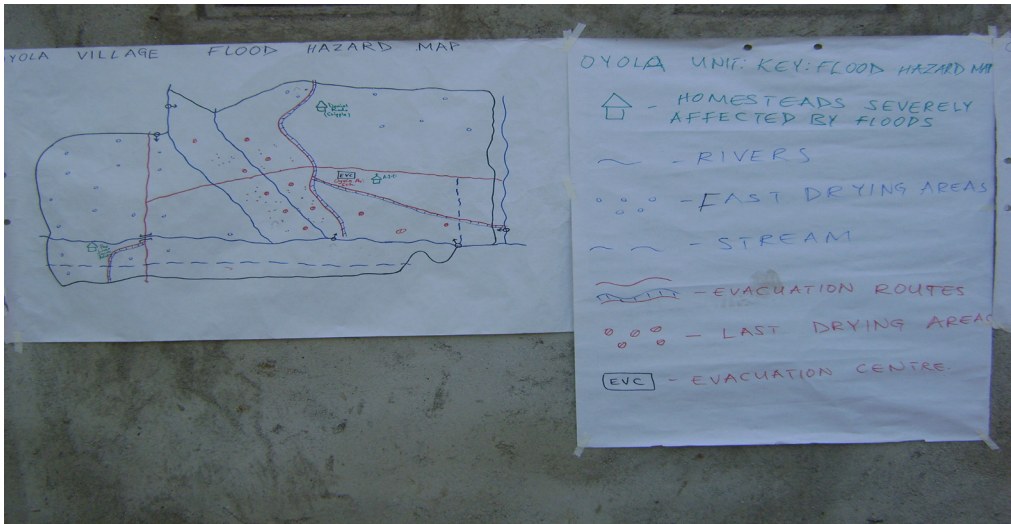


Figure 3: Hand-drawn flood hazard map by a member of the community

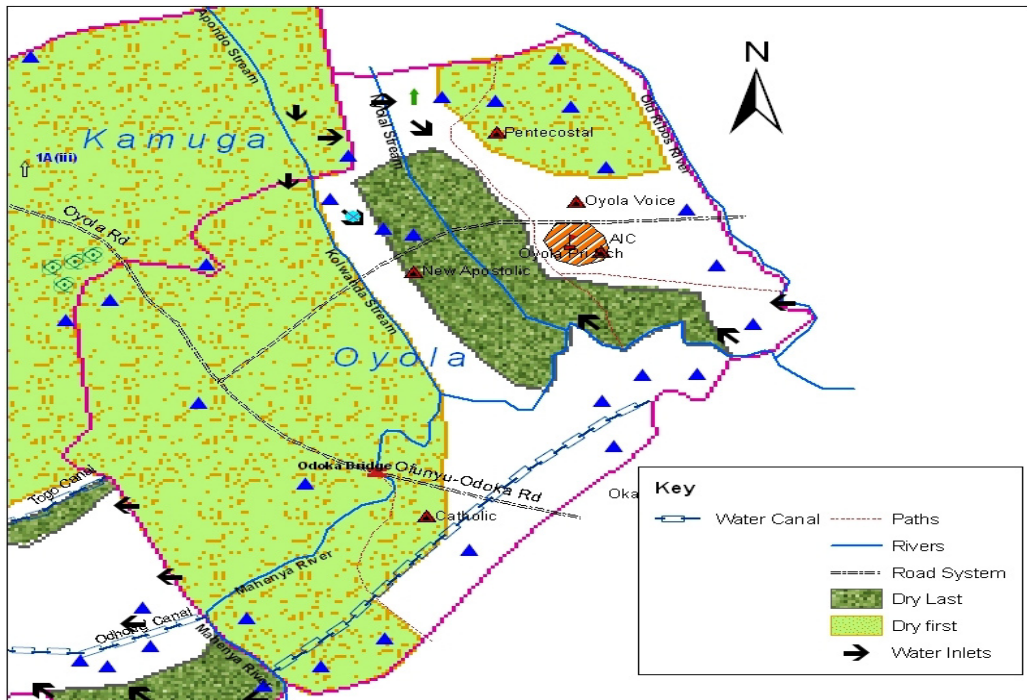


Figure 4: GIS drawn hazard map

Problems	Opportunities
<ol style="list-style-type: none"> 1. Floods 2. Destruction of properties 3. Drought 4. Poor roads during rainy seasons 5. Lack of grazing land 6. Livestock diseases causing death 7. Human diseases 8. Lack of safe water 9. Hunger 10. Few bridges 11. Floods 12. Destruction of properties 13. Drought 14. Poor roads during rainy seasons 15. Lack of grazing land 16. Livestock diseases causing death 17. Human diseases 18. Lack of safe water 19. Hunger 20. Few bridges 	<ol style="list-style-type: none"> 1. Desilting River Mahenya and its tributaries 2. Gabion construction along the river banks 3. Sinking boreholes and water sources 4. Establishing a health center 5. Building of more culverts and bridges 6. Reducing the number of livestock 7. Improve health care 8. Construct water tanks and treat water 9. Commitment in work.

Table 2: Summary of problems identified and opportunities from the hazard

Historical profile

The team used LOCATE to determine the ancestral background and origin of the villagers. The young adults and children also got acquainted with their history as it was passed from one generation to another. Groups of old people in the community assisted in writing the history of the village. Then the community as a whole participated in developing their historical timeline. This gave a background

of experience and knowledge that has influenced present behaviour and attitude in the community with special reference to historical flood management, flooding, drought, famine and farming practices. By use of this tool, major events that have affected the life of the community in the past were identified. The effects of such events and how the community has coped in the past was also recorded.

PERIOD	EVENT	LOCAL ACTION	RESULT
1946	Drought "Kee Otonglo"	-People walked to Sondu in search of food for sale and consumption -Livestock were taken to swampy areas for grazing and watering -Sale or exchange of livestock for food	-Famine -Death of cattle due to lack of pasture -Reduced number of cattle -Increased trade in food crops -Disease Coping strategies -Fishing
1948	Drought	-Invaded neighboring sugarcane farms -Walked long distance in search of food and water -Exchange of livestock for food/barter trade -Exchanged sugarcane with fish	-Famine "Kee angwani" -Migration
1952-1955	Mau Mau war Floods	-Fed on food stocks/surplus from previous season -Planted drought resistance crops like sweet potatoes in the preceding season. -Migrated to safer areas. -Constructed water pans as water reservoirs.	-Hunger " Kee Dhima" due to failure to cultivate crops. People used <i>chang'aa</i> as medicine -Displacement. -Silted riverbed. Human disease called 'olima'
1962	Floods 'Koth Uhuru'	-Depended on relief supplies from the government. -Migrated to raised areas and to schemes -Shared houses. -Government diverted river course. -Community constructed drainage canals/channels	-Displacement -Diseases -Destruction of houses -Hunger due to crop destruction. -Siltation of Mahenya stream -Yellow maize - Food for work by Government
1975	Drought	-Walked long distance in search of water. -Fed on 'Ogira' after buying maize at high costs. -Grazed cattle at swampy areas and sought fodder. -Reduced number of meals taken per day. -Bought food at high cost from lands adjacent to lake Victoria. -Dug wells on the riverbed to access water. - Fed on wild vegetable/failed sorghum head 'Ochondo'	-Famine "koro koro" -Water scarcity - Death (Cattle) - Reduced vegetation. -Diseases outbreak.- HIV/AIDS - Government provided drugs and food
1994	Floods	-Migrated to safer areas and homes. -Constructed drainage channels and water pans.	-Displacement. -Hunger due to lack of farming. -Diseases -Soil erosion
1997	El Nino (Rain)	-Sought relief food, drugs and other supplies -Migrated to safer areas and homes. -Constructed water reservoirs i.e. pans.	-Floods -Displacement and migration. -Destruction of houses. -Diseases i.e. water borne -Hunger. -Siltation of riverbed. - Government provided drugs and food
2005/06	Drought Followed by Strong winds Heavy rains	-Took livestock to areas with pasture such as swamps/ wetlands. -Rationed available water for needy usage only. Cultivated riverbank for short term crops i.e. vegetables through irrigation. -Dug water pans in anticipation of rainfall as reservoirs.	-Famine -Water scarcity -Disease outbreak i.e. cholera.
2007	Post Election Violence	Staying indoors	Destruction of property Inflation Deaths

Table 3: Period, events, location and results of how the community has coped with past occurrences

Below is a summary of the problems and opportunities identified by looking at the historical Profile.

Table iii	Problems	Opportunities
	Flood Hunger Human diseases Drought Strong winds Drought Post Election Violence People displaced Human and animal diseases Destruction of property	Digging drainages and river channels Irrigation Digging boreholes Capacity Building on disaster preparedness

Table 4: Summary of the problems and opportunities identified by looking at the historical profile

Historical Trend Lines

This tool was used to show how things have been increasing or decreasing with time within the community. The parameters looked at included population, education diseases, food availability, and number of livestock, living standards and flood intensity.



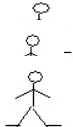
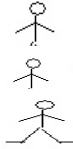
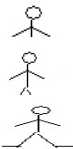

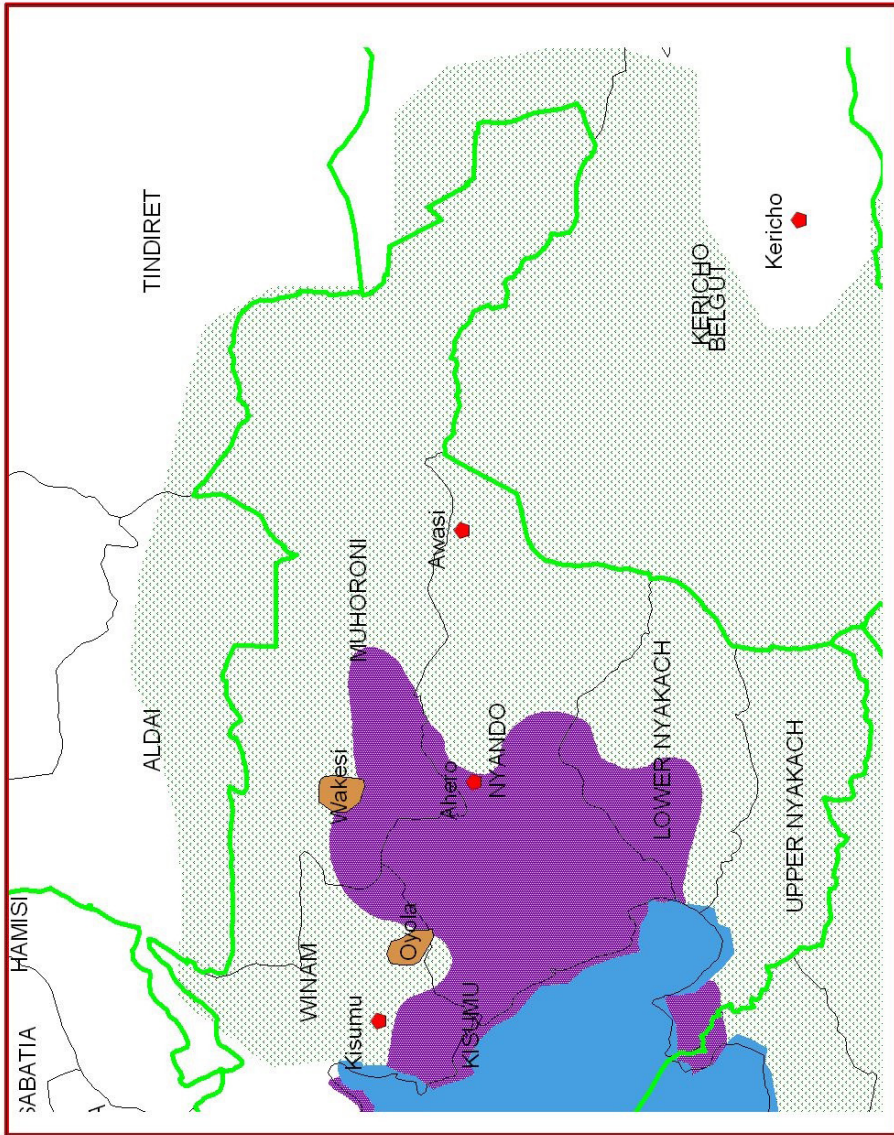
Parameters/ Year	1950-1960	1960-1970	1970- 1980	1980- 1990	1990-2000	2000- date
Population						
Amount of food	□ □ □ □ □ ○ □ □ □ □ □ □	□ □ □ □ □ ○ □ □ □	□ □ ○ □ □ ○	□ □ ○	□ □	□
Flood intensity	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~	~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~ ~~~~~

Table 5: Trends of various parameters

Kano Plains



- Major Towns
- Study Villages
- Districts
- Divisions
- Major Lakes
- Wetlands
- Kano plains
- Kenya



Historical Resource Analysis

The LOCATE tool was used to show the availability of key resources to the community over time from the past, present and future and indication of the reasons in changes of these resources. This helped the community know the changes on their resources and base their development action plan on the same.

Natural Asset

Product	Availability	Use	Ranking
Maize	3	-Consumption	3
Sorghum	4	Consumption	3
Horticulture	2	-for sale -Consumption	4
Livestock	3	-Source of milk -For Ploughing – sale	3
Trees	3	-Building- fuel wood -Sale	4
Grass	2	-For grazing	3
Firewood	2	-For cooking	3
Fish	2	-Consumption	2
Rice	1	-Consumption	3
Water	2	-Consumption	5

Table 6: Natural assets of Oyola village

Financial Assets

Assets	Availability	Use	Ranking
Banks	3	-Savings, loans, overdrafts	4
Credit Providers	2	-Loans, train on investing	4
Pension	1	-	2
Remittance	2	-	3
Earnings (formal, informal, self employment)	3	-	5

Table 7: Financial assets of Oyola village

Human Assets

Assets	Availability	Use	Ranking
Educational level	3	-Skills	5
Workshops	4	-Learning	4
Training	3	-Learning	4
Field tours	3	-Learning skills	3
Seminars	4	-Learning -Skills	3

Table 8: Human assets of Oyola village

Physical Assets

Assets	Availability	Use	Ranking
Weathered Roads	1	-General use	5
Tarmac roads	1		1
Foot paths	4		5
Flood evacuation routes and centers	2	-To evacuation centers	3
Telephone services	1		2
Land lines/Mobile			2
Kiosks			3
Postal services	1		2

Table 9: Physical assets of Oyola village

Social Assets

Institution	Availability	Use	Ranking
Water user	1		5
Association			
CBO	3	-Merry Go Rounds -Poultry keeping & farming -Savings	4
NGOs	4	-Sponsor students -Assist orphans -Build schools/shelters	4
Water service provider	1		5
Government			4

Table 10 : Social assets of Oyola village

KEY

1. Very many
2. Many
3. Few
4. Very few
5. Non



Effects of flooding in Oyola village

Local options for enhancing adaptive capacity by the community

1. Building of makeshift bridges

The community has constructed makeshift bridges across rivers and streams to enable them cross during the flooding seasons. These makeshift bridges are made of wood as shown in the pictures below.



Makeshift bridges in Oyola village

2. In search of pasture in the neighbouring community –Wakesi

During flooding and drought seasons, the community travels long distances with their livestock to the neighbouring Wakesi village. Wakesi village is located on higher ground towards Nandi Hills and provides abundant pasture for livestock. In addition they can access the Miami Sugar Factory's expansive fields.

3. Construction of water pans and planting of sweet potatoes

The study team, together with the community re-visited earlier plans of constructing the water pans, a plan earlier discussed with the Japan International Co-

operative Agency (JICA). The water pans are intended to control flash floods and store water to be utilised for crop irrigation and domestic use during dry seasons. The community has also expanded drainage canals and introduced sweet potatoes on the embankments to reinforce them.

4. Shift farming

Oyola farmers practice shift farming. They move to Nyamasaria swamp, which is approximately 10 kilometres from Oyola village, to plant crops and vegetables for subsistence. The subdivision of the swamp area among the community members was done several years ago. So far no conflicts have been reported over the use, access and control of the swamp.

5. Crop diversification

Farmers have diversified their crops. Cassava, sweet potatoes, and sorghum are being planted alongside the maize crop. Maize is now being planted on a small scale unlike earlier years where they practised large-scale maize farming. These crops are drought and flood tolerant, enhancing their food security when droughts and floods hit the village.



A community leader shows the expanded drainage canals



A field of maize and sorghum and (right) cattle migration to better pasture

planting period which is February.



A farmer holds a cassava tube (and right) her small plot of cucumber.

Other crops planted by the villagers include fast maturing crops like tomatoes, indigenous and exotic vegetable.

The community is planning to plant oranges and mangoes for commercial purposes. ACTS, Uhai Lake Forum, Oyola CBO and Kenya Agricultural Research Institute (KARI), have started working on introduction of mango fruit seedlings that are more productive than the local species.

The unpredictable rainfall pattern has forced farmers to plant their maize crop earlier than they used to. According to them, the harvest was much better than those who followed the traditional

Housing

Most families live in iron-roofed and grass-thatched houses (mud-walled houses). These houses are normally built on raised grounds but during extremes of weather events like the *El Niño*, these houses are destroyed by water. The community has come up with a coping strategy of raising floors and digging drainage canals around the compounds to control flood water from flowing inside the houses.

Sanitation facilities

Sanitation facilities such as pit latrines are built on termite hills. Termite hills are common in the area. CARE Kenya has introduced eco-toilets in the neighbouring Wakesi village and can be replicated in the area.

Sources of Energy

The community depends heavily on firewood, crop residues and kerosene as sources of energy. The project created awareness on use of renewable energy and the community members are receptive of the need to enhance available sources and other available low cost energy technologies like improved *jikos*.





An improved Jikoadopted by some Oyola community members

Participatory Video

The use of participatory video enabled the study team to capture and draw out some of the issues and strategies that the community had not highlighted when they used other participatory approaches. The study team initially trained six members from the community on the techniques of operating, shooting, recording and using the video and editing. The training took 12 days and thereafter the trained community members did a test run in the field in their own communities. Later, other community members were taught by the first trainees on how to use the equipment.

Members of the community were given the opportunity to shoot and record themselves as they highlighted the effects of floods, drought and other social and economic issues affecting them in general. So far the community members have since recorded good pieces at different times of the year and especially the onset of rains, droughts and any unusual event related to change in weather patterns.

Other information captured includes social and economic events and the communities' perceptions on the general well being at different seasons. (For more

information on the videos, please visit www.acts.or.ke). This information will be used by the study team to document the early lessons in regard to the adaptive capacities of the local communities.



Training of Oyola community members on Participatory Video recording

Gender mainstreaming

Women and youth are actively participating in the implementation of the adaptation activities and they are appreciating that there have been changes in climate over the past years. They were the majority during the Participatory Video training and were well represented in their CBO, both as members and officials.



Training of Oyola community members on Participatory Video recording

Indigenous Knowledge and Rituals in Climate change

The Wakesi community traditionally offers sacrifices to the gods for rain. These offerings are made under trees as they

are associated with rain. The Baobab is one tree under which offerings are made. During the development of a recent participatory action plan carried out by the study team, the community revealed that they are increasingly offering sacrifices to the gods for rain. It appears climate change is catalyzing these practices.

Another traditional strategy used when alerting the community about floods is the use of drums, screams and ululation. The first affected community members

alert others by shouts of “*Mahenya omwomo! Mahenya omwomo!*” meaning River Mahenya has broken its banks.

References

UNFCCC, 2007. Climate change: impacts, vulnerability and adaptation in developing countries. A report by the United Nations Framework Convention on Climate Change.

For more information on the project, please contact:

Eastern Africa:

	Country	Contact Person	Organization	Email address
1	Kenya	Prof. Judi W. Wakhugu	African Centre for Technology Studies	j.wakhungu@acts.or.ke
2	Sudan	Dr. Sumaya Zaki- Eldeen	Sudanese Environment Conservation Society	zakiields@yahoo.com
3	Tanzania	Ms. Euster Kibona	Environmental Protection Management Services	epms@bol.co.tz
4	Uganda	Ms. Susan Nanduddu	Development Network for Indigenous Voluntary Association	pna@deniva.or.ug

Southern Africa:

5	Malawi	Mr. Khumbo Kamanga	Coordination Unit for the Rehabilitation of the Environment	kjkamanga@yahoo.co.uk
6	South Africa	Ms. Bettina Koelle	Indigo development and change	bettina@indigo-dc.org
7	Zambia	Dr. George Kasali	Energy and Environmental Concerns Zambia	kasaligeorge@yahoo.com
8	Zimbabwe	Mr. Shepard Zvigadza	ZERO Regional Environment Organization	shepard@zeroregional.com

Non-African Partners:

9	Great Britain	Dr. Saleemul Huq	International Institute for Environment and Development	Saleemul.huq@iied.org
10	Bangladesh	Golam Rabbani	Bangladesh Centre for Advanced Studies	golam.rabbani@bcas.net
11	Sweden	Dr. Richard Klein	Stokholm Environmental Institute	richard.klein@sei.se



We wish to thank our partners for their continuous support in implementing the project in the year 2009. We look forward to working with them again in the year 2010.

Photos courtesy of Charles Tonui and Elvin Nyukuri

The CBAA project is financially supported by the International Development Research Centre (IDRC) and Department for International Development (DFID)

For more information, please visit: www.cbaaafrica.org; www.clacc.net; www.acts.or.ke Contact Email: info@acts.or.ke