CHAPTER 7 THE PILOT PROJECTS

7.1 OBJECTIVES AND GOAL OF THE PILOT PROJECTS

It has been understood that “Mutual Help” between the administration and the communities, as well as “Self Help” at the community level became important factors for successful flood management, since “Official Help” by the government is limited to a part of the assistance with the disaster damage. In the Study, the sharing of roles between the administration, NGOs and the communities in the IFM was analysed and the institutional framework of the IFM was proposed. In addition, necessity of mutual and self-helps in the IFM was discussed through forums, workshops and surveys at the community level.

For the spread of ‘Mutual and Self Helps’ in the communities for IFM, participatory approaches at the community level were adopted to empower communities to cope with the disasters and also to share with the government and other key players the responsibility of rehabilitating the damaged structural measures. People in the community have to be trained in both diagnostics and treatment to create a community-driven and sustainable flood management programme that can be readily accessible to people and reduce excessive flood damage. A key component of these programmes is the community-based disaster preparedness that incorporates indigenous knowledge and techniques of monitoring impending disasters. As an approach, community participation is potentially an effective resource mobilisation strategy. When sufficient capacity is built at the community level with some of the disaster preparedness institutionalised within government structures at national and grass-root levels, the process could lead to community ownership of disaster management projects. The novelty of a community-based participatory approach lies in the creative interaction between the local people and outsiders, and the recognition that the former have some capabilities which have been largely unknown to the latter but which are invaluable to sustainability.

In the master plan, capacity development of community-driven flood management was selected as a priority project. The capacity development for flood management to prioritised communities should be implemented as packaged programmes through preparation of community flood hazard maps, establishment of community-driven flood management organisations, training in flood management including evacuation drills, and construction of community-driven structural measures. Those packaged programmes should be examined and improved, since community-driven flood management is a unique approach in the study area.

In this background, the objectives of the Pilot Projects are to:

- examine community-driven flood management with both mutual and self helps in terms of effectiveness,
- develop capacity in flood management through implementation, and
- learn lessons for finalising priority projects proposed in the master plan.

Environmental degradation and lack of disaster preparedness increase the level of vulnerability to disasters and affect the well-being of present and future generations. Therefore, the goal of the Pilot Project is to achieve long-term well-being for all through sustainability and expansion of community-driven flood management in the flood prone areas.

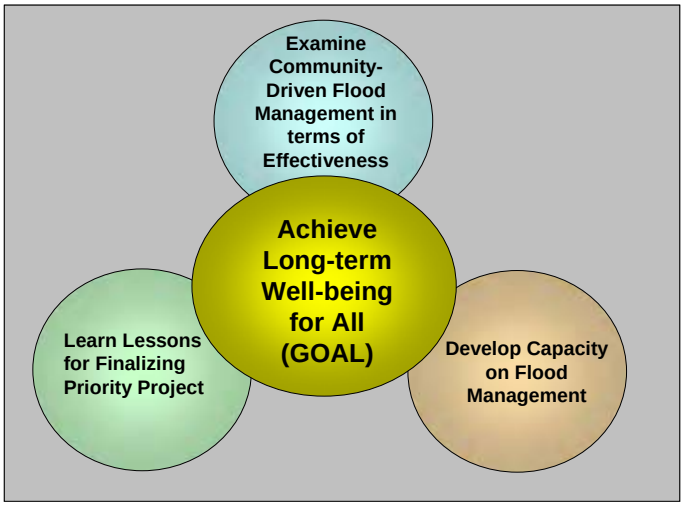


Figure 7.1.1 Objectives and Goal of Pilot Projects

7.2 MASTER PLAN VS THE PILOT PROJECTS

For formulation of the master plan for IFM, the following approaches were applied, namely: i) development of Integrated Flood Management (IFM), ii) conversion to community based flood management, iii) applicability of traditional flood control measures in Japan, iv) poverty alleviation with a community development approach, and v) production of flood hazard maps based on lessons learnt. From the viewpoints of the five approaches, comparisons between the master plan and the Pilot Projects are summarised below.

Table 7.2.1 Comparison between Master Plan and Pilot Projects

Approach	Master Plan	Pilot Project
Development of IMF	✓ Official, mutual and self help activities were examined. ✓ Water and land management in the basin was considered.	✓ Out of three activities, mutual and self help activities on a community basis will be examined in four communities. ✓ Soil conservation in the upper catchment was taken up in one community.
Conversion to community based flood management,	✓ Disaster maps were formulated through public meetings. ✓ Various measures at community	✓ All the activities were formulated based on the CAP proposed by the community.

Approach	Master Plan	Pilot Project
	level were proposed. ✓ Capacity development of community-driven flood management was taken up as a priority project.	✓ Community flood management training will be implemented in four communities.
Applicability of traditional flood control measures in Japan,	✓ Community based flood management organisations were examined. ✓ Some traditional methods as structure measures were considered.	✓ Community based flood management organisations will be examined in four communities. ✓ Education for disaster prevention will be examined in one community.
Poverty alleviation with a community development approach	✓ Various community development approaches were proposed.	✓ Relationship between poverty and flood was analysed in PRA process. ✓ Evacuation centre use as a community centre for various activities will be considered. ✓ Well and toilet installations will contribute to reduction of local disease and this aspect will be discussed.
Production of flood hazard maps based on lessons learnt	✓ Based on the experience of past JICA projects, two steps (disaster maps and community flood hazard maps) were proposed.	✓ Community flood maps were produced. The maps will be utilised in order to enhance awareness of flood risk the same as other JICA projects.

From the above table, it can be understood that i) approaches to the master plan are the same as for the Pilot Projects, ii) some components proposed in the master plan will be verified in the Pilot Projects, and iii) the fundamental methodology for the master plan will be formulated in the Pilot Projects. It is also emphasised that “Capacity development of community-driven flood management” as one of the priority projects will be smoothly implemented based on the lessons learnt from the Pilot Projects.

7.3 SELECTION OF THE COMMUNITIES FOR PILOT PROJECTS

7.3.1 The First Screening: Selection of Divisions Affected by Flood

Based on the information regarding Flood Disaster in Western Kenya prepared by Kenya Flood Security Steering Group (May 2004), Nyando, Miwani, Lower Nyakach, Winam, and Kadibo divisions were selected as the divisions affected by flood in Nyando and Kisumu districts. The selected divisions are shown in Figure 7.3.1.

7.3.2 The Second Screening: Selection of Priority Divisions and Locations

For Nyando district, the needs assessment made by the JICA Study on Regional Development Programme in Nyando and Homa-Bay Districts was referred to since various workshops were held to assess development needs from the administrative to grass root levels. The results show that Nyando and Miwani divisions have high priority needs for flood protection, while Lower Nyakach Division has less priority. Based on this result, Nyando and Miwani divisions were selected, and Lower Nyakach Division was excluded. In addition to the above, the Flood Disaster in Western Kenya study (May 2004), the district disaster management plan, and the flood mitigation food for work project were reviewed. Based on the review, seven locations in Nyando district were selected, namely, Kochogo, Kakola, Wawidhi, Onjiko, Ombeyi, Nyangoma, and North East Kano locations as shown in Figure 7.3.1.

For Kisumu district, the Flood Disaster in Western Kenya study (May 2004), the district disaster management plan, and the flood mitigation food for work project were reviewed as well. Based on the review, seven locations in Kisumu district were selected, namely, East Kolwa, Central Kolwa, West Kolwa, Bwanda, Kawino, Kombura, and Kochieng locations as shown in Figure 7.3.1.

7.3.3 The Third Screening: Selection of Priority Locations

Based on the flood damage surveys, locations in which damage levels are relatively high were selected. As a result, four locations in Nyando district were selected, namely, Kochogo, Kakola, Ombeyi, and Nyangoma locations, while one location in Kisumu district was selected, namely Kombura location. The third screening result was presented in the meeting of the Nyando River Basin Water Resource Management Forum on 20 September 2006. Kenya Red Cross and VIRED International suggested that the team add Bwanda, Kawino, Wawidhi and North Nyakach locations. In the meeting with PWG on 21 September, members suggested that the team add Central Kolwa and East Kolwa locations. The team decided to review both suggestions. Those results are shown in Figure 7.3.1.

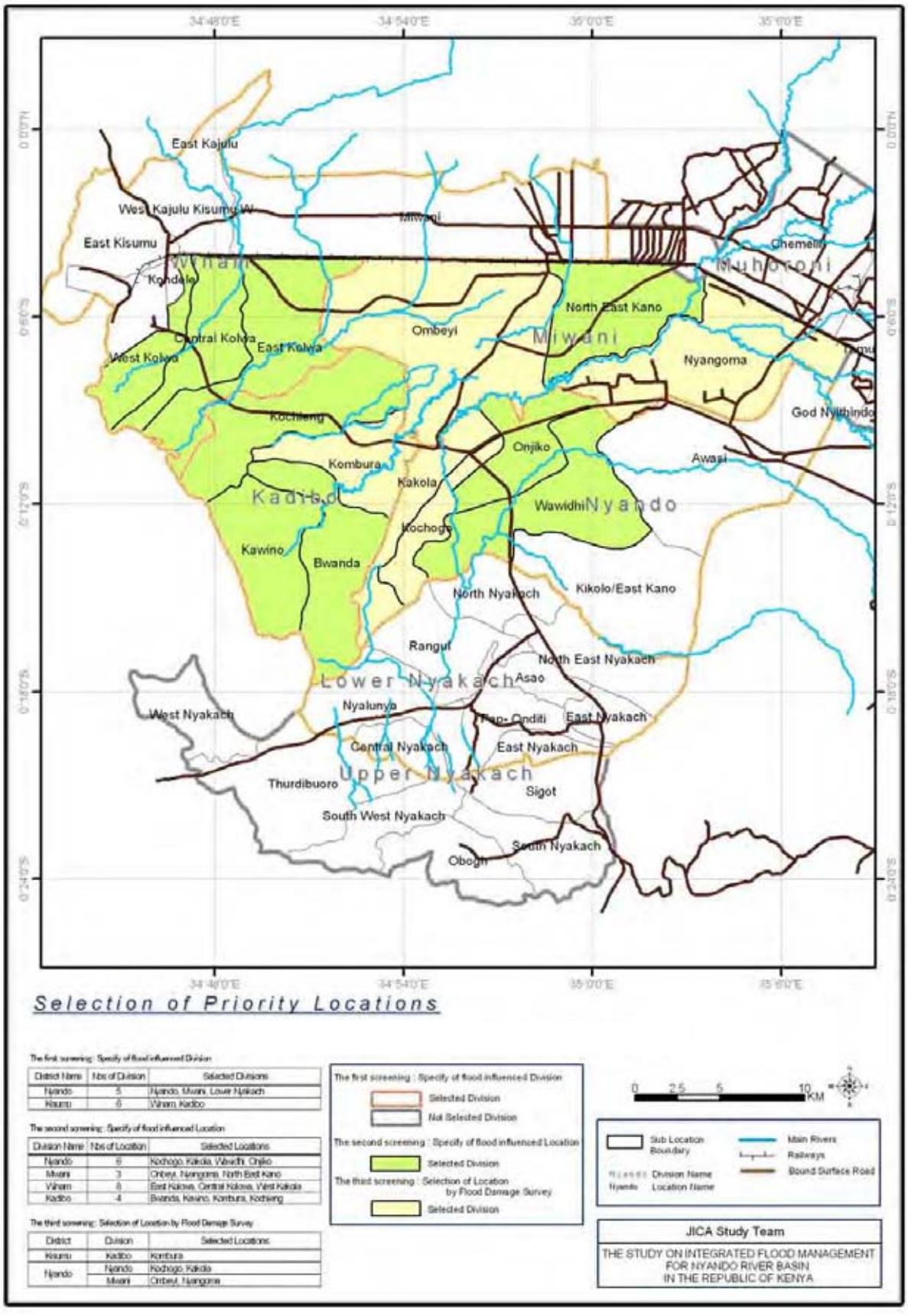


Figure 7.3.1 Selection Process and Result for Priority Locations

7.3.4 Selection of Priority Locations for Implementation of Pilot Projects

The JICA Study Team, members of PWG and the chairman of the Forum discussed the following items in order to select the priority locations.

- One Pilot Project should be implemented in the upper or middle catchments since reduction of soil sedimentation transport from the upper/middle catchments to the lower catchments is one of the key issues for flood mitigation.
- Regional balance of the location should be considered. Lower Nyakach division is excluded considering the needs assessment result arrived at by the JICA Study on Regional Development Programmes in Nyando and Homa-Bay Districts.
- The Pilot Projects in the flood prone areas should be formulated considering the characteristics of the floods.

Considering the above, the following locations were selected as illustrated in Figure 7.3.2 and explained in Table 7.3.1.

(1) Upper/middle catchments: Chil Chila

From viewpoints of demonstration of the effect on reduction of sedimentation to the downstream, the cross point between Bararget River and national road in the Chil Chila location was selected. The Chil Chila location is located in the middle catchment of Nyando river basin.

(2) Lower catchment: Central Kolwa

It was decided to formulate one Pilot Project in a Central Kolwa location considering regional balance and the flood characteristics. Central Kolwa location is located along Nyamasaria River.

(3) Lower catchment: Ombeyi

Ombeyi location is located in the portion of the Kano plain area that has been seriously affected by seasonal floods. Floods from the Oroba and Lielango rivers pour into Kano Plain and the flood water stagnates for a long time due to the topographic conditions.

(4) Lower catchment: Wawidhi

Shortage of channel carrying capacity in Nyando River was observed due to degradation of the river bed, although dike construction is under way on both banks. In addition, protection and proper maintenance of the dikes are required.

(5) Lower catchment: Bwanda

Serious flood damage has been observed between the Nyando and Miriu rivers. During floods, the flood flow goes along the Miriu River. Flood inundation of about 2 m deep on average

occurs annually at the river mouth (downstream end).

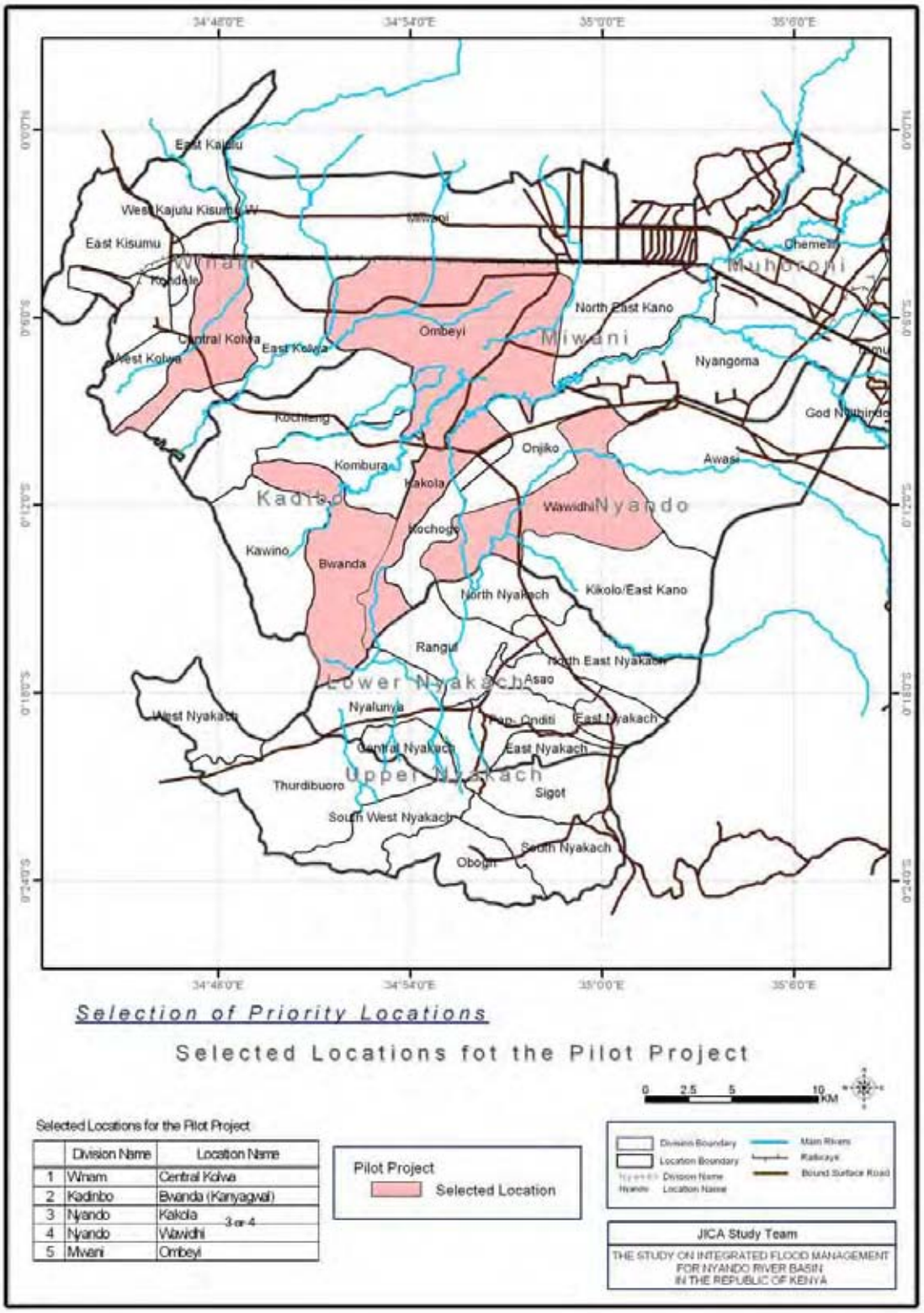


Figure 7.3.2 Selection of Priority Locations for Pilot Projects

Table 7.3.1 Characteristics of Flood in Each Location

Division	Location	Pilot Area	Population Density (person/km^2) (Estimated in 2006) [1]	Poverty (Population Rate of BPL) [2]	Assessment of Flood Damage	Characteristics of Floods
Winam	East Kolwa		325	60-70%	Low-Medium	The flood damage is serious in the lower elevation areas between Nyamasaria and Luando.
	Central Kolwa	O (A)	624	50-60%	Low-High	Present flood damage is serious in Kasule sub-location. Flash floods with a travel time of around 1.5-2.0 hours sometimes cause damage along the river channel.
	West Kolwa		6,629	50-60%	Low-Medium	Present flood damage is not so serious.
Kadibo	Bwanda (Bwanda & Kanyagwal)	O (B)	248	60-70%	Medium-High	Serious flood damage has been observed between Nyando and Miriu rivers. Flood inundation of about 2 m deep on the average occurs annually at the river mouth
	Kawino (South& North Kawino)		279	60-70%	Medium-High	The West Kano irrigation area and site opposite are functioning as flood retarding basins for reducing flood peak discharge.
	Kombura (Kombura & Katho)		431	50-60%	Low-High	The culvert at the National Road is partially clogged with silt. The insufficient flow capacity of the culvert causes rather long duration of flood inundation in the area upstream of National Road.
	Kochieng (East & West Kochieng)		435	60-70%	Medium-Low	Most of the area is located at a higher elevation. Flood inundation has not occurred regularly where the river crosses the main road since the culverts at National Road were improved.
Nyando	Kochogo		556	50-60%	High	Dike construction is under way on both banks of Nyando river. The maintenance of the dikes and de-siltation is required.
	Kakola		1,011	40-50%	High	Dike construction is under way on both banks of Nyando river. The maintenance of the dikes and de-siltation is required.
	Wawidhi	O (C)	182	60-70%	Medium-High	Siltation at the National Road culvert was quite serious at Awach Kano. The maintenance of the dikes and de-siltation along Nyando river is required.
	Onjiko		295	> 70%	Low-Medium	There is an inundation area near Nyando river, but the dwellings are located at a higher elevation.
Miwani	Ombeyi	O (D)	298	60-70%	Medium-High	Flood from the Oroba and Lielango Rivers pours into Kano Plain and the water stagnates for a long time. There are local flash floods from the north hill area.
	Nyangoma		290	60-70%	Low-Medium	The flood damage area is limited, but some flood damage is observed at its confluence with a tributary river.
	North East Kano		408	50-60%	Medium	The flood damage area is limited since the slope gradient of the catchment is relatively steep
Lower Nyakach	North Nyakach		274	60-70%	Low-High	There is flood damage along the road and near the swamp area.
	Nyalunya		215	40-50%	Low-Medium	The flood damage area is limited since the slope gradient of the catchment is relatively steep
	Rangul		158	60-70%	Low-Medium	The flood damage near the habitations is limited due to the topographic conditions.

Note: indicate priority locations for flood management.

7.3.5 Selection of Priority Sub-Locations and Communities

At first, the four sub-locations most affected by floods were selected based on the overlay analysis between the sub-location boundaries and the flood damage survey as shown in Table 7.3.2

Table 7.3.2 Selection of Priority Sub-Locations

Location	Sub Location	Area (%) by Flood Depth					Area (km^2)	Remarks
		0cm	0 - 50cm	50cm - 100cm	100cm - 150cm	>150cm		
Central Kolwa	Kasule	20.4	15.3	51.2	13.1	0.0	14.7	Deepest flood Area
	Nyalunya	7.1	32.6	54.1	6.3	0.0	16.1	
Bwanda	Central Bwanda	0.4	0.0	44.8	39.4	15.3	14.1	Largest affected area
	Lower Bwanda	1.2	0.0	70.9	27.6	0.3	21.4	
	Upper Bwanda	2.4	0.0	26.5	32.3	38.8	8.3	
Ombeyi	Ahero Irrigation sc	0.0	1.1	57.6	41.3	0.0	16.2	
	Kango	24.7	22.9	51.0	1.5	0.0	17.9	
	Kore	0.0	0.6	64.6	28.9	5.9	18.3	Deepest flood Area
	Obumba	20.0	29.1	50.9	0.0	0.0	28.0	
	Ramula	52.9	34.1	12.9	0.0	0.0	23.0	
Wawidhi	Ayweyo	21.8	40.1	26.9	11.2	0.0	33.5	
	Magina	0.0	0.0	8.1	87.8	4.2	13.6	Largest affected area
	Nyakongo	30.3	55.9	13.8	0.0	0.0	7.0	

Source: GIS overlay analysis result between sub-location boundary and JICA flood damage survey (2006)
Note: Sub-location selected as priority area

In the community surveys made during December 2006-Feburary 2007, sub-location meetings were held in December 2006. Chiefs and elders coming from the selected sub-locations ranked communities in each sub-location by the influence of flood. As a result, the following villages were selected as priority communities in the sub-locations (Table 7.3.3).

Table 7.3.3 Selection of Villages

	Kisumu		Nyando	
Location	Central Kolwa	Bwanda	Ombeyi	Wawidhi
Sub-location	Kasule	Central Bwanda	Kore	Magina
Village	Odesso	Kokwaro	Kasiru	Kochiewo

For Chil Chila location located in the middle catchment, Siwot and Kamiwa Villages were selected as priority communities in the location meeting held in February 2007.

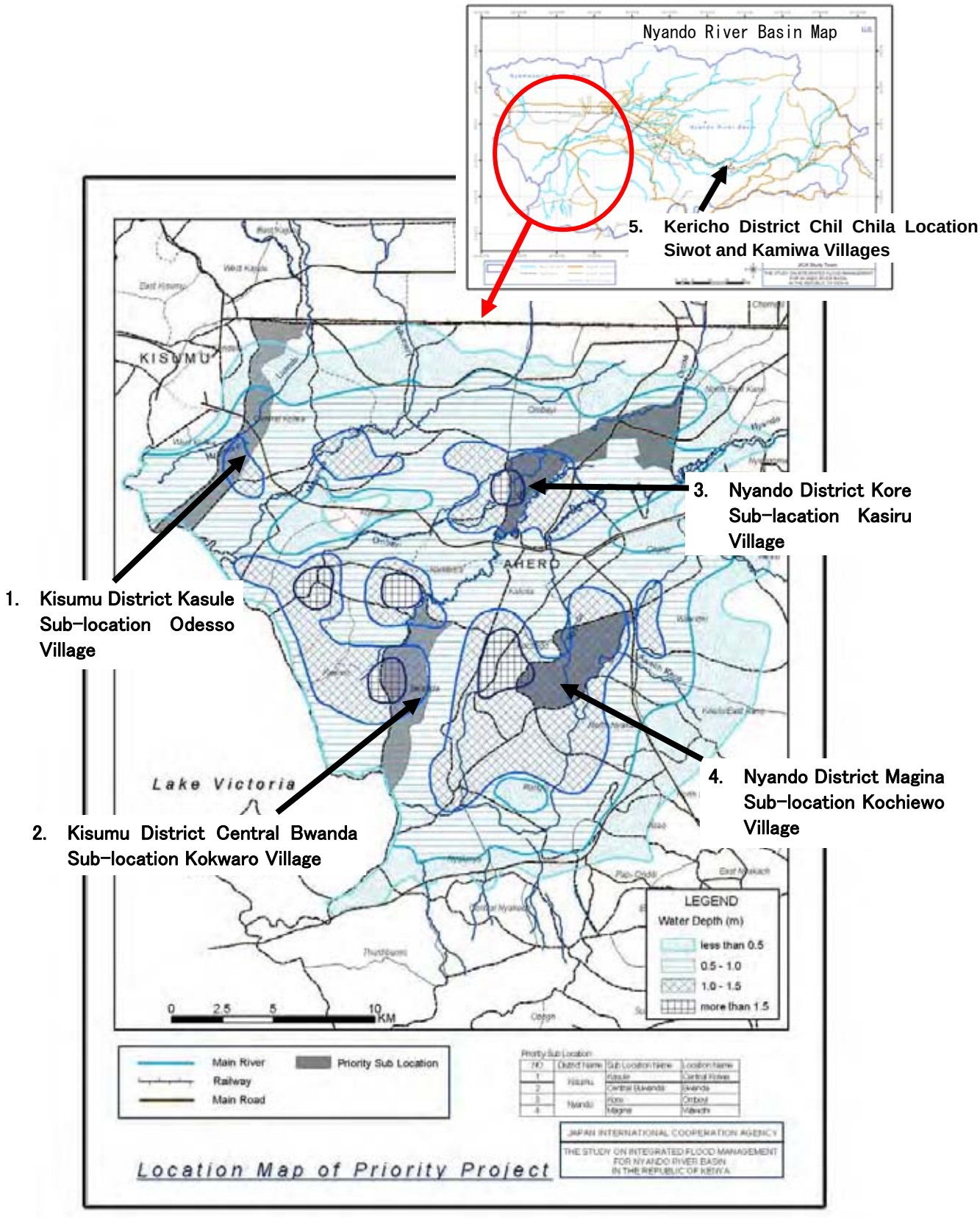


Figure 7.3.3 Location Map of Pilot Project Sites

7.4 RESULTS OF THE COMMUNITY SURVEYS

7.4.1 Outline of Community Surveys

It is understood that the participatory approach should be considered to formulate a community based flood management plan from viewpoints of local people and communities, since long term and continuous efforts at field level are required to maintain sustainability of the plan. It was proposed, therefore, that the community surveys should be conducted for the Integrated Flood Management for Nyando River Basin based on a participatory approach at community level.

The community surveys were done during December 2006 – February 2007 by VIRED, a sub-contracted Kenyan NGO. The surveys included the following main parts:

(i) Implementation of meetings for selection of five communities for Pilot Projects,

(ii) Facilitation of elaboration of community flood hazard map,

(iii) Implementation of questionnaire surveys,

(iv) Assess community vulnerability through Participatory Rural Appraisal (PRA), and

(v) Facilitation of community action plan (CAP) formulation indicating actions to be taken to the major problems, roles and resources of actors, timing etc.

The following photos show the view of surveys and the results of the surveys were explained in the following sections.

PRA at Kochiewo	Community Hazard Map at Kasiru
	

Figure 7.4.1 Views of Community Surveys

7.4.2 Odesso Village, Kasule Sub-Location

(1) Village profile

1) Population

Population of Odesso village is approximately 1,500 persons and the number of households is estimated at 300.

2) Livelihood

Main livelihood sources of Odesso are agriculture including livestock raising, but fishing and working in Kisumu are also important. Approximately 60 % of interviewed households gain less than 2,000 KSh in a month according to the result of interview survey.

3) Specific social factors

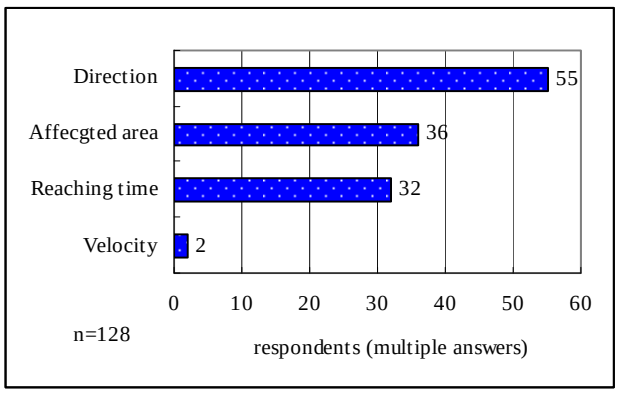
Sale of land in Odesso is a recent phenomenon due to its adjacency to Kisumu, which has reduced the acreage of land under crop production. A number of people bought houses in Odesso and commute to Kisumu and do not participate in community meetings.

(2) Flood damage

Floods have caused human deaths, animal deaths, and destruction of houses and crops. The long lasting rain fall of November and December 2006 brought the latest disaster to Odesso village: around Christmas, the bank of Nyamasaria River collapsed and flood water destroyed houses and churches in Odesso.

(3) Actions regarding floods

People expect to know arrival time (77%) and probable affected area (66%) prior to flood occurrence if a warning system is available (Figure 7.4.2). When they get information of floods, about 30% of respondents evacuate to hilly areas and to schools/churches/clinics (25%) shown in Figure 7.4.3



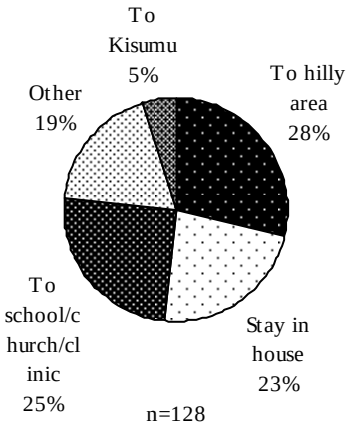


Figure 7.4.2 Expected Information (Left), and Figure 7.4.3 Action taken by Inhabitants (Right)

(4) Community based organisations and intervention from outside

The NGOs and CBOs dealing in disaster management are available, of which the most important one is the Red Cross. The services most expected from disaster management organisations are: training on flood management (43%), flood warnings (28%) and relief aid (25%).

(5) Community Action Plan (CAP)

Table 7.4.1 Summary of CAP of Odesso Village- Structural Measures

Problem	Proposed structural measures	Location
Floods	De-Silting Rivers	- Odesso to Aguyo - Nyamasaria to Auji
	Opening Blocked Culverts	-From Nyamasaria to Odesso river -Geseko omiele to Isaiah Gate: Mowlem, Ragumo road to Odiedo
	Construction of New culverts.	- Gogo Mowlem stream
	Dredging of blocked canals	- Omoro main road to Odesso - Mowlem to Nyamasaria - Auji stream -Nyamasaria to Odesso
	Reconstruction of Nyamasaria bridge	Nyamasaria bridge
	Construction of Dykes	-Odesso river on both sides { 6m x 1m high} -Along Omoro stream { 4m x 1m]
Poor roads	Repair of Roads	- Orongo, Nyamasaria to Nyamasaria - Nyamasaria, to Odesso river - Nyamasaria, Odesso, K' Opiyo - Mowlem, Odesso River Bwanda, Nyamthoi swamp - Nyamthoi, Kando - Nyamasaria, Otina, Tako - Akono to kendo
Lack of clean water	Drilling of Boreholes	- St Meshack Odesso - Odesso nursery
	Roof water harvesting	- St Mesheck Odesso - Israel C.A. church Odesso
	Roof catchments	Among community homes
	Reinforcement of Law on use of River water {bathing & dumping of wastes}	River Kibos to Nyamasaria
	Training in Primary Health Care	The whole community
Drought	Dredging of water pans	-Dak Yogo
Famine & food insecurity	Growing drought resistant crops	The whole community

Table 7.4.2 Summary of CAP of Odesso Village- Non-Structural Measures

Problem	Proposed non-structural measures	Location
Floods	Training on Disaster Awareness	To be carried out in whole community
	Training on Food Security	
	Training on Livestock & Animal Husbandry	
	Training Community Health Workers (C.H.W)	
	Training on Rural Entrepreneurship and Development	

7.4.3 Kokwaro Village, Central Bwanda Sub-Location

(1) Village profile

1) Population

Population of Kokwaro village is estimated at 1,200 persons and the number of households is 136.

2) Livelihood

Rice farming is the main source of income in this village hence. Also, vegetables and peas are cultivated both for sustenance and cash crops. Approximately 59 % of interviewed households gain less than 2,000 KSh in a month according to the result of the interview survey.

3) Specific social factor

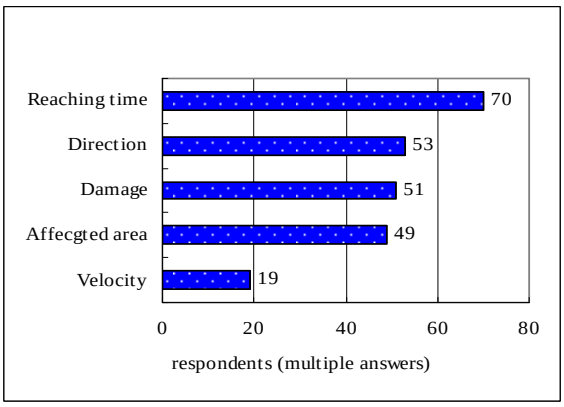
A woman proposed to offer her land to the public so that the community could construct an evacuation centre. This is not the first case of land donation; previously an elder person offered his land for the construction of water pans. Donations are made partly to avoid conflicts of inheritance.

(2) Flood damage

Flood problems occur during the months of March-May and Nov-Dec. which cause destruction of properties, death of animals, soil erosion, and destruction of roads. Depth of flood water is 0.5-1.5m and flood duration lasts 2 weeks to 1 month. There has been an increase in the number of deaths resulting from floods. At least 2 people have gone missing since 2004.

(3) Actions regarding floods

Most people obtain flood information from the radio, followed by the people who anticipate floods by watching clouds and river water levels. They have a wish to know the arrival times (55%) first, then flood direction, expected damage and probable affected areas (around 40%) (Figure 7.4.4). When they get information of imminent flooding, 42% of respondents evacuate to hilly areas and to schools/churches/clinics (39%). Distribution of actions is shown in Figure 7.4.5.



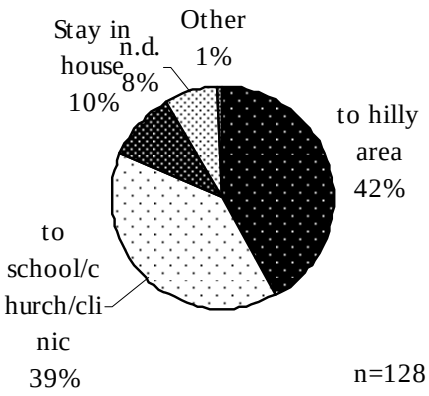


Figure 7.4.4 Expected Information (Left) and Figure 7.4.5 Action taken by Inhabitants (Right)

(4) Community based organisations and interventions from outside

The PRA participants listed institutions that work with them. Some of these organisations' activities had impacts felt on the ground like VIRED International and SISO, which help in flood mitigation and water for irrigation respectively.

(5) Community Action Plan (CAP)

Table 7.4.3 Summary of CAP of Kokwaro Village– Structural Measures

Problem	Proposed structural measures	Location
Flooding	1.Widening of water ways	River Miriu from Okumu Guya to Anyanga Ogawa's homes
	2. Building dykes along River Miriu	From Okumu Guya to Anyanga Ogawa's homes
	3. - Canalisation –opening old canals - digging new ones	-Amilo canal, Gembo canal - Ka –Alfayo canal, Ka – Anyanga canal
	4. Construction of roads and installing culverts	-
	5. Improvement of the evacuation centre Borehole construction, improved sanitation, provision of drugs and expansion of evacuation	-
Lack of food security	1. Community storage bank	to be at the proposed evacuation centre provided by Caren Matito
Lack of Nursery school	1. Construction of nursery	Land donated by Caren Matito
Lack of health facility	1. Construction of dispensary 2. Installation of VCT centre	-
Poor livestock husbandry	1. Construction of cattle dip	Land donated by Peter Awili Bacho
Lack of fuel wood	1.Growing of flood resistant trees	-
Lack of bridges	1. Construction of permanent bridges	At Kokwaro, Kowaga, Ochuna and Ka Kong'o)

Table 7.4.4 Summary of CAP of Kokwaro Village– Non–Structural Measures

Problem	Proposed non-structural measures	Location
Flooding	1. Training on disaster preparedness and management	To be carried out in the whole community
	2. Training on swimming techniques	
	3. Training on dyke and drainage systems	
Lack of food security	1. Training on crop husbandry	
	2. Training on starting a village bank	
	3. Training on marketing federations	
Lack of health facilities	1. Training of community health workers	
	2. Training on home-based and primary – Health care	
Poor livestock husbandry	1. Training on animal husbandry	
Lack of fuel wood	1. Training on tree management from nursery to harvesting	

7.4.4 Kasiru Village, Kore Sub-Location

(1) Village profile

1) Population

Population of Kasiru village is approximately 1,300 persons and number of households is 260.

2) Livelihood

The economic activities carried out by the villagers include crop farming and animal rearing. Approximately 53 % of interviewed households gain less than 2,000 KSh in a month according to the result of interview survey.

3) Specific social factors

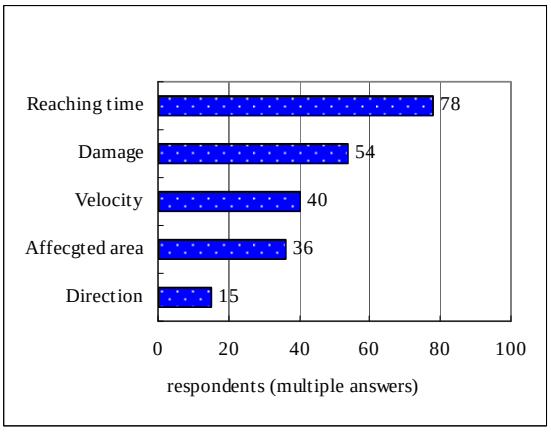
Part of this village lies on a strip bordering River Miriu while another part borders Bacho stream and the village is almost land locked by water. Also it is dissected by a vast rice field. There are no designed road networks and community use pathways during flooding to evacuation.

(2) Flood damage

Some of the problems associated with flooding in Kasiru include human and animal diseases, famine, destruction of crops, reduction of pasture for animals, displacement of humans and animals and destruction of houses and footpaths.

(3) Actions towards flood

Almost a quarter of respondents said that they know flood coming by listening to radio or by tolerance rain fall, whereas 18% of respondents know floods by observing water level of rivers. They have intention to know reaching time (62%) first, and then expected damage (Figure 7.4.6). When they get information of imminent flooding, about 34% of respondents evacuate to schools/churches/clinic, and 29% of respondents go to hilly areas as shown in Figure 7.4.7.



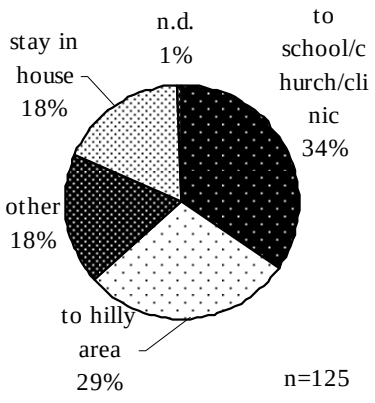


Figure 7.4.6 Expected Information (Left) and Figure 7.4.7 Action taken by Inhabitants (Right)

(4) Community based organisations and interventions from outside

As for interventions from outside, VIRED international is involved in flood mitigation under the food for work programme. The Christian Children's Fund (CCF/Kano plains) provides school fees for orphaned children, established a nursery school, provides school uniforms and medicine for children and pays nursery teachers. Only 46% of respondents said that the disaster management committee worked well while 36% said their work was poor. For establishment of a disaster management system, the most expected service will be training on flood management with the figure of 49.6% of the respondents.

(5) Community Action Plan (CAP)

Table 7.4.5 Summary of CAP of Kasiru Village– Structural Measures

Problem	Proposed structural measures	Location
Flooding	1. Dredging	-Miriu river and Bacho stream (from Kamangete to Kokelo; Korua, Kodida and Kondiek)
	2. Dyking	-Miriu river and Bacho stream (from Kamangete to Kokelo; Korua, Kodida and Kondiek)
	3. Opening up blocked canals	-From Kamangete to Nyangoto
	4. Opening up new canals	-From Korua to Kowade
	5. Widening river channel	-Miriu river and Bacho stream (from Kamangete to Kokelo; Korua, Kodida and Kondiek)
	6. Training on flood disaster preparedness	- Village (AIC Kudho church)
Lack of roads and bridges	1. Road construction	-Lela-Nyangoto, Oyuma route, Lela Bacho road, Kodida-Mtando road, Okana –Kore road
	2. Construction of bridges	-Kondiek, Bacho, Atonde, Okana-Kore
Poor sanitation	1. Construction of VIP toilets	-Village
Lack of health facility	1. Construction of a dispensary	-Kadur swamp, Kore scheme, Kachiawo B
	2. Training	-Village
Lack of clean water	1. Water trough construction	-
	2. Construction of boreholes	-
Lack of technical knowledge on animal husbandry	1.Training	- Village
	2. Construction of cattle dip	- Oyuma maeket.
Low literacy level	1. Awareness creation	- Village
	2. Construction of permanent buildings in schools	- Existing neighbouring schools e.g. Bacho Mtando, Kolal
Food insecurity	1. Irrigation	-Rice field, farm lands
	2. Training	-Village
Lack of market	1. Formation of market federations	-Village

Table 7.4.6 Summary of CAP of Kasiru Village– Non-Structural Measures

Problem	Proposed non-structural measures	Location
Flooding	- Training on river bank stabilisation - Improvement of evacuation centres - Training on food and fodder conservation	To be carried out in the whole community

7.4.5 Kochiewo Village, Magina Sub-Location

(1) Village profile

1) Population

The population of Odesso village is around 3,120 persons and the number of households is 620.

2) Livelihood

The main livelihood sources are agriculture including livestock raising and this village has a rather rich crop production. Approximately 65 % of interviewed households gain less than 2,000 KSh in a month, which is a higher rate of poverty than in the other three Pilot Project sites.

3) Specific social factors

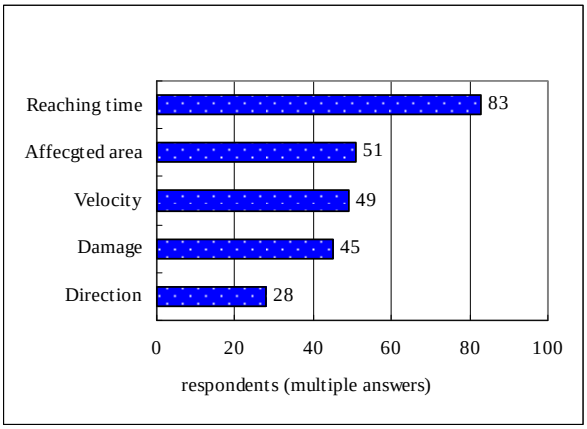
Magina sub-location was divided into two parts by the Nyando River when this river changed its course. Inhabitants of Kochiewo village on the right bank have difficulty to get to the centre of the sub-location, which is on the left bank.

(2) Flood damage

At least two people have died yearly in the recent floods. Some 6 people went missing during the 2004 flood. In December 2006, the trunk of the Nyando broke its banks at Odiembo (east of Kochiewo). It was one of the most serious floods that Kochiewo has experienced.

(3) Actions regarding floods

A total of 79% of the interviewed persons said that they obtain flood information by observing torrential rains or by observing clouds. The inhabitants do not judge imminent flood danger by observing the water levels of the Nyando River. Inhabitants wish to know arrival time (65%) and probable affected area (Figure 7.4.8). When they get information of imminent flooding, about 58% evacuate to hilly areas and to schools/churches/clinics (27%) (Figure 7.4.9).



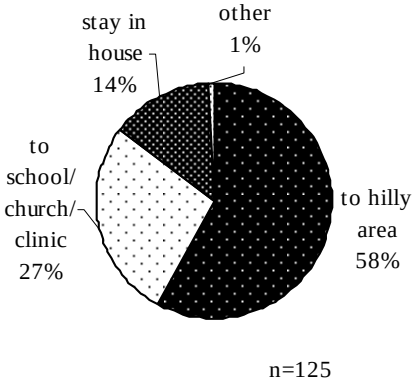


Figure 7.4.8 Expected Information (Left) and Figure 7.4.9 Action taken by Inhabitants (Right)

(4) Community based organisations and interventions from outside

In the PRA workshop, participants listed 21 organisations. However, partnership between the community and these organisations were not judged to be very good. UNICEF and Amref offer training to community health workers and traditional birth attendants who are very handy in the absence of health facilities and this training was welcomed by the inhabitants.

The most expected services from a proposed disaster management organisation are training on flood management (42.2%), relief aid (21.1%) and evacuation guidance (13.3%). Those who wanted flood warnings represented only 8.6% of the total.

(5) Community Action Plan (CAP)

Table 7.4.7 Summary of CAP of Kochiewo Village- Structural Measures

Problem	Proposed structural measures	Location
Flooding	Widening of River Nyando	From Nyalunya to Koduma
	Opening blocked canals	Jalaram-Jordan-Nyamware-Olunje-On'gul-Bwaja Odada Olwendo-Kadika Okello-Jeniffer Opiyo-Kondiek
	Construction of dykes	From Koduma to Ran'gul
Lack of food security	Construction of a cattle dip	Olunje 2 acres
	Construction of water pans	Migango
	Irrigation by canals	Olunje Migango
Lack of clean water	Sinking Boreholes	Kogwedhi Pri. Sch, Isreal CA, Free Pentecostal Church, VOSH church, Apii Opiyo's area, Daniel Odindo, Joanes Akello
	Roof harvesting	Kogwedhi Pri. Sch, Kodete dispensary
Lack of health facilities	Construction of Dispensary	Kodete
Lack of marketing channels		
Poor roads	Construction of culverts	Omulo Orondo- Kogwedhi Pri Kanango—Olunje- migire ochieno
	Murraming of roads	Omundo John-Kenton Omundo-Migeni Opiyo Olwendo-Atito Nango-Olunje
Lack of bridges	Construction of permanent bridge	Kanyadee

Table 7.4.8 Summary of CAP of Kochiewo Village- Non-Structural Measures

Problem	Proposed non-structural measures	Location
Flooding	Training on : - Evacuation preparedness - Food conservation - Dyke maintenance - Fodder conservation	To be carried out in the whole community
Lack of food security	Training on crop husbandry and drought resistant crops Training on animal husbandry and fish farming	
Lack of health facilities	Training of community health workers Traditional Birth Attendants (TBA)	
Lack of marketing channels	Training based on different enterprises	

7.4.6 Siwot and Kamiwa Villages, Chil Chila Location

(1) Village profile

1) Population

The population of Siwot village is approximately 700 persons and the number of households is 120. The population of Kamiwa village is approximately 400 persons and the number of households is 80.

2) Livelihood

The main livelihood sources are rainfed agriculture including coffee, sugarcane and maize, and livestock. Approximately 75 % of interviewed households gain less than 2,000 KSh in a month according to the result of the interview survey.

3) Specific social factors

Local people occasionally participate in communal work, 74.6 % of the respondents said they participate in communal work when called upon. The type of communal work includes i) farming based communal work (37%), education (22%) and, health and sanitation (18%). Tree planting and protection of river banks are not communally practiced.

(2) Erosion

Regarding soil erosion, 90 % of the respondents indicated an increase in soil erosion in Kamiwa and Siwot village; only 6 % said that soil erosion has been declining. The others could not tell the trends of soil erosion in their villages. Three major reasons for soil erosion are: i) deforestation, ii) poor faming methods, and iii) over grazing.

(3) Actions regarding soil erosion

Half of respondents said that there are no counter measures in place to help mitigate the impact of soil erosion. Others noted i) plantation of cover crops such e.g. sugarcane, ii) planting of sisals in water channels, iii) construction of terraces by individuals along the farms, iv) practicing agro-forestry, v) building of gabions across the roads, vi) building of barriers using stones, and vii) reduction of the number of livestock.

(4) Community based organisations and interventions from outside

Community oriented organisations such as CBOs and NGOs do not exist in Kamiwa or Siwot villages according to many people interviewed. In fact, only 30 % of the respondents said that such organisations do exist in these villages, the rest, 70%, said that such organisations do not exist.

Women’s groups are the most common community based organisations that exist in the two

villages; these were followed by NGOs from outside dealing in health and disaster. Some of the CBOs are involved in community development. However, half of the respondent noted that such organisations do not work effectively.

(5) Community Action Plan (CAP)

In Siwot and Kamiwa Villages, low income, lack of clean water, lack of fuel and food, poor roads, and poor sanitation are key issues. One of the reasons for the low income is soil degradation. The people would like to solve those issues through non-structural measures rather than structure measures. The summary of CAP they formulated is shown in Table 7.4.9 (structural measures) and Table 7.4.10 (non-structural measures).

Table 7.4.9 Summary of CAP of Siwot and Kamiwa Villages – Structural Measures

Problem	Proposed structural measures	Location
Low income	Construction of soil conservation structures	Whole community
	Construction of Irrigation systems	Mologit, sombo, and Lelu rivers
Lack of clean water	Piped water fed by gravity	Kaula spring, Mologit, Sombo and Lelu Rivers
	Construction of boreholes	Siwot village -Siwot Primary school, AIC-Siwot Kamiwa village - Rev Samoei's farm, Richard Bii's farm
Poor road	Improvement of roads and construction of culverts	Siwot village Kenduiywa- Siwot primary (1) , Philip Mosoni-Christopher (4), David Ronoh- Joel Too (2), Masai-Joel Too (6), and Mathias- Joel Sawe (2) Kamiwa/Kaula Thomas Mutai- David Kalya (1), Pauline Soi-Lawrence Belyon (3), Chilcilla Sec-Cheronges (2), Kiprotich chumo- Richard Bii (1), Joseph Misoi- Alice Ngeno (2), and Catholic church-Joseph Bii

Table 7.4.10 Summary of CAP of Siwot and Kamiwa Villages – Non-Structural Measures

Problem	Proposed non-structural measures	Location
Low income	1. Training on animal and crop husbandry and soil fertility improvement 2. Formation of marketing federations 3. Formation of a village bank	To be carried out in the whole community
Lack of clean water	1. Training on water harvesting techniques 2. Roof harvesting of rain water (Training of artisans on water tank construction	
Lack of fuel wood	1. Training on Agro forestry 2. Training on alternative sources of energy and energy saving devices	
Poor roads	Training on drainage management	
Poor sanitation	Training on Primary Health Care and construction of toilets	

7.5 FORMULATION OF PILOT PROJECTS

7.5.1 Selection of Structural Measures

Various structural measures proposed in the CAPs were reviewed from the following viewpoints in order to select structural measures in the Pilot Projects.

1) High effectiveness with relatively low cost
2) Less negative impact to other communities
3) Easy access for construction materials
4) No requirement for high technical standards for construction or heavy equipment
5) Easy maintenance of the constructed structures and facilities
6) Easy restoration by communities with support of related agencies.

The review results of proposed structural measures are summarised in Table 7.5.1.

Table 7.5.1 Review Result of Structural Measures

Issues in CAP	Structures Proposed in CAP	Review Result by JICA Study Team
Odesso Village, Kasule Sub-Location		
1) Flood	1. De-Silting rivers	×: Large scale works are required with high cost
	2. Opening blocked culverts	×: Effectiveness is locally limited
	3. Construction of new culverts.	×: Effectiveness is locally limited
	4. Dredging of blocked canals	○: High benefit per cost is expected No impact to surrounding area is expected since the canal joins Odesso river However, it will require intensive O&M after floods.
	5. Reconstruction of Nyamasaria bridge	×: Large scale works and high cost are expected ○: High need for restoration of damaged riverbank is observed. Main road to village will be eroded if there is no restoration. Positive impact to surrounding area is high.
	6. Construction of dykes	×: Large scale works and high cost are expected
2) Poor roads	1. Repair of roads	×: Large scale works and high cost are expected
Kokwaro village, Central Bwanda Sub-Location		
1. Flooding	1. Widening of water ways	×: Large scale works and high cost are expected
	2. Building dykes along river Miriu	×: Large scale works and high cost are expected
	3. Opening old canals and digging new ones	×: Effectiveness is locally limited
	4. Construction of roads and installing culverts	○: Safe evacuation road is strongly requested. High benefit per cost is expected

Issues in CAP	Structures Proposed in CAP	Review Result by JICA Study Team
	5. Improvement / Establishment of the evacuation centre - Borehole construction - Improved sanitation	○: Safe evacuation centre is strongly requested. High benefit per cost is expected. ×: Underground water is salty. ○: Roof catchment will be applied in evacuation centre. ○: This will be considered as an attachment to the evacuation centre.
2. Lack of bridges	1. Construction of permanent bridges	×: Large scale works and high cost are expected
Kasiru village, Kore Sub-Location		
1. Flooding	1. Dredging (river and canal)	×: Large scale works and high cost are expected
	2. Dyking along Miriu	×: Large scale works and high cost are expected
	3. Opening up blocked canals	×: Effectiveness is locally limited Negative impact to other area is expected
	4. Opening up new canals	×: Effectiveness is locally limited Negative impact to other area is expected
	5. Widening river channels (Miriu river)	×: Effectiveness is locally limited Large scale works and high cost are expected
2. Lack of roads and bridges	1. Road construction	○: Safe evacuation road is strongly requested. High benefit per cost is expected
	2. Construction of bridges	×: Large scale works and high cost are expected
3. Lack of clean water	1. Water trough construction	
	2. Construction of boreholes	○: Safe drinking water is strongly requested. High benefit per cost is expected
Kochiewo village, Magina Sub-Location		
1. Flooding	1. Widening of River Nyando	×: Large scale works and high cost are expected
	2. Opening blocked canals	×: Large scale works and high cost are expected Negative impact to other area is expected
	3. Construction and improvement of dykes	○: Construction of dyke is strongly requested by communities. Restoration of damaged dyke is done by NMCPC as planned. New dyke construction is taken up.
2. Poor roads	1. Construction of culverts	×: Effectiveness is locally limited.
	2. Improvement of roads	×: Large scale works and high cost are expected
3. Lack of bridges	1. Construction of permanent bridge	×: Large scale works and high cost are expected

Source: Reviews made by JICA Study Team
Remark: ○: Candidate structures to be taken up ×: Structures not to be taken up

(2) Structural Measures Proposed by the JICA Study Team

Based on the above review results, the following construction approaches are proposed as reasonable structural measures for community based flood management in the Pilot Project.

Table 7.5.2 Selected Structural Measures in Pilot Project

Sub location/Village	Selected Structural Measures	Construction Approach
Kasule/Odesso	1. Restoration of damaged riverbank (37 m long)	1. By gabion mattress
Central Bwanda/Kokwaro	1. Construction of one evacuation centre 2. Raising of local road as evacuation road leading to the above centre (600 m long)	1. Required land is donated by resident 2. Raising existing road
Kore/Kasiru	1. Construction of 2 wells and construction of 1 storage house in the existing evacuation centre 2. Raising of local road as evacuation road leading to the above centre (400 m long)	1. By drilling boreholes in the existing evacuation centre 2. Raising existing road
Magina/Kochiewo	1. Construction of new dyke (100m long)	1. By earth dyke
Chil-Chila	1. Riverbank protection (17 m long) 2. Improvement of existing ramp to low water channel of Bararget river (4m wide)	1. By wooden and gabion mattress 2. By grading the ground surface

Source: JICA Study Team

7.5.2 Non-Structural Measures

(1) Review of Non-Structural Measures Proposed by the Communities

The following non-structural measures were proposed by the five communities during the exercise of the Community Surveys.

Table 7.5.3 Non-Structural Measures proposed by the Communities

Community	Proposals for Non-Structural Measures	Assessment by the Study Team
Odesso	- Training on Disaster Awareness - Training on Food Security - Training on Livestock & Animal Husbandry - Training Community Health Workers - Training on Rural Entrepreneurship and Development	- Local people proposed disaster management training as a non-structural measure in the CAP. - The communal flood work has problems because there are many new comers. Therefore, members of the organisation for flood management should be trained. - The other community proposals have been rejected because there is good access to the village.
Kokwaro	- Training on disaster preparedness and management - Training on Swimming techniques - Training on building dykes and drainage systems	- An evacuation system should be the main thing considered in the Pilot Project. - Local people proposed disaster management training as a non-structural measure in the CAP. - Technical know-how on construction can be obtained through construction work raising the evacuation road.

Community	Proposals for Non-Structural Measures	Assessment by the Study Team
Kasiru	- Forming a disaster management committee - Training the community on disaster preparedness - Training the community on disaster management - Training on river bank stabilisation - Improvement of evacuation centres - Training on food and fodder conservation	- An evacuation system should be the main thing considered in the Pilot Project. Local people proposed disaster management training as a non-structural measure in the CAP. - Technical know-how on construction can be obtained through construction work raising the evacuation road.
Kochiewo	- Training on evacuation preparedness - Training on food conservation - Training on dyke maintenance and fodder conservation	- Local people proposed disaster management training, and technical training on maintenance of dikes, as non-structural measures in the CAP. - Those points will be considered in the Pilot Project.
Siwot and Kamiwa Villages	- Training on animal and crop husbandry and soil fertility improvement - Formation of marketing federations - Formation of a village bank - Training on water harvesting techniques - Roof harvesting of rain water (Training of artisans on water tank construction - Training on Agro forestry - Training on alternative sources of energy and energy saving devices - Training on drainage management - Training on Primary Health Care and construction of toilets	- Various proposals on capacity development were proposed by the communities. - Considering present issues relating to soil erosion, and soil fertility improvement, agro-forestry could be implemented. However, it is difficult to achieve any results from those components within the period of the Pilot Project. - Instead of implementation of the above components, training on proposal preparation will be given to help them prepare for future action.

Source: Result of Community Survey, JICA Study Team 2007.

It is observed in every target village that there are greater needs for training in disaster (flood) management and needs for establishment of a community based disaster (flood) management organisation, which is currently missing at the village level. Therefore, it is understood that training in flood management and establishment of a sort of community based flood management organisation be common components among all the target villages

(2) Proposed Non-Structural Measures

1) Community-Driven Flood Management Organisations

In order to formulate the core body of flood management in the target communities excluding Siwot and Kamiwa villages, it is proposed to establish Community Based Flood Management Organisations (CFMO). The major work items for establishment and development of the CFMOs include i) institutional development of the CFMO, ii) training in O&M of small-scale flood mitigation facilities availed by the Pilot Project, and iii) production and installation of one signboard with a community flood hazard map based on a fully participatory approach.

2) Capacity Development for Flood Disaster Management

The training of capacity development for flood disaster management will be provided to the newly established CFMOs and selected community residents. The training will have three components: 1) community flood management, 2) community flood management manuals, and 3) implementation of evacuation drills.

3) Education regarding Disaster Prevention

Overview

It is understood that the awareness enhancement will be more effective if it is given to both adults and children. The JICA study team, therefore, proposed education in disaster prevention focusing on floods as a component of the non-structural measures for flood management in the Pilot Projects, even though this component was not proposed in the CAPs.

Components

Sub-Component 1: Enhancement of pupil's knowledge and understanding of floods

In this component, basic understanding of natural conditions and flood are taught; including the characteristics of the river system in the basin, causes of flood and the nature of flood damages nearby. For enhancement of understanding of floods, it is effective to teach them elementary science and geography.

Sub-Component 2: Increase pupil's awareness on preparedness

To increase pupil's awareness of preparedness, several practices are applied in teaching the syllabus and adding to lectures. It is expected that will pupils feel that flood mitigation and preparedness are applicable to them.

Sub-Component 3: Onsite training and planning

This component is expected to make pupils ready to prepare for the flood disasters. Also, transfer of the things that they learned from pupils to their family members is expected.

The subjects of each component are shown in the table.

Target Schools for Implementation

Primary schools in and around Kokwaro village

7.5.3 Outline of Pilot Project in Odesso Village, Kasule Sub-Location

The components of the Pilot Project in Odessa village are summarised below.

Table 7.5.4 Outline of Pilot Project in Odesso Village, Kasule Sub-Location, Kisumu District

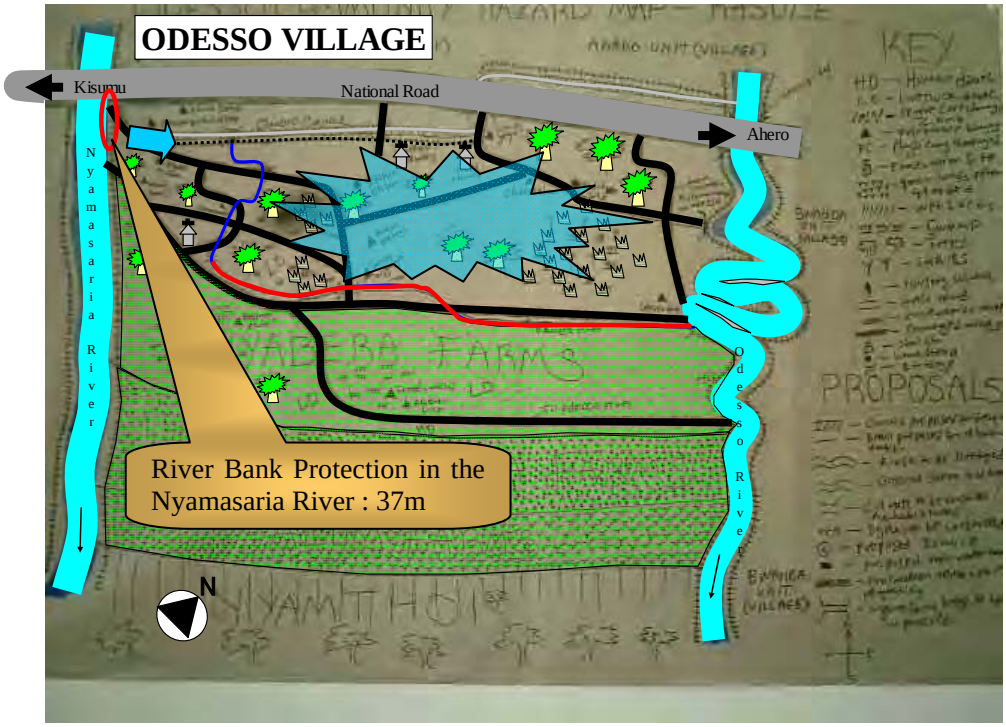
Component		Outline	Remark
Structural Measures		River bank protection in the Nyamasaria river Length: 37m, Height of protection: 4m, Height of dike: 1m	
Non-Structural Measures (common)	Establishment and Development of Community Based Flood Management Organisation	✓ Community sensitisation regarding the establishment of a Community Based Flood Management Organisation ✓ Selection of organisation members (Chairperson, Vice-Chairperson, Group Leaders, Secretary, Auditor) ✓ Preparation of bylaws and registration ✓ Training in organisational operation ✓ Monitoring and evaluation	Monitoring and evaluation of organisation activities will be executed after the establishment and training is given to the organisation's members
	Training in Disaster Management	✓ Dissemination of disaster knowledge (Concept of disaster cycle (Preparedness / Response / Rehabilitation), introduction of structural measures that can be implemented by the community, and knowledge of equipment in the evacuation centre ✓ Utilisation of the flood hazard map ✓ Emergency communication and key issues of evacuation ✓ Training on rescue and first aid	
	Preparation of Community Flood Management Plan (manuals)	✓ Community flood management plan for disaster cycle ✓ Preparedness: confirmation of emergency communication network ✓ Response: confirmation of operational procedures for the emergency siren and communication network, coordination procedures with the disaster management committee, and roll call of evacuees ✓ Rehabilitation: how to assess flood damages, procedure for preparation of rehabilitation plan, procedures for request of relief goods, and procedures for request for cooperation in rehabilitation	
	Implementation of evacuation training	✓ Production and installation of signboard for community flood hazard map indicating evacuation routes and dangerous areas ✓ Production and installation of signboard indicating dangerous areas and evacuation centre ✓ Implementation of evacuation training (drills) including information dissemination using emergency communication network, and feedback from the meeting	

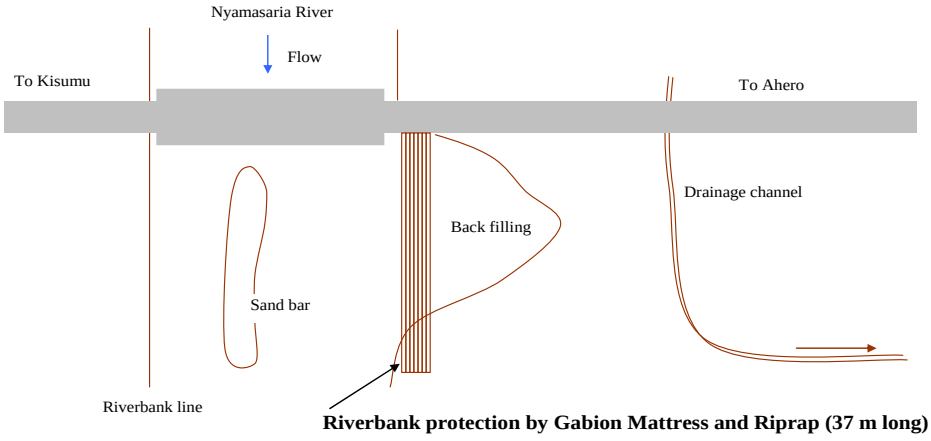
Eroded Riverbank in Nyamasaria River

The riverbank greatly eroded by the flood

Figure 7.5.1 Damaged Riverbank in Nyamasaria River

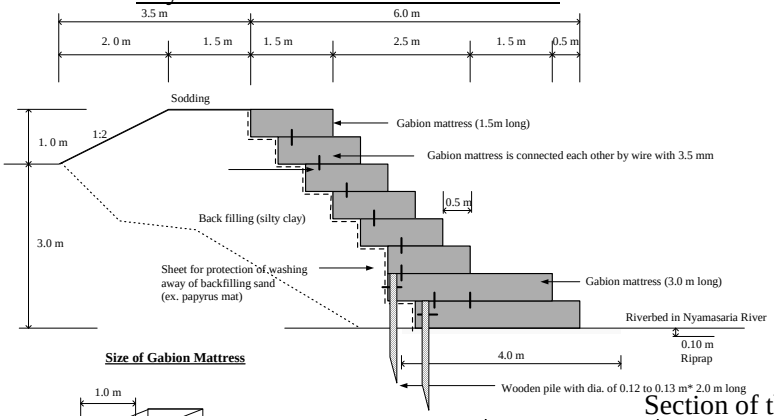
Odesso Village Flood Hazard Map





Riverbank protection by Gabion Mattress and Riprap (37 m long)

Layout of Riverbank Protection Work



Section of the riverbank protection

Figure 7.5.2 Pilot Project （Odesso Village）

7.5.4 Outline of Pilot Project in Kokwaro Village, Central Bwanda Sub-Location

The components of the Pilot Project in Kokwaro village are summarised below.

Table 7.5.5 Outline of Pilot Project in Kokwaro Village, Central Bwanda Sub-Location

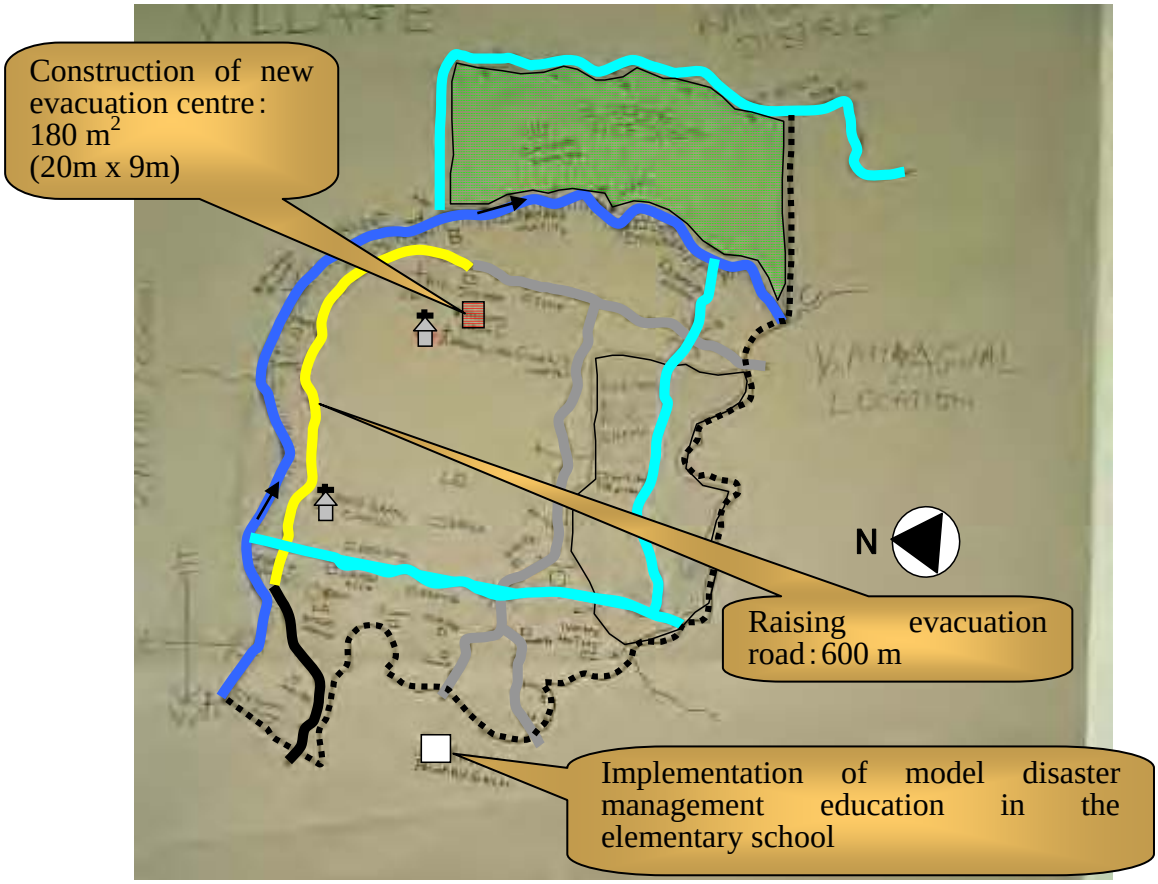
Component		Outline	Remark
Structural Measures		✓ Raising local road as evacuation route: length: 600 m ✓ Construction of new evacuation centre: floor space: 180 m2, with roof water catchments ✓ Installation of a toilet: 1 place	Land for evacuation centre is provided by residents and registered
Non-Structural Measures (common)	Model disaster management education	✓ Training teachers (Necessity of disaster management education, sharing of disaster experience, selection of the training components, development of resident-participation type programme, teaching materials, and training skills) ✓ Implementation of model class by the trained teacher	
	Establishment and Development of Community Based Flood Management Organisation	✓ Community sensitisation regarding the establishment of a Community Based Flood Management Organisation ✓ Selection of organisation members (Chairperson, Vice-Chairperson, Group Leaders, Secretary, and Auditor) ✓ Preparation of bylaws, and registration ✓ Training in organisational operation ✓ Monitoring and evaluation	Monitoring and evaluation of organisation activities will be executed after training is given to the organisation's members
	Training in the maintenance of the structures	✓ Maintenance training (training in operation) of evacuation centre, evacuation route and signboards installed in the Pilot Project.	
	Preparation of Community Flood Management Plan (manuals)	✓ Community flood management plan for disaster cycle ✓ Preparedness: emergency communication network ✓ Response: confirmation of operational procedures of the emergency siren and communication network, coordination procedures with the disaster management committee, and roll call of evacuees ✓ Rehabilitation: how to assess flood damages, procedure for preparation of rehabilitation plan, procedures for request of relief goods, procedures for request for cooperation in rehabilitation	
	Implementation of evacuation training	✓ Production and installation of signboard for community flood hazard map indicating evacuation route and dangerous areas ✓ Production and installation of signboard indicating dangerous areas and evacuation centre ✓ Implementation of evacuation training (drills) including information dissemination	

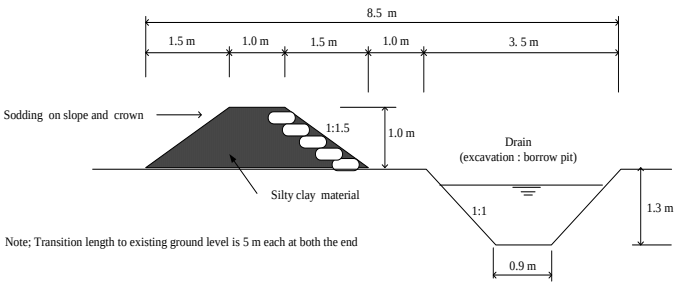
Proposed Site of Evacuation Centre

The existing community road to be raised

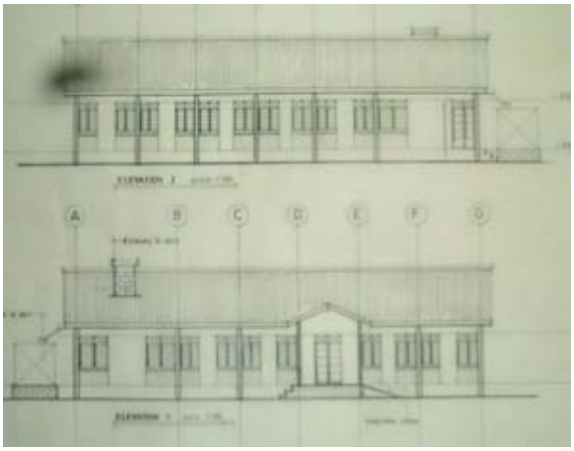
Figure 7.5.3 Existing Condition of Proposed Project at Kokwaro

Kokwaro Village Flood Hazard Map





Section of raising road



Design of the new evacuation centre

Figure 7.5.4 Pilot Project (Kokwaro Village)

7.5.5 Outline of Pilot Project in Kasiru Village, Kore Sub-Location

The components of the Pilot Project in Kasiru village are summarised below.

Table 7.5.6 Outline of Pilot Project in Kasiru Village, Kore Sub-Location, Nyando District

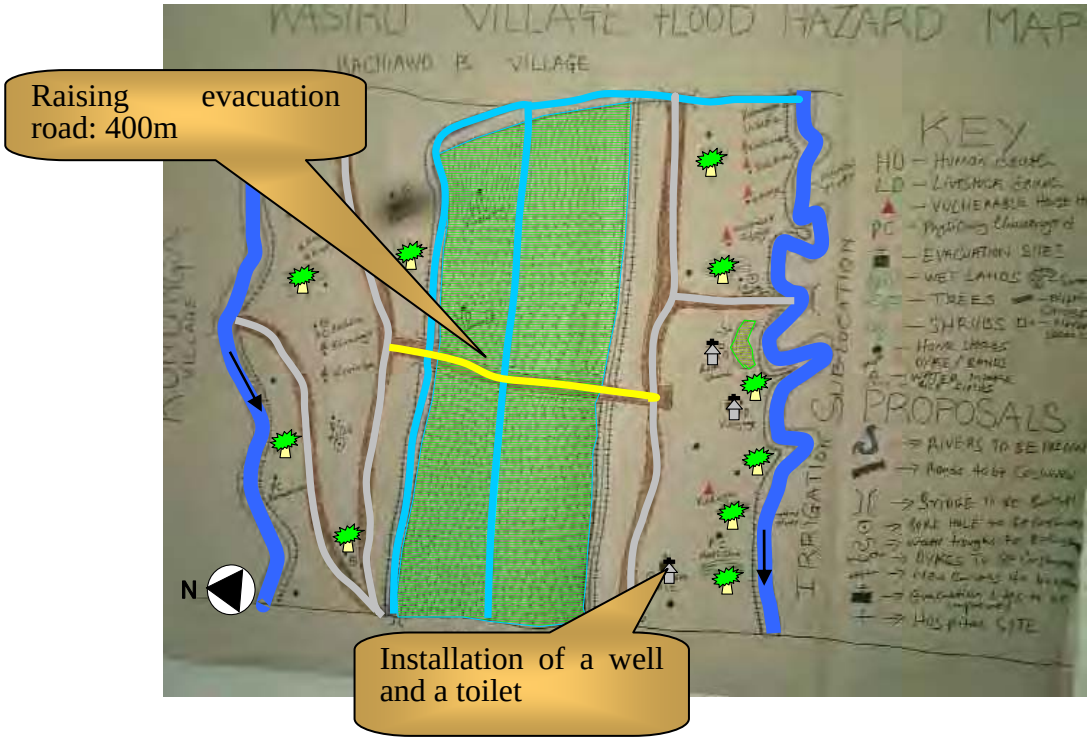
Component		Outline	Remark
Structural Measures		✓ Raising evacuation road: length: 400m ✓ Installation of a well at existing evacuation centre: depth: minimum 50m and installation of a hand pump ✓ Installation of a toilet: 1 place	
Non-Structure Measure (common)	Establishment and Development of Community Based Flood Management Organisation	✓ Community sensitisation regarding the establishment of a Community Based Flood Management Organisation ✓ Selection of organisation members (Chairperson, Vice-Chairperson, Group Leaders, Secretary, and Auditor) ✓ Preparation of bylaws and registration ✓ Training in organisational operation ✓ Monitoring and evaluation	Monitoring and evaluation of organisation activities will be executed after the establishment and training is given to the organisation's members
	Training in the maintenance of the structures	✓ Maintenance training (training and operation) of evacuation centre, evacuation route and signboards installed in the Pilot Project.	
	Preparation of Community Flood Management Plan (manuals)	✓ Community flood management plan for disaster cycle ✓ Preparedness: confirmation of emergency communication network ✓ Response: confirmation of operation procedures for the emergency siren and communication network, coordination procedures with the disaster management committee, and roll call of evacuees ✓ Rehabilitation: how to assess flood damages, procedures for preparation of a rehabilitation plan, procedures for request of relief goods, procedures for request for cooperation in rehabilitation	
	Implementation of evacuation training	✓ Production and installation of signboard for community flood hazard map indicating evacuation route and dangerous areas ✓ Production and installation of signboard indicating dangerous areas and evacuation centre ✓ Implementation of evacuation training (drills) including information dissemination	

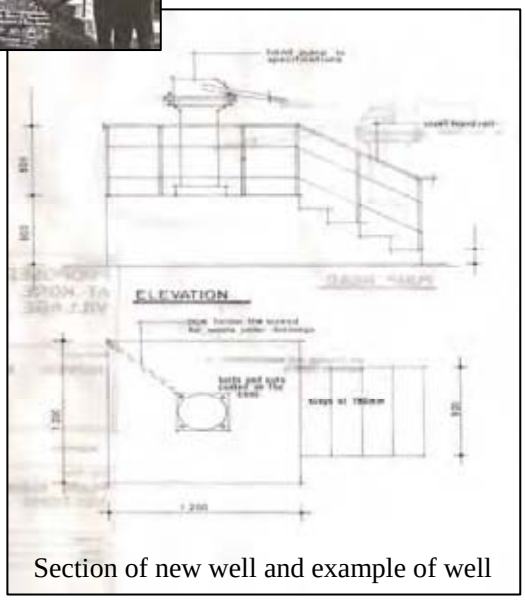
Proposed Site for Construction of Borehole

Proposed Route of Raising Road

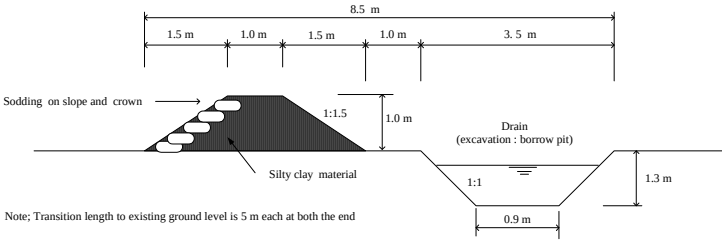
Figure 7.5.5 Existing Condition of Proposed Project at Kasiru

Kasiru Village Flood Hazard Map





Section of new well and example of well



Section of raising road

Figure 7.5.6 Pilot Project（Kasiru Village）

7.5.6 Outline of Pilot Project in Kochiewo Village, Magina Sub-Location

The components of the Pilot Project in Kochiewo Village are summarised below.

Table 7.5.7 Outline of Pilot Project in Kochiewo Village, Magina Sub-Location, Nyando District

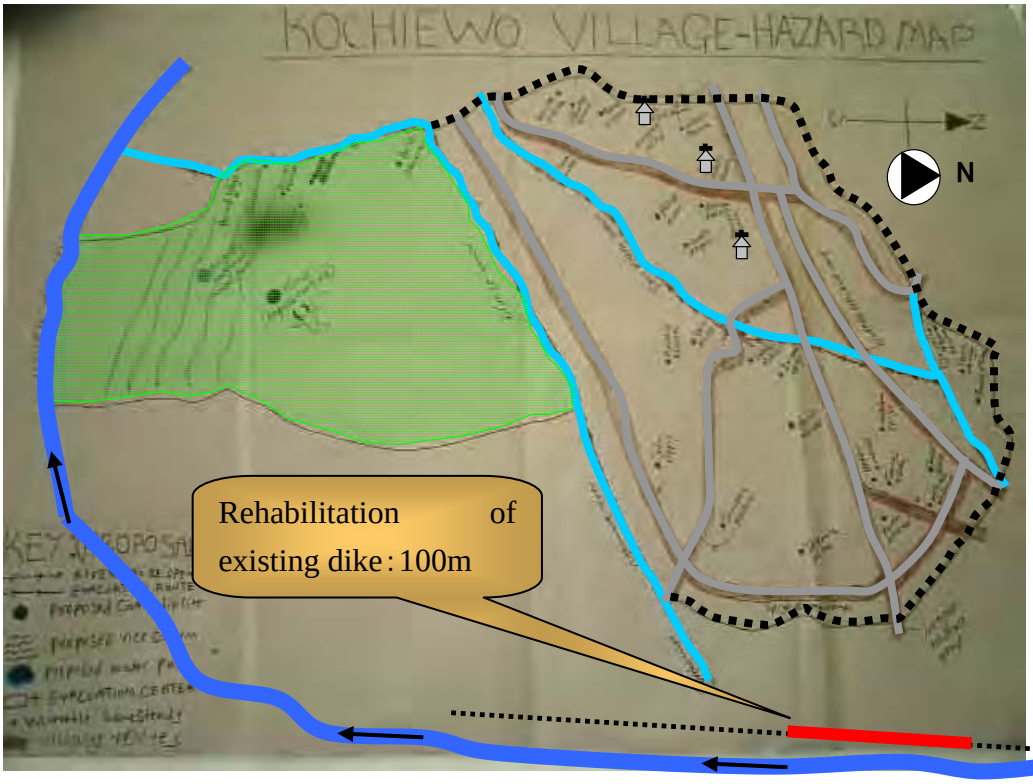
Component		Outline	Remark
Structural Measures		✓ Rehabilitation of existing dike: length: 100m	
	Establishment and Development of Community Based Flood Management Organisation	✓ Community sensitisation regarding the establishment of a Community Based Flood Management Organisation ✓ Selection of organisation members (Chairperson, Vice-Chairperson, Group Leaders, Secretary, and Auditor) ✓ Preparation of bylaws, and registration ✓ Training in organisational operation ✓ Monitoring and evaluation	Monitoring and evaluation of organisation activities will be executed after the establishment and trainings to the organisation
	Training in the maintenance of the structures	✓ Maintenance training (training in operation) of evacuation centre, evacuation route and signboards installed in the Pilot Project.	
	Preparation of Community Flood Management Plan (manual)	✓ Community flood management plan for disaster cycle ✓ Preparedness: confirmation of emergency communication network ✓ Response: confirmation of operation procedures for the emergency siren and communication network, coordination procedures with the disaster management committee, and roll call of evacuees ✓ Rehabilitation: how to assess flood damages, procedures for preparation of a rehabilitation plan, procedures for request of relief goods, procedures for request for cooperation in rehabilitation	
	Implementation of evacuation training	✓ Production and installation of signboard for community flood hazard map indicating evacuation route and dangerous areas ✓ Production and installation of signboard indicating dangerous areas and evacuation centre ✓ Implementation of evacuation training (drills) including information dissemination using emergency communication network, and feedback from the meeting	

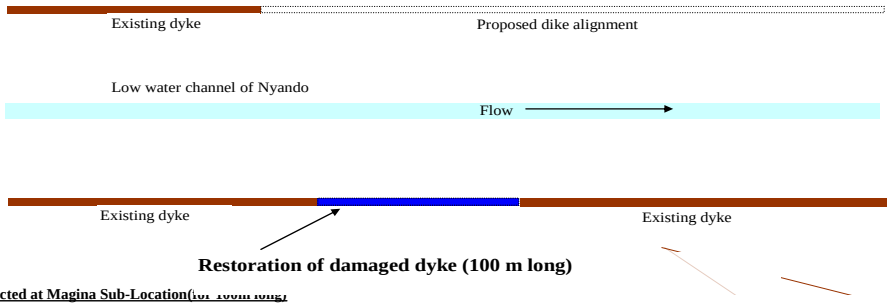
Lower Nyando near damaged dyke

Damaged Dyke on Right Bank

Figure 7.5.7 Damaged Dyke in Nyando River (Magina Sub Location)

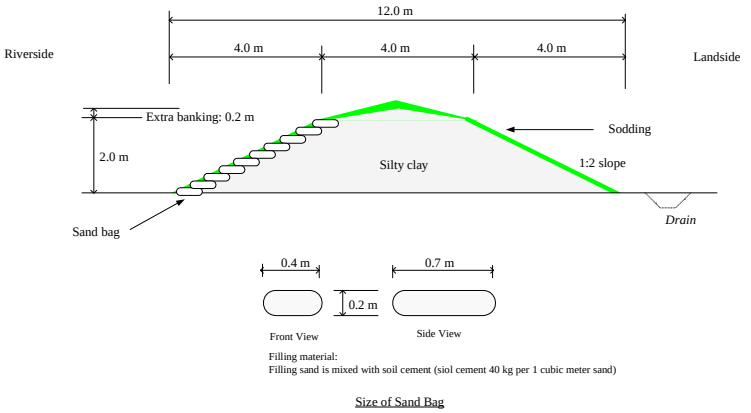
Kochiewo Village Flood Hazard Map





Dike position figure

Dike Section to be Constructed at Magina Sub-Location(for 100m long)



Section of dike

Figure 7.5.8 Pilot Project (Kochiewo Village)

7.5.7 Outline of Pilot Project in Siwot and Kamiwa Villages, Chil Chila Location

The components of the Pilot Project in Siwot and Kamiwa Villages are summarised below.

Table 7.5.8 Outline of Pilot Project in Siwot and Kamiwa Villages, Chil Chila Location, Kericho District

Component		Outline	Remark
Structural Measures		✓ River bank protection upstream of bridge in the Bararget river: length: 17 m: height: 2m ✓ Construction of Ramp for cattle	
	Development of Existing Community Based Organisation	✓ Preparation of proposal for realisation of CAP	
	The non-structural measures such as i) development of a Community Based Flood Management Organisation, ii) preparation of a Community Flood Management Plan, and iii) implementation of Evacuation Training will not be implemented since flood is not serious problem in this area		

Layout of the proposed site

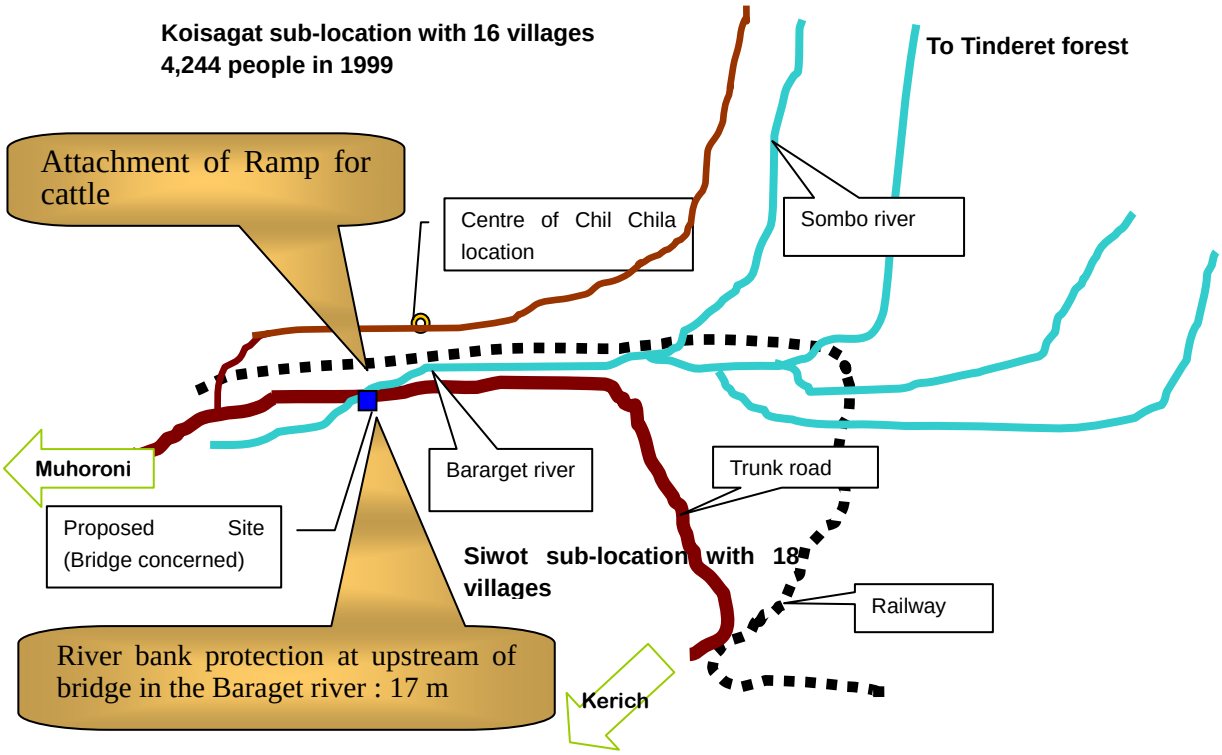
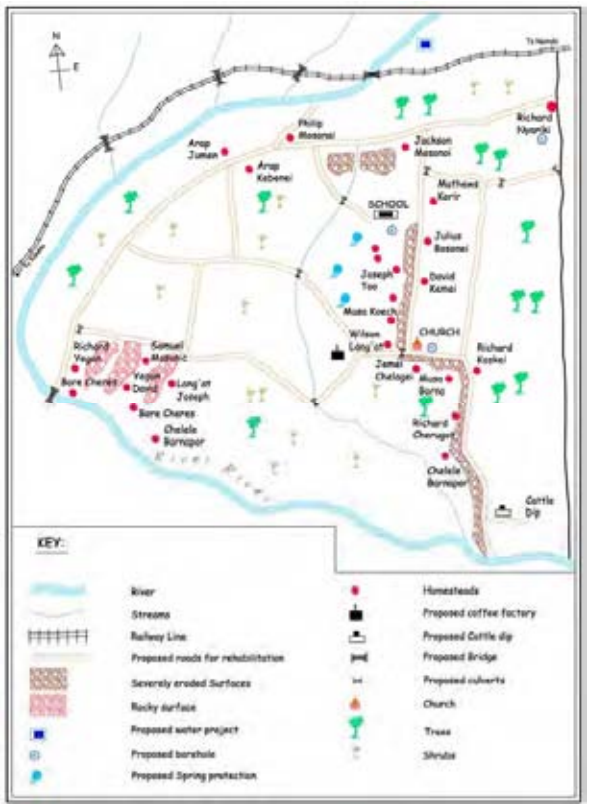


Figure 7.5.9(1/2) Pilot Project (Siwot and Kamiwa Village)

Community Hazard Map for Soil Erosion (Siwot Village)



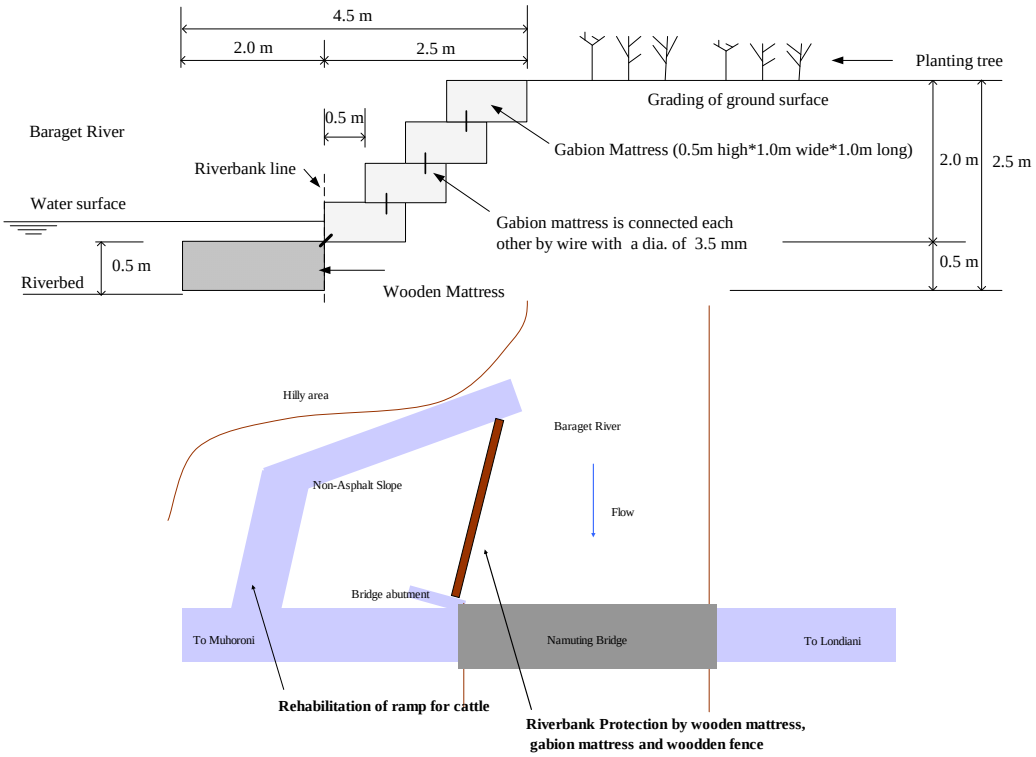


Figure 7.5.9(2/2) Pilot Project (Siwot and Kamiwa Village)

7.6 PROJECT MANAGEMENT PLAN

7.6.1 Overall Institutional Framework for Project Management

The related key organisations and institutional framework are illustrated in Figure 7.6.1, namely WRMA-LVSC, the JICA Study Team, Local Administration (Location), and the Communities.

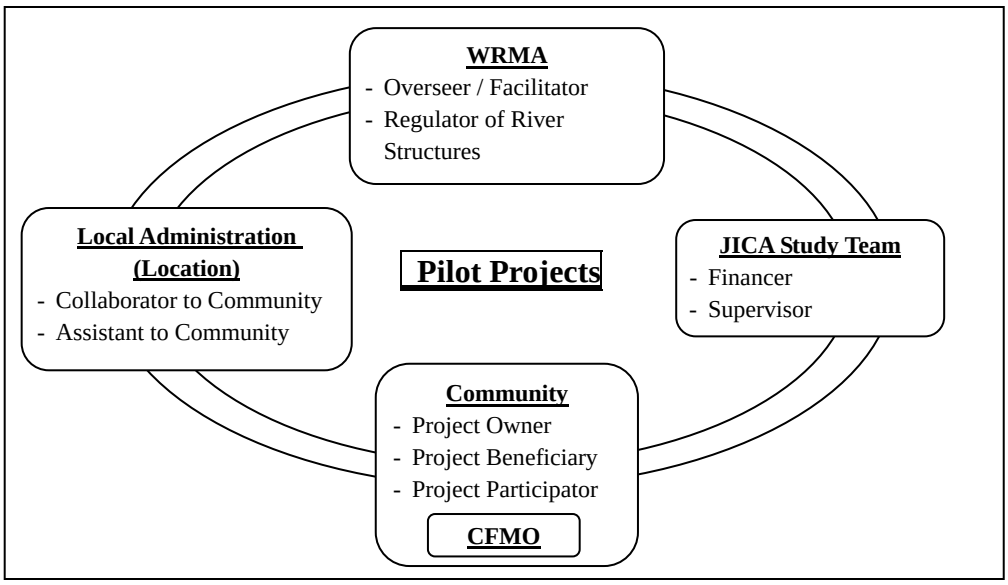


Figure 7.6.1 Institutional Framework for Project Management

The detailed roles and responsibilities of each institution are described in Table 7.6.1. Before the commencement of the Pilot Project works and activities, a memorandum of understanding for the project management should be signed by each party. The expected roles and responsibilities of each institution are explained in Table 7.6.1.

Table 7.6.1 Roles and Responsibilities of Each Institution in the Project Management

Institutions	Roles and Responsibilities in the Project Management
WRMA Lake Victoria South Catchment	- Being the counterpart of the JICA Study Team. - Being the overseer of the river structures availed under the Pilot Projects, - Assist in conflict resolution related to the community affairs (i.e. land ownership, community land, and riparian areas) in implementation of the Pilot Projects in collaboration with the JICA Study Team, - Assist community mobilisation in order for the community to cope with implementation of the Pilot Projects in collaboration with the Local Administration, - Assist the community in the procedures of environmental impact assessment clearance of the Pilot Projects in assistance with the JICA Study Team, - Assist the community for appropriate O&M of the assets / facilities / equipment availed under the Pilot Projects, - Responsible for facilitating implementation of the Pilot Projects, - Responsible for facilitating the community to establish CFMO and harmonise it with the existing appropriate River Water Users Association (WRUA) as the proponent of environmental impact assessment clearance process, - Responsible for coordinating with other related organisations, - Assist Monitoring and Evaluation (M&E) for the Pilot Projects

Institutions	Roles and Responsibilities in the Project Management
JICA Study Team	- Being a financer for the items specified as: ◆ Construction of structural measures such as dykes, evacuation centres, evacuation routes, and boreholes, ◆ Installation of non-structural measures such as sign boards ◆ Formulation and operation training of CFMO ◆ Training on Flood Management and preparation of Community Flood Management Manuals ◆ Implementation of evacuation drills - Provide technical advice and training to the community and CFMO for O&M of the facilities availed under the Pilot Projects, - Provide capacity building on flood management to the community in collaboration with WRMA, - Supervise construction works concerning the Pilot Projects, - Assist the community in procedures for environmental impact assessment clearance for implementation of the Pilot Projects, - Implement M&E
Local Administration (Respective Locations)	- Cooperate in overall implementation of the Pilot Projects, - Participate in the key events, and meetings regarding the implementation of the Pilot Projects, - Resolve conflicts related to the community affairs (i.e. land ownership, community land, and riparian areas) in implementation of the Pilot Projects, - Assist community mobilisation in order for the community to cope with implementation of the Pilot Projects in collaboration with WRMA, - Assist with administrative matters / processes concerning the implementation of the Pilot Projects
Communities	- Responsible for bearing the costs / expenses NOT specified in the costs / expenses borne by the JICA Study Team, - Being the owners of the Pilot Projects, - Raise awareness in the communities regarding the implementation of the Pilot Projects, - Responsible for cooperation and participation in construction works, - Responsible for mobilisation and participation in the training and capacity building programmes provided under the Pilot Projects, - Responsible for prevention of vandalism / robbery of the assets / facilities / equipment availed under the Pilot Projects, - Responsible for providing the labour force for implementation of the Pilot Projects and its part of wages being vested in the community funds to bear a part of O&M expenses for the assets / facilities owned by the communities, - Responsible for bearing O&M costs / expenses for the assets / facilities owned by the communities, - Responsible for assisting M&E activities including data collections, - Responsible for formulating Community Based Flood Management Organisations with assistance of the JICA Study Team and WRMA, with its specific tasks as follows: ◆ Raise awareness in the communities regarding flood management, ◆ Cooperate as an organisation with implementation of the Pilot Projects, ◆ Responsible for cooperation and participation in the training and capacity building programmes provided under the Pilot Projects ◆ Responsible for O&M and management of the assets / facilities / equipment availed under the Pilot Projects in collaboration with the communities and WRMA, ◆ Responsible for information dissemination about flood management knowledge and deployment of the same training that the CFMO received to other community residents, ◆ Responsible for leading the communities in flood preparedness, emergency response, and rehabilitation. ◆ Responsible for the expansion of the reticulation network for community based flood management.

7.6.2 Project Design Matrix

A project design matrix (PDM) for the Pilot Project was formulated as shown in Table 7.6.2. In addition, the PDM for each community was formulated as attached in Data Book. PDM is utilised for the monitoring and evaluation of the Pilot Project.

Table 7.6.2 Project Design Matrix (PDM) –Version 2

Project Name: The Pilot Projects in the Study on Integrated Flood Management for Nyando River Basin
Duration: 2007(May) – 2009(Sep) Target Area: Five communities selected in the Study Area
Target Group: Community Driven Flood Management Organisations (CFMOs) to be established
Key Stakeholders: Community as project owner and beneficiaries, WRMA as project facilitator, local government (location/sub-location) as collaborator to community, and JICA Study Team as project supervisor
Date of Preparation: July 10, 2007 Date of Revision: July 10, 2008

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Achieve long-term well-being for all in flood prone areas through expansion and sustainability of community driven flood management	- Opinions of participants in the final workshop about the Pilot Projects	- Questionnaires to be completed in the final workshop	
Project Purpose 1. Examine community-driven flood management with both mutual and self helps in terms of effectiveness 2. Improve flood management capacity through on-the-job training including site training and implementation of Pilot Projects	- Satisfaction of community people on effectiveness of Pilot Projects to protect against flooding - Evaluation on achievement of capacity development on flood management	- Questionnaires to be completed by the members of the communities after floods - Mid-term and final monitoring report to be prepared by the Forum members and the Study Team	
Output 1 Effective flood management structural measures are installed and functioning.	- Progress of construction - Damage to structures after flooding - Participation of community people - No of users of facilities (wells, evacuation centres and roads)	- Comparison between schedule and actual implementation of construction work - Surveys after floods - Record of participants in construction works - Records of numbers of users	
Output 2 Community driven flood management organisation is established and functioning.	- Completion of bylaws - Progress of fund creation compared to amounts specified in by-laws - No. of meetings compared to numbers specified in by-laws	- Bylaws prepared - The organisation's Account books - Meeting records	
Output 3 Flood Management measures are being operated at community level	- No. of participants in flood drills - Lead and evacuation times - Use of skills	- Reports regarding evacuation drills - Community surveys on lead and evacuation times - Questionnaires to be completed by the communities before and after floods	
Output 4 Effectiveness of education programme on flood prevention is confirmed at the site level	- No. of participants in training programme - Satisfaction of students and teachers	- Reports regarding the education programme - Questionnaires to be completed by the students and teachers	

Activities	Inputs		Important Assumptions
	JICA Study Team	**WRMA**	
Component 1: Structural Measure Development 1.1 River bank protection in the Nyamasaria river (Length: 37m, Height of protection: 4m, Height of dike: 1m) 1.2 Raising local road as evacuation route (length: 600 m), construction of new evacuation centre (floor space: 180 m2) with roof water catchments, installation of a toilet 1.3 Raising evacuation road (length: 400m), installation of a well at existing evacuation centre (depth: minimum 50m) with a hand pump, installation of a toilet 1.4 Rehabilitation of existing dike (length: 100m) 1.5 River bank protection upstream of bridge in the Bararget river (length: 17 m: height: 2m) with ramp for cattle 1.6 Training in O&M for the above structures Component 2: Institutional Development of CFMO 2.1 Community sensitisation regarding the establishment of a Community Based Flood Management Organisation 2.2 Selection of organisation members (Chairperson, Vice-Chairperson, Group Leaders, Secretary, the Auditor) 2.3 Preparation of bylaws, and registration 2.4 Training in organisational operation 2.5 Monitoring and evaluation Component 3: Capacity Development on Flood Management 3.1 Community flood management plan for disaster cycle 3.2 Preparedness: confirmation of emergency communication network 3.3 Response: confirmation of procedures for operation of emergency sirens and communication network, coordination procedures with disaster management committee, roll call of evacuees 3.4 Rehabilitation: how to assess flood damages, procedures for preparation of rehabilitation plans, procedures for request for relief goods, procedures for request for cooperation in rehabilitation 3.5 Production and installation of signboards for community flood hazard maps indicating evacuation routes and dangerous areas 3.6 Implementation of evacuation training (drills) Component 4: Education Programme on Floods 4.1 Training teachers (Necessity of disaster management education, development of resident-participation type programmes, teaching materials, training skill) 4.2 Implementation of model class by the trained teacher	- Being a financer for the specified items including: ✓ Construction of structural measures such as dykes, evacuation centres, evacuation routes, and boreholes, ✓ Installation of non-structural measures such as sign boards ✓ Formulation and operation training of CFMO ✓ Training on Flood Management and preparation of Community Flood Management Manuals ✓ Implementation of evacuation drills - Provide technical advice and training to the community and CFMO for O&M of the facilities availed under the Pilot Project, - Provide capacity building on flood management to the community in collaboration with WRMA, - Supervise construction works concerning the Pilot Projects, - Implement training on community development activities, - Assist the communities with procedures for environmental impact assessment clearance for implementation of the Pilot Projects, and - Implement M&E	- Being the overseer of the river structures availed under the Pilot Project, - Assist in conflict resolution related to the community affairs (i.e. land ownership, community land, and riparian areas) in implementation of the Pilot Projects, - Assist community mobilisation in order for the community to cope with implementation of the Pilot Projects, - Assist community in the procedures for environmental impact assessment clearance of the Pilot Projects, - Assist community for appropriate O&M of the assets / facilities / equipment availed under the Pilot Projects, - Responsible for facilitating implementation of the Pilot Projects, - Responsible for facilitating the community to establish CFMO and harmonise it with the existing appropriate River Water Users Association (WRUA) for proponents of the environmental impact assessment clearance process, - Responsible for coordinating with other related organisations, - Implement M&E	- Extraordinarily large floods compared to average year have not occurred. - Shortage of budget allocated by JICA due to increase of material and labour price

7.7 INITIAL ENVIRONMENTAL EXAMINATION FOR PILOT PROJECTS

(1) General

As mentioned the sub-section 5.6.5 for the procedures for environmental impact assessment, the Pilot Project is only be required to submit a Project Report to obtain an Environmental License. Since the project scale is limited to the community level, a full EIA is not required. This process is covered by Section 10(2) of Part II of Legal Notice 101, which allows for approval of proposed projects at the Project Report stage. NEMA has used this procedure effectively to grant Environmental Licenses to small projects. This JICA Study has defined the environmental study at the Project Report stage as an initial environmental examination (IEE) in order to facilitate understanding of the level of detail investigation for the environmental study.

(2) Implementation of the IEE

The Study Team's Environmental Expert had set in motion the process leading to development of an environmental Project Report for each of the five Pilot Projects. The activities that had been accomplished are as follows:

i) Completion of a desktop study to become familiar with the environmental requirements and procedures under both JICA and GoK regulations;

ii) Preparation of a concept note clarifying on the scope of environmental assessment and identifying requirements considered critical to completing the IEE process in the available time;

iii) Meetings with the team members and WRMA to define the scope and process of IEE studies;

iv) Reconnaissance trips to the site of the five Pilot Projects and identification of key stakeholders at each site;

v) Stakeholder consultations at each site;

vi) Preparation of questionnaires and conducting field surveys;

vii) A meeting with relevant GoK regulators to facilitate definition of the requisite sectoral approvals for the five Pilot Projects;

viii) Analysis of the public meeting, questionnaire and field survey results, as well as impact identification;

ix) Development of an environmental management plan; and

x) Preparation of a Project Report and submission of the report to NEMA.

(3) Result of the Consultation Meeting with Community

Consultation meeting with communities for each Pilot Project was implemented and the result is summarised shown in Table 7.7.1.

Table 7.7.1 Result of Consultation Meeting with Community

Sub-location/Village Meeting Date and No. Of Participants	Proposed Structural Measures	Main Questions/Comments	Clarification by JICA Study Team
Kasule/Odesso 27 Feb. 2007 14 Participants	1. Restoration of damaged riverbank (37 m long).	1. The proposed riverbank protection was not priority one in the community's proposal and the community questioned if that proposed project will be effective 2. The community members pointed out that they had proposed a bridge that connects Odesso and Bwanda villages that school pupils could use to access Bwanda primary school but this proposal had not been prioritised and the community wanted to know why. 3. Community members wanted to know if their proposal of expansion and dyking along R. Nyamasaria if it was going to be done. They pointed out that they had also proposed the de-siltation of Omoro canal be done they therefore requested clarification if that proposal was going to be addressed 4. They pointed out that when the bridge was constructed in 1963 Omoro canal was also dug such that the over-flow at the bridge may drain through this canal.	1. This component is related to the reconstructions of Nyamasaria bridge and dykes proposed by the community. The proposed bank protection will be very effective for bridge protection and flood along the river. But due to limitation of budget, only location for protection of bridge will be rehabilitated. 2. It is financially difficult to construct such long bridge, dyke construction along the river, replace of existing bridge under the pilot project. 3. The canal improvement is not taken up in the project since it will negatively affect to the other communities.
Central Bwanda/Kokwaro 25 Feb. 2007 9 Participants	1. Construction of one evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (600 m long).	1. There was no opposition by the community to the proposed pilot project in the village 2. ½ an acre of land had been donated by Karen Matito for purposes of constructing an evacuation centre. 3. While there evacuees suffered from lack of clean water, firewood for fuel and attacks from diseases. 4. Community stated that they were ready to participate in the construction works of both the evacuation centre and the raised evacuation route. 5 Quality of soil material required investigation to ensure good quality is used.	1. The evacuation centre will have rain water catchment system for drinking water supply. It is also considered the room for kitchen space. 2. The quality of soil materials will be checked before construction

Sub-location/Village Meeting Date and No. Of Participants	Proposed Structural Measures	Main Questions/Comments	Clarification by JICA Study Team
Kore/Kasiru 26 Feb. 2007 8 Participants	1. Construction of two wells and construction of one storage house in the existing evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (400 m long).	1. Community members wanted to know why their list of priorities as indicated in the CAP was not followed. They pointed out that their priority was a dispensary. They pointed out also that JICA Study Team had not given the community a feedback on selection of pilot project. 2. It was pointed out to the community for need of them to register a CBO which will help in the O&M of the structures that were going to be constructed 3. They wanted to know why the project was not going to construct an evacuation centre on land identified and donated by community.	1. Most of components proposed in CAP are too big to implement as pilot project. The project can not cover dispensary, since the executing agency is Ministry of Water. 2. The survey was completed in February and explanation is done in this meeting. 3. The proposed land is muddy area and it is technically difficult to construct the centre.
Magina/Kochiewo 21 Feb. 2007 21 Participants	1. Construction of a new dyke (100m long).	1. Community members stated that there was no feedback on the PRA exercise that had been carried out in the village 2. Community members also pointed out that they thought that the project was going to encroach on their land. 3. Community also agreed without any objection that the project be carried out	1. The survey was completed in February and explanation is done in this meeting. 2. Only exiting dyke will be rehabilitated. Therefore, no encroachment to community lands will occur.
Chil-Chila 3Mar. 2007 50 Participants	1. Riverbank protection (17 m long) 2. Improvement of existing ramp to low water channel of Namuting River (4m wide)	1. Only 18 community members stated that they had tap water. They pointed out that the same source of water was used as animal watering point, bathing purposes and washing of clothes by the residents. They clarified that the main problem was that this water was silted and polluted during the rains as the eroded soil moves downstream. River Water was also polluted from coffee factory effluents upstream. It came out also that a lot of erosion is occasioned by access paths to the water source as people and livestock access water. 2. Community members also pointed out that fetching water took a lot of their valuable time. They also pointed out that there were complains of malaria and typhoid and amoeba as a result of the water	1. The project will contribute to install deferent water points between local residents and their cattle. Soil erosion of river will reduce after the project is completed. 2. The project can not contribute to reduce time of water collection and water related disease. However, the fund generated by the project will be utilised to implement new activities against such problems.

(4) Result of the IEE

Possible negative impacts and proposed countermeasures for each Pilot Project are shown in Tables 7.7.2 and 7.7.3, respectively.

Table 7.7.2 Possible Negative Impacts for the IEE

Sub-location / Village	Structural Measures	Possible Impact	Reason
Kasule / Odesso	1. Restoration of damaged riverbank (37 m long).	1. Blockage of access to water for domestic and livestock uses. 2. Impacts on material sources. 3. Blockage of access to river sand.	1. Riverbank construction will block access to river water for local residents and their cattle. 2. Poor quality material is available at the community. 3. Riverbank construction will restrict the access of people who harvest sand from the river.
Central Bwanda / Kokwaro	1. Construction of one evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (600 m long).	1. Disturbance along material source and supply routes. 2. Occupational health and safety concerns. 3. Pollution concerns: sanitation, debris, etc. at the construction site. 4. Site disturbance in material borrow areas.	1. The evacuation centre requires masonry stone, quarry stone, sand, and ballast. Obtaining these materials has the potential to cause minor environmental degradation. Delivery of such materials may cause the temporary damage of pasture. 2. Workers may disturb sanitation and security conditions in community. 3. Construction waste will be produced at site. 4. Raising the road levels will require soils to be borrowed locally. Such borrow areas have potential to accumulate water in flood prone areas and thus become mosquito breeding grounds.
Kore / Kasiru	1. Construction of two wells and construction of one storage house in the existing evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (400 m long).	1. Disturbance along material and equipment transport routes. 2. Pollution from drilling waste and debris. 3. Site disturbance in material borrow areas.	1. As there is no access road to the community, a temporary road will be opened and this may block the drainage canal. 2. Construction waste from drilling will be produced at the site. 3. Raising the road levels will require soil to be borrowed locally. Such borrow areas have the potential to accumulate water in flood prone areas and thus become mosquito breeding grounds.
Magina / Kochiewo	1. Construction of a new dyke (100m long).	1. Site disturbance in material borrow areas. 2. Risk of fire hazards at the Fuel depot 3. Pollution from waste oil. 4. Occupational health and safety concerns. 5. Blocked access to river water.	1. Dike construction will require soil to be borrowed locally. Such borrow areas have the potential to accumulate water in flood prone areas and thus become mosquito breeding grounds. 2. Temporary storage of fuel for machines may present a fire hazard. 3. Construction machines will generate oil waste. 4. Construction machines will generate noise, dust and vibration. 5. The construction will restrict access to river water for local residents and their cattle.
Chil-Chila	1. Riverbank protection (17 m long) 2. Improvement of existing ramp to low water channel of Namuting River (4m wide)	1. Blocked access to river water 2. Destabilisation of debris in river bed 3. Impacts at material sources	1. The construction will block access to river water for local residents and their cattle. 2. Wooden mattress will be constructed in the river and materials may be flashed out. 3. The construction requires wooden materials, which might lead to illegal logging activities taking place.

Table 7.7.3 Proposed Countermeasures for the IEE

Sub-location / Village	Structural Measures	Possible Impact	Mitigation Measure
Kasule / Odesso	1. Restoration of damaged riverbank (37 m long).	1. Restriction of access to water for domestic and livestock uses. 2. Impacts in material source areas. 3. Blockage of access to river sand	1. Water can be accessed from other sections. 2. Materials to be sourced from licensed dealers. 3. Consultations with local people should be held before construction.
Central Bwanda / Kokwaro	1. Construction of one evacuation centre 2. Raising of local road levels for use as an evacuation road leading to the above centre (600 m long)	1. Disturbance at material source areas and along supply routes. 2. Occupational health and safety concerns. 3. Pollution concerns: sanitation, debris, etc. at the construction site. 4. Site disturbance in material borrow areas.	1. Only small quantities are required. 2. Workers are to be supervised by competent foremen. 3. Debris should be treated properly. 4. Rehabilitation by refilling of borrow areas or providing drainage to the area where refilling is not required (e.g. in riverbeds).
Kore / Kasiru	1. Construction of two wells and construction of one (1) storage house in the existing evacuation centre. 2. Raising of local road levels for use as an evacuation road leading to the above centre (400 m long).	1. Disturbance along material and equipment transport routes. 2. Pollution from drilling waste and debris. 3. Site disturbance in material borrow areas.	1. Adoption of the route after meetings with the community members 2. Safe disposal of all drilling waste 3. Rehabilitation by refilling borrow areas or providing drainage to the area where refilling is not required (e.g. in riverbeds).
Magina / Kochiewo	1. Construction of a new dyke (100m long).	1. Disturbance in material borrow areas. 2. Risk of fire hazards at the fuel depot. 3. Pollution from waste oil and spares. 4. Occupational health and safety concerns. 5. Restricted access to river water.	1. Rehabilitation of all disturbed areas leading to watering points. 2. Isolation and securing of fuel reserves. Maintaining minimum supplies on site. 3. Safe disposal of engineering wastes. 4. Use of qualified staff under competent supervision. 5. Water can be accessed from other sections.
Chil-Chila	1. Riverbank protection (17 m long). 2. Improvement of the existing ramp to the low water channel of the Namuting River.	1. Restricted access to river water. 2. Destabilisation of debris in the river bed. 3. Impacts in material sources areas.	1. Water can be accessed from other sections of the river. 2. Destabilisation will cease once civil works are completed. 3. Wooden material will be sourced from licensed dealers.

7.8 IMPLEMENTATION OF PILOT PROJECTS

7.8.1 Implementation Schedules of Pilot Projects

(1) General

Odesso, Kokwaro, Kasiru, and Kochiewo villages established CBOs for the Pilot Projects after implementation of community surveys that were executed in February 2007, while at Chil Chila it was decided to utilise the existing CBO covering the entire location for the project. The Draft Memorandum of Understanding (MOU) was discussed amongst the local administration, villagers, CBO, the JICA Study Team and WRMA during 6-8 June 2007. All the MOUs were singed in June 2007. The formulated Pilot Projects, as mentioned previously in Sub-section 7.5, were divided into five packages for implementation, as shown in Table 7.8.1.

Table 7.8.1 Contract Packaging for the Pilot Projects

Package	Items	Target Village	Sub-Contractor
Package 1	- Riverbank protection work on Nyamasaria River	Odesso village	Wadich Company Ltd.
	- Riverbank protection work with livestock ramp on Baraget River	Siwot and Kamiwa village in Chil Chila Locality	
	- Dike rehabilitation on Nyando River	Kochiewo village	
Package 2	- Construction of evacuation centre	Kokwaro village	Landmark Ltd.
	- Installation of toilets	Kokwaro and Kasiru village	
Package 3	- Installation of raised well with hand pump	Kasiru village	GADCO
Package 4	- Establishment and development of community-based flood management organisation	Odesso, Kokwaro, Kasiru, Kochiewo villages	VIRED International
	- Installation of community flood hazard map - Installation of evacuation signboards		
	- Construction of raised evacuation roads Kokwaro: 600 m, Kasiru: 400 m	Kokwaro and Kasiru villages	
	- O&M training for structural measures	Odesso, Kokwaro, Kasiru, Kochiewo villages	
	- Disaster management education programme	Kokwaro village	
Package 5	- Community flood management training - Preparation of community flood management plan - Implementation of evacuation drill	Odesso, Kokwaro, Kasiru, Kochiewo villages	Kenya Red Cross Society

Source: JICA Study Team

In general, most of the packages were not completed by December 2007 as scheduled and the remaining work was completed in October 2008. The delay is mainly due to the absence of the JICA Study Team during January - May 2008 (5 months). The detailed implementation schedules of each package are described below.

(2) Package 1

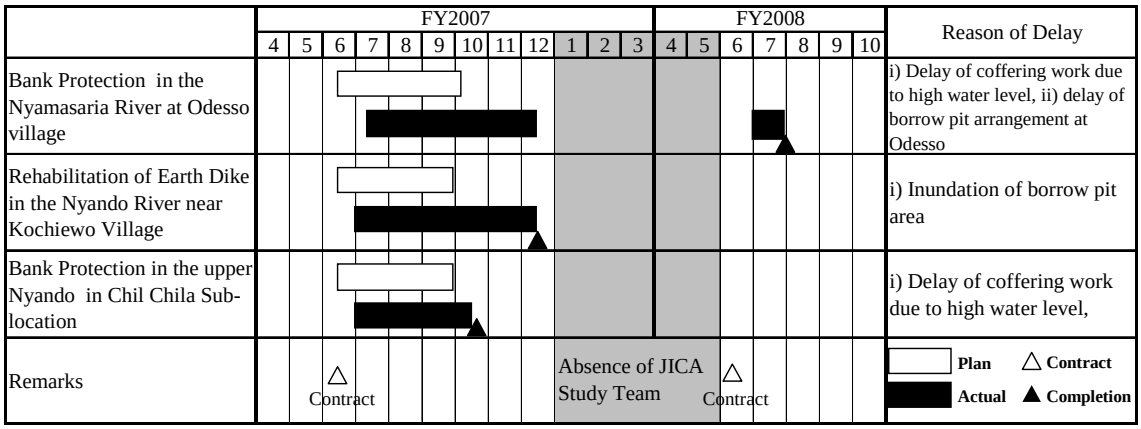
1) Proposed River Structural Works

The following river structural works were proposed in Package 1:

- Riverbank protection works by gabion mattress in the Nyamasaria River (total longitudinal length 37 m) at Odesso village.
- Rehabilitation of the earth dike for the Nyando River (total longitudinal length 100 m) near Kochiewo village.
- Riverbank protection works by wooden and gabion mattress in the Bararget River in the upper Nyando River (total longitudinal length 17 m) in Chil Chila.

2) Implementation Schedule of River Structural Works by Wadich General Contractor

Wadich General Contractor was contracted to undertake the work for Package 1. The implementation schedule of Package 1 is summarised in Figure 7.8.1.



Source: JICA Study Team

Figure 7.8.1 Implementation Schedule of Package 1

In the initial stage of the structural works, heavy rains caused the delays in the coffering works due to frequent occurrence of small and medium scale floods, especially in the riverbank protection works at Odesso, Siwot and Kamiwa villages. Coffering works using sandbags had to be repeated several times. For the dike rehabilitation at Kochiewo, the excavation works at borrow pits could not be undertaken because construction machinery could not gain access to the pits under muddy conditions. In addition, the contractor could not prepare the borrow pit area in Odesso village and, as a result, the backfilling work was delayed. The following photos indicate the major works undertaken in Package 1.

Coffering Works at Odesso

Fabricating Mattress for Gabion(1st layer) at Odesso

Sodding and Formation Works of the Dike at Odesso

Embankment Works at Kochiewo

Rehabilitated Earth Dike (Landside) at Kochiewo

Wooden and Gabion Mattress in Progress at Chil Chila

Completed Wooden and Gabion Mattress at Chil Chila

Bank Protection Works Constructed at Chil Chila

Source: JICA Study Team

Figure 7.8.2 Works Undertaken in Package 1

(3) Package 2

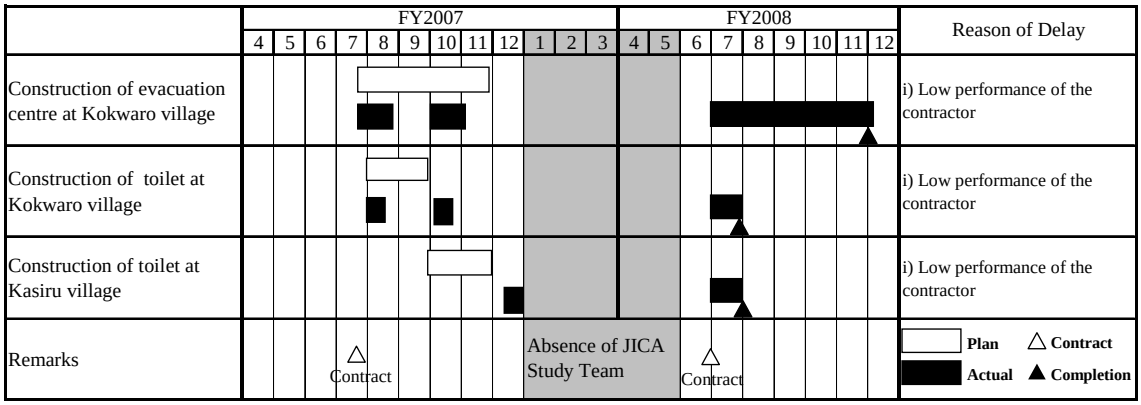
1) Proposed Building Work

The following building works were proposed in Package 2.

- Construction of an evacuation centre (180 m^2) with toilet in Kokwaro village.
- Construction of toilets at the existing evacuation centre in Kasiru village.

2) Implementation Schedule of Building Works by Landmark General Works Ltd.

Landmark General Works Ltd. was contracted to undertake the work for Package 2. The implementation schedule of Package 2 is summarised in Figure 7.8.3



Source: JICA Study Team

Figure 7.8.3 Implementation Schedule of Package 2

A serious delay was encountered with progress for Package 2 due to considerably low performance of the contractor, even though Landmark General Works Ltd is registered as Class D contractor by both the Ministry of Water and Ministry of Public Works. The following photos indicate the major works undertaken in Package 2.

Constructed Toilets

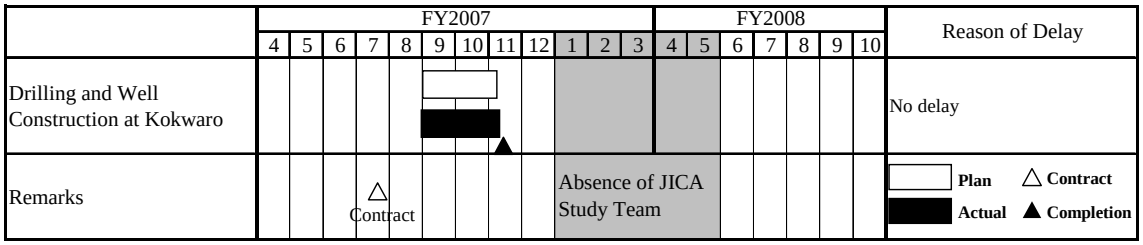
Constructed Evacuation Centre

Source: JICA Study Team

Figure 7.8.4 Building Works in Package 2

(4) Package 3

Package 3 is designed to install a flood resistant well in Kasiru village, for which a foundation is constructed and equipped with a hand pump. Gulf Agricultural Developers and Consultants (GADCO) was contracted to undertake the work for Package 3. The implementation schedule of Package 3 is summarised in Figure 7.8.5.



Source: JICA Study Team

Figure 7.8.5 Implementation Schedule of Package 3

Due to unexpected frequent rain during August 2007, mobilisation by the contractor was delayed and the started date of the work was shifted to September 2007. The developed borehole was registered with the government and its specification is summarised in Table 7.8.2.

Table 7.8.2 Specification of the Developed Borehole

Item	Description
Borehole No.	WRMA/LVSC/C256
Borehole Name	Kasiru Borehole Project
Total depth	52 m
Pump intake	21 m
Recorded yield	20 m^3/hr
pH	6.5
Temperature	25^oC
Water quality test result	Good water recommended for domestic use

Source: JICA Study Team

Issues raised by the village residents after demobilisation of the contractor were that there was a difficulty in drawing water from the pump into bucket and there was no appropriate drainage. The Study Team decided to install an additional slab for buckets and a small drainage channel before handing over the completed borehole to the community. The following photos indicate the major works undertaken in Package 3.

Community meeting before construction

Mobilisation to the site

Drilling work in progress

Casing

Test Pumping

Construction of Slab

Construction of Additional Slab and Drainage

Completed Raised Well

Source: JICA Study Team

Figure 7.8.6 Drilling and Well Construction in Package 3

(5) Package 4

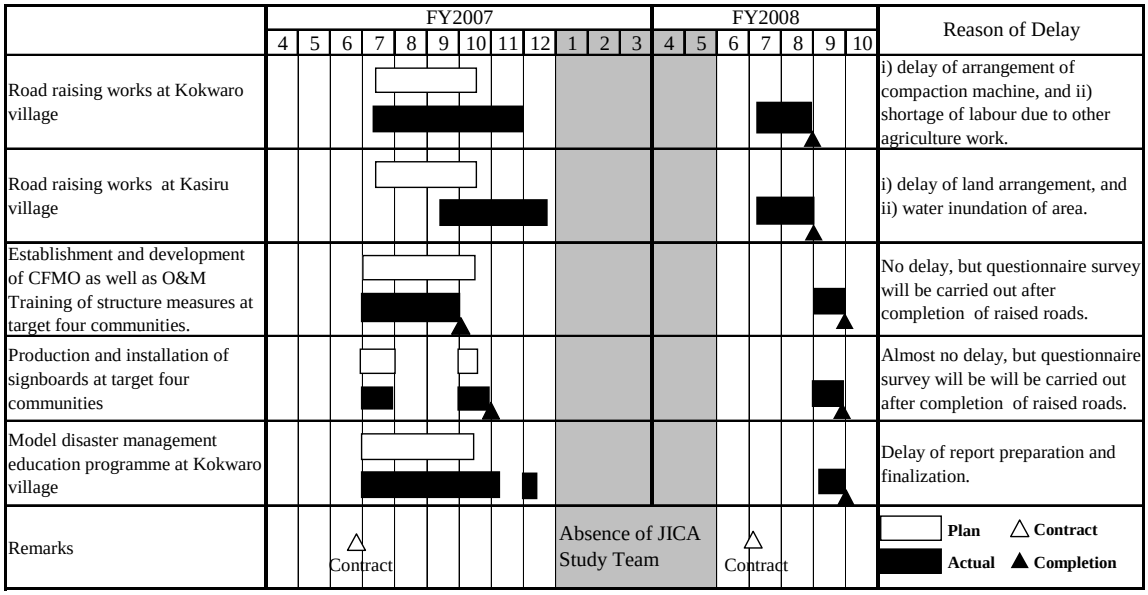
1) Proposed Works

The following works were proposed in Package 4.

- Road level raising works at Kokwaro village (600 m) and at Kasiru village (400 m).
- Establishment and development of CFMO as well as O&M Training in structural measures at the four target communities.
- Production and installation of signboards at the four target communities.
- Model disaster management education programme at Kokwaro village

2) Implementation Schedule of Works by VIRED International

VIRED International was contracted to undertake the work for Package 4. The implementation schedule of Package 4 is summarised in Figure 7.8.7.



Source: JICA Study Team

Figure 7.8.7 Implementation Schedule of Package 4

In Kokwaro village, the road level raising work was delayed due to a shortage of community workers because of their farming activities, the general election, and delays in the arrangement of a compactor. In Kasiru village, the preparatory works could not commence since the existing farmland encroached onto the road reserve. Finally, the landowners agreed to move out of the road reserve area. Other training programmes and signboard installation were almost completed as schedule, except for finalisation of the report and the questionnaire survey. The following photos show the major works undertaken in Package 4.

Sodding of Embanked Slope

Raised Road

Conflict Resolution Meeting

Fundraising Training for CFMO

Proposal Writing Training for CFMO

O&M Training for Structural Measures in Kasiru

Installed Evacuation Signboard

Installed Community Flood Hazard Map

Source: JICA Study Team

Figure 7.8.8 Works Undertaken in Package 4 (1/2)

Teachers' Training for Disaster Management

Arrangement of Disaster Topics

Presentations by the Teachers

Textbook Development by the Trained Teachers

Pupils at Bwanda Primary School

Flood Disaster Education Class in Progress

Flood Disaster Education Class in Progress

Assessment of Teaching and Learning Programme

Source: JICA Study Team

Figure 7.8.8 Works Undertaken in Package 4 (2/2)

(6) Package 5

1) Proposed Works

The following works were proposed in Package 5.

- Training in community flood management, preparation of community flood management plans and evacuation drill at the four target communities.

2) Implementation Schedule of Works by Kenya Red Cross Society

Kenya Red Cross Society was contracted to undertake the work for Package 5. The implementation schedule of Package 5 is summarised in Figure 7.8.9.

	FY2007												FY2008						Reason of Delay
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	
Community flood management training and evacuation drill																				Almost no delay excluding final report submission.
Remarks				△ Contract						Absence of JICA Study Team							△ Contract			Plan △ Contract Actual ▲ Completion

Source: JICA Study Team

Figure 7.8.9 Implementation Schedule of Package 5

The following photos indicate the major works undertaken in Package 5.

Training in Community Disaster Management

Preparation of a Community Flood Management Manual

First Aid Training

Evacuation drill – Evacuating to the Evacuation Centre

Source: JICA Study Team

Figure 7.8.10 Works Undertaken in Package 5

7.8.2 Situation in Target Villages

The Pilot Projects are the products of the CAP formulated by the communities during the community survey that was conducted by the JICA Study Team. Therefore, the Pilot Projects are a paradigm shift in that the communities were involved in formulating the CAP. This has resulted in the awareness of the community that they can be involved in the planning of their developmental agenda and that they do not have to wait for planning to be done externally and then brought to them for implementation. This awareness necessitated the voluntary establishment of the CFMO. The communities realised that they need to organise themselves to become part of effective flood management efforts in their areas.

During the CAP formulation, the communities' expectations were high. However, after prioritisation of the CAP and the selection of the components, the communities' expectations were lowered. Even so, after participating in the training that was provided by the Pilot Projects, the communities realised that they could write proposals and achieve the CAPs on their own. Thus, the expectations of the communities have again been revived. Some CFMOs aim to send proposals to CDF or other financial sources to seek funding for protection from flood and improvement of community life.

During the construction works, community labour was used and the community voluntarily donated 10-20% of their earnings to the CFMO account to support the growth of the organisation and promote further community development. The CFMO also meets regularly and issues relating to flood management are at the core of the agenda in these meetings. The community has become proactive in matters concerning floods and water resource management. This has led the CFMO to hold discussions with WRMA to explore the possibility of joining a Water Resource Users Association (WRUA) that will bring more benefits to the CFMO.

Based on the above observations, it seems that the communities have been empowered and they have a voice through the CFMOs. They will be able to stand on their own with little help to strengthen the CBO. However, it is noted that such changes vary depending on the communities. In Kokwaro, the CBO has not operated well and their demand for further assistance is still very high. The situation in each community is summarised in Table 7.8.3.

Table 7.8.3 Situation in Villages Involved in the Pilot Projects

	Odesso Village	Kokwaro Village	Kasiru Village	Kochiewo Village	Chil Chila Locality
CFMO	Odesso Multipurpose registered on 6th March 2007	Kokwaro Development registered on 8th March 2007	Kitauchi-Yoko IFM Kasiru registered on 28th February 2007	Kogwedhi Self Help registered on 6th March 2007	Millennium registered on 2nd July 2003
Present Activity	✓ Meet regularly ✓ Opening of a blocked drainage canal ✓ Leased of land for horticulture cultivation	✓ Not meeting regularly; have so far held less than 8 meetings	✓ Meet regularly ✓ Leased land for rice cultivation ✓ Distributed cassava seeds to CBO farmers ✓ Establishment of sub-committee for management of wells ✓ Construction of new well through proposal writing	✓ Meet regularly ✓ Plans to engage in horticulture and land is already donated for a season by one member ✓ Poultry keeping (17 chickens) ✓ Goat rearing (3 goats)	✓ Meet regularly ✓ Community health, especially malaria prevention ✓ Involved in the assistance of internally displaced people (IDP)
Financial Status	10% of their earnings during river rehabilitation work	10% of their earnings during road and evacuation construction work	20% of their earnings during road and well construction work	10% of their earnings during dike rehabilitation work	10% of their earnings during river rehabilitation work
Linkage with WRMA and other organisations	✓ Have become members of the Kibos River WRUA ✓ WRMA is considering funding for drainage rehabilitation	✓ Have become members of the Kano Plains WRUA	✓ Have written a proposal to an NGO for borehole drilling ✓ In the process of writing a proposal to potential donors for realising the CAP	✓ Have become members of the R. Nyando WRUA ✓ In the process of writing a proposal to CDF for funding of Margi River de-silting.	✓ Have become members of the Nyando River WRUA ✓ Have requested tree seedlings from Ministry of Environment in order to plant trees along the riverbanks
Issues Raised	In the first month of working, the CBO did not get the agreed 10% of earnings from labourers.	Dissention of some of the community members arose when the constructed evacuation road led to flooding	Money collected as water fees was not recorded in the cash book	None	Account books have to be audited.
Remarks	None	The Chairman of the CBO was arrested and later released. He is a politician and very busy with work other than the CBO.	The number of water well users is between 400-500 people from an average of 54 homes	In the CFMO, three communities were involved, namely Kochiewo, Kokul and Katieno to ensure the success of the project	

Source: Community meetings with JICA and WRMA hold in July 2008

Draining Improvement in Odesso

Site Meeting with Forum Member in Odesso

Land Cultivation by CBO in Kochiewo

CBO Member in Kochiewo

Goat Breeding in Kochiewo

Sweet Potato Cultivation by CBO in Kasiru

Extension of Raised Road by CBO in Kasiru

Use of Raised Road in Kasiru

Source: JICA Study Team

Figure 7.8.11 Community Activities after Completion of Pilot Project

7.8.3 Follow-up Activities

After the implementation of the Pilot Projects, the following follow-up activities were conducted by the Study: 1) Rehabilitation of the Installed Evacuation Signboards, 2) In-depth Training for Proposal Writing.

(1) Rehabilitation of the Installed Evacuation Signboards

After the installation of the signboards in October 2007, some of the signboards fell down due to various reasons such as storm wind, livestock hitting, pre and post election violence as summarised in Table 7.8.4.

Table 7.8.4 The Number of Fallen Signboards

Community	No. of Fallen Signboards
Odesso	8
Kasiru	3
Kogwedhi	4
Kokwaro	7
Total	22

The all fallen signboards were kept safely by the communities. With assistance of the Study Team including provision of materials and guidance, all 22 signboards were reinstalled by the communities and they were fixed on the ground with more reinforced conditions. Thorny acacia branches were put surrounding the signboards as a low cost protection by the communities' idea. The following figures present one of the sites for reinstallation and the reinstalled signboards in Kokwaro village.

Figure 7.8.12 Reinstallation Site of the Signboards

Figure 7.8.13 Reinstalled Signboard

(2) In-depth Training for Proposal Writing

After the series of training programmes during the implementation of Pilot Project, there has been strong need arisen from the communities for training of more advanced proposal writing. In fact, introductory and middle advanced trainings on this topic were conducted under the Pilot Project in 2007. The Study Team complied with their strong need and conducted the in-depth training as presented in the following table.

Table 7.8.5 Brief Description of the In-Depth Training for Proposal Writing

Date / Duration	9th -12th September 2008
Venue	Ahero Multipurpose Hall
Participants	- 2 selected members from 5 CFMOs (Total 10 participants) - 3 representatives from WRUA in the Nyando River Basin
Lecturer	Project Officer of the Study (The Study Counterpart staff)

Targets of the training were extended to CFMO of Chilchila and WRUAs, since CFMO of Chilchila had no training as non-structural measures, while all CFMOs are trying to be members of WRUAs, which provide a linkage to access to fund.

The overall objective of the training workshop was to increase the capacity of WRUAs and CFMOs on resource mobilisation for integrated flood management within the Nyando river basin. Specifically, the training was aimed at building the participant's level of understanding on fundraising, major types of resources, methods of fundraising, elements of structured proposal and practice proposal writing. Major contents of the training are the followings.

Table 7.8.6 Major Contents of the Training

Major Topics	Contents	Remarks
Contents and Proceedings	- Fundraising - Major types of resources - Methods of fundraising - Principles of fundraising	Introductory sessions were given to the participants
Overview of Proposal Writing	- Challenges and solutions - Research about funding organisation - Personal connection - Major components of proposal	Necessary knowledge prior to writing proposal were introduced and discussed among the participants.
Description of the components	- Summary and Introduction - Definitions of issues - Desired results - Outputs and Outcomes - Impacts - Resources and activities - Budget - Monitoring and evaluation - Sustainability - Conclusion - Appendices	As a non-guided proposal, the components in the left were raised. On the other hand, WSTF format for application was introduced and will be practically in use for preparation of the proposal.

Source: WRMA/JICA Study Team

After the whole sessions above, the participants developed an action plan to cover the following key activities in order to prepare for the future funding of each organisation within three months after this training.

i) Conduct community meeting and develop a proposal by the trainees,

ii) Fill the get-ready list for proposal preparation by the trainees and trainer,

iii) Train other members of the participants' organisations on proposal writing.

Finally, the participants came up with the following conclusions and recommendations as a way forward.

1) The community and WRUA groups need to identify potential sources of funds, and grants, donors and make contact with them.

2) The training beneficiaries should keep reading and practice the skills gained on proposal writing by submitting proposals to potential donors

3) The organisations should network, partner and collaborate with other development partners in the region as a matter of synergy.

4) The CFMOs and WRUAs should be ready for fundraising by making sure that all requisite documents and structures are in place. They should in the next three months set these structures and forward them to WRMA-LVSC as part of the requirements for the proposal.

Based on the above 4th item, three proposals from WRUAs, which includes the CFMOs as their members, were planned to be prepared and submitted for WSTF through WRMA-LVSC within the Year 2008. The preparation and submission will be followed up by WRMA-LVSC for realisation.

Figure 7.8.14 Group Session in Proposal Writing Training

Figure 7.8.15 Plenary Session in Proposal Writing Training

7.9 EVALUATION OF THE PILOT PROJECTS

7.9.1 Methodology

An evaluation of the Pilot Projects was conducted based on the Project Design Matrix (PDM) that was prepared. The indicators set in the PDM can be categorised into either quantitative or qualitative indicators. These indicators can be verified by various means and data can be collected from various sources:

1) Questionnaire survey or interview in the communities;
2) Records kept by the communities;
3) Records and data kept or collected by the Study Team during and after the project implementation[1]; and
4) Evaluation results made by the members of the Forum

After analysing the indicators, an evaluation was made according to five criteria, namely: efficiency, effectiveness, impact, relevance and sustainability.

- Project Efficiency: Assessment of inputs in terms of timing, quantity and quality, and the degree to which inputs have been converted into outputs so far.
- Project Effectiveness: Assessment of achievement of each output, and projection of achievement of the project purpose at the end of project period.
- Project Impact: Identification of recent impacts caused by the project, if any, and projection of future project impacts from the viewpoints of policy, technological, environmental, institutional, management, economic and financial aspects.
- Project Relevance: Assessment of the relevance of the project design, especially the project purpose and overall goal at this point of time.
- Project Sustainability: Projection of project sustainability from the viewpoints of policy, institutional, management, and financial aspects.

[1] Since the commencement of the Pilot Projects, the Study Team has been collecting various data and information to assess the impact of the Pilot Projects on the community's behavior. These data include financial records and records of community participation in the projects.

7.9.2 Result of Evaluation

The results of the evaluation are described in Data Book 5 and are summarised below.

(1) Effectiveness

Although the flood did not occur in April and May 2008, the M&E survey on satisfaction of beneficially carried out in August 2008 and results are summarised below:

Table 7.9.1 Satisfaction on Pilot Projects of Beneficiaries

Item	Odesso	Kokwaro	Kasiru	Kochiewo	Magina
Structure					
- Satisfaction	Fairly satisfied (50%)	Fully satisfied (80%)	Fully satisfied (90%)	Fully satisfied (70%)	Fully satisfied (90%)
- Damage	No	Partially	No	No	Partially
- Users	-	500 per day	150 HH per day	-	Partially
CFMO					
-Organisational Training	Fairly satisfied (80%)	Fully satisfied (80%)	Fully satisfied (100%)	Fully satisfied (80%)	-
-Flood Management Training	Fully satisfied (50%)	Fully satisfied (80%)	Fully satisfied (100%)	Fully satisfied (80%)	-
-Leadership	Good (80%)	Good (90%)	Good (90%)	Good (80%)	-
-Meeting	Good (100%)	Good (40%)	Good (80%)	Good (100%)	-
-Financial Record	Good (100%)	Good (70%)	Good (80%)	Good (100%)	-
-Evacuation Drill	Fully satisfied (80%)	Fully satisfied (80%)	Fully satisfied (50%)	Fully satisfied (50%)	-

Source: Internal M&E Survey Report on Pilot Project, JICA, October 2008

All the river works were completed and no damage was observed up to October 2008, except that the iron mesh and planted trees were stolen in Chil Chila locality. Drilling work at Kasiru was completed as schedule and the number of water users reached around 500 households. On the other hand, building work and the raising of road levels were delayed and completed in October 2008.

Training programmes including organisation, O&M, flood management, and evacuation drills have been completed as scheduled. Out of the four communities that were trained, it was confirmed that CFMOs in Odesso, Kasiru and Kochiewo utilised the skills acquired during their training. On the other hand, in Kokwaro these skills have been poorly used, based on the observation that the account book has not been maintained well and no meeting records have been prepared.

Education programmes were implemented for pupils in Class 4, 5, 6 and 7 of Bwanda Primary School in October and November 2007, as scheduled. According to the interview results, the pupils and teaches were satisfied with the education programme.

(2) Efficiency

JICA Study Team could not return to the project site during January-May 2008 due to security concerns that characterised the pilot sites after the December 2007 elections. Accordingly, all the contracts were terminated and payments were finalised based on the work that had been completed by March 2008. The absence of the JICA Study Team is the major reason for general delays in the Pilot Projects. In addition, the JICA Study Team's office was vandalised during the post-election protests, allegedly by marauding youths, and most of the Study Team's documents were lost.

The final evaluation result on work done in each package by Forum members in October 2008 are summarised below:

Table 7.9.2 Final Evaluation Result on Works in Pilot Project

Contract Package		Good	Fair	Poor	Total
Package 1	Wadich General Contractor (River Structures)	83%	17%	0%	100%
Package 2	Landmark General Work Ltd (Building Works)	25%	75%	0%	100%
Package 3	GADCO (Raised Well)	75%	25%	0%	100%
Package 4	VIRED International	61%	38%	1%	100%
	(Institutional Training)	69%	31%	0%	100%
	(Raised Road & Sing Board)	50%	48%	2%	100%
	(Education Programme)	100%	0%	0%	100%
Package 5	Kenya Red Cross Society (Flood Management Training)	81%	19%	0%	100%
Total		68%	32%	1%	100%

Source: Final evaluation result on Pilot Projects conducted by Forum Member, October 2008

While river structure construction, raised well construction, flood management training, education training, and institutional training indicate relatively high evaluation result, building works, and raised road are relatively low evaluation since the work progress was delayed.

(3) Impacts

WRMA is establishing the WRUA development cycle for water resources management. WRMA can provide more support to the communities through WRUA after completion of the project. During the project implementation stage, WRMA explained to the CFMO about what joining a WRUA entails. As a result, four CFMO have joined WRUA and one is considering joining a WRUA. It is expected that community-driven flood management will be expanded through the WRUA development cycle.

(4) Relevance

Part of the purpose of the project is "To examine community-driven flood management with both mutual and self helps in terms of effectiveness". This might be considered as not being an immediate need of the target communities. However, this part of the project purpose will contribute to future project formulation and result in more communities being benefited.

In contrast, the part of the project purpose "To improve flood management capacity through on-the-job training, including site training and implementation of Pilot Projects" definitely does meet the needs of target communities in the flood prone area, since the priority issue is flooding according to the CAP result. On the other hand, flood management, including riverbank protection, is not such a high priority need of target communities in the middle and upper catchment.

(5) Sustainability

The project sustainability has been strengthened at the community level, in terms of technical and institutional aspects, through various activities for capacity building. According to the final evaluation result made by the forum members as shown below, sustainability of the structure measures are higher than the non-structure measures. The forum member pointed out some questions on future sustainability of financial aspect of CFMOs.

Table 7.9.3 Sustainability of Structural Measures and CFMOs

Community	Item	Fully	Fairly	Poorly	Total
Odesso	Structure Measure	63%	38%	0%	100%
	Organisational Aspect of CFMO	38%	63%	0%	100%
	Financial Aspect of CFMO	38%	50%	13%	100%
	Overall	46%	50%	4%	100%
Kokwaro	Structure Measure	63%	38%	0%	100%
	Organisational Aspect of CFMO	50%	50%	0%	100%
	Financial Aspect of CFMO	50%	50%	0%	100%
	Overall	54%	46%	0%	100%
Kasiru	Structure Measure	75%	25%	0%	100%
	Organisational Aspect of CFMO	38%	63%	0%	100%
	Financial Aspect of CFMO	25%	63%	13%	100%
	Overall	46%	50%	4%	100%
Kochiewo	Structure Measure	63%	38%	0%	100%
	Organisational Aspect of CFMO	50%	50%	0%	100%
	Financial Aspect of CFMO	25%	75%	0%	100%
	Overall	46%	54%	0%	100%
Chilchilla	Structure Measure	75%	25%	0%	100%
	Total	49%	49%	2%	100%

Source: Final evaluation result on pilot projects done by Forum Member, October 2008

The JICA Study Team has no doubt that the fulltime counterparts have sufficient capacity for formulation and management of future community-driven flood management projects. On the other hand, it was observed that involvement of other WRMA staff was not sufficient in the Pilot Projects, since most of these staff have duties and responsibilities that are defined according to performance contracts. In addition, there is no extra staff in WRMA's Water Reform Section. Therefore, the JICA Study Team prepared a Guide for Community-Driven Flood Management in order to document planning and implementation methods for community-driven flood management projects in the future.

7.9.3 Environmental Aspects

Possible negative impacts identified by the IEE and actual situation after the Pilot Project are shown in Tables 7.9.4.

Table 7.9.4 Possible Negative Impacts Identified by the IEE and Actual Situation After the Project

Sub-location/Village	Structural Measures	Possible Impact	Actual Situation
Kasule/Odesso	1. Restoration of damaged riverbank (37 m long).	1. Blockage of access to water for domestic and livestock uses. 2. Impacts on material sources. 3. Blockage of access to river sand.	1. Community keeps access point for water in opposite side of river bank. 2. Except for sand, local material was not utilised. 3. The sand harvester agreed to change the harvest area in downstream of the site. 4. No other issues on environment.
Central Bwanda/Kokwaro	1. Construction of one evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (600 m long).	1. Disturbance along material source and supply routes. 2. Occupational health and safety concerns. 3. Pollution concerns: sanitation, debris, etc. at the construction site. 4. Site disturbance in material borrow areas.	1. The contractor discussed this matter with community before construction. No disturbance has been observed. 2. The contactor managed health and safety during construction. 3. The contactor managed pollution during construction. 4. The contractor discussed this matter with community before construction. And borrow pit fixed near road side and drainage function was also considered. 5. Dissention of some community members arose when the constructed evacuation road led to flooding. Cuttings made by these community members damaged the road. To drain excess water, the cutting place is kept with sandbags (See below). 

Sub-location/Village	Structural Measures	Possible Impact	Actual Situation
Kore/Kasiru	1. Construction of two wells and construction of one storage house in the existing evacuation centre. 2. Raising of local road levels to allow use as an evacuation road leading to the above centre (400 m long).	1. Disturbance along material and equipment transport routes. 2. Pollution from drilling waste and debris. 3. Site disturbance in material borrow areas.	1. The contractor discussed this matter with community before construction. No disturbance has been observed. 2. The contactor managed pollution during construction. 3. The contractor discussed this matter with community before construction. And borrow pit fixed near road side and drainage function was also considered. 4. No other issues on environment.
Magina/Kochiewo	1. Construction of a new dyke (100m long).	1. Site disturbance in material borrow areas. 2. Risk of fire hazards at the Fuel depot 3. Pollution from waste oil. 4. Occupational health and safety concerns. 5. Blocked access to river water.	1. The contractor discussed this matter with community before construction. And borrow pit fixed near river channel. 2. The contactor managed fuel during construction.. 3. The contactor managed oil waste during construction.. 4. The contactor managed health and safely condition during construction 5. The construction was only 100 m. In fact, no complaints from local people have been observed. 6. No other issues on environment.
Chil-Chila	1. Riverbank protection (17 m long) 2. Improvement of existing ramp to low water channel of Namuting River (4m wide)	1. Blocked access to river water 2. Destabilisation of debris in river bed 3. Impacts at material sources	1. The contractor discussed this matter with community before construction. And community agreed to limit the access during construction (one month). 2. No issues on destabilisation have been observed. 3. No issues on materials have been observed. 4. No other issues on environment.

7.10 KEY LESSONS LEARNT FROM THE PILOT PROJECTS

Various lessons were learnt from the project. The major findings are summarised below:

1) Prioritisation of communities based on present and past flood damage.

In the pilot projects, the communities with serious flood damage were selected and, accordingly, all the community action plan indicated a very high need for flood protection and management. As result, community indicated their high satisfaction with the structure measures. It is noted that the awareness on flood will be weak if the flood condition of the community is not so serious. Therefore, the selection of communities should be carefully done using the flood disaster map and the knowledge of local people about present and past flood damage through location or sub-location meetings.

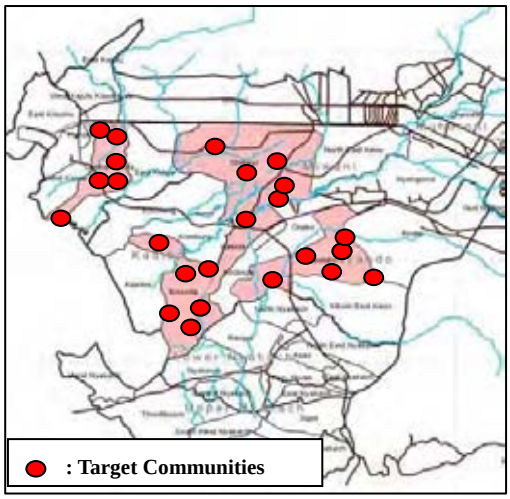


Figure 7.10.1 Image of Selection of Communities

2) Formulation of community driven flood management projects.

The key points for formulation of the projects were: i) priority of CAP should be considered as much as possible; ii) the balance between structural and non-structural measures should be considered; iii) negative impacts on other communities should be avoided; iv) land arrangements, necessary approvals and their costs should be examined; and v) if there is any limitation of funding or components in the project, the reason for non-selection should be given to the communities in order to maintain the sense of project ownership. In general, community expectation is very high compared to proposed structure measures. Therefore, the above process shall be carried out for the community in the planning stage.

3) EIA clearance

Minimal negative impacts on the natural environment will occur since the proposed structural measures will be developed only at the community level. However, if structural measures are included in the project, EIA clearance is required according to applicable law in Kenya. In the EIA survey, the social impact on land, benefit sharing, and equal involvement of the whole community should be carefully assessed. In addition, approval of the drawings on structure measures shall be obtained from authority concerned before commencement of the EIA process.

4) Implementation of the project

The capacity of construction contractors should be carefully checked in the pre-qualification

and tender process. In the tender process, the construction plan should be submitted as a supporting document for the bill of quantities (BOQ) and should be carefully reviewed. In the review of tender documents and negotiations, contractor with little understanding of construction work should be disqualified.

It was generally found that local NGOs have little technical knowledge of construction work, although they do have good skills and knowledge about institutional development at the community level. It is recommended that the structural measures work be done by construction contractors or by local foremen engaged by CBO.

Kenya Red Cross now has good knowledge and experience for the implementation of training programmes for flood management. It is therefore highly recommended new projects coordinate with Kenya Red Cross for implementation of training programmes for flood management.

5) Planning on structure measures for the community-based flood management projects in the future

The followings should be considered in planning on the structural measures for community-based flood management projects in the future.

- ✓ In Kokwaro, the raised road provided more flood between river and the road, even though the drainage channel with culvert was planed and installed with acceptance of the community. The reason was lack of hydrological data for drainage plan. Such a risk should be taken into consideration in construction of raised road, if hydrological data is not available.
- ✓ In Odesso, 27 m length of river bank protection was constructed and only 50% of local people were satisfied with the bank protection, since community needs river bank protection along whole the river side in order to protect their farm lands. Based on this experience, possibility of future extension or priority of river bank protection shall be carefully assessed in the planning stage if the same needs in other areas are observed.

6) Capacity development based on “learning by doing”

In the pilot projects, the CFMOs learned institutional development through the actual activities of CFMO, financial management through operation of funds raised by labour wages, flood management concepts through evacuation drill exercises, and maintenance of structural measures through involvement of labour work. In addition, the structure measures with involvement of community provided good incentive to establish and operate the CFMO and as a result, the CFMO has been strengthened. The concept of “learning by doing” should be emphasised in future community-driven flood management projects.

Dissention of community members at Kokwaro arose when the constructed evacuation road led to flooding. Cuttings made by these community members damaged the road. The community meeting was held and community decided that the cutting place should be kept with sandbags to drain excess water. Therefore, any issues including environmental aspect should be settled through community involvement.

7) Project Sustainability

The community had four tools for feature development, namely, i) CAP as basis, ii) skill for proposal writing, iii) operation fund raised by labour wages, iv) linkage with WRMA and WRUA. Those tools will be utilised for community development in the future including flood management. It is, as result, expected that the operation of CFMO will be organisationally and financially sustained. Before project implementation, needs of future operation of CFMO should be carefully considered and necessary programme should be included as project component.

On the other hand, the sustainability of the structural measures in the pilot project was strengthened through i) O&M training, ii) operation fund raised by labour wages, and iii) involvement of community in the construction works. Those aspects should be considered in the future community-based flood management project.

CHAPTER 8 INSTITUTIONAL STRENGTHENING

8.1 NATIONAL WORKSHOP ON INTEGRATED FLOOD MANAGEMENT FOR NYANDO RIVER BASIN

8.1.1 General Description of the National Workshop

MWI, WMO and JICA collaborated to organise a National Workshop on Integrated Flood Management for Nyando River Basin on the 3rd of August, 2006 at the Hilton Hotel Nairobi.

Figure 8.1.1 National Workshop on 3rd August 2006

The overall objective of the Workshop was to seek a synergetic approach to flood management in the Lake Victoria South Catchment focusing on Nyando River Basin as a target area and to consult with stakeholders and partners on the issue of integrated flood management for the Nyando River Basin to ensure better cooperation and coordination among various stakeholders and development partners.

The participants consisted of the representatives from line-ministries, government parastatals, regional authorities, the private sector and development partners.

In the Workshop, a range of opinions and ideas were exchanged to generate comments that will contribute to the course and direction of the study. The discussion was focused on the opportunities and challenges of development in the basin vis-à-vis the flood risks, enabling community participation in the process, addressing needs and requirements, and proposed actions to overcome the challenges of development.

8.1.2 Key Recommendations as the Results of the Workshop

As the results of the workshop, the following 13 key recommendations were made with the consensus of all participants.

(1) The study should be implemented taking into consideration the issues addressed in the “Strategy for Flood Management for Lake Victoria Basin” prepared under the APFM programme.

(2) The master plan to be prepared should consider the alternatives and trade off / flood storage / flow transfers between Nzoia, Yalla, Nyando, Sondu and Gucha.

(3) The communities in the basin need to be assisted in terms of small income generating projects that are environmentally sound.

(4) It is necessary to promote the concept of nature conservation through presenting specific information to sensitise the communities (e.g. tonnes of soil lost in Nyando basin in the last 3 years).

(5) It is necessary to undertake innovative measures for management of gullies (e.g. fill them with water and instigate fish farming).

(6) A database to be accessed by any interested stakeholder should be established enabling them to undertake flood management activities and establish a coordination mechanism for stakeholder information sharing

(7) It should be ensured that stakeholders are involved at all levels, especially those working on the ground such as NGOs and the private sector.

(8) It is necessary to identify opportunities from the floods that can benefit the communities and improve their participation considering up-down stream activities.

(9) Viable high cost and low cost structural measures should be considered including the infrastructure improvement required for flood management.

(10) Viable community incentives should be identified to improve participation based on poverty alleviation measures, which can reduce overdependence on relief.

(11) The ongoing good flood control pilot project measures should be supported instead of starting new ones or running parallel similar activities

(12) The study should be followed by implementation or demonstration of flood mitigation activities for upstream/downstream communities targeting commercial afforestation and water harvesting for agricultural use.

(13) The new WRMA river quality and riverine protection rules should be promoted and enforced.

8.2 ID/OS WORKSHOP

8.2.1 General Description

The ID/OS Workshop was organised by the JICA Study on 22-24 August 2006 in Kisumu. There were 37 Participants in the Workshop, including the staff of WRMA (25 participants), MWI (4 participants), LVSWSB (2 participants), NWCPC (1 participant), OP-Special Programme (1 participant) and the JICA Study Team (4 participants). The main objectives of the Workshop were to work out in a participatory way:

Figure 8.2.1 Plenary Discussion

(1) An organisational framework for the Integrated Flood Management (IFM) in Nyando River Basin, and

(2) A capacity development plan for the WRMA organisation (so that WRMA is able to effectively and efficiently coordinate the IFM in Nyando River Basin).

Figure 8.2.2 Group Discussion

Regarding the institutional framework of the IFM in Nyando River basin, the participants identified the following as being the major organisations: WRMA (as coordinator), MWI, LVSWSB, NWCPC, Donors, CAACs, Regional Development Authorities, WRUAs, and others. The major opportunities include well-defined mandates by the Water Act 2002 and the number of organisations already present thanks to the water sector reform (especially the Forum and WRUAs), as well as the available data from previous studies on IFM. The major threats were the lack of capacity (both at institutional and community levels), lack of coordination, reluctance to form WRUAs and the community perception of floods as benefits.

8.2.2 Capacity Development Plan

Regarding the capacity development plan for WRMA, the superior target was common for all the groups: “WRMA will be able to effectively and efficiently coordinate the Integrated Flood Management in Nyando River Basin”. Then, each of the 4 groups worked out an independent plan. The major targets of those plans included: strengthening linkages with other collaborating agencies, developing human resources, securing funds, developing and harmonising common approaches to community participation, developing flood forecasting systems and commitment to the WRMA mission. Table 8.2.1 presents the summary of the capacity development plans and possible contributions to the plan through the Study.

Table 8.2.1 Summary of Capacity Development Plans and Possible Contributions through the Study

Group	Target	Results	Activities	Capacity Development Approach Proposed by the Study
Group 1	To establish flood forecasting systems based on the NWRMS	1) Early warning systems, 2) Evacuation systems	1) Develop monitoring network, 2) Develop communication strategy, 3) Capacity building (staffs & communities), 4) Infrastructural development	Technical seminars on early warning or hydrological network systems and on–the-job training for evacuation planning
Group 1	To manage the Nyando catchment by using the clearly defined roles in the water sector	Catchment Management Plan	1) Soil & water conservation, 2) River bank protection, 3) Forestation and re-forestation, 4) Structural measures, 5) capacity building & awareness creation	Technical seminars on Watershed Management Planning covering the entire Nyando River Basin
Group 1	To strengthen the linkage between WRMA, other collaboration agencies, and stakeholders, using good will from Development Partners and other Stakeholders	1) MoUs, 2) MoCs, 3) MoAs, 4) WRUAs	1) Consultative forums, 2) Formulation of roles and responsibilities; documentation, 3) WRUA establishment	Consultative discussions through Nyando River Management Forums addressing the agenda to establish consensus on roles and responsibilities of each stakeholder.
Group 2	To develop WRMA capacity in community participation	Resources effectively utilised for enhanced community involvement and common issues addressed	1) Determine available resources, 2) Prepare work plans procurement, 3) Put in place M&E plan	Counterpart involvement in planning and implementation of pilot projects on community-based flood management
Group 2	To develop human resources	Staff recruited, deployed and trained in community development approaches	1) Identify the required staff, 2) Recruit the staff, 3) Carry out training needs assessment / skills assessment, 4) Training/ capacity building/ training plan	Counterpart involvement in planning and implementation of pilot projects on community-based flood management
Group 2	To harmonise community participation approaches	Community based approaches harmonised by the WRUAs / CAACs	1) Community mobilisation/ formation of groups, 2) Capacity building/ creating awareness/ sensitisation, 3) Drawing up of MoUs with the relevant agencies, e.g. Red Cross	Counterpart involvement in planning and implementation for pilot projects on community-based flood management
Group 3	Commitment to WRMA mission	Achieve IFM goals and objectives	1) Strategic Plan, 2) Business Plan, 3) Capacity building: training (disaster management, preparation of disaster maps, flood forecasting, GIS/ remote sensing) and equipment (computers and software, hydro-meteorological equipment, vehicles)	Technical seminars on flood hazard maps and traditional flood mitigation measures of Japan. On-the-job training on GIS data processing and handling
Group 3	Secure funds	Enhancement of Project implementation plans	1) Budgeting, 2) Develop financial management systems, 3) Expenditures	Counterpart involvement in formulation of the Master Plan, particularly in project formulations including priority projects.
Group 3	Appropriate services delivery mechanism	Adequate services delivered effectively/ efficiently	1) Carry out baseline surveys, 2) Stakeholder awareness & participation, 3) Monitoring and Evaluation; Operation and Maintenance	On-the-job training on socio-economic baseline data collection and organising community workshops under the counterparts' initiatives.

Group	Target	Results	Activities	Capacity Development Approach Proposed by the Study
Group 4	Make the necessary information accessible	Availability of information	1) Improvement of monitoring network, 2) Establishment of database from National, Regional, and Sub-regional levels, 3) Establishment and installation of Internet	On-the-job training on GIS data processing and handling. Technical meetings on the results of the river structure survey.
Group 4	To have skilled and well remunerated staffs	Skilled and motivated manpower	1) Capacity building (training), 2) Establish staff welfare institutions and well defined scheme of work, 3) Organise external exchange programmes between WRMA and development partners	Full-time stationing of counterpart staff in the Study Team Office.
Group 4	To have adequate finance	All the IFM activities and facilities will be achieved	1) Solicit funds from willing development partners, 2) Solicit funds from Exchanger, 3) Funds from relevant government departments	On-the-job training on how to prepare project proposals for funding.

Source: Result of ID/OS Workshop, JICA Study Team

Since the shaded items for the capacity development plan indicate the financing issues of the WRMA, it was difficult for the study to contribute to these items. However, as indicated in the right columns, the study team provided the proposed training and seminars for the un-shaded items during the study period as mentioned in the sub-section 8.5.

8.2.3 Participants' Evaluation of the Workshop

The evaluation questionnaires regarding the ID/OS Workshop revealed that the participants were actively involved (57% judged their degree of involvement as "high" and 35% as "very high"). The participants found that the quality of the results worked out during the Workshop was high (70% said the quality was "high" and 13% said "very high"). Regarding the results of the capacity development plans, 43% of the participants found them "very useful" and 48% "useful". As for the feasibility of the implementation of the plans 35% said the results were "very feasible" and 48% said they were "feasible" for implementation. A total of 57% of the Participants found the ID/OS method useful in general, and 35% will "surely use" the method in the future.

8.3 REGIONAL WORKSHOPS

MWI, WRMA and JICA collaborated to organise a Regional Workshops on Integrated Flood Management for Nyando River Basin on the 9th of October, 2007 and 11th of December 2008 at the Imperial Hotel Kisumu with about 100 participants from various institutions and organisations. The followings are the general outlines of both workshops.

(1) Regional Workshop on 9th October 2007

The overall objective of the workshop was to seek a synergetic approach to flood management in the Nyando river basin and encourage participants to create new idea on realisation of flood management through exchange of experience in Nyando river basin, Nzoia river basin, and Japan. According to the objectives, the workshop was organised by series of presentations as follows:

Figure 8.3.1 Regional Workshop on 9th October 2007

1) Integrated Flood Management in Nyando River Basin comprising of the explanation of the Master Plan, outline and progress of Pilot Projects (JICA Study Team)

2) Western Kenya Community Driven Development and Flood Management (WKCDD/FM) Project in Nzoia Basin (WRMA LVNC/OP)

3) Integrated Flood Management in Japan - Findings of the Kenyans Training in Japan (Major Counterpart of JICA Study Team)

After these presentations, various stakeholders presented their own views. Two projects in LVS and LVN exchanged information on the both activities and sharing of the counterpart experience during the training in Japan gave a strong impression of replication to Kenya. In particular, the workshop provided the first opportunity that the representatives of CBOs that were established under the Pilot Project to participate and present their own circumstances of flood situations to the remaining stakeholders. Generally, those representatives appreciated the assistance in community-based flood management by JICA Study and believed that the projects simulated awareness of the communities toward flood management.

In summary, the discussion was emphasised on the continuity of Nyando River Basin Water Resource Management Forum, importance of environmental consideration for future projects, importance of structure measures including dam, disaster education and capacity building for disaster management.

(2) Regional Workshop on 11th December 2008

Figure 8.3.2 Regional Workshop on 11th December 2008

The overall objective of this third workshop was to widely share and exchange opinions on the study results as well as the emerging issue of global warming and activities of WMO among the participants.

The workshop was also designated to encourage participants to create new idea on realization of flood management through exchange of experiences in Nyando, Nzoia and Tana river basins as well as to seek a way forward for Integrated Flood Management. In line with the objectives, the workshop was organised by series of presentations as follows:

1) Draft Final Report on Integrated Flood Management in Nyando River Basin including Master Plan, Priority Schemes, Results of Pilot Projects (JICA Study Team)
2) Global Warming and Flood (JICA Headquarter)
3) Technical Cooperation and Activities on Integrated Flood Management (WMO) – handout only.
4) Case Study: Flood Situation in Tana Catchment (WRMA-TANA)

In this workshop, the participants' interest went beyond various issues of global warming, flood situation and land management in Tana Catchment, new flood management activity of Kenya Red Cross Society financed by DANIDA, continuity of Nyando River Basin Water Resource Management Forum, additional 24 community-based flood management projects and so on.

During the open discussions, the Study Team made recommendations on a way forward for integrated flood management; a) to keep consistency with Catchment Management Strategy in LVS, b) to establish a coordination committee with other government agencies, c) to prepare an implementation programme of the Master Plan, d) to maintain the Nyando Forum, e) to transfer knowledge to catchments, and f) to update the Master Plan.

In closing remarks, the Study was very much appreciated by WRMA and other participants for provision of various assistances on flood management, fund raising, on-going another study for 24 communities' project.

8.4 PROJECT WORKING GROUP

The Project Working Group (PWG) for the Study was established in May 2006. The following members of the PWG were appointed from WRMA, MWI and NWCPC.

Table 8.4.1 Members of PWG

Name	Organisation	Position in PWG
Mr. P. Oloo (Eng. P. Olum)	WRMA	Chairman
Eng. P. K. Njurumba (replaced with Eng. J. Kinyua later)	WRMA	Secretary
Mr. J.R. Nyaoro	MWI	Member
Eng. Ogalo	MWI	Member
Mr. E. M. Mnyamwezi	WRMA	Member
Eng. S. G. Mbugua	NWCPC	Member

Note: Due to personnel reshuffle within the water sector, the chairman was changed to Eng. Olum, new WRMA CEO since August, 2008.

PWG as counterpart of the team is expected to fulfil the following roles, namely, i) focal point of the study and a facilitator of the study activities, ii) liaison with regional agencies, iii) coordination of community activities, and iv) secretariat of workshops. In fact, the roles to be played in the regional level have been carried out by the regional office of WRMA, while the roles to be played in the central level have been carried out by the PWG.

The following meetings between PWG and the JICA Study Team have been held from August 2006 to December 2008.

Table 8.4.2 Meetings with PWG

Date	Major Topics	Remarks
Aug 2, 2006	✓ Explanation of Draft Inception Report ✓ Explanation of Study Schedule	✓ The PWG introduced the present condition of the Nyando river basin. A serious concern in the upper catchment is soil erosion resulting in heavy siltation in the river channel in the downstream areas. ✓ The water level of Lake Victoria might be another factor to trigger serious flooding in low-lying areas.
Sep 21, 2006	✓ Study Progress ✓ Preliminary Result of Flood Damage Survey ✓ Preliminary Selection of Pilot Project Areas	✓ The PWG appreciated the good progress of the Study. ✓ The regional balance and flood characteristics should be considered in formulating the pilot projects.
Nov 07, 2006	✓ Explanation of Discussions with JICA Tokyo	✓ Dam plans should be considered in the master plan. ✓ The steering committee meeting will be held in the beginning of December.
Dec. 04, 2006	✓ Explanation of Progress Report No.1 ✓ Steering Committee was also held.	✓ PS pointed out the possibility of obtaining Japanese financing for the proposed scheme. ✓ Early warning system introduced in Nyando should be tied-up with the one examined in Nzoia river basin ✓ The issue of raising the national road should be raised with MoPW in order to get them involved. ✓ Watershed management in the master plan should be more detailed in the upper catchment

Date	Major Topics	Remarks
Mar. 05, 2007	✓ Explanation of Pilot Projects	✓ There seems to be a lack of understanding of the Pilot Projects and priority schemes as proposed in the master plan ✓ The Study Team explained procedures for budgeting with JICA and the possibility of changes in the scopes of the Pilot Projects
Jun. 27, 2007	✓ Explanation of Draft Interim Report	✓ The interim report (draft) on the Master plan was basically approved as being the final configuration. ✓ It was agreed that WRMA regional office should become a member of DMC. ✓ MoPW should be invited to the PWG meetings.
Jun. 11, 2008	✓ Resumption of the Study Schedule in FY 2008 ✓ Additional study	✓ The study was resumed from June 2008 since national chaos due to presidential election in December 2007. Then, the resumed study schedule was explained and agreed. ✓ Extension of pilot projects was discussed. Within the study period, community survey for 24 communities will be conduced to formulate community-based structure / non-structure measures.
Aug. 12, 2008	✓ Explanation of Progress Report No. 2. ✓ Progress of formulation of the community driven flood management projects	✓ Involvement of MoPW was emphasised regarding the proposed priority schemes ✓ The M/P and the priority schemes should be in line with CMS by WRMA-LVSC. ✓ Sustainability of the Nyando Forum was emphasised and agreed. ✓ Importance of EIA clearance for the additional projects for 24 communities was recognised.
Nov. 5, 2008	✓ Explanation of draft report on 24 community driven flood management projects	✓ The project targeting at 24 communities for flood management was explained upon a request from GOK for further assistance in Nyando river basin. ✓ The project consists of structure and non-structure measures. ✓ PWG members basically agreed on the contents of the project.
Dec. 8, 2008	✓ Explanation of Draft Final Report and procedure on project for community-based flood disaster management to adapt climate change in Nyando river basin (Outline Design Study)	✓ JICA mission from Tokyo confirmed the schedule for the steering committee, workshop and site inspection with the related officers of MWI and WRMA. ✓ Draft Final Report was presented and discussed. ✓ It was agreed that the comments on the report would be forwarded by 10th Jan. 2009 to JICA Kenya Office. ✓ Inception report was explained for the outline design study.

Source: JICA Study Team

The meetings with PWG contributed to: i) understanding of the study for PWG members, ii) receiving timely inputs from PWG regarding the study direction, and iii) establishment of good coordination with MWI and NWCPC for the study.

8.5 TRAINING PROGRAMME FOR STAFF OF WRMA AND LVSWSB

The various training programmes based on the seminar or trip types were formulated and have been implemented. The objectives of the trainings programme are to: i) develop basic capacity of WRMA staff for flood management, and ii) leant the cases on flood management in other counters. The following training programmes have been organised from August 2006 to October 2008.

Table 8.5.1 Training Programmes for WRMA Regional and LVSWSB Staff

Month	Major Topics	Contents
Nov 2006	Preparation of Flood Disaster Map	✓ Basic concept on the flood disaster map. ✓ Process of Preparing the flood disaster map ✓ Sustainable use of flood disaster map
Jan and Feb 2007	Natural Disaster and Re-construction in Other Countries	✓ Earthquake damage occurred in October 2006 in the northern part of Pakistan ✓ Tsunami disaster occurred in December 2005 in the Banda Aceh, North Sumatra, Indonesia ✓ Volcanic disaster and mudflow due to the eruption of Mt.Pinatubo in Luzon, Philippines
June 2007	Various Structural Measures and Function for Flood Management	✓ Basic concept on flood management (mitigation and preparedness). ✓ Introduction of various structural options and function.
June, 2007	GIS and Database Training for "The Study on Integrated Flood Management for the Nyando River Basin"	✓ Basic concepts of GIS and remote sensing. ✓ Structure of the GIS Database established in the Study. ✓ How to use basic GIS software functions including creating and editing GIS data.
June, 2007	Rivers in Japan and Mitigation Countermeasures against Flood and Riverbank Erosion	✓ Explanation of river features in Japan ✓ Various structural measures for flood and riverbank erosion mitigation as well as various activities against flooding in Japan.
August, 2008	Introductory of Project Cycle Management (PCM)	✓ Concept of the method ✓ How to conduct stakeholder analysis, problem analysis, prepare PDM ✓ Monitoring and evaluation using the PDM
October, 2008	Flood Forecasting and Warning System	✓ Overall flood forecasting and warning system (equipment, organisation, etc)
Feb 2007-October 2008	Pilot Project (OJT basis)	✓ Concept of pilot project ✓ Formulation and outline of pilot projects ✓ Environmental issues to be considered in the pilot project ✓ Progress of pilot project (field visits) ✓ Mid-term and final evaluation of the pilot project

Source: JICA Study Team

In addition to the above training programmes, the counterparts for the study visited Japan in order to observe the flood management done in Japan in May 2007. The training programme in Japan is summarised below.

Table 8.5.2 Outline of Training Programme in Japan

Title:	Community Disaster Management in Japan
Period:	May 13-27, 2007 (15 days)
Trainee:	Dr. Margaret A. Abira (WRMA) Mr. Edward S. Kelengwe(NWCPC) Mr. Willis O. Memo(WRMA) Mr. Peter M. Waithaka (MWI)
Objectives:	✓ To learn traditional structure measure with low cost, community based flood management, administrative structure on flood management, ✓ To utilise above knowledge to develop community based flood management in Kenya, and ✓ To apply intervention method to the communities into the flood management planning in Kenya.

Schedule			
Date		Activity	Staying
2007/5/13	Sun	Leaving Kenya	Airplane
2007/5/14	Mon	Arriving Japan	Tokyo
2007/5/15	Tue	Programme Orientation Lecture by the Researcher of International Centre for Water Hazard and Risk Management	Tokyo
2007/5/16	Wed	Nippon Koei Research & Development Centre National Research Institute for Earth Science and Disaster Prevention (NIED)	Tokyo
2007/5/17	Thu	Lecture about Information Dissemination for Disaster Prevention Arakawa River Lower Reach Work Office	Tokyo
2007/5/18	Fri	Miyagase Dam	Tokyo
2007/5/19	Sat	Tokyo St.-Shin Fuji St.	Fuji
2007/5/20	Sun	Participating in Fujikawa River Flood Fighting Drill	Koufu
2007/5/21	Mon	Shingen Tsutsumi	Tokyo
2007/5/22	Tue	Kiso Sansen Ring Levee and traditional flood management facilities	Nagoya
2007/5/23	Wed	Lake Biwa Canal and facilities	Osaka
2007/5/24	Thu	Honganji Canal	Tokyo
2007/5/25	Fri	Evaluation Meeting	Tokyo
2007/5/26	Sat	Leaving Japan	Airplane
2007/5/27	Sun	Arriving Kenya	

Source: JICA Study Team

8.6 NYANDO RIVER BASIN WATER RESOURCE MANAGEMENT FORUM

In the meeting for the Study between MWI, WRMA and JICA on the 21st of October 2005, the necessity of a Nyando River Basin Water Resources Management Forum was discussed. MWI and WRMA finally agreed to formally establish the Forum. The Forum was thus officially established on the 18th of August 2006 after the consultative meeting of the 4th of August 2006.

Figure 8.6.1 Forum Meeting on 9th September 2006

It is expected that the Forum will develop its capacity and function through the Study, since the Forum is the new vision for water management in the basin. The objectives of the forum are to i) monitor and deliberate the progress and out-puts of the Study, ii) prepare recommendations for WRMA on issues concerning flood management, iii) establish linkage between communities and WRMA for the purpose of the Study, and iv) propose post-study activities for the Forum including soliciting for funds from potential donors.

The Forum is composed of 34 members drawn from various fields that are concerned with the Nyando river basin. The membership includes Government institutions, Parastatals, NGOs,

Private Organisations, and CBOs, which are locally based in the Nyando river basin or are involved in water management in the Nyando river basin. In addition to these members, the JICA Study Team will be a special member of the Forum during their assignment period. The membership shall not exceed 35 members unless and until that number is changed by the members. The list of members is shown in Table 8.6.1.

Table 8.6.1 Members of the Forum

Kind of Organisation	Members	Remarks
Government Institutions	7	Ministry of Agriculture, Ministry of Education, Ministry of Environment and Natural Resources, and local Governments,
Parastatals	4	LVSWSB, KARI, LBDA, WRMA
NGOs	11	NGOs related to disaster management, rural development etc.
CBOs	7	4 CBOs in the lower catchment and 3 CBOS in the upper catchment
Private Companies	3	Tea, sugar and agro-chemical companies.
Others	2	University and opinion leaders

Source: JICA Study Team

One chairperson and one vice-chairperson were elected by the forum members in September 2006. WRMA-LVSC serves as the secretary of the forum. WRMA is responsible for operations including the calling of meetings in consultation with the Chairperson and performing other related duties to ensure the effective operation of the Forum. In addition, the JICA Study Team provided technical support with WRMA during the meetings. The following meetings of the Forum were held from August 2006 to November 2008.

Table 8.6.2 Forum Meetings

Date	Major Topics	Remarks
Aug 4, 2006	✓ Needs of the forum ✓ Preliminary selection of forum members	✓ It was agreed to formulate the forum for Nyando River Basin Water Resources Management Forum. ✓ The members of the forum were preliminarily selected. Involvement of females and balance between upper and lower catchments should be carefully considered.
Aug 18, 2006	✓ Background and outline of the Study ✓ Draft operation guidelines for the Forum	✓ A Provincial Commissioner noted that the GOK will offer full support and that his office in particular was open for the study team anytime they needed administrative assistance. He officially declared the Forum opened. ✓ The objectives, members, and operation of the forum have been discussed. Various comments were expressed and reflected for finalising the operation guidelines.
Sep 9, 2006	✓ Draft operation guidelines for the Forum ✓ Election of chair person ✓ Selection criteria for priority areas for the Integrated Flood Management	✓ Dr Okeyo Owuor (Director of VIRED) was elected as the chairperson and Mr Aloo Ogeka (opinion leader) was elected as vice- chairperson. ✓ Preliminary selection of priority areas was explained and various comments were expressed. In addition, members requested to formulate one pilot project in the upper catchment area.
Nov 16&17, 2006	✓ Present condition of upper catchment ✓ Institutional aspect of watershed management	✓ Coordination amongst organisations concerned will be required for protection of the upper catchment in the future. ✓ Soil erosion level is not very high in Nyado upper catchment. However, protection of gullies in some sub-catchments will be required in the future

Date	Major Topics	Remarks
Nov 30, 2006	✓ Draft Master Plan	✓ The draft master plan was accepted by the members of the Forum. ✓ After the study, the master plan should be revised by WRMA through a capacity development programme to be created during the study.
Mar. 01, 2007	✓ Findings of Community Survey ✓ Draft Plan for Pilot Projects ✓ Environmental Considerations for the Pilot Projects	✓ The forum member should be involved in the evaluation of pilot projects. ✓ The scale of the pilot projects should be re-considered if possible. WRMA explained that the pilot projects represent the first step and the efforts of the pilot projects will be expanded after successful implementation of the pilot projects.
Jun. 29, 2007	✓ Interim Results of the IFM Study in Nyando River Basin ✓ IFM in Japan	✓ The final master plan was accepted by the Forum members. ✓ The forum understood the importance of WRUA in expanding the efforts of the pilot projects. WRMA will arrange another meeting for explanation of WRUA for the forum.
Oct. 31, 2007	✓ Explanation of WRUA ✓ Discussion on Mid-term evaluation of Pilot Projects by Forum Members	✓ WRMA explained the expected benefit being a member of WRUA and process to being a member. Explanation aimed at the WRUA and CBO representatives in the Forum to enhance mutual collaborations. ✓ Forum members were selected as representatives for site reconnaissance at Pilot Project sites. Total 10 members from NGO, government, parastatal and WRUA were selected in addition to 4 members from WRMA.
Jun. 25, 2008	✓ Study Schedule ✓ Progress of Pilot Project ✓ Mid-Term Evaluation ✓ New Community-Driven Flood Management Project for 24 Communities	✓ JICA Study Team explained time-frame work of the study in 2008 and the progress of five pilot projects. ✓ Forum member reported the result of the first mid term evaluation for the pilot project. It was agreed that same members would implement the 2nd mid term evaluation in 8th-10th July. ✓ JICA Study Team explained new community-driven flood management project for 24 communities. The concept of the project were discussed and agreed.
Sep. 19, 2008	✓ The results of Mid-Term Evaluation of Pilot Project ✓ Final Evaluation of the Pilot Project ✓ The results of Community Survey	✓ The Pilot Projects were recognised to be effective for the community in flood management by the Forum members ✓ The issue was raised whether community should participate in contractual matters for the pilot project. ✓ Members were selected for the Final Evaluation and method of evaluation and points to be looked into were discussed.
Nov. 3, 2008	✓ The results of the final evaluation for Pilot Projects ✓ The 24 community-driven flood management projects ✓ Discussion on the continuity and sustainability of the forum	✓ It was recognised that Pilot Projects were basically effective and useful for the target communities. More community involvement was recommended particularly at the implementation stage. ✓ Preliminary designs for the 24 community-driven flood management projects were presented. Capacity of storage and evacuation centre was confirmed by the members. The future schedule for the projects was explained including EIA clearance procedure. ✓ Continuity of the forum was discussed and agreed to voluntarily hold another meeting to discuss WRUA registration and future coordination of the forum

Source: JICA Study Team

Generally, the Forum always provided a good opportunity to regularly share stakeholders' opinions on flood management and JICA Study. As lessons learnt from the series of the Forum

meetings, the following observation can be made as presented in Table 8.6.3.

Table 8.6.3 Lessons learnt from the Forum Meetings

Goodness of the Forum	Potential Risk of the Forum
- The Forum contributed for consensus building among various stakeholders for various issues such as selection of priority communities in the Master Plan, selection of the target communities for the Pilot Projects. - Degree of transparency of the Study activities was increased by the Forum. - WRMA and WRUA have been publicised in the Nyanza area through the Forum.	- The Forum could potentially become a place for political campaign. It will be necessary to keep paying particular attention. - The largest issue is continuity / sustainability of the Forum after the end of this Study. Major concern is a budgetary issue whether WRMA will be able to keep supporting the Forum through tying up with WRUA.

Source: JICA Study Team

8.7 INVOLVEMENT OF WRMA IN DISASTER MANAGEMENT COMMITTEE

8.7.1 Introduction

There has been strong concern about the membership of WRMA in Disaster Management Committee (DMC) at regional level as noted in Chapter 3. It has been understood that WRMA will be potentially able to shed a light on flood forecasting and community mobilisation in disaster management. The Steering Committee on 2nd July 2007 made several resolutions, out of which importance in this regard states that:

"WRMA Lake Victoria South Regional Office should be a member of disaster management committee at provincial and district level to take the initiative of the integrated flood management in the Nyando Basin"

In fulfilling this resolution, a consultation between WRMA Lake Victoria South Catchment and DMC at provincial and district level was held in the board room of LVSWSB on October 16th, 2008 with the following objectives and participants shown in Table 8.7.1.

1) Give a brief overview of the Study on Integrated Flood Management (IFM) currently going on for Nyando River Basin by WRMA/JICA Study Team

2) Share experiences on the disaster management structures with emphasis on flood within Nyando River Basin

3) Develop a common joint action for engaging sectoral participation and involvement of WRMA-LVSC within the DMC

Table 8.7.1 List of Participants for the Consultation Meeting with DMC

Organisation	No.	Name of Participant	Position /Title
Kisumu Town	1.	Samuel Okello	City Mayor Kisumu
	2.	Elizabeth Oduor	MCK Administrative Officer rep. Town Clerk
Nyanza Province	3.	Nicholas Kujuba	Representative of Provincial Commissioner
Kisumu District	4.	John Cheruiyot	Senior District Officer, Kisumu East
	5.	Margaret Ouma	District Development Officer Kisumu East
Nyando District	6.	Philemon Agulo	District Development Officer Nyando
LVSWSB	7.	Eng. P.A Ogut	Technical Manager
WRMA-LVSC	8.	Dr. Margaret Abira	Regional Manager
	9.	Samuel Gor	Sub-Regional Manager
	10.	Willis O Memo	Project Officer IFM / Counterpart Staff of the Study Team
	11.	Charles Okaka	Senior Superintendent Water Officer
	12.	Julius K Marepu	Catchment Management Officer
	13.	Arshel M. Ogembo	Stakeholders Relations Officer
	14.	Herman Kiruayi	Environment Officer
	15.	Petrlis Opango	Water Quality Officer

Source: JICA Study Team

In the consultation meeting, the following major contents were discussed.

1) Overview of the Study presented by JICA Study Team,

2) Structure and role of DMC presented by the representative of Provincial Administration

3) Mandate and role of WRMA in Flood Management presented by Regional Manager, WRMA-LVSC, and

4) Joint action in flood disaster management in the region.

8.7.2 Raised Key Issues

Overall, the participants such as representative of the province and districts recognise the importance of preventive strategies against flood disaster rather than response oriented approach, which is currently undertaken by the DMC. In the meeting, membership of WRMA was approved by all participants and the followings were the major issues raised by the participants.

Figure 8.7.1 Consultation Meeting between DMC and WRMA

1) It was understood that the key mandates of WRMA are water resource regulation and stakeholders' involvement in water management through WRUA development.

2) Mandate of WRMA has little on rescue oriented activities but can assist in providing useful data and linking up with other stakeholders on ground.

3) Importance of information flow was recognised for disaster preventive measure,

where the district information officer facilitates linking up with the local radio station for disseminating.

4) The roles of the DMC including identification of disaster and available resources, prompt response to disaster, and development of a disaster plan were understood, while there is a need for capacity building and equipment procured for the DMC.

5) Water sector organisations including WRMA have catchment basis approach, which can cut across the administration boundaries that DMC members follow.

6) It is important to note that WRMA can assist community capacity building through implementing flood management trainings during non-flood period and there is a need for reconstruction and mitigation in the post flood period. The main challenge is recognised as funds for flood mitigation and management.

7) It was also recognised that the challenge is to establish a direct linkage between the communities and DMC, and fast means of information dissemination for more effective actions against flood disaster prevention.

8.7.3 Resolutions of the Meeting

As joint actions for way forward on the disaster management in the region, it was recommended that there is a need for a timeline pegged on both the plan and the action and indicate who is going to be the lead agency in pursuing and undertaking the action. For the first step with involvement of WRMA in the DMC, the followings are resolved as outcomes of the meeting.

Table 8.7.2 Resolutions of the Meeting between WRMA and DMC

No.	Resolution Items	Contents
(1)	Incorporation of WRMA to the provincial and district DMCs	At provincial level WRMA had already received an approval and official letter was going to be issued to WRMA in the fourth week of October. District DMC are set to approve the incorporation of WRMA and issue a letter of approval in the fourth week of October.
(2)	Capacity building of DMC and linking them with WRUA	It was recommended that WRMA alongside other stakeholders to come up with a plan which then will be pegged with a timeline.
(3)	Linkages on dissemination and flow of information	It was agreed that this item will be tackled with item (2) above.
(4)	Compliance and compound of disaster plan	It was agreed that for the purposes of specific disaster that is being tackled the term disaster plan should be narrowed to Flood Disaster Management Plan. It was agreed that relevant plans are already available and what was needed was that based on relevant sub-catchment plan that correlates with the target district be sliced and applied to that target district plan.
(5)	Need for political goodwill for the success of the Master Plan of the JICA Study	It was agreed that the Master Plan handed to the committee and relevant measures will be discussed at different forums for funding their implementation.

Source: Minutes of Meeting for Stakeholders Consultation on Flood Disaster Management within Nyando River Basin, October 2008.

8.8 GIS DATABASE

8.8.1 Outline of GIS Database

In this study, two distinct types of surveys were completed, first, a survey for the compilation of a general map for the region which included the geographic extent of the Nyando and Nyamasaria river basins and second, surveys for the compilation of detailed maps for the regions affected by flood. All survey data were obtained, stocked and managed using a Geographic information system (GIS).

The overall objective of the mapping work was to prepare GIS-based digital maps and data to support this project. In order to implement the investigations of flood conditions, the topographical data are indispensable. The topographical maps for the study area are on a scale of 1:50,000 and were made based on 1970s aerial photos.

The mapping areas, mapping items and basic information of this study database are shown below.

The study area comprises two distinct mapping regions:

(1) The Nyando and Nyamasaria river basins -A general mapping region-

A general mapping region, which is nominally defined as the geographic extent of the Nyando and Nyamasaria river basins that are within Nyanza Province in Kenya. This study area covers an area of approximately 4,500 km^2.

The mapping scale for the Nyando and Nyamasaria river basins is one to fifty thousand (1:50,000).

(2) The flood damage survey region -A detailed mapping region-

A detailed mapping region, which is defined as the area affected by the floods is located in the east of the Nyando and Nyamasaria river basins. The total area of this study region to be mapped is approximately 620 km^2.

The mapping scale for the detailed mapping region is one to ten thousand (1:10,000).

Table 8.8.1 shows the GIS database outline of this study and Figure 8.8.1 shows the functions of GIS for this study.

Table 8.8.1 Outline of GIS Database

Item	General Mapping Region Mapping Scale 1:50,000	Flood Damage Survey Region Mapping Scale 1:10,000
Coverage area	4,485 km^2	620 km^2
Map scale	1:50,000	1:10,000
Satellite images	ASTER, LandsatTM	QuickBird
GIS data from satellite image analyses	20 meter interval contour lines, NDVI	Roads, Rivers
Other information	Existing topographical maps（1:50,000）, Administrative boundary maps, Existing flood damage survey results, and Existing topographical survey results	Flood damage survey results
GIS data from other information	Administrative boundaries, Roads, Rivers, Railways, and Spot elevations	Property boundaries, Roads, Rivers, Lakes, Houses, and Architectural structures

Source: JICA Study Team

Functions of GIS

○ Data base function

GIS can create geographical data,
Line, Point and Polygon data (vector data)
with attribute table data.

○ Data analysis function

GIS can do analysis and calculations.
Ex) overly analysis, network analysis, etc.

○ Presentation function

GIS can be integrated various presentation.

Source: JICA Study Team

Figure 8.8.1 Functions of GIS for This Study

8.8.2 Data Sources

This section shows the data sources for the two distinct mapping regions. This study has used the existing analogue maps and existing survey results for the mapping works. These existing data in different formats were collected, digitised, compiled and had attribute data added for GIS data. This study also used satellite imagery to update the existing analogue maps. Tables 8.8.2 and 8.8.3 show the satellite image lists and Figure 8.8.2 shows a sample satellite image used by this study.

Table 8.8.2 List of ASTER Satellite Imagery

Data ID	Date	Image Format
PRDAT011.DAT	14 February 2004	EOS HDF
PRDAT012.DAT	10 July 2005	EOS HDF
PRDAT021.DAT	9 April 2003	EOS HDF
PRDAT031.DAT	9 April 2003	EOS HDF

Source: JICA Study Team

Table 8.8.3 List of QuickBird Satellite Imagers

Data ID	Date	Image Format
S2AS_R1C1, R1C2, R2C1, R2C2	29 January. 2003	GeoTiff Image
S2AS_R1C1, R1C2, R1C3, R1C4, R2C1, R2C2, R2C3, R2C4, R3C1, R3C2, R4C1, R4C2, R5C1, R5C2, R6C1	4 June. 2004	GeoTiff Image
S2AS_R1C1, R1C2, R1C3, R1C4, R2C1, R2C2, R2C3, R2C4, R3C1, R3C2, R4C1, R4C2, R5C1, R5C2, R6C1	3 January. 2005	GeoTiff Image

Source: JICA Study Team

Sample Area -AHERO Town-

ASTER Satellite Image
15 m resolution

QuickBird Satellite Image
0.6 m resolution

Source: JICA Study Team

Figure 8.8.2 Sample Satellite Image

8.8.3 Coordinate Reference System

The coordinate reference system used for the mapping and GIS database is the World standard coordinate reference system "Universal Transverse Mercator (UTM)". The details of the coordinate reference system are shown below.

Table 8.8.4 Coordinate Reference System

Parameters	Value/Reference
Projection	Universal Transverse Mercator (UTM)
Zone	Zone 36 South
Spheroid	Everest 1830 (1937 Adjustment) Semi Major Axis: 63777276.345 meters Inverse Flattening: 300.8017
Central Meridian	33.000000
False Coordinates at origin	False Easting: 500000.000000 False Northing: 10000000.000000
Scale Factor	0.9996000

Source: JICA Study Team

8.8.4 GIS Data Format

The database made in this study consists of two different types of data, the raster data set and the vector data set. The raster data set is the image data set including the satellite imagery and analogue maps, and the vector data set is the GIS data that includes the point data, the line data, and the polygon data. The data formats used for raster datasets and images are "Geo-TIFF" format along with projection world file. The data formats used for GIS datasets are ESRI's "shape" format for all the vector datasets with associated projection and metadata files. The data formats used in this study are as follows.

Table 8.8.5 Data Format

Data Type	Data Format
Raster Data Set	GEO-TIFF Format with Projection World File
Vector Data Set	Shape Format with Projection file, associated attribute table and metadata file

Source: JICA Study Team

8.9 OUTLINE OF MANUAL FOR CAPACITY DEVELOPMENT

8.9.1 General

The pilot projects aimed at establishment of a community approach to flood management in the Study area. The pilot projects include the components of not only structural measures (e.g., river bank protection works and construction of evacuation roads), but also non-structural measures, (e.g., community flood hazard mapping, establishment of community based organisation, various activities based on a disaster cycle).

Based on the experience in the pilot projects, the manuals were prepared in order to manage and supervise the community-driven flood management by WRMA and related stakeholders in future. These manuals are organised into nine sections covering the following contents.

Table 8.9.1 List of Integrated Flood Management Manuals

No.	Section	Manual Name	Contents
1	Community flood hazard mapping	How to conduct Community Flood Hazard Mapping (for the purpose of capacity development of WRMA)	Procedure of community flood hazard mapping by Participatory Rural Appraisal (PRA) method.
2	Community flood management organisation	How to establish community-driven flood management organisation (CFMO)	Necessity of establishment of community-driven flood management organisation (CFMO) and how to organise the community people in line with the experience throughout the Study.
3	Community flood management	How to develop community flood management manual	Community driven flood management organisation for each CFMO to cope with flood management along with flood management cycle.
4	Community-driven structure measures	How to design community-driven structural measures	Basic knowledge for providing the community-driven structural measures as a part of integrated flood management.
5	Operation and maintenance of community-driven structure measure	How to conduct operation and maintenance (O&M) for community-driven structural measures	Basic knowledge for operation and maintenance (O&M) for the community-driven structural measures as a part of integrated flood management.
6	Evacuation drill	How to execute community-driven evacuation drill	Procedure of periodic evacuation drill as one of the major task in capacity building for flood vulnerable communities.
7	Education of disaster management	How to conduct disaster management education	Teachers' training manual and disaster management education textbook for students.
8	Flood disaster map	How to update flood disaster map	Basic knowledge of how to create flood disaster map and update the existing flood disaster map.
9	GIS Database	How to utilise Geographic Information System (GIS)	Effective use of Geographic Information System (GIS) for integrated flood management.

8.9.2 Community Flood Hazard Mapping

This manual shows the process of creating the community flood hazard map. The community map will support communities to aware of their potentials and resource endowments in a graphic spatial context for the efficient management of their own development process. It has the potential of creating an endogenous force that supports economic development and gives the communities a special dynamic quality and ownership of the development processes. In this process, communities use the locally available resources.

The community mapping process introduced in this manual is aimed at achieving the followings;

1. Transmitting and communicating desired information about the flood situation as perceived by the communities quickly, clearly and in a most effective way
2. Providing required information on the nature and distribution of flood hazard areas along with other variables of interest in the areas of operation
3. The provision of graphic insights into significant relation ships, e.g. between the flood hazard prone areas and evacuation centres and other existing health facilities.

In order to achieve the above objectives, a community participatory procedure is necessary. In this manual shows the detailed steps of the community mapping exercise in the pilot project communities.

Table 8.9.2 Outline of Community Flood Hazard Mapping

- Objectives	- To create Community Mapping with PRA (Participatory Rural Appraisal). - To clarify the overall procedure for creating a flood disaster map, - To update the map from time to time, - To facilitate WRMA in organising community to prepare flood hazard map
- Target User	- Community-based flood management organisations and residents of four Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages - WRMA Regional Office and other pertinent bodies staffs
- Target Area	- Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages
- Chapters	1. Introduction 2. Case Study: Kochogo Sub-location, Nyando District 1) Introduction and Familiarisation with participants 2) The making of a base map for community hazard mapping 3. Output 1) Assessment of Flood Hazards 2) Community Flood hazard Map at different locations

Source: JICA Study Team

8.9.3 Community-Driven Flood Management Organisation

This manual shows the process of formation of Community Based Organisations (CBOs), especially for Community-driven Flood Management Organisation (CFMO).

Community institutions are important to plan, implement and monitor different activities relating to flood disaster and minimise the impacts of flood on the community. Community development will start with the component of mobilisation of communities, to strengthen the organisational bases for local flood mitigation initiatives. The awareness-raising and capacity development of communities themselves is necessarily to be focused on.

Prior to the formation of CFMO, required information such as importance of community institutions, role and responsibilities of CFMO, formation process and involvement of the community, woman, affected groups, etc. should be disseminated to the concerned officials of sub-location and representatives from government agencies, local leaders, teachers and the community. It is also necessary to organise meetings and dialogue with communities regarding the formation of the CFMO.

This manual is organised into four parts, main text, Appendix I, II and III. The format of draft constitution of CFMO is provided in Appendix I and the proposed organisation chart is in Appendix II. Appendix III shows the manual for fund-raising which is very important for CFMO how to raise the fund for their community-driven flood managing activities, especially seeking for the local sources of funds.

Table 8.9.3 Outline of Community-driven Flood Management Organisation Manual

- Objectives	- To facilitate community in preparation of the constitution of CFMO - To facilitate community in establishing CFMO - To facilitate CFMO for fundraising for its sustainable activities
- Target User	- Community-driven Flood Management Organisation (CFMO) - WRMA Regional Office and other pertinent bodies staffs
- Target Area	- Nyando river basin wide
- Chapters	1. Main text 2. Appendix I; The constitution of Kogwedhi community self help group 3. Appendix II; Kogwedhi Community Self Help Organisation 4. Appendix III; Fundraising manual for Community Flood Management Organisations (CFMOs) 1) Introduction 2) Chapter 1: Preparing your need statement 3) Chapter 2: Defining clear goals and objectives 4) Chapter 3: Developing methods 5) Chapter 4: Preparing the evaluation component 6) Chapter 5: Preparing a programme budget

Source: JICA Study Team

8.9.4 Community Flood Management

The purpose of this manual is to outline the process and procedure to be followed and activities to be carried out by target pilot project community areas, Kogwedhi area, Kasiru village, Kokwaro village and Odesso village, working together and effectively prepare for floods, minimise damage of floods, respond to floods and how to recover from the impact of flood hazard.

The manual is designed to enable these communities to plan and manage themselves in protecting against flood disaster according to the flood management cycle: Preparedness, Response, and Recovery stages. Moreover, it will be aimed at outlining the procedures to be followed and activities to be undertaken by the communities to cooperatively and effectively prepare for, mitigate against, respond to and recover from the impact of the flood hazards.

This manual shows the outlines of the activities that are to be undertaken at the different stages of the flood disaster cycle, preparation of mitigation plan, early warning, evacuation plan and rehabilitation and reconstruction plan and evacuation drill.

Table 8.9.4 Outline of Community Flood Management Manual

- Objectives	- To enhance the capacity of four Pilot Project communities in tackling and managing the perennial floods. This manual shows the outline of the process and procedure to be followed and activities to be carried out by residents, working together and effectively prepare for floods, minimise damage of floods, respond to floods, and how to recover from the impact of flood hazard.
- Target User	- Community-based flood management organisations and residents of four Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages - Community Self Help Group - Disaster Management Committee - Administrative officials - Primary School, Church and NGOs in this target area
- Target Area	- Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages
- Chapters	Flood management Manual for each four villages; Odesso, Kasiru, Kokwaro, and Kochiewo villages 1. Pre-Plan stage 2. Planning Phase 1) Preparation of mitigation plan 2) Early Warning 3) Evacuation Plan 4) Medical Referral System 5) Rehabilitation and Reconstruction plan 6) Evacuation Drill

Source: JICA Study Team

8.9.5 Community-Driven Structure Measure

The lower reach of the Nyando River has been unfortunately suffering from the frequent flood damages with casualty in the rainy season almost every year. In the master plan on water resources development in the Nyando river basin, it is mainly proposed large structural measures including dams and dykes. However, the most of structural measures have not been constructed in place since the government can not arrange such huge investment immediately.

Under such circumstance, there are the needs for the implementation of low cost structural measures in the number of communities. The implementation of the pilot projects were carried out taking into consideration the community-driven and/or participatory approach by setting up the CFMO in view of disseminating experience and performance of the target communities. It is expected that small scale and low cost project will be implemented in the collaboration with WRMA and CFMO. In this regard, this manual was prepared for the reference of WRMA for further implementation of such kinds of projects, so that those projects carry out by user's own responsibility in as many communities as possible.

In order to increase the sustainability of the structural measures built to protect against flooding, the small scale structural measures should be built using community initiative and involvement. Involvement of communities in the construction works and also involvement of their knowledge is useful since they will manage and maintenance those structures as their own property.

Table 8.9.5 Outline of Community-driven Structure Measure Manual

- Objectives	- To clarify overall procedures for project implementation, - To formulate the target projects surely and effectively, - To carry out the tendering and construction works on time and within allotted budget and to carry out the essential O&M activities surely and effectively, - To facilitate the communities to maintain the constructed facilities in a sustainable condition
- Target User	- WRMA staff and representatives of CFMOs
- Target Area	- Nyando river basin wide
- Chapters	1. Introduction Background and objectives of this manual. 2. Applicable Measures and Implementation Procedure Options for applicable small scale structural measures under community initiative and involvement, and overall procedure for the project implementation cycle. 3. Planning and Formulation of Structural measures Points kept in mind for formulation of the projects and standard dimensions of the structures and sample drawings 4. Construction management Overall procedures at the construction management stage and points kept in mind for construction supervision 5. Operation and Maintenance Maintenance activity cycle on the community basis and key points in mind in each period, ordinary time, pre-flooding, during g flooding, and post-flooding

Source: JICA Study Team

8.9.6 Operation and Maintenance of Community-Driven Structural Measures

This manual addresses operation and maintenance activities required in some of structural components of the pilot projects. This manual has been prepared for members of the Community Flood Management Organisations (CFMOs), which were established within the framework of the pilot projects, and village people in the communities. It aims at providing CFMOs and village people guidance on how to operate and maintenance (O&M) structural measures in a sustainable manner. Once structural measures constructed, they are required O&M activities in order to work properly in the right time. In general, O&M activities should be carried out by Government. However, the limited resources of Government make it difficult to monitor all of the structural measures. Therefore, it is important that communities take their initiatives to O&M activities for structural measures, at the same time, this manual aimed at capacity building of CFMO and communities of O&M activities for structural measures.

In this manual mentioned the structural measures such as 1) river bank protection works adopting gabion mattresses in Odesso village and Chil Chila location, 2) dykes in Magina sub-location, and 3) evacuation roads in Kokwaro village and Kasiru village.

Table 8.9.6 Outline of Operation and Maintenance of Community-driven Structural Measure Manual

- Objectives	- To provide CFMOs and village people guidance on how to operate and maintain structural measures in a sustainable manner. - To be clarified necessary items for operation and maintenance, - To be formulated the rules or regulations of operation and maintenance, and - To operate and maintenance the constructed evacuation facilities by community members in a sustainable condition.
- Target User	- CFMOs (Community Flood Management Organisations) - Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages
- Target Area	- Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages - Other communities in Nyando river basin
- Chapters	1. Introduction 2. About Operation and maintenance activities The general guidance of procedures of activities, roles of communities, responsibilities, and issues. 3. About Operation and maintenance activities The monitoring timing and risk management cycle of pre, during and post flood situations. 4. Monitoring To compile the result of the monitoring and prepare assessment reports, which prioritise a set of issues that are identified through the monitoring processes. 5. Assessment and evaluation To carry out maintenance activities to prepare and recovery activities of flood. 6. Maintenance and recovery The importance of incorporating lessons learned in to future activities to further improve activities initiated by communities. 7. Further improvement of the activities

Source: JICA Study Team

8.9.7 Evacuation Drill

It has been recognised that structural measures are not perfectly to be able to prevent flood holistically, therefore non-structural measures are also applied as important part of the flood management. Therefore, the pilot projects in this study addressed not only structural measures but also non-structural measures, e.g., community flood hazard mapping, establishment of community based flood management organisation, various activity involving communities and stakeholders. This manual addressed on the one of the non-structure measure, evacuation drill which helps communities envisage the different stages of flood disaster cycle, preparation, mitigation plan, early warning, and evacuation plan of flood through activities.

This manual shows that the evacuation is an important part of saving lives and minimises property damage from the flood. And more, it shows the detailed steps of evacuation, 1) how to evacuate, 2) what is to be done while at the evacuation centre, 3) how to deal with the injured and the sick during evacuation, 4) dissemination of information to Government and organisations, and 5) management of the evacuation centre. It can be said that to put an evacuation system is to be able to early warnings of flood for communities to evacuate.

Table 8.9.7 Outline of Evacuation Drill Manual

- Objectives	- To assist community-driven evacuation drill to show the detailed procedure steps. - This manual envisages evacuation as an important aspect in saving lives and minimise property damage and more so put a system in place that enable early warnings for communities to evacuate, how to evacuate, what is to be done while at the evacuation centre, how to deal with the injured and the sick during evacuation, dissemination of information to government and humanitarian organisation and the management of evacuation centre.
- Target User	- CFMOs (Community Flood Management Organisations) - Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages
- Target Area	- Pilot Project communities; Odesso, Kasiru, Kokwaro, and Kochiewo villages - Other communities in Nyando river basin
- Chapters	1. Preparatory stage 2. Execution of evacuation drill 1) Commencement of Drill 2) Checking River Water Level 3) Dissemination of Information to Community 4) Dissemination of Information for External Assistance 5) Settling of Evacuation Centre 6) First Aid Demonstration 7) Questionnaire survey 8) Wrap up meeting 3. Appendix; Communication Flowchart before, during and after flood

Source: JICA Study Team

8.9.8 Education of Disaster Management

This manual is arranged in modules and units that are aimed at achieving specific objectives as outlined, all of which prepare for teachers, education officials and other trainers for flood management and disaster prevention through practical approaches and programmes. The contents and tasks are specifically designed to equip trainees with appropriate knowledge awareness, skills, values and attitudes that will enable them to educate for the disaster management and prevention.

This manual consists of eight modules and one attachment, primary school textbook. Each module and contents of school textbook is shown as below.

- Module1: Introduction to disaster management; define disaster, describe disaster classification and explain phases of disaster and preparedness measures appropriate for each phase.
- Module2: Flood disaster management; explain the causes of floods, describe the factors intensify effects of floods, the impact of floods on human, develop flood prevention and preparedness measures and flood response activities
- Module3: Causes of floods; Draw a sketch of the water channel and label it appropriately
- Module4; Areas affected by floods in Kenya; understand the area which affected by flood in Kenya, Nyanza province and in the Nyando river basin.
- Module5; Effects of floods; good effects and bad effects of flood.
- Module6; Flood disaster management; Flood preparedness, flood mitigation, flood response management and recovery of post-flood.
- Module7; Approaches for enhancing flood management education in the primary school curriculum; describe and utilise Didactic, Expository, Empiricist, Heuristic, Inquiry/Discovery/Investigative, Constructivists and ASIE/PDSI[1], describe the advantages and disadvantages of each learning approach in flood management education.
- Module8; Work planning for flood management education; describe integration and infusion as methods for localising the curriculum enhance flood management education, develop infusion and integration plan, schemes of work, and lesson plans for flood management education

Table 8.9.8 Outline of Education of Disaster Management Manual

- Objectives	- To assist in training of disaster management to teachers, education officials and other players in flood management and disaster prevention within the local and national education sector, NGOs and governmental disaster commissions and local or community disaster committees.
- Target User	- Teachers, education officials, national education sector, NGOs and governmental disaster commissions and local or community disaster committees.
- Target Area	- Flood affected area in Kenya
- Chapters	Module1: Introduction to disaster management Module2: Flood Disaster Management Module3: Causes of Floods Module4: Areas affected by Floods in Kenya Module5: Effects of Floods Module6: Flood Disaster Management Module7: Approaches for enhancing flood management education in the primary school curriculum Module8: Work planning for flood management education

Source: JICA Study Team

[1] "ASEI/PDSI" means "ASEI lesson" and “PDSI approach” that Kenya SMASSE is advocating. The ASEI lesson is to mean the class of the science that contains the element of "A: Activity", "S: Student-centred", "E: Experiment", and "I: Improvisation", and to introduce the PDSI approach that means "P: Plan", "D: Do", "S: See", and "I: Improvement" aiming at the achievement.

8.9.9 Flood Disaster Map

The downstream of Nyando and Nyamasaria river basin is located at flood prone area and suffers from high risks of flooding. One of the main causes of flooding in this area is that insufficient and unsystematic structural measures are adopted. However, flood management structural measures are not only one solution of mitigating of flood problems but need communities' knowledge and residents activities. Therefore, it is necessarily that the strengthening of the social mitigation capacity against flood.

The disaster map shows flood conditions such as the heaviest and annual average prone areas with inundation depth and the evacuation facilities such as evacuation centres and evacuation routes. Therefore, it can be utilised the flood disaster map for the further study of regional planning and educational activity.

This manual consists of three chapters; introduction of Flood Disaster Map, process of preparing the Flood Disaster Map in this study area and sustainable use of Flood Disaster Map. The objectives of this manual are to support WRMA Regional Office staffs that have responsibilities of Nyando River basin management to create the flood disaster map and to update the existing flood disaster map for the sustainable use. Also, this manual recommends the residents participation for map creating process. To include the residents, it is enable that to include the local knowledge and information such as the evacuation centre position and the evacuation route, and etc. The residents can visually understand the danger zone and spots by using the completed Flood Disaster Map.

Table 8.9.9 Outline of Flood Disaster Map Manual

- Objectives	- Provide a guideline of how to effectively create a Flood Disaster Map with spatial reference of the Nyando River basin with available limited data and also explain about how to update existing Flood Disaster Map and its related database. Though this manual was target to Nyando River basin but a similar Flood Disaster Map can be made by applying the same methodology as other basins.
- Target User	- WRMA Regional Office Staff and stakeholders who have responsibilities of flood management in Nyando River basin.
- Target Area	- Nyando River basin
- Chapters	1. Introduction of Flood Disaster Map 1) What is the Flood Disaster Map 2) Objectives and target groups 3) Flood Disaster Map for the Nyando river basin 2. Process of Preparing Flood Disaster Map 1) Key steps of create Flood Disaster Map 2) Data collection 3) Necessity data of creating Flood Disaster Map 4) Analysis steps (topographical survey, historical survey and field survey) 3. Sustainable use of Flood Disaster Map 1) Necessity of updating map 2) Process of updating existing Flood Disaster Map

Source: JICA Study Team

8.9.10 GIS Database

Through the Study, the study team created the GIS database of Nyando and Nyamasaria Basin area. This database includes 1) Satellite image (ASTER, Landsat TM, and QuickBird), 2) Existing Topographical maps scale 1:50,000, 3) Related vector (polygon, polyline, and point) data such as administrative boundary, river, road, etc., 4) Site survey (flood damage survey) result, and 5) Pilot project related data. This GIS database has two different scales of data. One is 1:50,000 scale data based on existing topographical maps which covered the whole watershed area of Nyando and Nyamasaria and the other is based on the QuickBird satellite image (resolution of this image is 0.6 m) which covered the flood damaged area of Nyando river.

The purpose of the GIS Database manual is to describe operation and maintenance of the GIS database for which the data was collected and created through this Study. The operation and maintenance of the GIS database include;

1. Understanding GIS data format and this database structure,
2. Access to the database, and according to the necessity,
3. Edit and update the existing GIS data.

Table 8.9.10 Outline of GIS Database Manual

- Objectives	- To operation and maintenance of the GIS database, for which the data was collected and created through this Study. - To use and manage GIS database properly, and - To assist the further activity of integrated flood management.
- Target User	- WRMA Regional Office and LVSWSB staffs. However, the only staff that will be permitted to edit or update the GIS vector data will be the portion of the target users that successfully completed the GIS training that was given during the Study.
- Target Area	- Nyando and Nyamasaria River basin
- Chapters	1. Outline of GIS database manual 1) Outline and targets of this manual 2. Open GIS Data 1) Access to the GIS data (Vector data, Raster data) 3. Open Existing GIS Map 1) Access to the existing GIS Map 4. Print Existing GIS Map 1) Print existing GIS Map prepared during this project 5. Edit and Update GIS Data 1) Edit and update of GIS vector data 6. Edit and Update GIS Map 1) Edit and update of existing GIS Map and create new GIS Map 7. GIS Database structure 1) GIS Database structure of this project 8. Existing GIS Map and its GIS Database structure 1) Sample print paper of Existing GIS Map sheet and its GIS data

Source: JICA Study Team

CHAPTER 9 ADDITIONAL 24 COMMUNITY-DRIVEN FLOOD MANAGEMENT PROJECTS

9.1 BACKGROUND

The flood plain of the Nyando River basin experiences frequent flooding in the months of April and May. The flood risk includes the potential loss of life and property, loss or reduction of livelihoods, health hazards and safety risks, financial costs associated with property damage, mass migration or population displacement to safer places due to flooding, and degradation of water resources and the environment.

Source: JICA Study Team

Figure 9.1.1 Flood Condition in the Nyando River Basin

There is also a growing concern about the impact of climate change on the frequency of floods. A number of studies on the potential impacts of climate change on flooding have been carried out. According to the Ministry of Planning and National Development, the future rainfall scenarios for Kenya for the year 2030 broadly indicate that the region extending from Lake Victoria to central highlands east of the Rift Valley will experience mild increases in annual rainfall with highest increments of rainfall occurring in the vicinity of Mount Elgon. If these projections are accurate, there are likely to be far reaching affects on the intensity and frequency of regional flooding.

Based on the above background, in June 2008 the Government of Kenya (GOK) officially requested the Government of Japan (GOJ) to assist with implementing 24 Community-Driven Flood Management Projects (the Projects) following the completion of the Study on Integrated Flood Management for Nyando River Basin. In response to this request, the Japan International Cooperation Agency (JICA) decided to implement a study (the Study) to formulate a plan for the Projects.

9.2 APPROACH TO PROJECT FORMULATION

The Study utilised a participatory approach for plan formulation, as well as a consensus building approach between concerned stakeholders. Therefore, the Study included the following steps:

i) Kick-off meeting with GOK and the Nyando River Basin Water Management Forum (the Forum) for confirmation of the Study approach;

ii) Selection of 24 target communities through location meetings;

iii) Implementation of community surveys based on a participatory approach for producing community flood hazard maps as well as formulation of community action plans (CAPs) under a sub-contract with a local NGO;

iv) Technical review of the CAPs and formulation of a Draft Plan for the Projects by the Study Team, with cooperation of WRMA; and

v) Approval of the Draft Plan by GOK and the Forum.

Work Item	2008						
	6	7	8	9	10	11	12
24 Community-driven Flood Management Projects							
1 Finalizing Procedure							
1.1 Procedure Finalization							
1.2 Explanation to Forum							
1.3 Explanation to MWI/WRMA							
2 Selection of 24 Communities							
2.1 Preliminary Study using GIS							
2.2 Location Meetings							
3 Community Survey							
3.1 Tender and Contract							
3.2 Implementation of Survey							
3.3 Preparation of Report							
2.4 Explanation to Forum							
2.5 Explanation to MWI/WRMA							
4 Examination of Plans							
4.1 Technical Aspect							
4.2 Cost Aspects							
5 Preparation of Report							
5.1 Preparation of Report							
5.2 Submission of Report							
5.3 Explanation to Forum							
5.4 Explanation to MWI/WRMA							

Figure 9.2.1 Schedule of the Study

9.3 OBJECTIVES AND MAIN CONCEPTS OF THE PROJECTS

(1) Objectives

The objectives of the Projects are to:

- Construct high priority structural measures for flood management within the communities through cooperation with them;
- Develop the capacity of the communities in operating and maintaining the structural measures;
- Establish Community-driven Flood Management Organisations (CFMOs) and promote activities for flood management through the awareness enhancement; and
- Establish an institutional framework within WRMA for implementation of future community-driven flood management projects in other basins, based on the experience and lessons to be learnt from the Projects.

(2) Main Concepts

1) Structural measures

In general, the high priority structural measures proposed in the CAP were selected on the basis that the structural measures were: i) related to flood management at a community level, ii) constructed at a community level and not an inter-community level; iii) unlikely to cause negative impacts for other communities; and iv) not in conflict with existing land arrangements and the current consensus amongst community members.

In addition, considering the need for awareness enhancement for flood management at the community level, the structural measures mainly focused on: i) improvement of the living conditions at existing evacuation centres; ii) securing the evacuation facility for community members; iii) improvement of accessibility to the evacuation place or facility; iv) effective utilisation of flood water; and v) drainage improvement for controlling excess water.

2) Non-structural measures

In order to establish CFMOs and develop their capacities for flood management, almost the same non-structural measures that were implemented in the Pilot Project were applied, namely: i) institutional training of CFMOs; ii) community flood management training; and iii) technical O&M training for structural

measures. However, the contents of each component were modified based on the lessons learnt from the Pilot Project. In addition, public dissemination of information was carefully considered in order to establish an institutional framework for future flood management projects. For example, the use of radio programmes, posters and mass production of textbooks for education programmes on disaster prevention.

			
Well Installation	**Dyke Improvement**	**Community Flood Management Organisation**	**Community Flood Hazard Mapping**
			
Raised Road	**Riverbank Protection**	**Disaster Education Programme**	**Evacuation Drill**
Structural Measures		**Non-structural Measures**	

Figure 9.3.1 Photos of Structural and Non-Structural Measures Implemented in the Pilot Projects

9.4 LOCATION OF TARGET 24 COMMUNITIES

The following 24 communities were successfully selected through location meetings to consider the present flood damage.

Table 9.4.1 List of Target 24 Communities

District	Location	Sub-Location	No.	Name of Communities
Kisumu	Central Kolwa	Kasule	1.	Rae Kanyaika
			2.	Mowlem
			3.	Bwanda
		Nyalunya	4.	Otera
			5.	Kamuga
			6.	Oyola
	Bwanda	Upper Bwanda	7.	Kanyango
			8.	Komwaga
		Central Bwanda	9.	Kowiti
			10.	Kamget Ugwe
	Kanyagwal Curved out from Lower Bwanda	Anyuro	11.	Kopudo
		Ogenya	12.	Kanyiamo
Nyando	Ombeyi	Kore	13.	Kolal
			14.	Wasiese
		Ahero Irrigation Scheme	15.	Kamagaga
			16.	Wangaya Mombasa
		Obumba	17.	Achuodho
		Kango	18.	Wakesi
	Wawidhi	Magina	19.	Kojiem
			20.	Kanyilum
			21.	Kadika
		Ayweyo	22.	Nyachoda
			23.	Masune
		Nyakongo	24.	Kojunga

Source: JICA Study Team

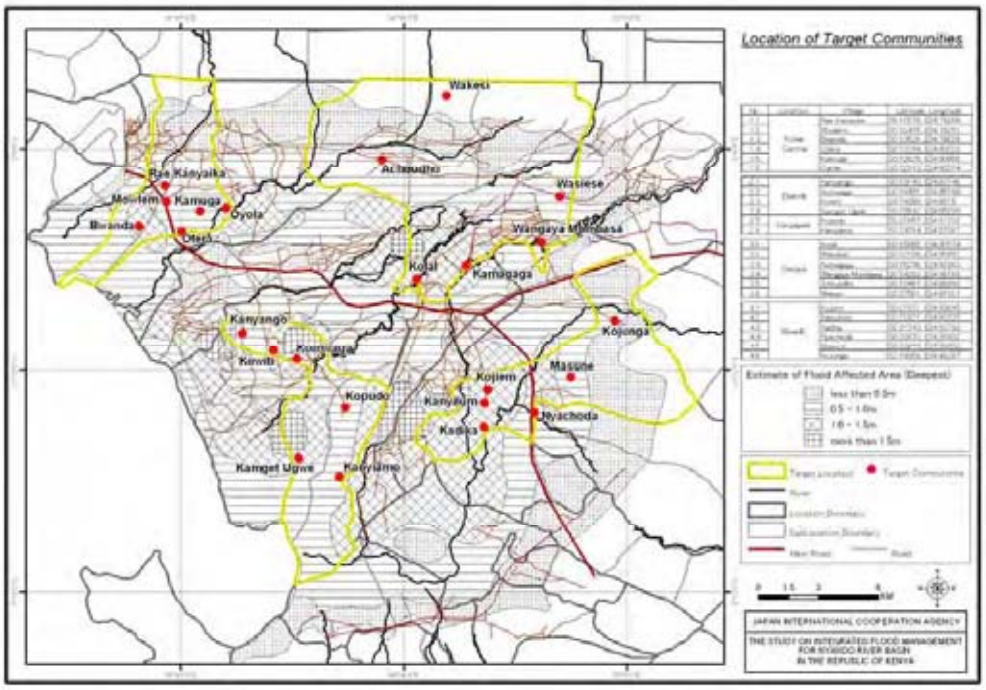


Figure 9.4.1 Location of Target 24 Communities

9.5 PROPOSED STRUCTURAL MEASURES

The proposed structure measures comprise various components selected based on CAP and site surveys result of 24 communities. General concepts of proposed structure measures are shown in Table 9.5.1 and the proposed structure measures for each community is summarised in Table 9.5.2.

Table 9.5.1 General Concepts of Structure Measures

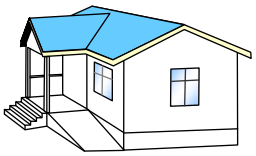
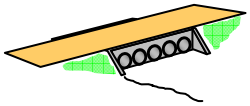
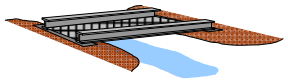
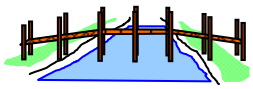
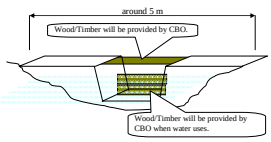
<table>
<tr><td colspan="3">(1) Architecture Measure</td></tr>
<tr><td>a) Borehole
■ Abstraction of groundwater per day is 20 m^3 for domestic use by the communities
■ Depth of borehole is up to 100m to get good quality groundwater
■ With a hand pomp and raised apron
b) Evacuation Centre
■ The capacity is for around 120 of evacuee
■ With a kitchen and storage
■ The floor is raised.
c) Toilet
■ 10 compartments for schools, 2 compartments for evacuation centre
■ The floor is raised.
d) Storage
■ Designed for the possible use of dispensary in future
■ The floor is raised.</td><td> 
Borehole on Pilot Project
 
Evacuation Centre on Pilot Project</td><td> 
Toilet on Pilot Project
 
Image of Storage</td></tr>
<tr><td colspan="3">(2) Infrastructure Measure</td></tr>
<tr><td>a) Culvert
■ For the evacuation use
■ Pipe culvert for relatively deep and wide stream and river
■ Open ditch with RC cover for small canal
b) Footbridge
■ For the evacuation use
■ H-shaped steel used as main member
■ H-shaped steel with RC slab
■ Wooden bridge
c) Weir
■ Impound water is being utilised for horticulture
■ Also utilised as footbridge for the evacuation</td><td> 
Image of Culvert
 
Image of Footbridge (Steel Made)</td><td> 
Image of Footbridge (Timber Made)
 
Image of Weir</td></tr>
</table>

Table 9.5.2 Summary of Proposed Structure Measures

No.	Village Name	Structural measure	Description	No.	Village Name	Structural measure	Description
1	Rae Kanyaika	Culvert (1)	L=2m, W=3.5m, H=0.7m	10	Kamget Ugwe	Footbridge	L=8m, W=2m, Wooden
		Culvert (2)	L=1m, W=3.5m, H=0.3m			Culvert (1)	L=7m, W=3.5m, L=0.3m
		Culvert (3)	L=1m, W=3.5m, H=0.3m			Culvert (2)	L=5m, W=2.5m, H=0.6m
		Culvert (4)	L=1m, W=3.5m, H=0.3m	11	Kopudo	Borehole	with hand pump, 100m
		Culvert (5)	L=2m, W=3.5m, H=0.7m	12	Kanyiaomo	Culvert (1)	L=5.5m, W=1.5m, H=0.8m
		Culvert (6)	L=2m, W=3.5m, H=0.7m			Culvert (2)	L=8m, W=3.5m, H=1.2m
		Culvert (7)	L=2m, W=3.5m, H=0.7m	13	Kolal	Evacuation Centre	floor area 210 m^2
2	Mowlem	Borehole	with hand pump, 70m			Toilet	floor area 48 m^2
		Toilet	floor area 48m^2	14	Wasiese	Footbridge	L=30m, W=1.5m, Wooden
		Evacuation Centre	floor area 210 m^2	15	Kamagaga	Footbridge	L=8m, W=1.5m, Steel
3	Bwanda	Culvert (1)	L=12m, W=5m, H=1.5m			Evacuation Centre	floor area 210 m^2
		Culvert (2)	L=5m, W=2.5m, H=1.5m			Toilet	floor area 48 m^2
		Culvert (3)	L=1.5m, W=2.5m, H=0.5m	16	Wangaya Mombasa	Culvert (1)	L=1.5m, W=8m, H=0.4m
		Culvert (4)	L=3.5m, W=2.5m, H=1.2m			Culvert (2)	L=2m, W=9m, H=0.4m
		Culvert (5)	L=13m, W=2.5m, H=1.2m			Culvert (3)	L=2.5m, W=6m, H=0.5m
4	Otera	Culvert (1)	L=6m, W=3.5m, H=1m			Culvert (4)	L=1.5m, W=9.3m, H=0.5m
		Culvert (2)	L=8m, W=3.5m, H=2.5m			Culvert (5)	L=1.5m, W=6.3m, H=0.5m
		Culvert (3)	L=12m, W=2.5m, H=1.5m			Culvert (6)	L=2m, W=5.5m, H=0.5m
		Culvert (4)	L=4m, W=3.5m, H=1m			Borehole	with hand pump, 80m
		Culvert (5)	L=1m, W=2.5m, H=0.6m	17	Achuodho	Borehole	with hand pump, 60m
5	Kamuga	Borehole	with hand pump, 90m			Culvert (1)	L=3m, W=4m, H=0.8m
		Toilet	floor area 48 m^2			Culvert (2)	L=2m, W=4m, H=1m
		Culvert	L=1.2m, W=2.5m, H=0.6m			Toilet	floor area 48 m^2
6	Oyola	Borehole	with hand pump, 100m	18	Wakesi	Culvert	L=1.3m, W=3.5m, H=0.6m
		Culvert (1)	L=10m, W=5m, H=1.5m			Borehole	with hand pump, 80m
		Culvert (2)	L=10m, W=5m, H=1.5m	19	Kojiem	Borehole	with hand pump, 100m
		Culvert (3)	L=1.5m, W=8m, H=0.5m	20	Kanyilum	Toilet	floor area 48 m^2
		Culvert (4)	L=2m, W=8m, H=0.8m			Storage	floor area 55 m^2
		Culvert (5)	L=2m, W=6m, H=1m			Borehole	with hand pump, 60m
		Culvert (6)	L=1.4m, W=5m, H=0.5m	21	Kadika	Footbridge	L=15m, W=1.5m, Steel
7	Kanyango	Culvert (1)	L=2m, W=5m, H=0.3m			Borehole	with hand pump, 70m
		Culvert (2)	L=1.2m, W=5m, H=0.3m			Culvert	L=10m, W=2m, H=0.7m
		Culvert (3)	L=1.2m, W=5m, H=0.3m	22	Nyachoda	Culvert (1)	L=5m, W=3m, H=1.2m
		Weir & Revetment	W=7.6m, H=1.5m			Culvert (2)	L=8m, W=3.5m, H=1.2m
8	Komwaga	Evacuation Centre	floor area 210 m^2			Footbridge	L=10m, W=1.5m, Steel
		Toilet	floor area 48 m^2	23	Masune	Borehole	with hand pump, 70m
9	Kowiti	Culvert	L=8m, W=3.5m, H=1m			Toilet	floor area 48 m^2
		Toilet	floor area 48 m^2	24	Kojunga	Footbridge (1)	L=12m, W=3.5m, Steel
		Storage	floor area 55 m^2			Footbridge (2)	L=12m, W=3.5m, Steel

9.6 PROPOSED NON-STRUCTURAL MEASURES

The proposed non-structural measures comprise common components throughout all the target communities. An outline of these components is presented in Table 9.6.1 below.

Table 9.6.1 Summary of Non-Structural Measures

<table>
<tr><td colspan="3">(1) Development of Community Based Flood Management Organisations (CFMO)</td></tr>
<tr><td>a) Management and operation training
■ Community sensitisation.
■ Development of bylaws / constitution.
■ Organisational training.
■ Financial management training.
b) Training in writing proposals for selected members of CFMO
■ Training in fundraising procedures.
■ Preparation of a manual for writing proposals.
c) Production and installation of 3 kinds of signboards
■ 1 community hazard map per village.
■ 10 signboards for evacuation routes per village.
■ 1 signboard at the evacuation centre per village.</td><td> 
Community Sensitisation
 
Community Flood Hazard Map</td><td> 
CFMO Training
 
Proposed Signboard at Evacuation Centres</td></tr>
<tr><td colspan="3">(2) Community Flood Management Training</td></tr>
<tr><td>a) Community Flood Management Training
■ Training in flood disaster cycles (preparedness, emergency response, rehabilitation).
■ Training in first aid
b) Community Flood Management Manual
■ Preparation of ready-to-use community flood management manual consisting of planned activities according to the disaster cycle.
c) Implementation of an Evacuation Drill
■ Evacuation drill implementation (300 participants).
■ The drill will be led by CFMO and utilise the communication network of communities.</td><td> 
First Aid Training
 
Evacuation Drill</td><td> 
Preparation of the Manual
 
Evacuation Drill</td></tr>
<tr><td colspan="3">(3) Technical O&M Training for Structural Measures</td></tr>
<tr><td>a) Both lectures and on-site training in O&M for the series of structures to be constructed by the Projects (evacuation centres, culverts, water pans, footbridges, toilets, boreholes, storage areas, etc.)
b) Preparation of O&M manuals, including rules / manners for use of public facilities such as the evacuation centres, toilets, storage areas, water pans and boreholes.</td><td> 
O&M Training</td><td> 
O&M Training</td></tr>
<tr><td colspan="3">(4) Education Programme for Disaster Prevention</td></tr>
<tr><td>a) Targeting 16 primary schools identified within 24 communities.
b) Teacher training in disaster prevention and flood management by using and modifying the teaching manual.
c) Review and modification of the textbook by extended number of teachers, as well as the trained teachers using the new textbook to teach pupils.
d) Mass printing (3,000 volumes) of the textbook.</td><td> 
Teacher Training in Flood Management</td><td> 
Teaching Pupils about Flood Management</td></tr>
</table>

<table>
<tr><td colspan="3">(5) Radio Programmes on Flood Management</td></tr>
<tr><td>a) The proposed long radio programmes will contain dialogues about issues related to flood management between the radio presenter and professionals for 60 minutes every week before the rainy season.
b) In the proposed short spots, necessary actions to be taken by local people when evacuating will be broadcast for 60 seconds per spot, which will be aired four to five times per day for three months during the rainy season.</td><td> 
Radio Station in Kisumu</td><td> 
Radio Station Studio in Kisumu</td></tr>
<tr><td colspan="3">(6) Awareness Campaign using Poster on Flood Management</td></tr>
<tr><td>a) Posters covering 3 subjects will be produced: i) Storing water and food; ii) Useful goods for evacuation; iii) Attention when evacuating; and iv) Early warning.
b) The posters will be distributed to 85 local governments in the Nyando River basin and WRMA-LVSC. The number of posters distributed will be 150 sheets per local government and 30,000 sheets in total will be produced.</td><td colspan="2">  
Samples of Posters
Source of the above left poster: Ministry of planning and national development, UNDP
Source of the above right poster: Swedish International Cooperation Agency</td></tr>
</table>

9.7 PRELIMINARY COST ESTIMATES

The preliminary cost of the projects has been estimated, as summarised in Table 9.7.1 below.

Table 9.7.1 Summary of Preliminary Cost Estimates of the Projects (1/2)

(1) Structure Measures (Unit: Ksh)

No	Community	Structure Measure	Subtotal (Ksh)	Total (Ksh)
1	Rae Kanyaika	Culvert (1)	306,000	1,923,000
		Culvert (2)	233,000	
		Culvert (3)	233,000	
		Culvert (4)	233,000	
		Culvert (5)	306,000	
		Culvert (6)	306,000	
		Culvert (7)	306,000	
2	Mowlem	Borehole	1,630,000	7,516,000
		Toilet	406,000	
		Evacuation Center	5,480,000	
3	Bwanda	Culvert (1)	2,212,000	5,880,000
		Culvert (2)	1,229,000	
		Culvert (3)	234,000	
		Culvert (4)	624,000	
		Culvert (5)	1,581,000	
4	Otera	Culvert (1)	621,000	4,407,000
		Culvert (2)	1,236,000	
		Culvert (3)	1,759,000	
		Culvert (4)	636,000	
		Culvert (5)	155,000	
5	Kamuga	Borehole	1,935,000	3,290,000
		Toilet	1,230,000	
		Culvert	125,000	
6	Oyola	Borehole	2,067,000	6,341,000
		Culvert (1)	1,662,000	
		Culvert (2)	1,662,000	
		Culvert (3)	187,000	
		Culvert (4)	239,000	
		Culvert (5)	380,000	
		Culvert (6)	144,000	
7	Kanyango	Culvert (1)	225,000	1,933,000
		Culvert (2)	133,000	
		Culvert (3)	133,000	
		Weir & Revetment	1,442,000	
8	Komwaga	Evacuation Center	5,480,000	5,886,000
		Toilet	406,000	
9	Kowiti	Culvert	1,121,000	4,272,000
		Toilet	1,230,000	
		Storage	1,921,000	
10	Kamget Ugwe	Footbridge	1,454,000	2,824,000
		Culvert (1)	866,000	
		Culvert (2)	504,000	
11	Kopudo	Borehole	2,067,000	2,067,000
12	Kanyiaomo	Culvert (1)	674,000	1,776,000
		Culvert (2)	1,102,000	

Table 9.7.1 Summary of Preliminary Cost Estimates of the Projects (2/2)

No	Community	Structure Measure	Subtotal (Ksh)	Total (Ksh)
13	Kolal	Evacuation Center	5,480,000	5,886,000
		Toilet	406,000	
14	Wasiese	Footbridge	1,079,000	1,079,000
15	Kamagaga	Footbridge	860,000	6,746,000
		Evacuation Center	5,480,000	
		Toilet	406,000	
16	Wangaya Mombasa	Borehole	1,776,000	3,005,000
		Culvert (1)	187,000	
		Culvert (2)	216,000	
		Culvert (3)	209,000	
		Culvert (4)	240,000	
		Culvert (5)	209,000	
		Culvert (6)	168,000	
17	Achuodho	Borehole	1,483,000	3,777,000
		Toilet	1,230,000	
		Culvert (1)	629,000	
		Culvert (2)	435,000	
18	Wakesi	Borehole	1,789,000	1,924,000
		Culvert	135,000	
19	Kojiem	Borehole	2,067,000	2,067,000
20	Kanyilum	Toilet	1,230,000	4,640,000
		Storage	1,921,000	
		Borehole	1,489,000	
21	Kadika	Footbridge	1,161,000	3,696,000
		Borehole	1,630,000	
		Culvert	905,000	
22	Nyachoda	Culvert (1)	471,000	2,081,000
		Culvert (2)	720,000	
		Footbridge	890,000	
23	Masune	Borehole	1,642,000	2,872,000
		Toilet	1,230,000	
24	Kojunga	Footbridge (1)	3,488,000	7,333,000
		Footbridge (2)	3,845,000	
		Number of Items: 78	**(1) Sub Total**	**93,221,000**
(2) Non-Structure Measures				
No.	Components			Amount
1	Development of Community Flood Management Organisation			8,156,000
2	Production and Installation of Signboard			3,887,000
3	Community Flood Management Training			11,489,000
4	Technical O&M Training for Structure Measures			4,781,000
5	Education Programme for Disaster Prevention			3,834,000
6	Radio Programme of Flood Management			4,621,000
7	Awareness Campaign using Poster on Flood Management			1,168,000
			(2) Sub Total	**37,936,000**
(3) Contingency		10% of (1) and (2)	**(3) Sub Total**	**13,116,000**
			Grand Total (Ksh)	**144,273,000**
			Grand Total (JPY)	**¥239,204,634**

Source: JICA Study Team

Note: (1) Exchange rate is KShs 1 = Japanese yen 1.658
(2) Costs for consultancy services, administration, and contingency are not included in the above table.

CHAPTER 10 CONCLUSION AND RECOMMENDATIONS

10.1 CONCLUSION

The Master Plan on Integrated Flood Management for the Nyando River Basin was prepared by incorporating the professional views of the JICA Study Team, fully considering actual flood conditions through flood damage surveys, preparation of flood disaster maps, and taking into account the stakeholders' opinions via the Nyando River Basin Water Management Forum. The JICA Study Team therefore recommends that the Government of Kenya implements the Master Plan. The JICA Study Team is of the view that implementation of this Master Plan will ensure the protection of human life and property that would otherwise be lost or damaged by flooding, as well as the improvement of economic and social conditions in the flood prone area.

It is noted that the effectiveness of community-driven flood management programmes was confirmed through implementation of pilot projects in five communities. The JICA Study Team therefore recommends that community-driven flood management programmes should be realised as one of the components proposed in the Master Plan, with full involvement of the local communities. Doing this will increase effectiveness and sustainability of the Master Plan.

10.2 RECOMMENDATIONS

(1) Consistency with the Catchment Strategy

WRMA-LVSC Regional Office is now preparing a catchment strategy, including policy and necessary actions for protection and development of the Lake Victoria South Catchment. In addition, the WRMA sub-regional office of Kisumu is formulating sub-catchment strategies, including the Nyando River Basin. The actions proposed in the Master Plan should reflect both the catchment and sub-catchment strategies, since these strategies are the basic policy of regional and sub regional offices. It is noted that not only flood protection, but also upper watershed conservation is important to reduce flooding, as recommended in the Master Plan. Accordingly, upper watershed conservation should be considered in both the catchment and sub-catchment strategies.

(2) Implementation Capacity

The JICA Study Team has no doubt that WRMA has sufficient capacity to formulate, implement and manage future community-driven flood management projects. On the other hand, the JICA Study Team is of the unanimous view that the major problem likely to be faced in implementation of the Master Plan is WRMA's limited capacity to design and implement large

structural measures such as dyke construction, river training, raising the base level of national and community roads, and replacement of bridges. Therefore, the JICA Study Team strongly recommends: i) establishment of a coordination committee comprising MWI Ministry of Roads, NWCPC, and WRMA for supervision of the project; and ii) during the implementation stage, creation of a project management unit consisting of officers from these agencies.

(3) Necessary Preparatory Works

For early implementation of the Master Plan, the following preparatory works will need to be done: i) preparation of an Implementation Programme (IP) including an implementation schedule, implementation arrangements, organisational structure, financing plan, and necessary engineering services to be requested from target donors; ii) undertaking an Environmental Impact Assessment (EIA) for the components proposed in the Master Plan; and iii) establishment of a coordination committee, as mentioned above. Completion of this preparatory works is a pre-requisite for requesting financial support from donors. Accordingly, early action should be taken to complete the preparatory works.

(4) Development of Institutional Framework for Flood Management

WRMA has established the Nyando River Basin Water Management Forum. The Forum was developed through discussion on the issues investigated by the JICA Study and monitoring of the pilot projects. During the JICA Study, a consultation meeting relating to WRMA involvement in the Disaster Management Committee (DMC) was held to allow discussions among WRMA, provincial and district administrations. As a result, WRMA has become a member of the DMC and has been appointed as the leading agency for flood management. The Forum and the DMC are key organisations for the implementation of the Master Plan. Accordingly, WRMA should continue to support the forum as the secretariat and coordinate with provincial and district administrations as a member of the DMC.

(5) Transfer Technology on Integrated Flood Management to Other Regions

The JICA Study provided fundamental tools for integrated flood management, including: i) flood disaster maps for the region; ii) community flood hazard maps; iii) development cycles for community-driven flood management projects; iv) disaster education programmes; and v) evacuation drills. Manuals for these tools were also developed under the JICA Study. These tools will also be effective for flood management in other regional offices of WRMA, since it seems that flooding has recently become a more common disaster in Kenya due to global climate change. It is therefore recommended that technology transfer be done by distributing these tools to other regional offices of WRMA. When this is done, it is recommended that the technology be modified by considering local conditions.

(6) Updating of the Master Plan

The project components proposed in the Master Plan are, at most, in skeleton form. Therefore, the project design should be refined at the feasibility and detailed design level by using more detailed survey results. The implementation schedule should also be revised from time to time by considering actual progress. It is noted that the current flood disaster maps are basic materials for flood management planning. Therefore, these maps should be revised when heavy flooding occurs and the accuracy of the disaster maps should be improved for future revision of the Master Plan.

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