

No.

MINISTRY OF WATER
AND IRRIGATION (MWI)

WATER RESOURCES
MANAGEMENT AUTHORITY (WRMA)

JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

**THE STUDY
ON
INTEGRATED FLOOD MANAGEMENT
FOR
NYANDO RIVER BASIN
IN
THE REPUBLIC OF KENYA**



**FINAL REPORT
VOLUME IV: DATA BOOK**

MARCH 2009

**Nippon Koei Co., Ltd.
IDEA Consultants Inc.**

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LIST OF REPORTS

The output of the Study was submitted to Ministry of Water and Irrigation (MWI) and Water Resources Management Authority (WRMA), the counterpart agencies of the Government of Kenya for the Study. The report is organised into (i) one volume of the Summary, (ii) one volume of the Main Report, (iii) one volume of the Supporting Report, (iv) one volume of the Data Book. This volume is the Data Book. The complete set of the reports is listed below.

Volume I : Summary

Volume II : Main Report

Volume III : Supporting Report

Volume IV : Data Book

CURRENCY EQUIVALENTS (AS OF JUNE 2007)

1 US\$ = 66.77 Kenyan Shilling (TTB) = 121.59 Japanese Yen (TTB)

KENYAN FINANCAL YEAR

July 1 to June 30

**THE STUDY
ON
INTEGRATED FLOOD MANAGEMENT FOR NYANDO RIVER BASIN**

FINAL REPORT

VOLUME IV

DATA BOOK

1. Flood Damage Survey
2. Inventory of River Structures
3. Formulation of Pilot Project
4. Project Design Matrix for Pilot Projects
5. Evaluation Results of Pilot Projects
6. Environmental Scoping Matrix for Priority Schemes
7. Minutes of Meeting for Nyando River Basin Water Management Forum
8. Minutes of Meeting for National Workshop and Regional Workshops

DATA BOOK 1.
FLOOD DAMAGE SURVEY

**THE STUDY
ON
INTEGRATED FLOOD MANAGEMENT FOR NYANDO RIVER BASIN**

FLOOD DAMAGE SURVEY

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1-1 FORMAT OF QUESTIONNAIRE FOR FLOOD DAMAGE SURVEY

FORMAT OF INTERVIEW SURVEY

NYANDO RIVER BASIN

Name of Interviewer: _____

QUESTIONNAIRE FOR FLOOD DAMAGE SURVEY IN NYANDO RIVER BASIN

1. **Place of Interview-Community** : Location _____
Sub-location _____
Village _____
Latitude : _____ Longitude : _____
Altitude in meter : _____ Site No. _____

2. **Date** : August ____, 2006

3. **Time begin** : _____ **Time End** : _____ **#Min** : _____

4. **Name of Respondent** : _____

- a) Sex of respondent : a. Male b. Female
b) Marital Status: a. Single b. Married
c) Age of the respondent : _____ years old

5. QUESTIONNAIRE

Q1. Have you ever affected by flooding around your community?

- a. Yes b. No

Q2. How many times a year does flood occur?

- a. Once b. Twice c. Three times or more

Q3. How do you get information on flood in advance?

- a. Cloud b. Torrential Rain c. River Water level
d. Radio e. TV f. Neighbors
g. Government info. h. Others (_____)

Q4. Did somebody inform you of flooding?

- a. Yes (by _____) b. No

Q5. Do you turn on a TV or radio to get more information about the flooding?

- a. Yes b. No

Q6. Did you remember of the deepest flood water level in the past around your community.

a) Deepest (biggest in the past) _____ meter in the year _____, Duration ____ days
 _____ flow direction, _____ velocity (meter/sec)

b) Annual average deep (a scale which occurred every year)

_____ meter in the year _____, Duration ____ days,
 _____ flow direction, _____ velocity (meter/sec)

Q7. When you expected flooding around your house, what was the very first action you did?

- a. Stay in your house. b. Escape to hilly area. c. Escape to Kisumu
 d. Escape to somewhere else (where _____)

Q7-1. What did you lose by flood?

- a. House was washed away (around value Kshs _____)
 b. Properties (around value Kshs _____)
 c. Livestock (around value Kshs _____)
 c. No.
 d. Others (_____ sround value Kshs _____)

For the respondent who answered as a. in Q7

Q8. Why did you stay in your house ?

- a. no. time to escape b. to guard properties c. to stay house is safety
 d. Others (_____)

For the respondent who answered as b. c. or d. in Q7

Q8-1. Did you remember the destination for escaping and the route to destination from your home.

- a. Government building b. Church c. School
 d. Hilly area e. Others (_____)

(Geographic location)

Q8-2. How did you escape to your destination?

- a. on foot
- b. Motorbike
- c. Vehicle
- d. Others (_____)

Q8-3 How many minutes/hours did it take to the destination? _____ minutes/hours

Q8-4. Did you escape safely to the destination?

- a. yes
- b. no, its reason
 - b-1. Road is submerged
 - b-2. Access route was washed away
 - b-3. Others (_____)

Q8-5. How long did you stay there (evacuation place) ?

- a. within a day
- b. 1-2 day
- b. 3-4 days
- c. a week
- d. more than a week
- e. more than month

Q8-6 Did you get food there ?

- a. yes please specify agency or group in the following
 - a-1. Local government
 - a-2. Community
 - a-3. NGO
 - a-4. Others (_____)
- b. no

Q8-7 Did you get health care?

a. yes please specify agency or group in the following

a-1. Local government a-2. Community a-3. NGO a-4. Others (_____)

b. no

Q9. What do you want the government agency and community based organization to do against flooding?

Please select 5 options with priority order in the later option list.

Government

CBO

a). Dry season : by putting 1. 2. 3. 4.5

same as the left

b). Rainy season : by putting 1. 2. 3. 4.5

same as the left

10. What kind of information do you need during flooding

a. Forecasting (weather condition) b. Evacuation order c. Emergency food

d. Medical care

e. Others (_____)

Q11. What infrastructures (such as school, hospital, road, bridge, etc.) exist in your village?

a. Evacuation center

b. School

c. Hospital/clinic

(name _____)

(name _____)

(name _____)

d. Bridge

(name _____)

e. Others (name _____)

f. No.

Q11-1. Who is an administrator in charge of operation and maintenance for the facility selected in the above Q11.?

a. Operation and maintenance by (_____)

Q11-2. How about is its work performance, working well or not?

a. Good b. fair (frequently occur accident) c. Damaged and no function

d. Others (_____)

Q11-3. In case of damaged and no function, how do you do?

- a. inform to whom ? _____)
- b. repaired by community/village itself
- c. others (_____)

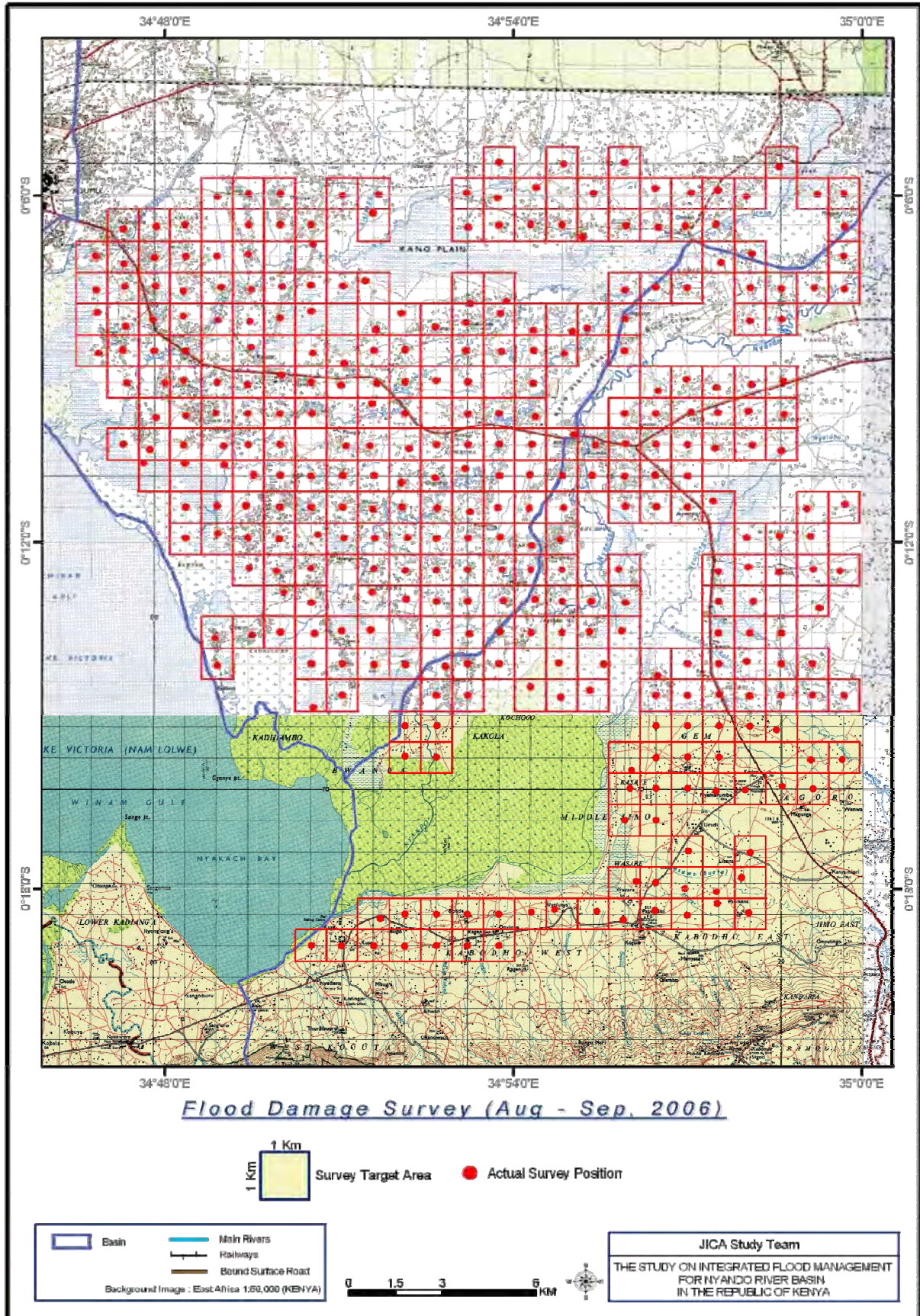
Q11-4. What is action taken for the above damaged and no function?

- a. repaired (by _____)
(cost in Kshs _____)
- b. abandoned
- c. others (_____)

For Question 9, please select the options in the following table.

Condition	Preparedness and/or Countermeasure	
	Government Agency	Community-based
Dry season	Construction of dike	Construction of dike
	Repair of destroyed dike	Repair of destroyed dike
	Removal of sediment	Removal of sediment
	Repair of destroyed structures/other infrastructures	Repair of destroyed river structures
	Construction of drainage channel	Construction of drainage channel
	Raising of trunk road	Raising of trunk road
	Reforestation	Construction of riverbank tree zone
	Land use regulation	Construction of small scale reservoirs
	Flood proofing measures	Flood proofing measures
	Secure evacuation places	Community based operation and maintenance
	Skill up of staff against flooding	Skill up of community against flooding
	Information, education and communication against flooding	Information, education and communication against flooding
	Risk management drill	Risk management drill
If any options, please write it down		
Wet season	Temporary repair of destroyed dike	Temporary repair of destroyed dike
	Temporary repair of destroyed river structures/other infrastructures	Temporary repair of destroyed river structures/other infrastructures
	Information of early warning	Information of early warning
	Flood fighting	Flood fighting
	Risk management drill	Risk management drill
		Emergency food
		Health care
If any options, please write it down		

1-2 LOCATION MAP OF SURVEY POINT



1-3

SUMMARY OF FLOOD DAMAGE SURVEY RESULTS

Sub-drainage	Historical Flood		Annual Average		Present Condition	Issues	Flood Damage
	Depth (m)	Duration (day)	Depth (m)	Duration (day)			
1. Nyamasaria	0.9	8	0.7	5	<ul style="list-style-type: none"> Flood inundation of about 2 m deep on the average occurred annually at river mouth (downstream end). Flood inundation was not occurred annually in the vicinity of Nyalunya, 2 km upstream of National Road. Traveling time of flush flood is estimated at 3 hours. 	<ul style="list-style-type: none"> Siltation at upstream stretch from the culvert of National Road is not serious, while riverbed scouring at immediately downstream of the culvert is identified. Counter-measure, such as the installation of gabion mattress is required for stabilization of riverbed.(Fig.1) 	Low
2. Upper Luando	1.1	23	0.8	17	<ul style="list-style-type: none"> Flood inundation occurred every year for many places with a depth of 1 m. Annual flood inundation occurred along the National Road at the towns of Rabour, Obugi and Ranjira. However, flood inundation does not occur annually at river cross point along main road. 	<ul style="list-style-type: none"> Drainage channel along the main road is not properly constructed. Culverts at National Road are not silted seriously.(Fig.2) 	Medium
3. Lower Luando	1.3	31	0.9	12	<ul style="list-style-type: none"> Flood inundation occurred every year for many places with a depth of 1 m. Flood inundation does not occur annually at the left bank area. Flow direction of flood does not follow the river alignment and flood spreads over catchment area. 	<ul style="list-style-type: none"> A part of catchment does not have slope gradient near main road and, accordingly, river meanders are observed. 	Medium
4. Lielango	1.3	28	0.8	14	<ul style="list-style-type: none"> Flood inundation occurred every year for many places with a depth of 1 m to 1.5 m. Flush flood with very short traveling time of within 1 hour caused damages along the river channel. 	<ul style="list-style-type: none"> Damage to the human life caused by the flood is so serious. Women and children who stayed in the river were flashed away. No action has been taken against flash flood. 	High

1-3-1 (1/3)

Summary of Flood Damage Survey Results

Sub-drainage	Historical Flood		Annual Average		Present Condition	Issues	Flood Damage
	Depth (m)	Duration (day)	Depth (m)	Duration (day)			
5. Oroba	0.7	32	0.3	13	<ul style="list-style-type: none"> Annual average flood inundation depth is 0.1 m. Flush flood with traveling time of within 2-3 hours sometimes caused damages along the river channel. 	<ul style="list-style-type: none"> There is locally flash flood. No action has been taken against flash flood. 	Medium
6. Kano Plain	0.6	17	0.4	9	<ul style="list-style-type: none"> Flood from the Oroba and Lielango Rivers pours into Kano Plain and the flows stagnates for long time. Flood inundation depth is at 0.5 m on the average. People lives at higher elevation area 	<ul style="list-style-type: none"> There is swamp area with very poor drainage. 	Medium
7. Ombeyi	1.2	72	0.7	16	<ul style="list-style-type: none"> Annual flood inundation of more than 1.0 m occurred at Arombo. Duration of flood inundation at downstream area are relatively short. 	<ul style="list-style-type: none"> Lower elevation area are scattered Culvert at National Road is not silted seriously (Fig.3) 	Medium
8. Upper Miriu	1.2	163	0.7	18	<ul style="list-style-type: none"> Flood inundation of 0.5 to 1.0 m occurred annually. Culvert at National Road clogged with siltation partially. The insufficient flow capacity of the culvert causes rather long duration of flood inundation at upstream area of National Road. 	<ul style="list-style-type: none"> Desiltation inside the culvert is inevitable (Fig.4) River channel is not identified clearly in the upstream catchment. 	High
9. Lower Miriu	1.0	299	0.6	21	<ul style="list-style-type: none"> Flood inundation occurred annually with a depth of 0.5 m. Flood flow stagnates at the swamp of mid-stream catchment with a depth of 0.3 m. Duration of flood inundation is rather long at downstream catchment. 	<ul style="list-style-type: none"> River channel was not identified. Catchment does not have slope gradient. The flood protection in the area should be made in advance to the improvement of Upper Miriu 	High

Sub-drainage	Historical Flood		Annual Average		Present Condition	Issues	Flood Damage
	Depth (m)	Duration (day)	Depth (m)	Duration (day)			
10. Upper Nyando	1.2	56	0.6	13	<ul style="list-style-type: none"> Both river banks at Ahero irrigation area and opposite site are functioning as flood retarding basin for reducing flood peak discharge. Cut-off channel with 20 m wide was constructed about 150 m upstream from Ahero Bridge.(Fig.9) 	<ul style="list-style-type: none"> Siltation occurred slightly at Ahero Bridge. However, the flow capacity at river channel with dyke is not sufficient (estimated at 660 m³/sec).(Fig.5) 	High
11. Lower Nyando	1.2	55	0.7	20	<ul style="list-style-type: none"> Dyke construction is going-on at both banks. 	<ul style="list-style-type: none"> Strength of dyke is not sufficient and, accordingly, the collapses of dyke caused by the human activities are observed. Design capacity against flood may be not enough. The government is planning to increase dyke height. 	High
12. Nyaido/ Awach Kano	0.9	33	0.5	15	<ul style="list-style-type: none"> Flood inundation of 1.0 m deep with rather long duration occurred along the river channel of Awach Kano, while inundation depth of 0.5 m for the other areas. 	<ul style="list-style-type: none"> Siltation at culvert of National Road was quite serious at Awach Kano. Floating sugar canes clogged also the culvert. (Fig.6) Siltation at culvert is not serious at Nyaido River. 	Medium
13. Asawo	0.8	61	0.4	10	<ul style="list-style-type: none"> Flood inundation of 0.5 m deep with short duration occurred. 	<ul style="list-style-type: none"> Siltation at culvert of National Road was not identified. The flow capacity against flood is ensured. (Fig.7) 	Low
14. Kabodho West	0.9	30	0.4	13	<ul style="list-style-type: none"> Flood inundation of 0.5 m deep. The duration of flood inundation would be short since the slope gradient of catchment is relatively steep. 	<ul style="list-style-type: none"> Road raising is on-going and the culvert with enough flow capacity is being constructed. (Fig.8) 	Low



Fig.1 River Nyamasaria



Fig.2 River Luando



Fig.3 River Ombeyi



Fig.4 River Mirriu



Fig.5 River Nyando(Ahero Bridge)



Fig.6 River Awach Kano



Fig.7 River Asawo



Fig.8 Around Kabodho West



Fig.9 Cut-off channel(R.Nyando)



Fig.10 River dyke(R.Nyando)



Fig.11 River dyke(R.Nyamasaria)



Fig.11 Damaged dyke(R.Nyando)

1-3-2 Photos

1-4 SPREADSHEETS OF FLOOD DAMAGE SURVEY RESULTS

Flood Damage Servay		All Count	334 /355	(94%)
Respondent a) Sex	a. Male	134	(40%)	
	b. Female	196	(59%)	
	n/a	4	(1%)	
b) Marital status	a. Single	12	(4%)	
	b. Married	313	(94%)	
	n/a	9	(3%)	
c) Age	0-19	4	(1%)	
	20-29	46	(14%)	
	30-39	67	(20%)	
	40-49	65	(19%)	
	50-59	58	(17%)	
	60-69	41	(12%)	
	70-79	29	(9%)	
	80-	8	(2%)	
	n/a	16	(5%)	
	average	46.6 years old		
Q1	Have you ever affected by flooding around your community?			
	a. Yes	326	(98%)	
	b. No	7	(2%)	
	n/a	1	(0%)	
Q2	How many times a year does flood occur?			
	a. Once	122	(37%)	
	b. Twice	185	(55%)	
	c. Three times or more	17	(5%)	
	n/a	10	(3%)	
Q3	How do you get information on flood in advance?			
	a. Cloud	36	(11%)	
	b. Torrential Rain	259	(78%)	
	c. River Water level	100	(30%)	
	d. Radio	51	(15%)	
	e. TV	3	(1%)	
	f. Neighbors	1	(0%)	
	g. Government info.	0	(0%)	
	h. Others	20	(6%)	
Q4	Did somebody inform you of flooding?			
	a. Yes	29	(9%)	
	b. No	296	(89%)	
	n/a	9	(3%)	
Q5	Do you turn on a TV or radio to get more information about the flooding?			
	a. Yes	201	(60%)	
	b. No	126	(38%)	
	n/a	7	(2%)	

Q6 Did you remember of the deepest flood water level in the past around your community?

	a. Deepest	b) Annual
depth(meter)		
0-1	99 (30%)	245 (73%)
1-2	210 (63%)	62 (19%)
2-3	21 (6%)	3 (1%)
3-	3 (1%)	0 (0%)
n/a	1 (0%)	24 (7%)
average	1.0 m	0.6 m
year		
1961	7 (2%)	0 (0%)
1962	8 (2%)	0 (0%)
1963	5 (1%)	0 (0%)
1971	1 (0%)	0 (0%)
1972	1 (0%)	0 (0%)
1987	4 (1%)	1 (0%)
1991	3 (1%)	0 (0%)
1995	0 (0%)	1 (0%)
1997	123 (37%)	15 (4%)
1998	29 (9%)	1 (0%)
2000	8 (2%)	0 (0%)
2001	1 (0%)	4 (1%)
2002	3 (1%)	2 (1%)
2003	12 (4%)	14 (4%)
2004	51 (15%)	0 (0%)
2005	42 (13%)	137 (41%)
2006	16 (5%)	38 (11%)
n/a	20 (6%)	121 (36%)
duration(days)		
1	2 (1%)	5 (1%)
2	9 (3%)	15 (4%)
3	11 (3%)	21 (6%)
4	11 (3%)	27 (8%)
5	2 (1%)	2 (1%)
6-10	59 (18%)	75 (22%)
11-30	127 (38%)	130 (39%)
31-60	47 (14%)	17 (5%)
61-	53 (16%)	5 (1%)
n/a	13 (4%)	37 (11%)
average	63.7 days	15.8 days
velocity(meter/sec)		
Very Fast	5 (1%)	3 (1%)
Fast	199 (60%)	176 (53%)
Slow	56 (17%)	63 (19%)
Very Slow	10 (3%)	5 (1%)
Zero	33 (10%)	26 (8%)
Average	1 (0%)	0 (0%)
Moderate	5 (1%)	11 (3%)
Stagnant	2 (1%)	3 (1%)
Stagement	1 (0%)	0 (0%)
n/a	22 (7%)	47 (14%)

Q7 When you expected flooding around your house, what was the very first action you did?

a. Stay in your house	154	(46%)	
b. Escape to hilly area	77	(23%)	
c. Escape to KISUMU	2	(1%)	
d. Escape to somewhere lese	110	(33%)	
Where? (Main answer)	School	39	(12%)
	Church	14	(4%)
	Neighbourhood	28	(8%)
	Shopping Centre	8	(2%)
	Rice store	3	(1%)
	CENTRE	18	(5%)
	Others	12	(4%)

Q7-1 What did you lose by flood?

			Value
a. House was washed away	183	(55%)	26,100 Kshs
b. Properties	187	(56%)	24,818
c. Livestock	196	(59%)	30,378
e. Others	187	(56%)	28,415
Main answer	Crops	167	(50%)
	Chicken	9	(3%)
	Human death	3	(1%)
	Others	9	(3%)
d. No	18	(5%)	-

Q8 For the respondent who answered as a. in Q7

Why did you stay in your house?

a. no time to escape	5	(3%)
b. to guard properties	48	(31%)
c. to stay is safety	93	(60%)
d. Others	49	(32%)

Q8-1 For the respondent who answered as b. c. or d. in Q7

Did you remember the destination for escaping and the route to destination from your home?

a. Government building	3	(2%)	
b. Church	28	(15%)	
c. School	68	(36%)	
d. Hilly area	55	(29%)	
d. Others	67	(35%)	
Main answer	Neighbourhood	24	(13%)
	Shopping centre	11	(6%)
	CENTRE	16	(8%)
	Others	12	(6%)

Q8-2 For the respondent who answered as b. c. or d. in Q7

How did you escape to your destination?

a. on foot	150	(79%)	
b. Motorbike	0	(0%)	
c. Vehicle	5	(3%)	
d. Others	23	(12%)	
Main answer	Boats/Cannes	14	(7%)
	Bicycle	5	(3%)
	Others	5	(3%)

Q8-3 For the respondent who answered as b, c, or d, in Q7
How many minutes/hours did it take to the destination?

< 10min	1	(1%)
10min -	11	(6%)
15min -	8	(4%)
20min -	18	(10%)
30min -	34	(18%)
40min -	8	(4%)
50min -	0	(0%)
1hour -	28	(15%)
2hour -	18	(10%)
3hour -	10	(5%)
4hour -	7	(4%)
5hour -	6	(3%)
n/a	40	(21%)
avarege	89	minitues

Q8-4 For the respondent who answered as b, c, or d, in Q7
Did you escape safely to the destination?

a. Yes	12	(6%)
b. No	154	(81%)
its reason-1. Road is submerged	72	(38%)
b-2. Access rout was washed away	60	(32%)
b-3. Others	124	(66%)
Main answer Sharp objects/Thorns	92	(49%)
Accidents	23	(12%)
Slipping	15	(8%)
Snakes/Wild animals	23	(12%)
Others	3	(2%)
n/a	23	(12%)

Q8-5 For the respondent who answered as b, c, or d, in Q7
How long did you stay there (evacuation place)?

a. within a day	1	(1%)
b. 1-2day	3	(2%)
c. 3-4days	6	(3%)
d. a week	22	(12%)
e. more than a week	42	(22%)
f. more than month	93	(49%)
n/a	22	(12%)

Q8-6 For the respondent who answered as b, c, or d, in Q7
Did you get food there?

a. Yes	47	(25%)
specify agency or group a-1. Local government	23	(12%)
a-2. Community	1	(1%)
a-3. NGO	22	(12%)
a-4. Others	12	(6%)
b. No	121	(64%)
n/a	21	(11%)

Q8-7 For the respondent who answered as b, c, or d, in Q7
Did you get health care?

a. Yes	37	(20%)
specify agency or group a-1. Local government	17	(9%)
a-2. Community	0	(0%)
a-3. NGO	16	(8%)
a-4. Others		
b. No	128	(68%)
n/a	24	(13%)

Q9 What do you want the government agency and community based organization to do against flooding?

Dry Season / Government Agency

	No.1	No.2	No.3	No.4	No.5	Sum
1 Construction of dike	120	28	31	17	7	203
2 Repair of destroyed dike	6	11	7	4	4	32
3 Removal of sediment	28	64	33	18	8	151
4 Repair of destroyed structures/other infrastructures	12	49	24	14	26	125
5 Construction of drainage channel	123	69	58	14	5	269
6 Raising of trunk road	9	37	51	24	15	136
7 Reforestation	3	16	14	12	3	48
8 Land use regulation	8	13	10	13	7	51
9 Flood proofing measures	4	13	21	37	47	122
10 Secure evacuation places	2	6	12	22	9	51
11 Skill up of staff against flooding	2	1	6	17	7	33
12 Information,education and communication against flooding	2	10	33	77	70	192
13 Risk management drill	1	1	0	5	9	16
14 others	10	13	19	22	34	98

14 others (Main answer)	Health care/Drug	16
	Emergency food	33
	Mosquito nets	2
	Reservoirs	19
	Borehole/Well	28
	Dams	20
	Bridge	8
	Others	26

Dry Season / Community-based

	No.1	No.2	No.3	No.4	No.5	Sum
1 Construction of dike	93	20	14	14	7	148
2 Repair of destroyed dike	16	11	7	6	4	44
3 Removal of sediment	22	45	21	15	10	113
4 Repair of destroyed river structures	18	32	31	7	12	100
5 Construction of drainage channel	57	55	56	29	11	208
6 Raising of trunk road	6	33	17	16	13	85
7 Construction of riverbank tree zone	5	23	11	4	7	50
8 Construction of small scale reservoirs	42	32	46	26	8	154
9 Flood proofing measures	6	15	19	29	15	84
10 Community based operation and maintenance	19	22	23	39	25	128
11 Skill up of community against flooding	9	8	22	26	28	93
12 Information,education and communication against flooding	13	13	23	48	58	155
13 Risk management drill	0	2	1	5	11	19
14 others	11	2	4	5	14	36

14 others (Main answer)	Health care/Drug	7
	Emergency food	15
	Evacuation place	6
	Reservoirs	4
	Bridge	4
	Borehole/Well	8
	Others	14

Wet Season / Government Agency

	No.1	No.2	No.3	No.4	No.5	Sum
1 Temporary repair of destroyed dike	52	8	40	42	17	159
2 Temporary repair of destroyed river structures/other infrastructures	24	82	58	37	15	216
3 Information of early warning	75	56	43	16	10	200
4 Flood fighting	70	0	94	0	68	232
5 Risk management drill	6	22	28	39	30	125
6 others	93	39	39	31	37	239

14 others (Main answer)	Health care/Drug	174
	Emergency food	110
	Mosquito nets	25
	Gum boots	13
	Borehole/Well	2
	Others	23

1-4 (5/6) Spreadsheets of Flood Damage Survey Results

<u>Wet Season / Community-based</u>	No.1	No.2	No.3	No.4	No.5	Sum
1 Temporary repair of destroyed dike	38	7	16	16	36	113
2 Temporary repair of destroyed river structures/other infrastructures	17	29	26	43	24	139
3 Information of early warning	54	28	18	23	16	139
4 Flood fighting	30	29	97	48	10	214
5 Risk management	2	11	14	19	19	65
6 Emergency food	120	98	48	17	5	288
7 Health care	45	104	64	51	17	281
8 others	3	2	1	5	6	17

Q10 What kind of information do you need during flooding?

a. Forecasting	131	(39%)		
b. Evacuation order	57	(17%)		
c. Emergency food	251	(75%)		
d. Medical care	279	(84%)		
e. Others	20	(6%)		
Main answer	Mosquito nets		6	(2%)
	Drainage channels		5	(1%)
	Othres		8	(2%)

Q11 What infrastructures exist in your village?

a. Evacuation center	5	(1%)		
b. School	327	(98%)		
c. Hospital/ clinic	144	(43%)		
d. Bridge	69	(21%)		
e. Others	52	(16%)		
Main answer	Road		37	(11%)
	Church		8	(2%)
	Dikes		2	(1%)
	Camp		3	(1%)
	Othres		3	(1%)

Q11-1 Who is an administrator in charge of operation and maintenance for the facility selected in the above Q11.?

Main answer	Government(KENYA)	138	(41%)
	Local Government	74	(22%)
	Community	39	(12%)
	School Administration	143	(43%)
	Othres	9	(3%)

Q11-2 How about is its work performance, working well or not?

a. Good	134	(40%)
b. Fair(frequently occur accident)	152	(46%)
c. Damaged and no function	37	(11%)
d. Others	9	(3%)

Q11-3 In case of damaged and no function, how do you do?

a. inform to whom?	244	(73%)	
Main answer	Government		56
	Local Government		108
	Community		19
	School Committee Members		88
	Othres		5
b. repaired by community/village itself	153	(46%)	
c. others	5	(1%)	

Q11-4 What is action taken for the above damaged and no function?

a. repaired	296	(89%)	
	(by)		291
	(cost in Kshs)		186,220 Kshs
b. abandoned	9	(3%)	
c. Others	4	(1%)	