

EVALUATION OF FARMERS LIVELIHOOD ASSETS AFFECTED BY 2010 FLOOD DISASTER IN SOKOTO STATE, NIGERIA

^{1*}Tambari, I. W. and ²Umar, L. A.

¹Department of Agricultural Extension and Rural Development, Faculty of Agriculture,
Usmanu Danfodiyo University, Sokoto

²Department of Agricultural Technology, College of Agriculture, Umaru Ali
Shinkafi Polytechnic, Sokoto State, Nigeria

*Corresponding author

ABSTRACT

The study was based on evaluation of farmers livelihood assets affected by 2010 flood disaster in Sokoto State, Nigeria. Purposive sampling was used for selection of areas affected by 2010 disaster, while, 178 farmers were used as sample size of the study. Data were collected using structured questionnaire and check list for focus group discussion. Descriptive statistics were used for analysis of qualitative data, while participatory rural appraisal tools were used for the analysis of quantitative data. The study revealed that the socio-economic characteristics of farmers that loss the livelihood assets were males (96.0%), married (94.9%), aged (42.7%) 41-51 years, indigenous knowledge (48.3%), household size (45.5%) 11-20 family members, farming (62.5%) with mud residential buildings (63.5%). The focus group discussion with farmers group revealed that the loss of upland crops, food stuffs and farm implements worth million of naira were loss as livelihood assets. The wealth ranking of farmers group revealed that the quantity of food stuffs possessed by farmers as wealth was reduced due to influence of 2010 flood disaster. The Venn diagram of farmers group revealed the extent of relationship between the institutional framework and key actors among the farmers group. The social mapping was used in the study for the evaluation of physical, environmental, social and economic livelihood assets of farmers affected by 2010 flood disaster. The study recommended that the farmers in Sokoto State should stop the expansion of residential building and farmland close to flood vulnerable areas.

Keywords: Evaluation, Farmers, Livelihood Assets, 2010 Flood Disaster

1. INTRODUCTION

The National Emergency Management Agency (NEMA) named 2010 as the year of flood disaster in Nigeria, because of the occurrence of flood disaster in 23 States of Nigeria that displaced many farmers away from their homes and submerged lot of farmlands (NEMA, 2010). In Sokoto State, the farmers in all the 23 local government areas were engaged in the upland and lowland farming. Thus, farmers engaged in upland farming constitutes more than 85%, while, those engaged in lowland farming constitutes less than 15% among the entire population of farmers in Sokoto State (Iliya and Tukur, 2013). According to Tosin (2010), more than 50 farming communities living in flood vulnerable areas were flooded due to occurrence of 2010 flood disaster in Sokoto State. The 2010 flood disaster occurred in Sokoto State destroyed the livelihood assets of farmers at varying degrees leading to decline of the farming (Tambari and Umar, 2018), in addition to the migration of farmers to semi-urban or urban areas for search of non-farm income (Tambari and Abubakar, 2018). Thus, the evaluation of livelihood assets of farmers affected by 2010 flood disaster in Sokoto State was the general objective of the study. It was based on this premise that the study highlighted the socio-economic characteristics of farmers affected by 2010 flood disaster, the quantity of food possessed by farmers as wealth before and after the occurrence of 2010 flood disaster, relationship between the institutional framework and key actors of farmers groups affected by 2010 flood disaster in addition to physical, environmental, social as well as the economic livelihood assets of farmers affected by 2010 flood disaster in Sokoto State (Tambari, 2016). Therefore, the study conceptualised livelihood assets as agricultural, physical, financial and material properties of farmers affected by 2010 flood disaster in Sokoto State.

2. METHODOLOGY

2.1 The Study Area

Sokoto State is located in north-west region of Nigeria between Latitude 11° 14' 00 N and Longitude 3° 5' 00 E bordered to the north by Niger Republic, Zamfara State to the East and Kebbi State to the South and West respectively (Sokoto State Government Diary, 2014). Sokoto State has an area of 32,000 square kilometer with a projected population of 4,998,090 people out of which more than 75% of its active populations were farmers across the 23 Local Government Areas-LGAs (Sokoto State Government, 2016). There were 9 LGAs in Sokoto State affected by 2010 flood disaster according to the report released by (Sokoto State Environmental Management Agency, 2010). Meanwhile, in Sokoto State the rainy season usually started from May and ended in September with mean rainfall of 600mm, while the dry season commenced from October and ended in April (Iliya and Tukur, 2013). Harmattan with cold and dust-laden wind arrived from November and ended around February (Yabo, 2005). Generally, the climatic

condition in Sokoto State was influenced by the movement of dry air mass originated from Sahara Desert and warm air mass originated from Atlantic Ocean. Therefore, the land for farming in Sokoto State was divided into lowland and upland (Abdullahi *et al*, 2014), utilizing the water resource from Rima and Sokoto Rivers extensively for upland and lowland farming (Iliya and Tukur, 2013).

2.2 Sampling Procedure and Sample Size

Purposive sampling technique was used in four stages for the selection of areas affected by 2010 flood disaster in Sokoto State. In the first stage, three out of nine flood-affected LGAs were purposively selected, based on loss of livelihood assets of farmers attributed to influence of 2010 flood disaster in Sokoto State. In the second stage, three flood-affected farming communities were selected in each of the selected LGAs. In the third stage, the population of farmers affected by 2010 flood disaster was used as sample frame of the study. In the fourth stage, the sample size of 178 farmers was obtained from the sample frame.

Table 1: Sampling Procedure and Sample Size

Flood-Affected LGAs	Flood-Selected LGAs	Flood-Affected Communities	Population of Farmers	Selected Farmers
Gada	Goronyo	Kagara Rima	202	25
Goronyo		Taloka	160	20
Gwadabawa		Giyawa	122	15
Isah		Lugu	221	28
Rabah	Wurno	Tunga	151	19
Wurno		Barayar Zaki	111	14
Kware		Bakin Gulbi	160	20
Silame	Wamakko	Kwal-Kwalawa	155	19
Wamakko		Rimawa	143	18
9	3	9	1425	178

Source: Field Survey, 2016

2.3 Instrument of the Study

Structured questionnaire through interview schedule was used for collection of data on socio-economic characteristics of farmers affected by 2010 flood disaster in Sokoto State, while checklist was used in focus group discussion for the collection of data on livelihood assets of farmers affected by 2010 flood disaster in Sokoto State.

2.4 Validity Test of the Study Instrument

The study instrument was subjected to face and construct validity test by experts in the field of agricultural extension, geography, rural and regional development to modify the items in the study instrument with vague meaning. Meanwhile, the pretest of the study instrument was carried out on 5th to 20th March, 2016 on 25 farmers affected by 2010 flood disaster in Sokoto State that were not part of sample size of the study.

2.5 Method of Data Collection

Data for the study was obtained from primary and secondary sources respectively. However, the primary data were collected through the aid of structured questionnaire administered to farmers affected by 2010 flood disaster in Sokoto State was used to collect the quantitative data for the study. Therefore, the check list used for focus group discussion with farmers group affected by 2010 flood disaster in Sokoto State was used to collect the qualitative data for the study. However, the secondary data used for the study was obtained from published and un-published materials such as journals, technical reports, projects, dissertations and theses.

2.6 Tools for Data Analysis

Descriptive statistics such as table, frequency, percentage and charts were used for the analysis of socio-economic characteristics of farmers affected by 2010 flood disaster in Sokoto State. The analysis of qualitative data for the study was achieved with the aid of participatory rural appraisal tools such as focus group discussion, wealth ranking, Venn diagram and social mapping.

Table 3: Tools for Data Analysis

Quantitative Data	Tools	Qualitative Data	Tools
Socio-economic characteristics of farmers affected by 2010 flood disaster in Sokoto State	Table Frequency Percentage Charts	Farmers group affected by 2010 flood disaster in Sokoto State	Focus group discussion Wealth ranking Venn diagram Social mapping

Source: Field Survey, 2016

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of Farmers

3.1.1 Sex

The result presented in Figure 1 indicated that the majority (96.0%) of farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were males, despite the fact that the responsibility of providing the family with the basic needs for survival against the adverse effects of 2010 flood disaster were made by males farmers. This result concurs with Yeldu (2014) that the provisions of basic needs for survival against the adverse effects of 2010 in Kebbi State were provided by males farmers compared with the females farmers.

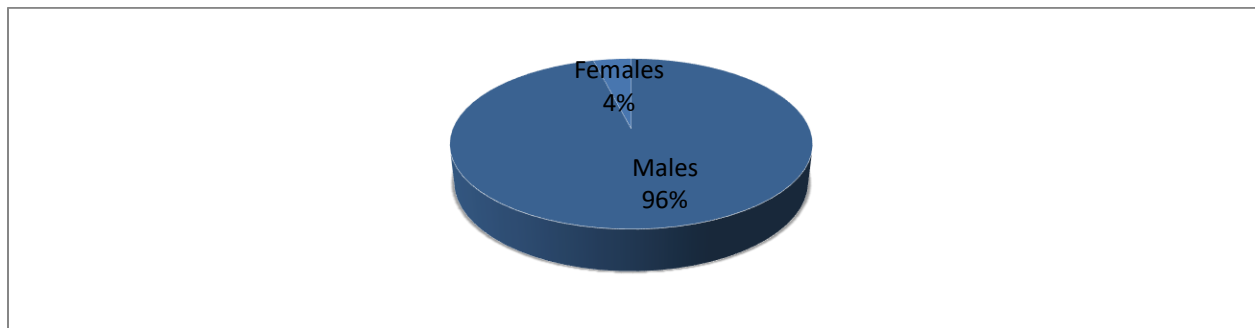


Figure 1: Sex of Farmers Affected by 2010 Flood Disaster in Sokoto State

3.1.2 Marital Status

The result presented in Figure 2 indicated that the majority (94.9%) of farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were married. This means that the farmers in Sokoto State respect marriage as a social institution for preservation of family norms and values. This result agrees with Makinta (2016) that the norms and values of family in Borno State were preserved through the institution of marriage.

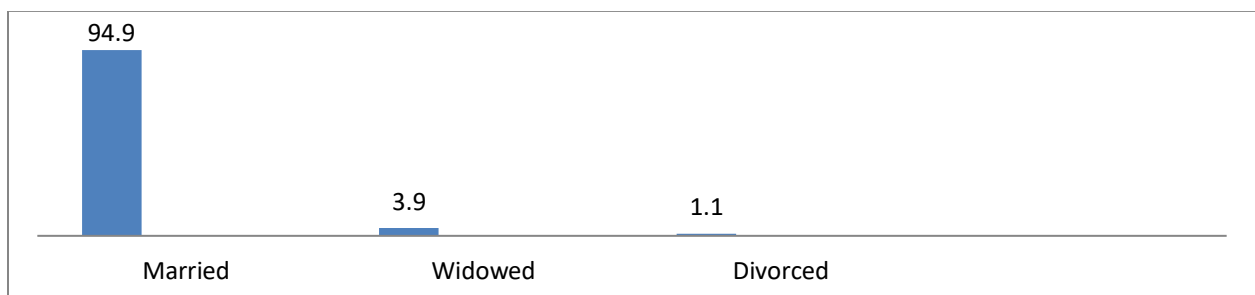


Figure 2: Marital Status of Farmers Affected by 2010 Flood Disaster in Sokoto State

3.1.3 Age

The result presented in Figure 3 indicated that most (42.7%) of the farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were within the age of 41-50 years. This result concurs with Yeldu (2014) that most of farmers that loss livelihood assets due to occurrence of 2010 flood disaster in Kebbi State were within the age of 40-50 years.

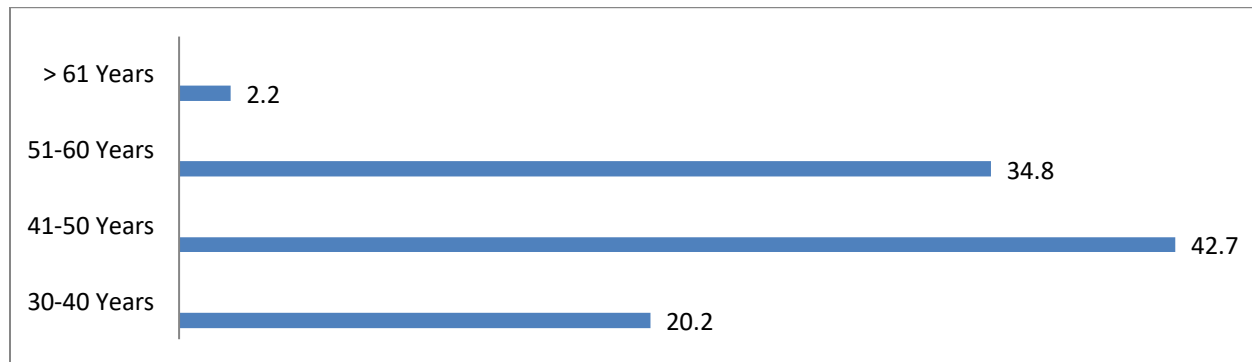


Figure 3: Age of Farmers Affected by 2010 Flood Disaster in Sokoto State

3.1.4 Educational Attainment

The result presented in Figure 4 indicated that most (48.3%) of the farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were vast in indigenous knowledge. This implies that the farmers affected by 2010 flood disaster were not also vast in western education. This result agrees with Nugroho and Koji (2012) that the low level of western education affects the farmers adaptation measures in Indonesian Purworejo Central Java.

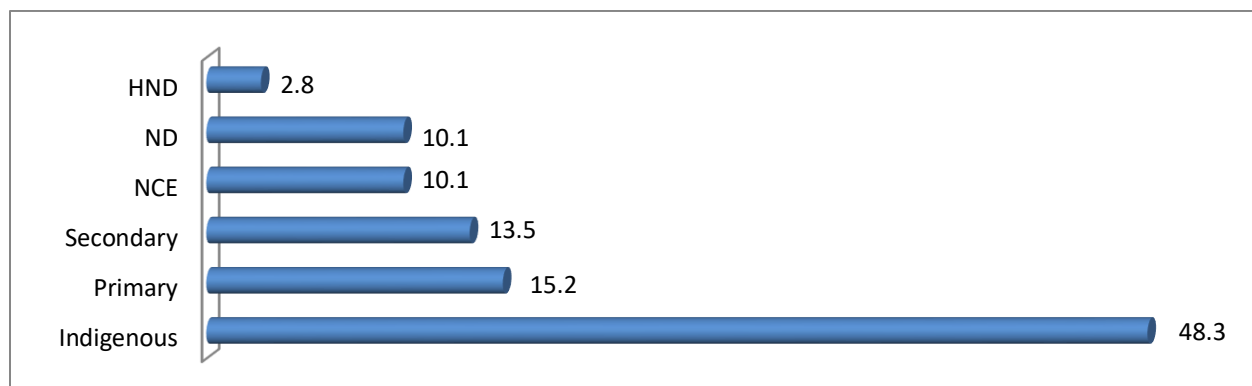


Figure 4: Educational Attainment of Farmers Affected by 2010 Flood Disaster in Sokoto State

NCE=National Certificate on Education; ND=National Diploma; HND=Higher National Diploma

3.1.5 Household Size

The result presented in Figure 5 indicated that most (45.5%) of the farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were having 11-20 family members as household size. This implies that the farmers with large family members would find it stressful in moving the family members to non-flood affected areas. This result conforms with Yeldu (2014) that the family with large members was faced with challenges of moving the family members to non-flood affected areas during the 2010 flood disaster in Kebbi State.

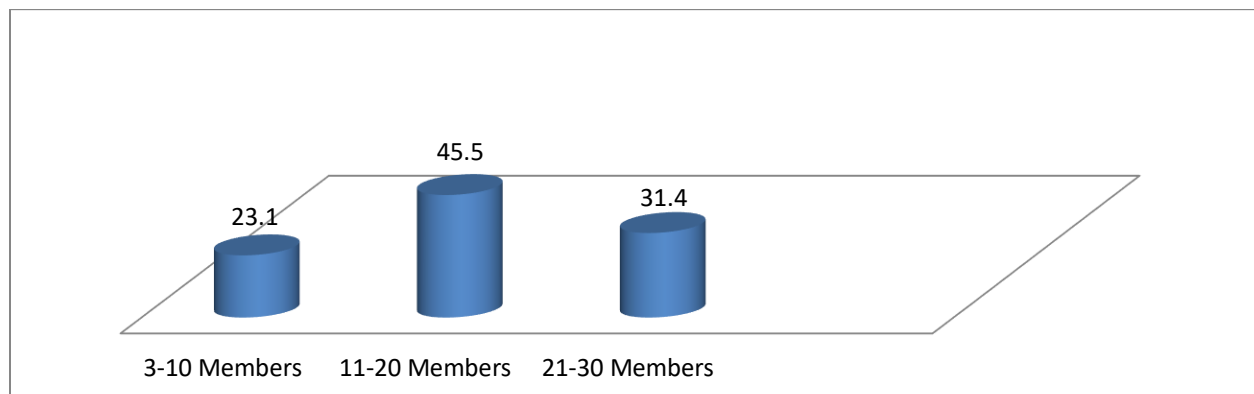


Figure 5: Household Size of Farmers Affected by 2010 Flood Disaster in Sokoto State

3.1.6 Primary Occupation

The result presented in Figure 6 indicated that the majority (62.5%) of farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were engaged in farming as primary occupation. This implies that the farming was the primary occupation of farmers affected by 2010 flood disaster. This result corroborates with the Sokoto State Government (2016) that more than 75% of the active populations in Sokoto State were into farming.

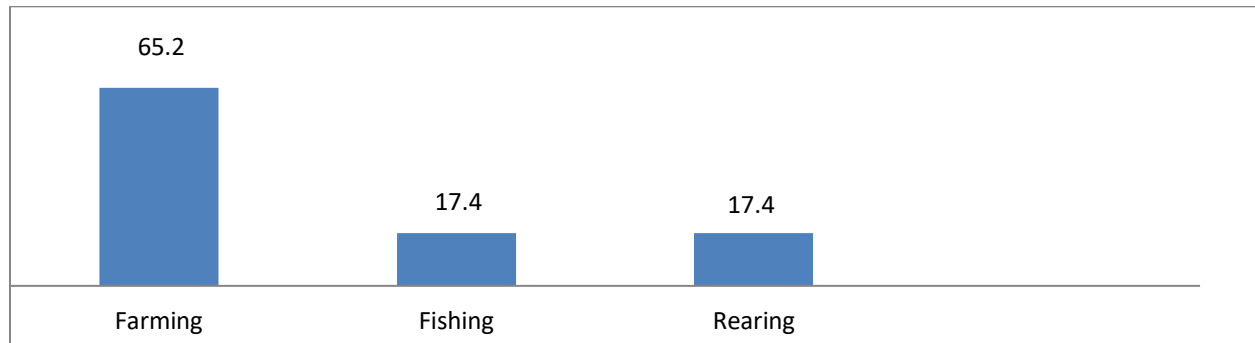


Figure 6: Occupation of Farmers Affected by 2010 Flood Disaster in Sokoto State

3.1.7 Residential Building

The result presented in Figure 7 indicated that the majority (63.5%) of farmers that loss livelihood assets attributed to 2010 flood disaster in Sokoto State were in typical mud building vulnerable to adverse effects of 2010 flood disaster. Additionally, One hundred and seventy-eight residential building of farmers were destroyed by 2010 flood disaster in Sokoto State (Tambar, 2016). This result concurs with Ismail and Mustaquim (2013) that the mud building at Chanchal was vulnerable to adverse effects of flood disaster in West Bengal.

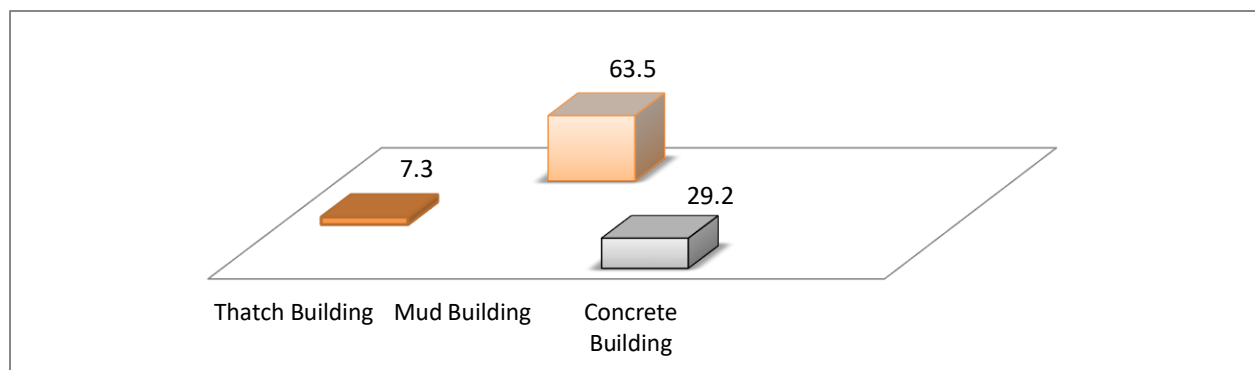


Figure 7: Residential Building of Farmers Affected by 2010 Flood Disaster in Sokoto State



**Figure 8: At the Mud Building of Farmers Destroyed by 2010
Flood Disaster in Sokoto State**

**Table 4: Socio-Economic Characteristics of Farmers Affected by
2010 Flood Disaster in Sokoto State (n=178)**

Variable	Frequency	Percentage
Sex		
Male	171	96.1
Female	7	3.9
Marital Status		
Married	169	94.9
Widowed	7	3.9
Divorced	2	1.1
Age (years)		
30-40	36	20.2
41-50	76	42.7
51-60	62	34.8
61and above	4	2.2
Educational Attainment		
Indigenous knowledge	86	48.3
Primary	27	15.2

Secondary	24	13.5
NCE	18	10.1
ND	18	10.1
HND	5	2.8
Household Size		
3-10	41	23.1
11-20	81	45.5
21-30	56	31.4
Primary Occupation		
Farming	116	65.2
Fishing	31	17.4
Rearing	31	17.4
Residential Building		
Thatch	13	7.3
Mud	113	63.5
Concrete	52	29.2

Source: Field Survey, 2016

3.2 Focus Group Discussion with Farmers Group Affected by 2010 Flood Disaster in Sokoto State

According to farmers group, excessive rainfall and release of water from Bakolori and Goronyo Dams were attributed to occurrence of 2010 flood disaster in Sokoto State. However, loss of upland crops, food stuffs and farm implements worth millions of naira were revealed by farmers group as livelihood assets loss due to 2010 flood disaster. The revelation of farmers group concerning the loss of livelihood assets of farmers affected by 2010 flood disaster concurs with the previous studies. For instance, Tambari and Dankani (2018) revealed that the occurrence of 2010 flood in Sokoto State was influenced by excessive rainfall and release of excessive water from Bakolori and Goronyo Dams respectively. Consequently, sixty-nine metric tons of upland crops were destroyed by 2010 flood disaster in Sokoto State; fifty-nine metric tons of food stuff was destroyed by 2010 flood disaster; one thousand one hundred and fifty-one farm implement were also destroyed by 2010 flood disaster (Tambari and Umar, 2018). According to Tambari (2016), twenty-nine million, two hundred and sixty-four thousand naira (N29,264,000) was estimated as the monetary value of upland crops (N13,740,000), food stuffs (N11,840,000) and farm implements (N3,675,000) destroyed by 2010 flood disaster in Sokoto State.



Figure 9: Focus Group Discussion with Farmers Group Affected by 2010 Flood Disaster in Sokoto State

3.3 Wealth Ranking of the Farmers Group

According to Abubakar (2006), wealth ranking was widely used as the participatory rural appraisal tools to classify the wealth of farmers on the basic assumptions that the farmers were of the picture of who among them are more or less rich, average or poor. Therefore, wealth ranking presented in Table 5 was based on the evaluation of quantity of food stuff possessed by farmers group as wealth before and after the occurrence of 2010 flood disaster in Sokoto State. However, the wealth ranking revealed that the quantity of food stuffs was reduced due to adverse effects of 2010 flood disaster. Accordingly, the reduction of quantity of food was observed in all the category of farmers group affected by 2010 flood disaster. The revelation of farmers group on the basis of wealth ranking of farmers affected by 2010 flood disaster conforms with the previous studies. For instance, Ma'arufuddeen (2013) revealed that the farmers were jeopardised as a result of loss of food stuffs as livelihood assets due to 2010 flood disaster in Sokoto State. According to Tambari and Umar (2018), eleven million eight hundred and forty-nine thousand naira (N11,849,000) was estimated as the monetary value of all the food stuffs destroyed by 2010 flood disaster in Sokoto State.

**Table 5: Wealth Ranking of Farmers Group Affected by 2010
Flood Disaster in Sokoto State**

Community	Category	Wealth	Qt. before 2010 Flood	Qt. after 2010 FLD
Kagara	Rich	sorghum, rice	70 bags	50 bags
	Average	millet, maize	40 bags	30 bags
	Poor	cowpea	20 bags	15 bags
Taloka	Rich	rice, onion	60 bags	40 bags
	Average	millet, sorghum	30 bags	20 bags
	Poor	millet, cowpea	8 bags	4 bags
Giyawa	Rich	rice, garlic	70 bags	50 bags
	Average	sorghum, onion	40 bags	20 bags
	Poor	millet	20 bags	10 bags
Lugu	Rich	rice, garlic	60 bags	40 bags
	Average	sorghum, onion	30 bags	20 bags
	Poor	millet, cowpea	10 bags	5 bags
Tunga	Rich	rice, wheat	80 bags	65 bags
	Average	rice, onion	60 bags	50 bags
	Poor	sweet potato	30 bags	15 bags
Barayar Zaki	Rich	rice, onion	70 bags	55 bags
	Average	sorghum	50 bags	40 bags
	Poor	cowpea	20 bags	10 bags
Bakin Gulbi	Rich	onion, rice	80 bags	60 bags
	Average	maize, cowpea	60 bags	45 bags
	Poor	maize	20 bags	10 bags
Kwal- Kwalawa	Rich	sorghum, onion	100 bags	85 bags
	Average	maize, onion	70 bags	60 bags
	Poor	sweet potato	30 bags	20 bags
Rimawa	Rich	rice, okra, onion	80 bags	65 bags
	Average	maize, tomato	50 bags	35 bags
	Poor	maize	20 bags	10 bags

Source: Field Survey, 2016

3.4 Venn Diagram of the Farmers Group

According to Tambari (2016), Venn diagram was among the familiar participatory rural appraisal tool to showcase the relationship between the influential stakeholders in the community and community action plan. Therefore, the Venn diagram presented in Figure 10 was based on the extent of relationship between the institutional framework and key actors of farmers group affected by 2010 flood disaster in Sokoto State. However, twenty one different institutions, associations, groups and individuals were identified as influential stakeholders of farmers group affected by 2010 flood disaster in Sokoto State. For instance, Universities, Research Institutes, Ministry of Agriculture, Ministry of Environment and Sokoto State Agricultural Development Project were the institutions that have relationship with farmers group through the extension contact as indicated in the overlap of Venn diagram. Even though, the provision of organic fertilizer, improved seeds, pumping machines and credit facilities were provided to farmers group as indicated in the overlap of Venn diagram. Cereal crops association, vegetable crops association, root and tuber crops association, women processing association and blacksmith association were the associations that have relationship with farmers group as indicated in the overlap of Venn diagram. Although, the relationship was also established within the association, for instance the overlap between the cereal crops associations and women processing association indicates that the activities of women processing association were based on the activities of cereal crop association. Likewise, the overlap in Venn diagram between the vegetable crops association and root and tuber crops association indicates a degree of importance the farmers group attached to lowland farming. Meanwhile, the activities of cereal crops and vegetable crops associations were connected by trade union for the purpose of local and inter-state domestic consumptions, which served as the sources of market for agricultural produce. Consequently, relationship between the farmers group and blacksmith association as expressed in the overlap of the Venn diagram was based on the purchase and sharpening of farming tools by blacksmith. Lowland for dry season farming in addition to upland for rainy season farming was practiced by farmers group as indicated in the overlap of Venn diagram in relation to the cultivation pattern. The overlap in Venn diagram between the rainfall, dam, tube well and river was identified as the principal source of water for farming among the farmers group. The water from the dam, river and tube well was used for irrigation farming by dry season farmers. Meanwhile, the overlap in Venn diagram between the village and district heads with community development workers and non-governmental organisations indicates the channel of communication that the influence life of farmers group. The overlap in Venn diagram between community development workers, vigilante and aid group indicates the relationship among *Yan ga aiki*, *Yan dako* and *Yangayya* involved as the agents of self-help humanitarian intervention due to occurrence of 2010 flood disaster in Sokoto State (Tambari, 2016).

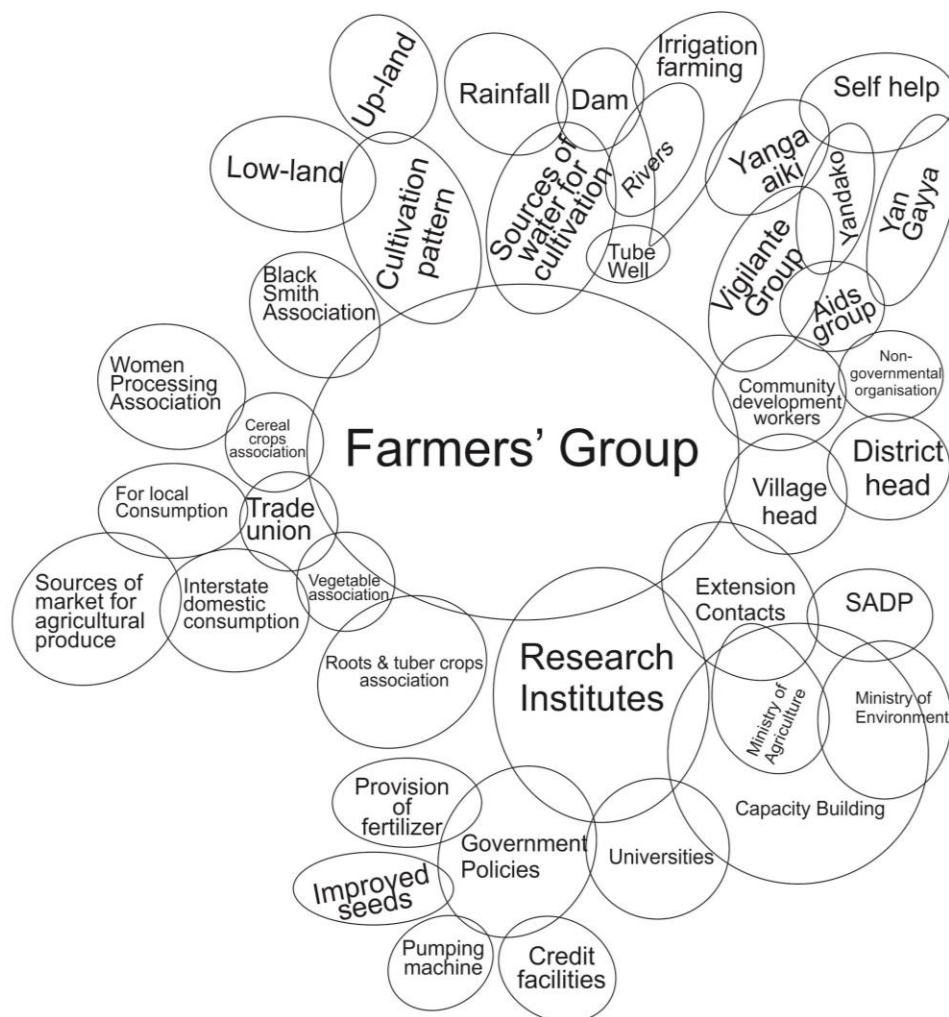


Figure 10: Venn Diagram of Farmers Group Affected by 2010 Flood Disaster in Sokoto State

3.5 Social Mapping

3.5.1 Goronyo Local Government Area (LGA)

Different colours were further used in Figure 11 to explain the physical, environmental, social and economic livelihood assets of farmers group affected by 2010 flood disaster in LGA. For instance, red colour portion in the map indicates location of flood-affected farming communities such as *Taloka*, *Kagara Rima* and *Giyawa* located at major route of River Rima. This implies that the closeness to River Rima and its tributaries exposed the farmers group to adverse effects of 2010 flood disaster. Thus, light blue colour portion in the map indicates the position of

Goronyo Dam and River Rima. This means that the Goronyo Dam exposed the farmers group to adverse effects of 2010 flood disaster. The light green colour portion in the map shows the location of lowland areas flooded due to occurrence of 2010 flood disaster. This implies that the influence of topography in the area exposed the farmers group to adverse effects of 2010 flood disaster, because of the action of river tributaries, valleys and flood running water. The dark green colour portion in the map highlights the entire landmass of Goronyo LGA. This implies that the adverse effects of 2010 flood disaster in upland areas were not severe compared to lowland areas due to influence of physical terrain, closeness to River Rima and Goronyo Dam. The fade white colour portion in the map indicates the upland areas of Goronyo LGA. This implies that the upland areas affected by 2010 flood disaster were extremely closed to lowland areas influenced by running flood-water discharged from Goronyo Dam. Hence, the black colour portion in the map indicates the position of farmers settlements. This implies that the farmers settlements affected by 2010 flood disaster were located at the lowland areas of Goronyo LGA (Tambari, 2016).

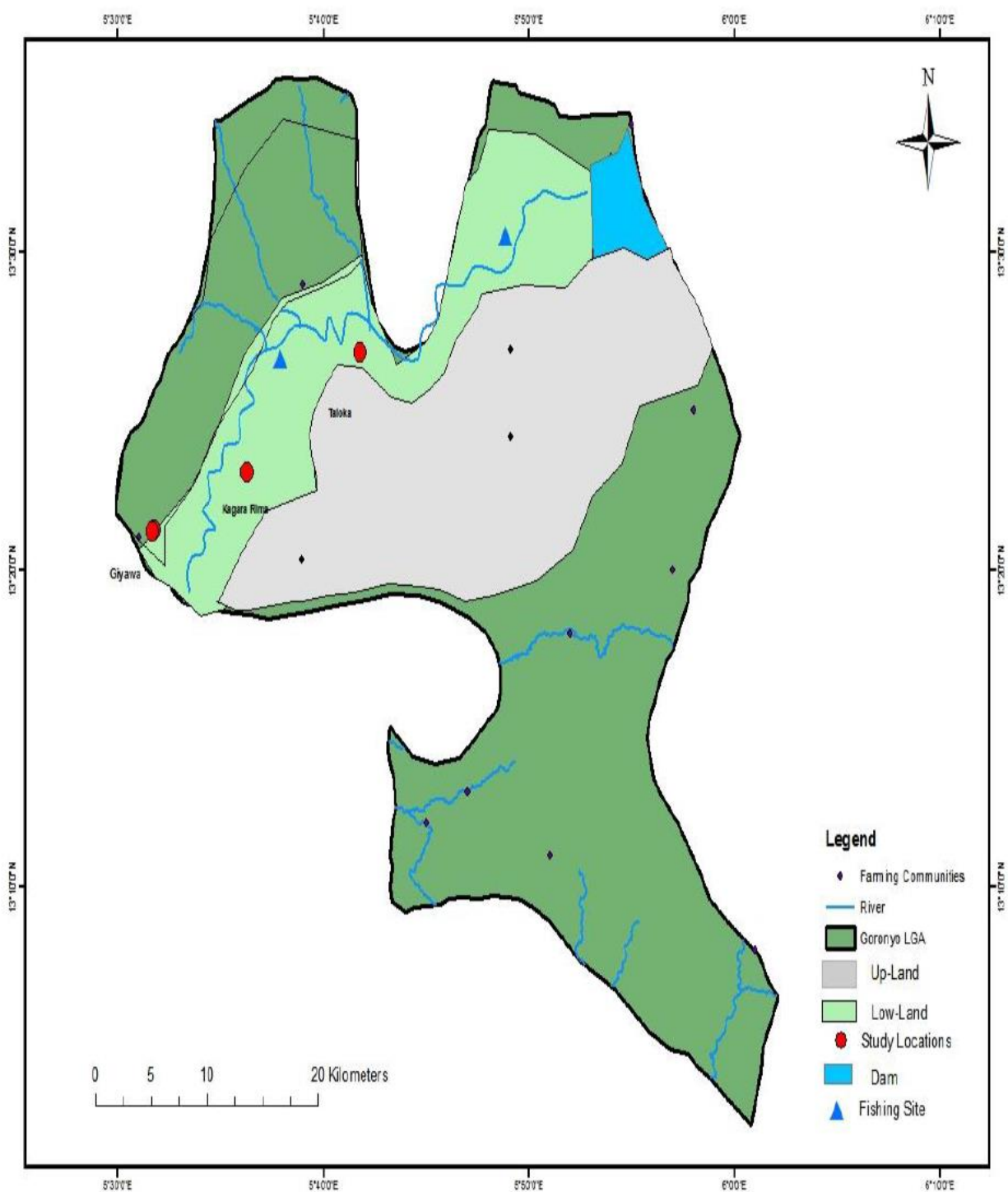


Figure 11: Goronyo LGA Showing the Livelihood Assets Affected by 2010 Flood Disaster

3.5.2 Wurno Local Government Area (LGA)

Different colours were used in Figure 12 to explain the physical, environmental, social and economic livelihood assets of farmers group in Wurno LGA affected by 2010 flood disaster. For instance, red colour portion in the map indicates the location of flood-affected farming communities such as *Barayar Zaki, Lugu and Tunga* located at the major route of River Rima. This implies that the closeness to River Rima and its tributaries exposed the farmers group to adverse effects of 2010 flood disaster. The light blue colour portion in the map indicates the position of Lugu Dam and River Rima. This means that the position of Lugu Dam exposed the farmers group to adverse effects of 2010 flood disaster. The light green colour portion in the map shows the location of lowland areas flooded due to occurrence of 2010 flood disaster. This implies that the influence of topography in the area that exposed the farmers group in Wurno LGA to adverse effects of 2010 flood disaster was due to action of river tributaries, valleys and flood running water. The dark green colour portion in the map highlights the entire landmass of Wurno LGA. This implies that the adverse effects of 2010 flood disaster in upland areas were not severe compared to lowland areas due to nature of physical terrain, closeness to River Rima and Lugu Dam in Wurno LGA. The fade white colour portion in the map indicates the upland areas of Wurno LGA. This implies that the upland areas affected by 2010 flood disaster were closed to lowland areas by frequency of running flood-water discharged from Lugu Dam. Hence, the black colour portion in the map indicates the location of farmers settlements affected by 2010 flood disaster. This implies that the settlements affected by 2010 flood disaster were located at lowland areas of Wurno LGA (Tambari, 2016).

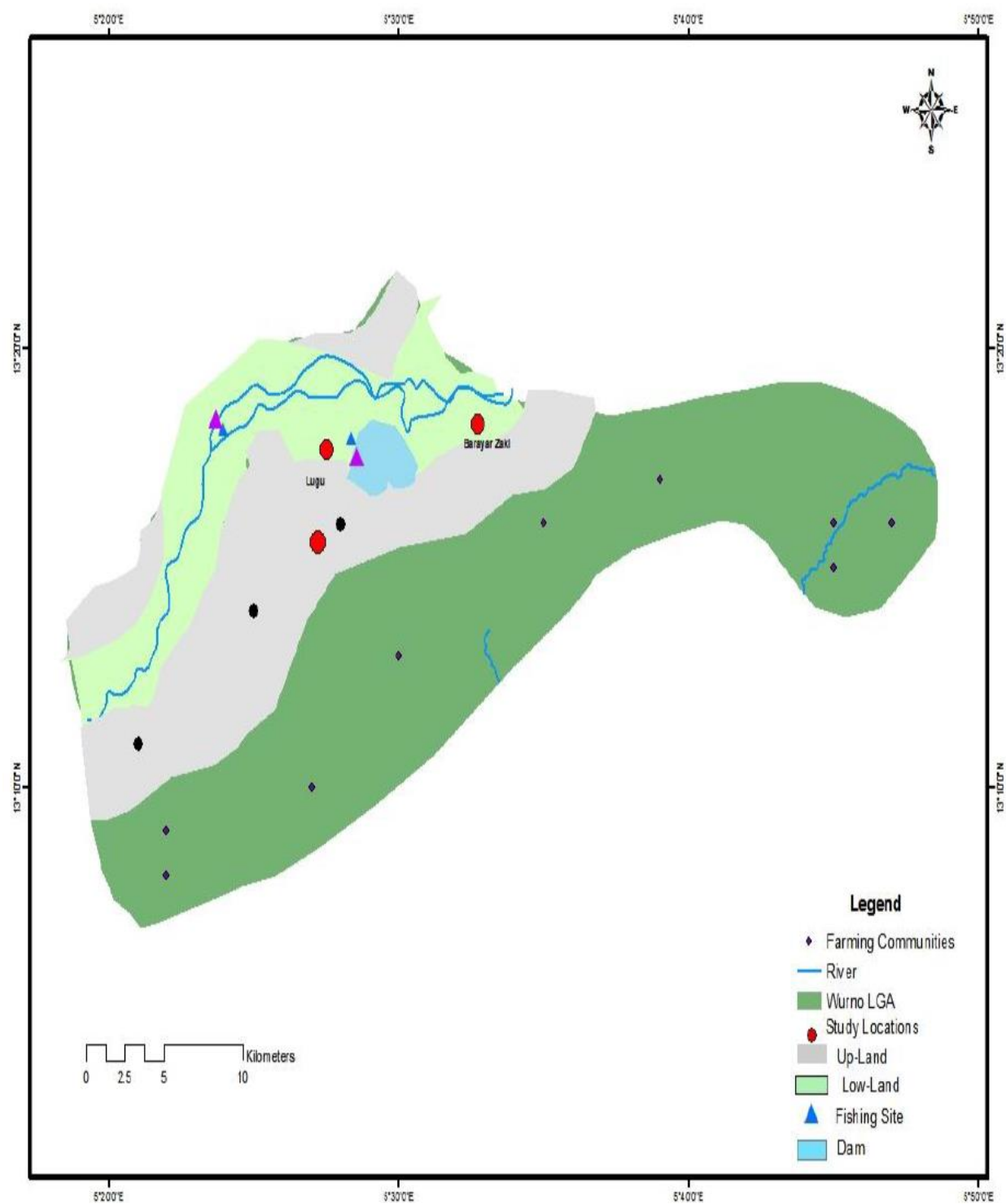


Figure 12: Wurno LGA Showing the Livelihood Assets Affected by 2010 Flood Disaster

3.5.3 Wamakko Local Government Area (LGA)

Different colours were also used in Figure 13 to explain the physical, environmental, social and economic livelihood assets of farmers group affected by 2010 flood disaster in Wamakko LGA. For instance, red colour portion in the map indicates the location of flood-affected farming communities such as *Rimawa*, *Bakin Gulbi* and *Kwal-Kwalawa* located at the major route of River Rima. This implies that the closeness to River Rima and its tributaries exposed the farmers group to adverse effects of 2010 flood disaster. Therefore, light green colour portion in the map shows the location of lowland areas flooded due to occurrence of 2010 flood disaster. This implies that the influence of topography in the area exposed the farmers group to adverse effects of 2010 flood disaster due to action of river tributaries, valleys and running flood-water. The dark green colour portion in the map highlights the entire landmass of Wamakko LGA. This implies that the adverse effects of 2010 flood disaster in upland areas were not severe compared to lowland areas due to nature of physical terrain and closeness to River Rima. Thus, fade white colour portion in the map indicates the portion of upland areas of Wamakko LGA. This implies that the upland areas affected by 2010 flood disaster were closed to lowland areas influenced by frequency of running flood-water discharged from Goronyo and Lugu Dams respectively. Meanwhile, the black colour portion in the map indicates the location of farmers settlements affected by 2010 flood disaster. This means that the farmers settlements affected by 2010 flood disaster were located at lowland areas of Wamakko LGA (Tambari, 2016).

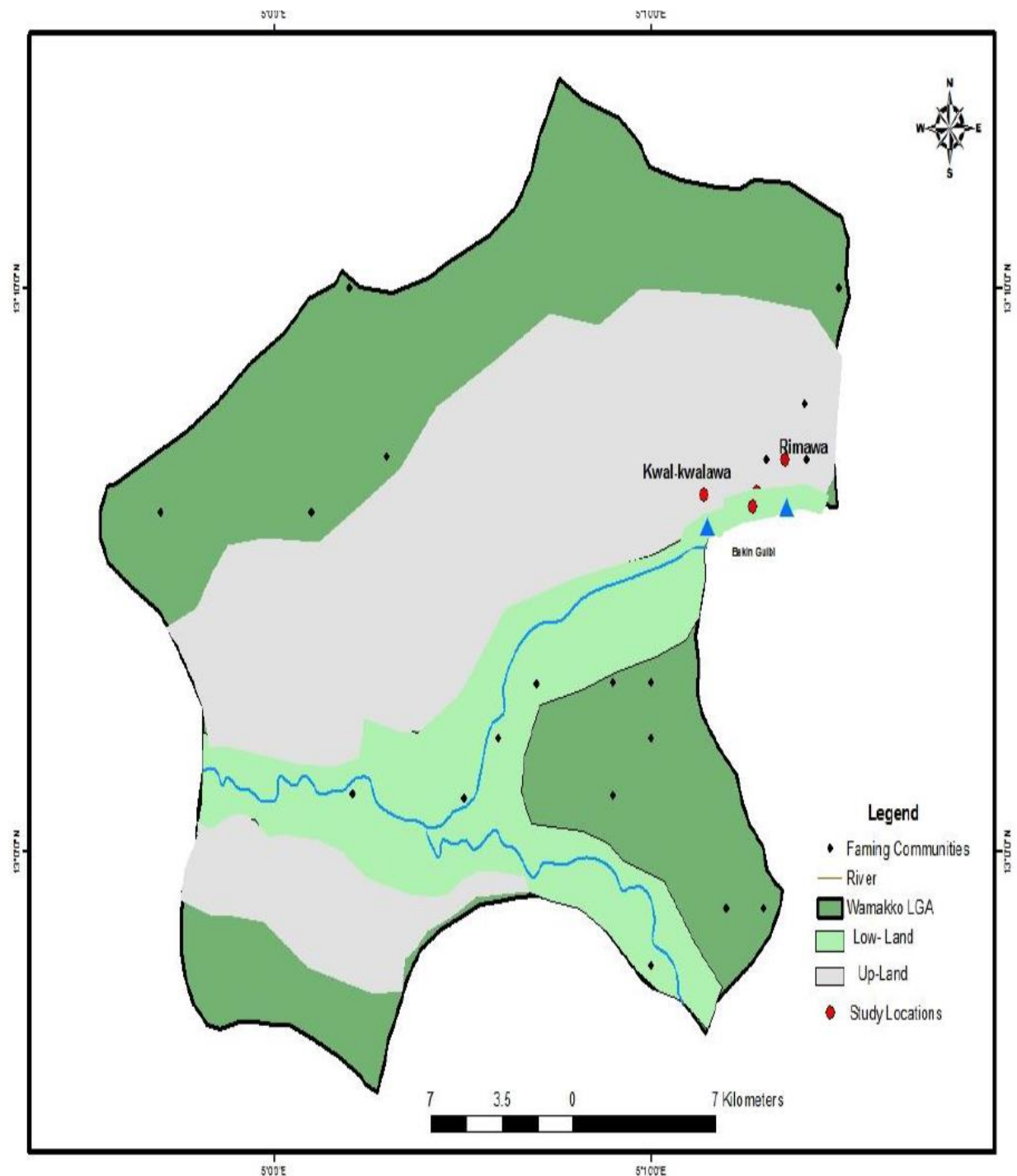


Figure 13: Wamakko LGA Showing the Livelihood Assets Affected by 2010 Flood Disaster

4. CONCLUSION

Sex, marital status, age, educational attainment, household size, primary occupation and residential building were used in the study for the evaluation of the socio-economic characteristics of farmers affected by 2010 flood disaster in Sokoto State. Thus, focus group discussion was also used in the study for the evaluation of upland crops, food stuffs and farm implements as livelihood assets of farmers affected by 2010 flood disaster in Sokoto State. Furthermore, wealth ranking was used in the study for the evaluation of quantity of food possessed by farmers group before and after the occurrence of 2010 flood disaster in Sokoto State. However, Venn diagram was used in the study for the evaluation of the extent of relationship between the institutional framework and key actors among the farmers group affected by 2010 flood disaster in Sokoto State. Lastly, the social mapping was used in the study for evaluation of physical, environmental, social and economic livelihood assets of farmers group affected in all the 3 selected LGAs affected by 2010 flood disaster in Sokoto State.

5. RECOMMENDATIONS

- i. Farmers in Sokoto State should change the mud residential building to concrete residential building.
- ii. Farmers in Sokoto State should endeavor to venture into non-farm income as supplementary to farm income.
- iii. Farmers in Sokoto State should cultivate flood tolerant crops so as to reduce the total loss of crops due to occurrence of flood disaster.
- iv. Farmers in Sokoto State should use dry season farming extensively to produce sufficient food stuffs.
- v. Farmers in Sokoto State should stop the expansion of residential building and farm land close to flood vulnerable areas.

REFERENCES

- Abdullahi, S. A., Muhammad, M. M., Adeogun, B. K., & Mohammed, I. U. (2014). Assessment of water availability in Sokoto Rima River Basin, *Journal of Resources and Environment*, 4 (5), 220-233.
- Abubakar, B. Z. (2006). Assessment of beneficiaries participation in Sokoto Agricultural Development Project, unpublished Theses, Usmanu Danfodiyo University, Sokoto.
- Galadima, Z. I. (2016). Effect of farmer field school on adaptation of improved farm practices by small ruminant farmers in Sokoto State, Nigeria, Unpublished dissertation, Usmanu Danfodiyo University, Sokoto.

- Iliya, M. A. & Tukur, B. A. M. (2013). The impact of climate change on Sokoto State, published by United Nations Development Programme & Sokoto State Government.
- Ismail, M. D. & Mustaqim, M. D. (2013). Socio-economic status of population in flood-prone areas of Malda District, West Bengal, *International Journal of Research in Applied and Social Sciences*, 1(3), 1-12.
- Ma'arufuddeen, A. A. (2013). The impact of climate change on Sokoto state: Evidence and challenges, published by United Nations Development Programme & Sokoto State Government.
- Makinta, M. M. (2016). Role of traditional institutions in farmer-herder conflict management in three selected local government areas of Borno State, Nigeria, Unpublished dissertation, Usmanu Danfodiyo University, Sokoto.
- National Emergency Management-NEMA (2010). Annual Report published by the Presidency, Plot 8, Adetokunbo Ademola Crescent, Maitama, Garki, Abuja, Nigeria.
- Nugroho, F. A. & Koji, A. (2012). Flood vulnerability based on social economic condition at flood-prone areas in Purworejo, central Java, Indonesia.
- Sokoto State Government (2016). The people, climate and vegetation of Sokoto, publication of Sokoto State Government.
- Tambari, I. W. (2016). Assessment of livelihood assets of farming households affected by 2010 flood disaster in Sokoto State, Nigeria, Unpublished dissertation, Usmanu Danfodiyo University, Sokoto.
- Tambari, I. W. & Abubakar, B. Z. (2018). Coping strategies of farming households affected by 2010 flood disaster in Sokoto State, Nigeria, *International Journal of Agriculture and Development Studies*, 3(1), 108-116.
- Tambari, I. W. & Umar, B. F. (2018). Adverse effects of 2010 flood disaster on livelihoods of farming households in Sokoto State, Nigeria, *International Journal of Agriculture and Development Studies*, 3(1), 100-107.
- Tosin, O. (2010). Sokoto State dams controversy on 2010 flood disaster, News Watch Report.
- Yabo, M. A. (2005). Recent expansion of Sabon Garin Igwai residential area in northwestern Sokoto metropolis, unpublished BSc project, Usmanu Danfodiyo University, Sokoto.

Yeldu, Y. M. (2014). The effect of flood disaster among farm families on flood plains of selected LGAs of Kebbi State, Nigeria, Unpublished dissertation, Usmanu Danfodiyo University, Sokoto.