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## APPLICATION OF PARTICIPATORY LAND USE PLANNING TOOL IN SOME COMMUNITY DEVELOPMENT AREAS OF JIGAWA STATE, NIGERIA

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### ABSTRACT

Participatory land use planning was conducted with the aim to develop community natural resources maps in some selected community development areas (CDA) for sustainable land use planning and problem prioritization for intervention in Jigawa State. Mapping of the community natural resources was conducted in six selected communities in two local government areas: Auyo LGA (Auyokayi, Ayan and Gamafoi), Dutse LGA (Dagwaje, Gandun Fawa and Kwadiya). The six CDAs were sketched, delineated and mapped participatorily, thereafter, problems of each of the CDAs were listed and ranked. The results obtained indicated that, land use types identified were rain-fed/upland, Fadama/ lowland, Sand-dunes areas and others. Farmlands are the major land use types in the study area, major prioritized problems by the farmers were poor irrigation facilities, low soil fertility, poor access roads and, inadequate water for domestic use.

**Keywords:** Participatory land use planning, Pairwise ranking: Community Development Areas.

### INTRODUCTION

Land use planning is a cross-sectoral and integrative decision-making process that facilitates the allocation of land to the uses that gives the greatest sustainable benefit (Haub, 2009). The need for land use planning arises whenever there is a competition for land in any form or in regions or sub-regions where severe degradation of natural resources (soil erosion or forest destruction) takes place, conflicts over land and natural resources increase, or in the areas where there is possibilities for intensification and diversification of crop production, but due to attitude of the community or government policy crop productivity remains limited.

Participatory land use planning is an iterative process based on the dialogue amongst all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating and monitoring its implementation (GTZ, 1999). The objective of participatory land use planning is to achieve sustainable land use, that is, a type of land use which is socially just and desirable, economically viable, environmentally sound and culturally and technically compatible. It sets in motion social processes of decision-making and consensus-building concerning the use and protection of private, communal or public land (GTZ, 1999).

Participatory land use planning aims at achieving the highest level of participation in order to ensure that people have a greater voice in planning and decision-making, become empowered, and develop ownership

for planning and implementing activities and to sustainably manage their land and the natural resources they rely on (Lisho, 2015). Participatory land use planning aims to achieve optimistic actual land use, choosing sustainable options that best meet community need, also raising awareness concerning environmental degradation and however, resolve conflicts which may arise between land users (Kusters *et. al.*, 2013). In order to involve the local population to the highest extent in the analysis and planning process, participatory rural appraisal (PRA)-tools are commonly used in participatory land use planning processes. Participatory rural appraisal (PRA) is an approach which can be used in the analysis of local problems and the formulation of tentative solutions with “grass-root”-stakeholders. It makes use of a wide range of visualization methods for group-based analysis to deal with spatial and temporal aspects of social and environmental problems. It mainly deals with a community-level scale of analysis and is increasingly being used to help deal with higher level systemic problems (GTZ, 1999).

Participatory land use planning links scientific and local knowledge. This means that local knowledge and technical know-how of land use planning are combined for improved land use. Information derived from stakeholders can be complemented with information from statistical and technical field surveys for sustainable land use. The objective of the research is to develop community natural resources maps in some selected community development areas (CDA)

for sustainable land use planning and problem prioritization for intervention in Jigawa State.

## MATERIALS AND METHOD

Jigawa state is one of the thirty-six states that constitute Federal Republic of Nigeria. It is situated in the northwestern part of the country between latitudes 11.00 ° to 13.00 ° N and longitudes 8.00 to 10.15 °E on an of elevation 472m above sea level. It has total population of about 4,361,002 (NPC, 2006).

The study was conducted in two local government areas of Jigawa state located between latitudes 11.00 to 13.00 ° N and longitudes 8.00 to 10.15 °E in the Sudan savanna agro-ecological zone of Nigeria (Fig. 1). The local government areas are Dutse and Auyo. Within each of the local government areas three

Community Development Areas (CDA) were selected. For Dutse LGA, Dagwaje (9424.48ha), Gandun-Fawa (355.87ha) and Kwadiya (2701.27ha) each with ten, three and four villages areas respectively, while Auyo LGA also consisted of three CDAs Gamafoi (2338.11ha), Auyakayi (2727.91ha) and Ayan (1823,12ha) CDA each had fourteen, thirteen and ten village areas respectively.

The vegetation is mainly Sudan savanna which has less continuous cover crops with short shrubs, featherless grass with isolated trees. Agricultural activities in the area are mainly rain-fed, irrigation, nomadic, sometimes, irrigation is used to supplement rain-fed farming, while, mixed cropping is the main farming activity.

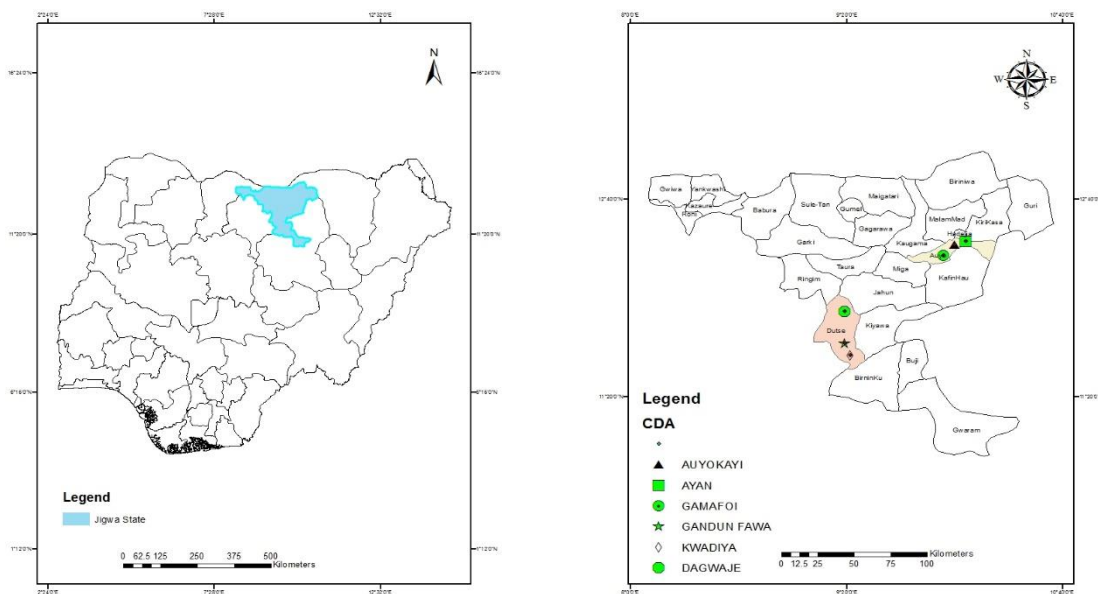


Figure 1: Map Showing Selected CDAs in the Study Area

### Focus Group Discussion

Focus group discussion aimed at participatory sketch mapping and problem identification and ranking was conducted in six Community Development Areas (CDAs) to explore issues such as land use planning, soil fertility management and natural resource management, the discussion were done in collaboration with community members and local stakeholders. In attendance were the State Participatory Land Use Team and the consultants. The Local Government Support Officers (LGSOs) were burdened with the responsibility of mobilizing the community for full participation. Participatory Land Use Mapping techniques which involved community

development members were conducted to explore local land use planning issues, aimed at developing a community action plan through identification of community problems, ranking of those problems and prioritizing them for interventions.

### Participatory Map Sketching

The sketch map of each community was drawn by the participants at the interactive session of the group discussion. The community members were guided by the facilitators for proper identification and location of their communities as well as the community administrative boundaries with local materials, indicating settlements roads, natural resources (rivers, streams, lakes, forests) land use patterns, such as

agricultural land, grazing land, cattle routes, and protected areas. Problems /conflicts areas, natural erosion, flooding and areas in conflict between user groups were also identified. A participant from each of the communities (either male or female) was asked to locate the position of his/her community on the map. In case of disagreement by community members, a member of the village area present at the venue helps to provide the accurate information. As a result of this

process a complete sketched map with location of resources and problem areas were identified (Figures 2). Some participants from the group were asked to copy the map on a large sheet of papers so that the map should be used for further planning. Care was taken to ensure that everything on the map was captured on the large sheet, legend was also developed and the map was later handed over to the community leadership.



Figure 2: Sketching of Resource Map at CDA

#### **Transect Walk and Resource Survey**

Ground-truthing was conducted with the aid of hand-held GPS, all important features located on the sketch map were identified and geo-tagged in order to optimally geo-reference them on the map. All point features and areas shown in the map were located on the map exactly where they are in the real world. Boundaries of each community were also delineated and surveyed with the participation of stakeholders in order to transfer the information into official maps. The spatial information obtained from the field was transferred into GIS software and satellite images were used as a base map of each community mapped.

#### **Problem Identification and Ranking**

At the interactive session of the discussion land use problems were identified and listed by the participants, to achieve active participation in the problem

identification session, the community members were grouped into mixed group with specific interest; Men, Women, Elderly and Young people.

The ranking exercise preceded using the pair wise ranking method and direct voting by the community members. This method involved pairing of a problem with series of others problems to determine its level of severity relative to other problems. The ranking provided opportunity to prioritize problems based on the needs of the community.

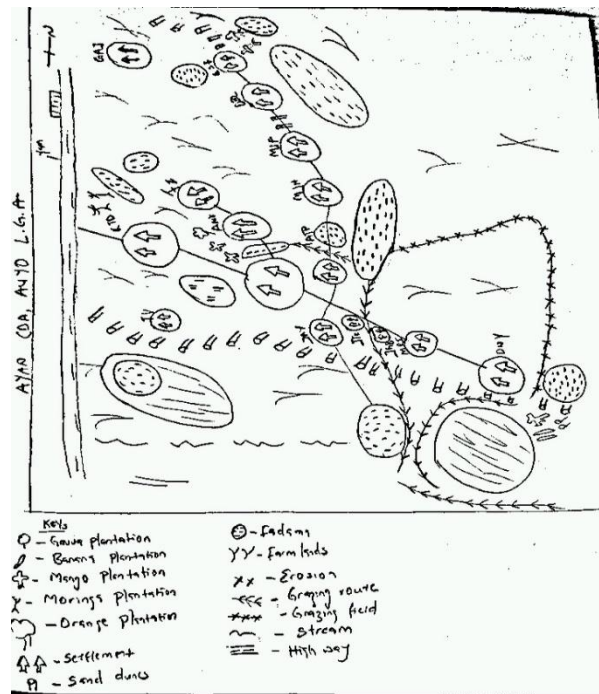
#### **RESULTS**

##### **Sketching and Geo-Reference Community Mapping**

Figures 3a and 3b showed hand sketched and geo-referenced maps of Ayan community. The size of the geo-referenced map was estimated to be approximately 1823.12 hectares with 10 villages areas

as shown in figure 3b. The participants mapped out the various land uses, such as Fadama land, farmland, Sand-dunes, eroded areas, grazing route and field, streams and settlements. Various plantations of guava, banana, mango and moringa were also mapped. As presented from the figures Fadama and rainfed agricultural lands are the main land use types in the CDA.

The geo-referenced map (Fig. 3b), indicated that Ayan CDA, is dominated by rain-fed agriculture (51%), stabilized dunes (9%), uncontrolled irrigation (36%), ponds (1%) and settlement sites (2%).



In Auyokayi village area, participants sketched map of the CDA, showing different land use types such as drainage pattern, fadama, villages, road, Sand-dune, river, bridge and others social amenities as shown in Figure 3c. Geo-referenced map also captured similar features as the participant sketched map, however, Agricultural land and irrigation scheme were added (Figure 3d). The geo-referenced map (Fig. 3d) size of the area was estimated to be approximately 2726.91 hectares consisted of rain-fed agriculture (8%), stabilized dunes (5%), constructed irrigation scheme (55%), Fadama (26%), ponds (2%) and settlement sites (2%). The community had 13 villages' areas.

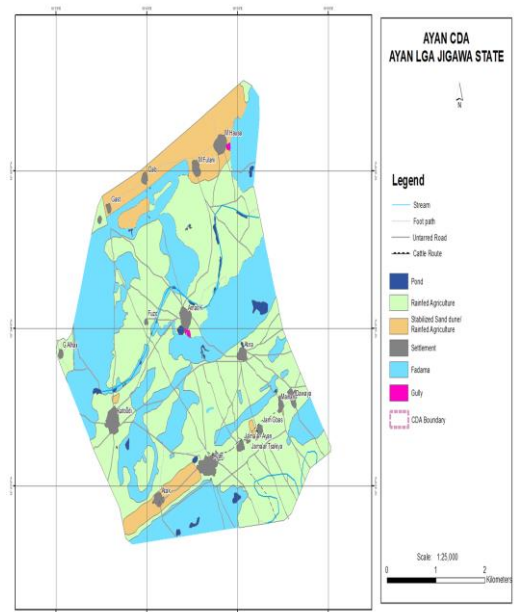


Figure 3a: Hand Sketced and Geo Referenced Map of Ayan CDA





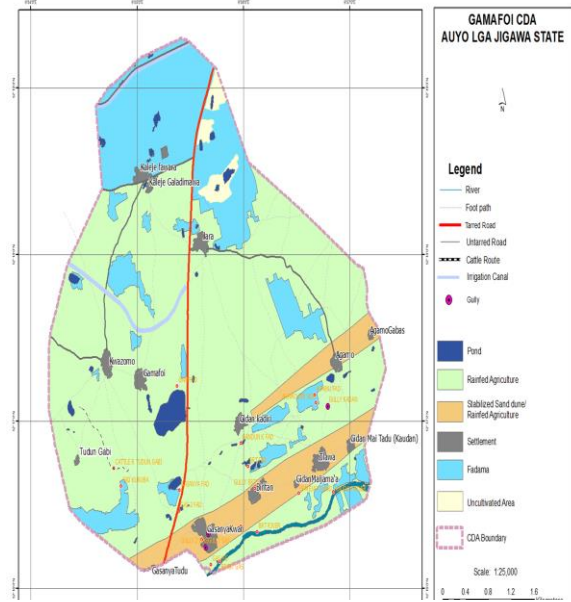
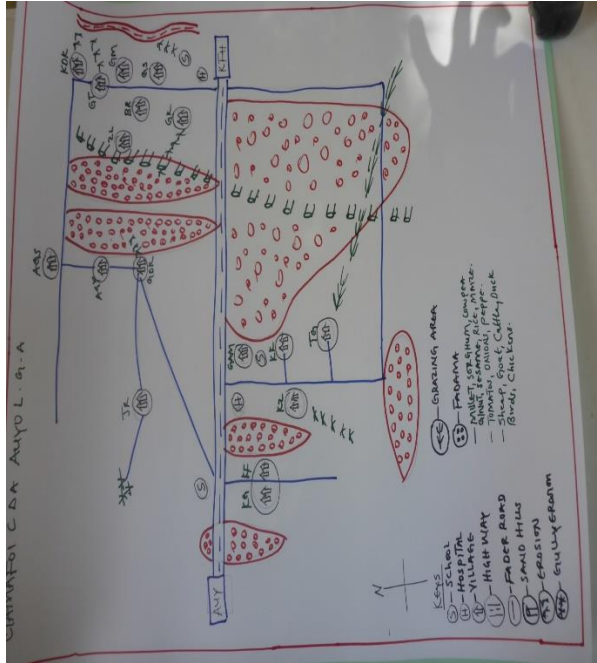


Figure 3e: Hand Sketched and Geo Referenced Map of Gamafoi CDA

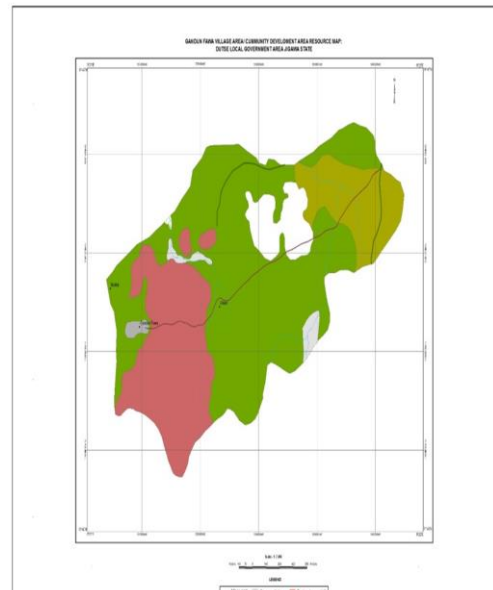
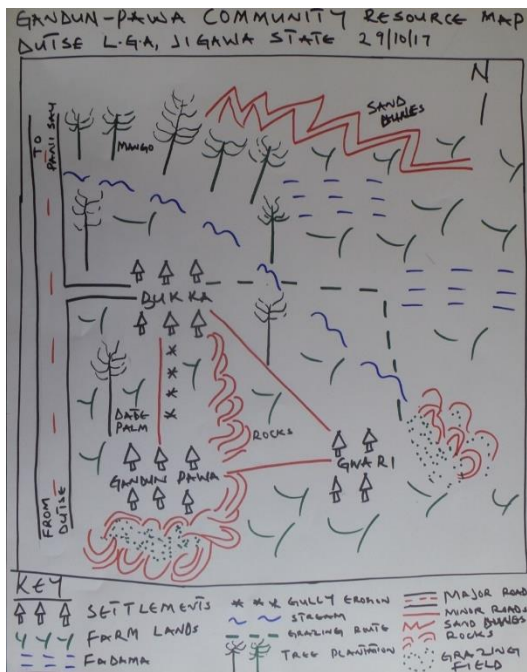


Figure 3g: Hand Sketched and Geo Referenced Map of Gandun Fawa CDA

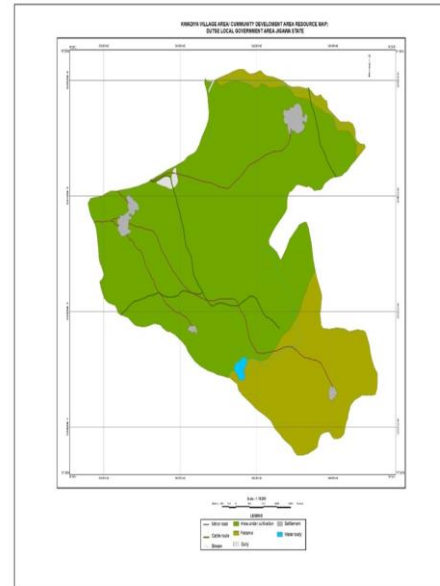
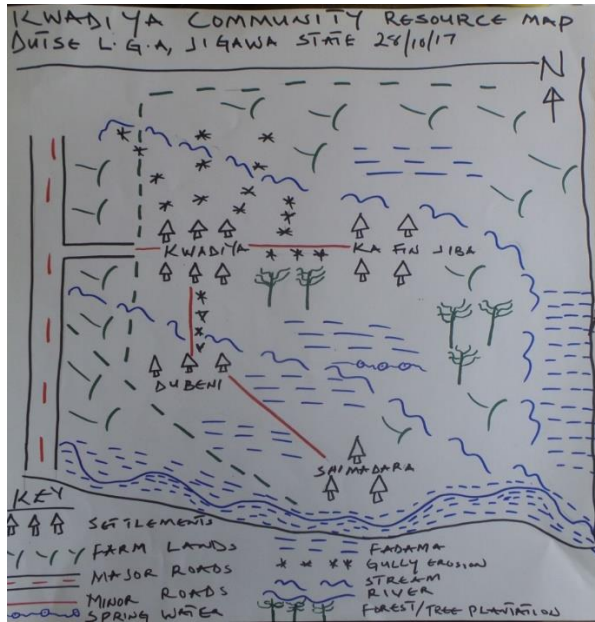


Figure 3i: Hand sketched and Geo Referenced Map of Kwadiya CDA

The geo-referenced map of Kwadiya CDA showed only five land cover types, with approximately 2701.27 hectares. The land cover types include area under cultivation (74%), Fadama (23%), gully (0.4%), settlement (2%) and water body (0.3%) as presented in (Figure 3j). However, other features visible in sketched map conducted by the participants during participatory mapping are shown in (Figure 3i). Such features are stream, forest plantation, major and minor roads.

Dagwaje CDA is the largest CDA among the six

community areas with an approximate land area of about 9424.48 hectares, both hand sketched and geo-referenced maps showed that the CDA had ten (10) village areas as shown in (Figure 3k and 3l). The participants sketched out areas like settlements, farmland, grazing area, Sand-dune, tree plantation and different roads, while the palm plantation was visible in geo-referenced map. The geo-referenced map (Figure 3l) constituted land cover types of area under cultivation (44%), dominantly palms plantation (26%), Sand-dune (20%), and grazing area (7%).

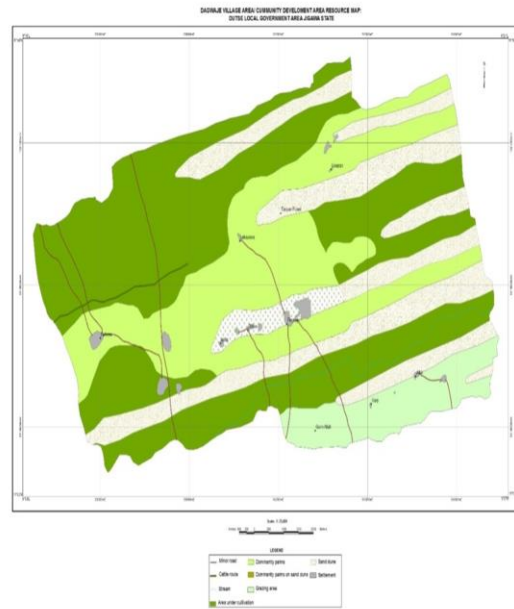
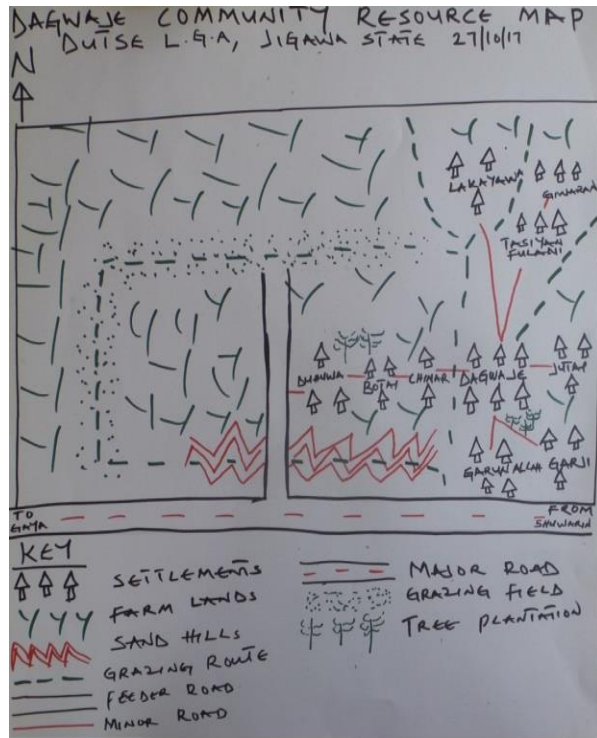


Figure 3k: Hand Sketched and Geo Referenced Map of Dagwaje CDA.

### Statistics of Land Resources and Land Use Types

The resource mapping in the various CDAs of the study areas indicated that, there are four major land use types (Table 2). The figures 3d to 3l, indicated that, the land use types include, irrigated land use type/Fadama constituted 1508.45ha (55.3%) in Auyokayi, 665.63ha (36.5%) in Ayan, 473.35ha (20.2%) in Gamafoi, 43.22ha (12.1%) in Gandu, and 632.25ha (23.4%) in Kwadiya. There were no irrigation facilities identified in Dagwaje CDA. Areas under cultivation for rain-fed were 215.48ha (7.9%) in

Auyokayi, 932.49ha (51.2%) in Ayan, 1549.51ha (66.3%) in Gamafoi, 4155.23ha (44.1%) in Dagwaje, 195.29ha (54.9%) in Gandun Fawa, and 2004.56ha (74.2%) in Kwadiya, Sand-dune also consisted of 129.01ha (4.7%) in Auyokayi, 162.99ha (8.9%) in Ayan, 184.39ha (7.9%) in Gamafoi, and 1888.86ha (20%) in Dagwaje, no Sand-dune in Gandun Fawa and Kwadiya, but hill 84.73ha (24.7%) at Gandu Fawa (Table 2) and (Figure 3h).



Table 1: Statistics of Land Use Types of the Study Area

CDA	Landuse cover	Ha	%
Auyukayi	Canal	35.62	1.306
	Fadama	719.48	26.384
	Gully	0.09	0.003
	Irrigation Scheme	1508.45	55.317
	Pond	53.5	1.962
	Rainfed Agriculture	215.48	7.902
	Reservoir	8.69	0.319
	Road	2.4	0.088
	Sand-dune	129.01	4.731
	Settlement	54.19	1.987
	<b>CDA Total</b>	<b>2726.91</b>	<b>100.000</b>
Ayan	Gully	1.47	0.08
	Pond	16.66	0.91
	Rainfed Agriculture	932.49	51.15
	Sand-dune	162.99	8.94
	Settlement	43.88	2.41
	Uncontrolled Irrigation	665.63	36.51
		<b>CDA Total</b>	<b>1823.12</b>
Gamafoi	Gully	0.03	0.001
	Pond	39.04	1.670
	Rainfed Agriculture	1549.51	66.272
	River	12.95	0.554
	Sand-dune	184.31	7.883
	Settlement	49.09	2.100
	Uncontrolled Irrigation	473.35	20.245
	Uncultivated Area	29.83	1.276
	<b>CDA Total</b>	<b>2338.11</b>	<b>100.000</b>
Dagwaje	Area under cultivation	4155.23	44.09
	Dominantly palms	2441.84	25.91
	Dominantly palms on sand	197.47	2.10
	Sand-dune	1888.86	20.04
	Grazing area	662.21	7.03
	Settlement	78.87	0.84
		<b>CDA Total</b>	<b>9424.48</b>
Gandu	Area under cultivation	195.29	54.88
	Fadama	43.22	12.14
	Gully	5.69	1.60
	Orchard	0.32	0.09
	Quarry	21.64	6.08
	Rock outcrop or hill	87.73	24.65
	Settlement	1.98	0.56
	<b>CDA Total</b>	<b>355.87</b>	<b>100.00</b>
Kwadiya	Area under cultivation	2004.56	74.21
	Fadama	632.25	23.41
	Gully	11.35	0.42
	Settlement	44.67	1.65
	water body	8.44	0.31
	<b>CDA Total</b>	<b>2701.27</b>	<b>100.00</b>

### Problems Identification and Ranking

Land use problems were identified and listed by the participants, to achieve active participation in the problem identification session, the community members were grouped into; Men, women and youths.

The community problems identified were ranked using the pair wise method and direct voting by individual community members. The method involved pairing of a problem, with series of other problems to determine its level of severity relative to others. The ranking

provided opportunity to prioritize problems based on the needs of the community with participants having a good understanding of the extent problems and the needed intervention type.

In Ayan village area eight problems were identified by the participants as presented in Table 2. The method involved pairing of a problem, with series of other problems, one after the other to obtain a position for on a chart depending on how important such a problem is to the community as shown in Table 1. Shortage of irrigation facilities being the number one prioritized problem agreed by the community members.

Eight problems were displayed on a problem's list of Auyokayi village area (Table 2), after a lengthy deliberation on the problems, poor irrigation system was voted as a major problem by all participants as presented in Table 2, while flooding and erosion were the least problem prioritized. The problem identification and ranking process in Gamafoi ensured the commitment of the community members leading to identification of eight problems (Table 3). Ranking of problems seeks to identify the most serious problems in the community, the prioritized problem was poor irrigation facilities (Table 3).

In Gandun Fawa Community Development Area (CDA), the participants men, women and the youths, identified their land use problems. The men and youth mentioned erosion/gullies, low soil fertility, shortage of work bulls, poor seedlings and inadequate irrigation facilities, and lack of storage facilities as their major problems. The women were particular about the lack of oil extraction machine and grain processing machine (Table 3). The most identified problem ranked base on need by the community was low soil fertility (Table 3).

The members of Kwadiya CDA identified problems related to land-use and agriculture as shown in Table 4. The identified problems were ranked by the community using the pair-wise ranking system where poor access road ranked first followed by low soil fertility and gully erosion as second and third majors problems as presented in Table 4.

Dagwaje CDA members identified eleven (11) problems as shown in Table 4. The identified problems were ranked using the pair wise ranking method and direct voting from the community members. This method involved pairing of a problem with series of other problems to determine its level of severity relative to others as presented in Table 4.

Table 2: Problem Identification, Ranking in Ayan and Auyokayi CDA

Problem Identification and Ranking in Ayan CDA												
Sn	Problems	Ranking Number	1	2	3	4	5	6	7	8	Score	Rank
1	Shortage of irrigation			1	1	1	1	1	1	1	7	1 <sup>st</sup>
2	Inadequate input supply				2	2	2	2	2	2	6	2 <sup>nd</sup>
3	lack of access roads					3	3	3	3	3	5	3 <sup>rd</sup>
4	Lack of capital for women empwerment						4	6	7	8	1	7 <sup>th</sup>
5	Inadequate processing machine							6	7	8	0	8 <sup>th</sup>
6	Poor extension service delivery								6	6	4	4 <sup>nd</sup>
7	Poor market linkages									7	3	5 <sup>th</sup>
8	Poor mechnization										2	6 <sup>th</sup>
Problem Identification and Ranking in Auyokayi CDA												
Sn	Problems	Ranking Number	1	2	3	4	5	6	7	8	Score	Rank
1	Poor access road			1	1	4	1	6	1	1	5	3 <sup>rd</sup>
2	Lack of capital for empowerment				2	2	2	6	7	8	3	5 <sup>th</sup>
3	Flooding and erosion					4	5	6	7	8	0	8 <sup>th</sup>
4	Poor irrigation system						4	4	4	4	6	1 <sup>st</sup>
5	Weed infestation (typha grass)							6	7	8	1	7 <sup>th</sup>
6	Inadequate input supply								6	6	6	2 <sup>nd</sup>
7	Poor market linkages									7	4	4 <sup>th</sup>
8	Poor mechnization										3	6 <sup>th</sup>

Table 3: Problem Identification, Ranking in Gamafoi and Gandun-fawa CDA

Problem Identification and Ranking in Gamafoi CDA												
Sn	Problems	Ranking Number	1	2	3	4	5	6	7		Score	Rank
1	Poor irrigation facilities			1	1	1	1	1	1	1	7	1 <sup>st</sup>
2	Low soil fertility				3	2	2	2	2	2	5	3 <sup>rd</sup>
3	Lack of improved seeds					3	3	3	3	3	6	2 <sup>nd</sup>
4	Inadequate access to inputs stores/shops						5	4	7	4	2	7 <sup>th</sup>
5	Inadequate processing machines							6	7	5	2	5 <sup>th</sup>
6	Poor market linkages (Off-Takers)								7	6	2	6 <sup>th</sup>
7	Inadequate mechanisation/ farm implements									7	4	4 <sup>th</sup>
8	Poor access roads linkages										0	8 <sup>th</sup>
Problem Identification and Ranking in Gandun Fawa CDA												
Sn	Problems	Ranking Number	1	2	3	4	5	6	7	8	Score	Rank
1	Gully erosion		1	3	4	5	6	7	8	9	1	8 <sup>th</sup>
2	Shortage of work-bulls			2	4	2	2	7	8	9	3	5 <sup>th</sup>
3	Lack of oil extraction machine				4	3	3	7	8	9	3	6 <sup>th</sup>
4	Irrigation scheme					4	6	7	4	4	6	2 <sup>nd</sup>
5	Lack of storage facility						6	7	8	9	1	9 <sup>th</sup>
6	Grain processing machine							7	8	9	3	7 <sup>th</sup>
7	Low soil fertility								7	7	8	1 <sup>st</sup>
8	Plant pest and diseases									8	6	3 <sup>rd</sup>
9	Improved seeds										5	4 <sup>th</sup>

Table 4: Problem Identification, Ranking in Kwadiya and Dagwaje CDA

Problem Identification and Ranking in Kwadiya CDA															
Sn	Problems	Ranking Number	1	2	3	4	5	6	7		Score	Rank			
1	Gully erosion			1	3	4	1	1	1	8	4	3 <sup>rd</sup>			
2	Lack of improved seeds				3	2	2	2	2	8	4	4 <sup>th</sup>			
3	Low soil fertility					3	3	3	3	8	6	2 <sup>nd</sup>			
4	Pest and disease						4	4	4	8	4	5 <sup>th</sup>			
5	Lack of rice milling machine							6	6	8	0	7 <sup>th</sup>			
6	Lack of oil extraction machine								6	8	3	6 <sup>th</sup>			
7	Lack of grain thresher									8	0	8 <sup>th</sup>			
8	Poor access roads									0	7	1 <sup>st</sup>			
Problem Identification and Ranking in Dagwaje CDA															
Sn	Problems	Ranking Number	1	2	3	4	5	6	7	8	9	10	11	Score	Rank
1	Soil infertility		2	1	1	1	1	1	1	1	1	1	1	9	2 <sup>nd</sup>
2	Water for domestic use			2	2	2	2	2	2	2	2	2	2	10	1 <sup>st</sup>
3	Grain threshers				4	5	6	7	8	9	10	11	11	0	11 <sup>th</sup>
4	Lack of oil extracting machine					5	6	7	8	9	10	11	11	1	10 <sup>th</sup>
5	Lack of good access roads						6	7	8	5	5	5	5	5	6 <sup>th</sup>
6	Lack of irrigation scheme							7	6	6	6	6	11	6	4 <sup>th</sup>
7	Pests and diseases								7	7	7	7	7	8	3 <sup>rd</sup>
8	Lack of drinking point for livestock's									8	8	8	8	6	5 <sup>th</sup>
9	Lack of grazing land											10	11	2	9 <sup>th</sup>
10	Shortage of cooking												11	3	8 <sup>th</sup>
11	Shortage of work-bulls												0	5	7 <sup>th</sup>

## DISCUSSION

### Sketching and Geo-reference Community Mapping

The sketch mapping and geo-reference mapping techniques were used to gather land use information in each Community Development Areas of the LGAs as reported by IFAD (2009). During the process various land uses such as Fadama land, rain-fed area, Sand-dune erosion, vegetation cover, access road, infrastructure, water bodies, grazing area, drainage and settlements were identified, sketched and mapped by the participants. Sketch maps were used to collect spatial data information from communities during qualitative interviews as reported by (Son, 2005).

Geo-referenced maps were produced based on GPS portions, and locations, which were delineated based on the resolution, scale and accuracy of the satellite images (Maji *et al.*, 1998). The maps produced for Auyokayi and Gamafoi communities revealed that the community's land is serviced with artificial irrigation scheme such as water reservoir, major and minor irrigation canal, the scheme was not sketched by the participants during the mapping exercise despite the fact that it played a key role in irrigation farming in the communities. Most of the farmers in the areas had access irrigation water through the scheme, this may be attributed by either their emphasis or miss-priority of land use types in the community or the scheme

escaped the memory of the participants. Important natural resources at the community levels are soil, water, and plant cover, the optional use of these natural resources depends mainly on the potential of people to sustainably manage these resources based on their socio-economic condition and carrying capacity of the natural resources within the areas (Rudi *et al.*, 2009).

#### **4.2 Statistics of Land Resources and Land Use Types**

The statistics of land resources and land use types revealed that the six communities were dominated by three to four land use types as presented below:

1) **Irrigation land use type/Fadama:** *Fadama is a Hausa name for wetlands area. This is the low lying plain mostly under laid by shallow stream-line along major river banks, such a land area especially is suitable for irrigation and traditionally provide feed and water for livestock. Fadama farming provides a platform for sustainable wet and dry seasons crop cultivation (Ufoegbune, 2016). Rice, maize, and sorghum are the major crops grow under Fadama area during rainy season, while vegetables, wheat, and rice are irrigated crops cultivated during dry season. Maize is grown particularly towards the end of the rainy season around September and supplement with irrigation. Soils of the Fadama are mostly characterized with silty loam to clay loam, moderately deep to deep with imperfectly to poor drainage (GIFSEP, 2017).*

2) **Rainfed land use type:** *Rain fed crop cultivation is the major cultivation types, it comprised of about 50-70% of total area. Millet, sorghum, groundnut, sesame and cowpea were the major crops cultivated in the area. Water melon is also cultivated under rainfed mostly at the middle to end of the rainy season. Roselle, moringa and gamba grass are usually planted around farm perimeters for boundary demarcation, and household income. Soils in the area are yellowish to reddish brown silty loam, deep and well drained as reported by GIFSEP (2017).*

3) **Sand-dune land use type:** *In Nigeria they are mostly found in the extreme northwestern region (Raji, 1995). Stabilized sand usually are parallel ridges at the flanks of the communities of Jigawa state. The Sand-dunes are silty sand reddish to yellowish brown, deep and well drained. Crops like millet, ground nut, and cowpea are cultivated on the dunes.*

4) **The others land use types:** *This includes settlements and water bodies. Plantations along and across the communities serves as wind breaks and shelterbelts, some of the plantations are economic trees such as date palm, guava, banana, and mango,*

*which have dual purposes as income trees. Uncultivated area/ grazing areas, found in some of the communities are used as grazing reserve or fallow area, orchard; economic tree plantation such as mango, guava, cashew, orange, banana use as erosion and wind control couple with sources of income for the communities.*

*The Sand-dunes and Fadama areas were not observed in Kwadiya and Dagwaje communities. In Gamafoi and Dagwaje CDAs, grazing areas were allocated for animal grazing, but in some of the CDAs the cattle routes that were used for the animal to access drinking water were encroached by farm lands..*

#### **4.3 Problems Identification and Ranking**

Problems Identified were listed by the participants in each of the six CDAs. The problems were listed without any notion of their importance, which allows for active participation in this session, the community members were grouped into men, women and youths.

The ranking of problems were carried out using pair wise ranking method and direct voting by the communities. The ranking provided opportunity to prioritize problems based on the needs of the community, with participants having a good understanding of the extent and the need for intervention. The CDAs in Auyo LGA were more concerned about poor or inadequate irrigation facilities in their communities, this may be attributed to vast Fadama land area available coupled with less irrigation inputs. The farmers in the area mostly use small pumps to their crops as well as tube-wells (HVL, 2012). In both Auyokayi and Gamafoi CDAs, irrigation scheme were visible on the maps. Ground-truthing of the irrigation schemes revealed that the scheme utilized the water released from Hadejia barrage through a feeder canal into the main canal, distributaries canals and finally to the field channels where water is fed directly to farmlands.

Low soil fertility is ranked the highest problem in Gandun Fawa of Dutse LGA, during problem ranking exercise. The physical properties of the soils revealed the soils were predominantly sandy in nature, low in nutrient contents and water holding capacity. Sandy soils are generally poor in plant nutrients and the nutrients applied to these soils are subject to loss by leaching especially nitrogen (FAO, 1973).

Inadequate water for domestic use was the most serious problem prioritized in Dagwaje CDA. Observing both sketch and geo-reference maps of Dagwaje, Sand-dunes formed parallel ridges at the flanks of the CDA, no Fadama land and water bodies were seen on the CDA maps, thus the CDAs are prone to desertification which characterized by low water

availability and vegetation cover (Morberg and Esu, 1991). The major source of water in the CDA is hand pumps and solar water project therefore, there is possibility for water scarcity during dry season in the area considering the nature of the CDA. During the ranking exercise in Kwadiya CDA, the participants prioritized poor access road as their main problem in the CDA, this may be attributed to the location of the CDA at the outskirts of state capital (Dutse), therefore, the farmers there need to have access road that would link them to the state capital for easy farm input and output transportation, in view of the water bodies in the CDA, thus the CDA is susceptible for flooding and erosion during rainy season, which might be responsible for the need for access roads to their inter and intra villages movement.

### CONCLUSION

Participatory land use planning in Auyo and Dutse LGAs of Jigawa state revealed that, the six community development areas delineated and mapped had similar natural resources. The six CDAs had different land use problems due to differences in terrain, physical, biological and economical characteristics in the CDAs, however, some of the outstanding problems were poor irrigation facilities in Auyo CDAs, low soil fertility issues in Gandun Fawa, poor access roads in Kwadiya and inadequate water for domestic use in Dagwaje.

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