

**STRATEGIC BASELINE STUDY OF AJASSE IPO  
WATERSHED CATCHMENT AREA**

**REPORT OF A**

**A STUDY BY**

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SECOND NATIONAL FADAMA DEVELOPMENT PROJECT  
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**List of Acronyms**

ADP	Agricultural Development Project
CBD	Convention on Biological Diversity
CEMP	Critical Ecosystem Management Project
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Activity
FAO	Food & Agricultural Organisation
FCA	Fadama Community Association
FGDs	Focus Group Discussions
FGDO	Fadama GEF Desk Office/Officers
FMAWRRD	Federal Ministry of Agriculture, Water Resources and Rural Development
FMEHUD	Federal Ministry of Environment; Housing and Urban Development
FUA	Fadama Users Association
FRUG	Fadama Resource Users' Group
GEF	Global Environmental Facility
GIS	Geographic Information System
GPS	Global Positioning Systems
LDPs	Local Development Plans
LGA	Local Government Area
IDA	International Development Association
IPM	Integrated Pest Management
IT	Information Technology
LDFC	Local Fadama Development Committee
LDP	Local Development Plan
LFD	Local Fadama Desk
LFDC	Local Fadama Development Committee
LFDO	Local Fadama Development Office/Officer
M&E	Monitoring and Evaluation
MIS	Management Information System
NFDO	National Fadama Development Office
NFDP	National Fadama Development Project
NFTC	National Fadama Technical Committee
NGO	Non-Governmental Organization
NPC	National Project Coordinator
NRM	Natural Resource Management
NTFPs	Non-Timber Forest Products
PCU	Projects Coordinating Unit
PME	Participatory Monitoring and Evaluation
PR:	Participatory Rural Appraisal
RBDAs	River Basin Development Authorities
SFDC	State Fadama Development committee
SFDC	State Fadama Development Committee
SFDO	State Fadama Development Office
SFEO	State Fadama Environmental Officer
SWS	State Watershed Sub-committee
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United Nations Convention to Combat Desertification

## ***Executive Summary***

Presently, Nigeria is among the nations that are technically unable to meet their food supply needs from rain-fed production at a low level of inputs and appear likely to remain so even at intermediate levels of inputs at some point's time between 2000 and 2025 (FAO 2002). For the rural areas of semi-arid Northern Nigeria, which experiences significant climatic and anthropogenic changes that have exacerbated food insecurity in the region, floodplain agriculture is critical to the survival and economic development of poor vulnerable rural households.

Stakeholders and donor agencies have become convinced that the security offered by floodplains could become the basis for rural economic transformation and food security in semi-arid Africa, as they contribute significantly to domestic food production. In October 2004, the Nigeria government launched the Second National Fadama Development Project (Fadama II) to increase the income of farmers, fishers and other people in low lying floodplains where poverty is concentrated.

To complement the Fadama II and to ensure the long term sustainable management of Fadama lands, the Federal Government of Nigeria (FGN) requested the Global Environment Facility (GEF) for a grant support. Specifically, the proposed GEF intervention will provide the ecological framework for addressing the root causes of reduced Fadama agricultural productivity and the negative impact of unsustainable land-use practices.

This study provides data and information on the status of the Ajasse-Ipo Watershed Catchments (proposed GEF intervention site) prior to investment, especially on land use and land and water management. Baseline data were collected through a review of existing documents and field investigation covering all environmental media and socioeconomics characteristics of the communities within the watershed area to obtain local environmental problems, knowledge, determine water use, examine land resource and water resource management, and status of infrastructures.

The baseline data provides a reasonably comprehensive description of the current socio-economic conditions of the communities around the watershed, the land use practices and the management of the water and land resources. The baseline data also presents mechanism for monitoring impacts of the GEF intervention.

The native vegetation of the project site is open savanna woodland typical of the southern guinea savanna. Plant species composition within the watershed is diverse and consists of trees, shrubs and herbs. The plant community types within the watershed include fringing vegetation, Fadama and upland farms, and plantations of Gmelina as well as woodland savannah.

The major causes of ecosystem degradation include bush burning, overgrazing, indiscriminate felling of trees for firewood and destruction of the riparian vegetation due to establishment of Fadama farms along Oshin stream. There are no traditional and or modern soil and water conservation methods in place to arrest land degradation in the area. There is a need to establish or enhance the existing community forests within the watershed through enlightenment campaign to prevent indiscriminate bush burning and deforestation.

Communities identified in the Ajasse-Ipo Watershed Catchments area along the River Oshin are Ajasse-Ipo, Sanmora, Iludun-Oro, Okeya-Po, Ilala, Esie, Buari, Eggi, Igbonla, Oke-Ola-Oro and Oro. Generally, these communities are agrarian and indigenes are within the low-income strata with average monthly income of less than N15, 000. Those that combine farming with other occupation, especially in a few communities earn more.

The social groups have varied interest in the GEF Intervention. The lack of infrastructure to support agriculture and other activities, further compound poverty levels of the people. There is a significant local and external interest in the River Oshin as all the community residents used the river for recreational, domestic purposes and Fadama farming.

The existing challenges facing the Fadama farmers include:

- Ineffective organizational structure at both the Local Government (LGA) and community levels.
- Inaccessibility of required farm inputs e.g. fertilizers, insecticides and herbicides provided by Federal, State or Local Government
- Inaccessibility of loans to the Fadama farmers hampers large scale crop production.

Recommended measures to improve environmental management within the communities and the watershed catchment area include:

- Maintaining the water channel and shoreline to reduce impact of upland sources of pollution and sedimentation;
- Providing defined grazing area for livestock especially cattle and water supply during the dry season;
- Discouraging the unsustainable exploitation of natural resources within the watershed;
- Developing land and water management for the proposed intervention area;
- Improving access to the various Fadama sites to aid easy transport of farm produce.

If these measures are implemented, it is envisaged that sustainable utilization of water, soil and land resources within the watershed would be enhanced and land degradation reduced or completely eliminated.

## **Chapter One: Introduction**

### **1.0 Background**

The Federal Government of Nigeria (FGN) has secured an International Development Association (IDA) facility to implement a Second National Fadama Development Project (Fadama II), which is aimed at improving the incomes of 2.3 million rural households, whose livelihood depend directly or indirectly on Fadama activities. The proposed Global Environment Facility (GEF) co-financed component of the Fadama II project will assist government in its effort to improve Fadama productivity by ensuring the continual provision of ecological services. This project will provide the incremental costs for six of the 18 states in the Fadama II. The target beneficiaries include both members of the Fadama community associations and other communities located around the intervention sites.

Fadama is the Hausa name for irrigable lands or flood plains and low-lying areas underlined by shallow aquifers. They are found along Nigeria's major rivers (e.g. Niger and Benue) and wetlands (e.g. Hadejia-Nguru). Fadamas plays an important role in the recharge of the shallow groundwater system through infiltration. Prior to their conversion to cultivation, Fadama lands supported highly productive natural vegetation consisting of dense acacia scrubland, open grassland, and seasonally or permanently flooded open bodies of water supporting dense emergent vegetation, including rushes, sedges and reeds. Furthermore, Fadama lands provided water and forage for pastoral livestock during dry seasons. Fadama lands also supported large and diverse resident or transient wildlife, including herbivores, carnivores and migratory birds.

The objective of Fadama II is to sustainably increase the incomes of Fadama users - those who depend directly or indirectly on Fadama resources (farmers, pastoralists, fishers, hunters, gatherers, and service providers) - through empowering communities to take charge of their own development agenda, and reducing conflict between Fadama users. The project will take a demand-driven approach whereby all users of Fadama resources will be encouraged to develop participatory and social-inclusive Local Development Plans (LDPs). The LDPs will provide the basis for support under the project.

To complement the Fadama II and to ensure the long term sustainable management of Fadama lands, the FGN requested the Global Environment Facility for a grant support. The GEF intervention would target four hundred and sixty thousand (460,000) beneficiaries. Thus, the GEF co- financed project is aimed at ensuring the productivity of Fadama lands and the livelihood systems they support through sustainable land use management. This objective will be achieved through sustainable watershed management, river basin and forest/woodland management, capacity enhancement at the national, state and local government levels, and support to Fadama communities for sustainable land management. By the end of the project it is expected that sustainable land use management practices would have been adopted by beneficiaries in the target areas.

### **1.1 Objectives of the GEF Intervention**

The broad objective of the GEF Component of Fadama II - Critical Ecosystem Management Project (CEMP) is to maintain the productive and ecological health of the Fadama resources base, in other to enhance the productivity of the Fadama areas and the livelihood systems they support, through sustainable land-use and water management.

The GEF component will address sustainable land management practices by restoring watershed functions, stabilizing soil loss, encouraging riverbank protection, reducing resource use conflicts and protecting biological diversity in Fadama ecosystem. GEF intervention will also assist the FGN in her effort to improve capacity to manage and improve the productivity of Fadama resources by ensuring that the integrity of the ecosystem and maintaining the ecological services they provide from threats stemming from competing land use for agriculture, grazing etc.

The project, in addition supports Nigeria's commitment to global environmental conventions including the convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification UNCCD.

The stated objective of CEMP is being achieved through:

- Capacity development for sustainable Fadama natural resources management at National, State, LGA and Community levels, including strengthening institutional capacity for integrated watershed management, and strengthening community capacity for development planning.
- Integrated Ecosystem Management in selected watersheds through management of key forest areas, buffer zones and wetlands and improved water management; and
- Community sustainable land use management through support for alternative land and/or water use activities and adoption of indigenous sustainable land management practices.
- Project Management, Monitoring and Evaluation.

Specifically, the CEMP will:

- provide the ecological framework for addressing the root causes of reduced Fadama agricultural productivity and the negative impact of un-sustainable land-use practice;
- ensure ecosystem stability, functions and services;
- reduce land degradation;
- improve institutional capacity to manage Fadama resources; and
- Improve productivity by ensuring that ecological balance in the Fadama are maintained and protected from threats from land use for agriculture and water management in the watershed.

## 1.2 Project Components

### Component 1: Capacity Building

This component aims to build the capacity of Fadama users and other key stakeholders. It supports the building of the capacity of Fadama User Associations (FUAs) in order to enable them access project advisory services and finance investment in productivity and income enhancement activities. The aim is to enhance the capacity of different stakeholder groups, including relevant federal, state and local government, NGOs, community based organizations, and Fadama users in the six priority states (Imo, Kebbi, Kwara, Kogi, Ogun, and Bauchi) for sustainable land and watershed management.

Major activities to be supported (financed) under this component include:

- Support for land use and water management capacity to enhance the productivity of Fadama area and the livelihood they support;
- Support for sustainable agricultural practices and harvest techniques for forest and forest non-timber products and fishing for community members;
- Support for the review of federal and state policies and regulations on environmental, land forest and water resources;
- Support for the development of framework for state-level coordination, monitoring and evaluation of watershed management activities among state agencies involved in environmental, agriculture, forest, water resources management activities; and,
- Support baseline and strategies studies related to Fadama critical ecosystem issues.



## Component 2: Integrated Ecosystem Management at Watershed Level

This component addresses the technical, social and location specific activities to improve the management of critical watersheds that ensure Fadama productivity and sustainability, in a few areas with high potential for up-scaling and replicability. Major activities include:

- strengthening existing watershed planning and coordination mechanism among the relevant state agencies;
- sustainable management of forest resources for the protection of Fadama areas, especially the establishment and/or management of community forest reserves in highly degraded and conflict-ridden rainforest and savannah areas;
- developing a lake management plan for a proposed RAMSAR site;
- studying and monitoring activities to understand the impact of upstream reservoir management and river flow regime in Fadama areas; and
- monitoring plans to improve the management of ground water and shallow aquifers in selected Fadama areas.

## Component 3: Community Sustainable Land Management

This component supports a range of advisory services, training, information sharing, awareness programmes, and adoption of land use practices that will enable Fadama users to adopt productivity enhancing techniques and more profitable marketing, and at the same time ensure the sustainability of the Fadama resource base.

While IDA financing (68 % of the component cost) finances traditional advisory services, including environmentally friendly practices (particularly, the promotion of Integrated Pest Management, and irrigation efficiency), the GEF financing (32 % of the component cost) supports Fadama users, through FCAs, community groups, and NGOs, to adopt sustainable land use and agricultural practices that enhance the structural and functional integrity of Fadama ecosystems, and improve rural livelihoods.

This component provides:

- support for a range of advisory services; training, information sharing and awareness programmes;
- support for the adoption of productivity enhancing land use practices to ensure the sustainability of the Fadama resource base;
- support for Fadama users through FCAs and NGOs to adopt sustainable land use agricultural practices that enhance the integrity of Fadama ecosystem and improve rural livelihoods;
- support through grant financing, using a demand-driven approaches for two types of alternative land practices namely; land use changes in critical areas, such as river banks, flood-prone or ground water recharge and forest or natural habitats of significant biodiversity value, and sustainable agricultural practices in Fadama areas added to IDA-financed LDPs.

Activities that may also be supported in this component include:

- biodiversity conservation;
- alternative livelihoods in highly degraded Fadama areas;
- energy-efficient use of solid fuels for watershed protection;
- community woodlots on river banks and other degraded areas;
- sustainable indigenous farming practices.

## **Component 4: Project Management and Monitoring & Evaluation (M&E)**

This component focuses on project management mechanisms; including monitoring and evaluation (M&E) plans to implement NFDP-II. GEF supports the full integration of CEMP activities into the following two main NFDP-II subcomponents under this component:

### ***Project Management Subcomponent***

This supports new or existing institutional entities and mechanisms at the federal, state and local government levels for overall project coordination and supervision and helps to strengthen the effectiveness and quality of project operations. It supports, at the federal level, the National Fadama Development Office (NFDO) attached to the Project Coordinating Unit (PCU) of the Federal Ministry of Agriculture and Rural Development (FMARD) which is responsible for overall project coordination. The subcomponent also supports the State Fadama Development Offices (SFDOs) housed at the Agricultural Development Projects (ADPs) in the states. At the local government level, the project supports Local Fadama Desks (LFDs) and a multi-stakeholder committee which is responsible for, respectively, screening and approving LDPs and subproject proposals submitted by the FCAs. Finally, the subcomponent finances specialized technical assistance and training at federal, state, and local levels aimed at developing capacity for coordination of sub-project implementation.

### ***Monitoring and Evaluation Subcomponent***

This will measure performance at various project milestones, and includes three main elements:

- i. Management Information System (MIS) integrating NFDO and SFDO levels with data generated by FCAs and;
- ii. impact evaluation and beneficiary assessments to enhance project implementation performance; monitoring of the project's environmental management plans (EMPs), which include mitigation measures related to agricultural production, processing, and marketing, to be incorporated in LDPs, and institutional capacity strengthening in Environmental Impact Assessment (EIA) and Integrated Pest Management (IPM); and,
- iii. monitoring GEF activities.

## **1.3 Study Justification**

Based on a study conducted for the GEF Grant Preparation, and the recommendations of a stakeholder workshop, the proposed project will be implemented in the following critical ecosystem sites:

- i. Imo State: Oguta Lake Watershed Catchment Area;
- ii. Kebbi State: Jega-Dimbegu Watershed Catchment Area;
- iii. Kwara State: Ajasse-Ipo Watershed Catchment Area;
- iv. Kogi State : Koton Karfe Watershed Catchment Area;
- v. Ogun State: Eriti Watershed Catchment Area; and
- vi. Bauchi State: Andiwa Lake Watershed Catchment Area.

In order to monitor project impacts, in line with the requirements of the World Bank, the NFDO commissioned a baseline study to enable an informed assessment of project outputs and outcomes.

## **1.4 Objective of the Baseline Study**

The strategic and baseline study/survey aims to provide data and information on the status of the Ajasse-Ipo Watershed Catchments prior to GEF intervention) in land use, land and water management. With the baseline information available, project impacts will be captured and duly assessed. Also the attainment of project objectives will be sharpened, measured and evaluated.

## 1.5 Synopsis of the Terms of Reference

The specific objectives of the survey are to:

- a. Identify villages/communities/settlements within the intervention site and provide a detailed account of demographic imperatives of the area (population size, structure, ethnic structure, settlement patterns, literacy levels, environmental awareness etc) on communities within the intervention;
- b. Give precise description of the economic situation of the communities/settlements within the intervention site. This would include a critical review of all existing socioeconomic data/information of the area towards ascertaining the interplay between economic wellbeing and gender parity;
- c. Identify and assess the nature of formal and informal institutions and their role (past and present) in watershed management, noting especially watershed management planning and coordination capacity;
- d. Collect and analyse reports, maps and satellite data documenting the conditions of natural resources within the intervention site with emphasis on vegetation, soil, water bodies and conservation areas. Also identify the sources of surface water (rivers streams, ponds, lakes, dams, impoundments, etc) and groundwater (boreholes, wells, etc);
- e. Review the current water and soil management practices in Fadama crop production areas within the intervention site and note the actual and potential Fadama areas and the use to which they are put. In addition establish the area (extent) under sustainable land and water management practices;
- f. Assess current land degradation situation in the area and ascertain land management/amelioration programme in place or envisaged in Fadama II local development plans (LDPs) to ensure effective land use/land management systems;
- g. Identify and assess the status of land resources, and conservation strategies and establish standards that could be used to monitor changes in soil and water quality;
- h. Derive a community spatial data of the area via participatory resource mapping (community sketch maps) and transects. In addition, obtain 1/10,000 or 1/50,000 topographical map and in close consultation with villagers/stakeholders delineate the main land use types e.g., cultivated land, fallow land, perennial streams and rivers, orchards, forest, settlements etc.;
- i. Identify and evaluate the current livelihood activities, especially their sustainability and potential for land degradation;
- j. Evaluate the status of infrastructural facilities in the community: market place, roads, schools, health centre, water supply etc.;
- k. Identify the prevalent environmental problems and the local responses to environmental challenges;
- l. Proffer monitoring mechanism to capture the impacts of the GEF intervention in the area; and organize stakeholders' workshop to review the draft final report.

## Chapter Two: Overview of Watershed Management

### 2.1 Watershed Management

Watershed is a topographically delineated area draining into a single channel. It is considered a natural unit of land, which collects water and drains through a common point by a system of drains. Hence it comprise of a Catchment area (Recharge Zone) (Revenga et al, 1998). Watershed management is a comprehensive approach to natural resources management. It involves the judicious use of natural resource with active participation of institutions, organizations and communities in harmony with the ecosystem

Integrated watershed management (IWM) is aimed at reforming the governance of water resources. It considers local as well as regional issues and is rooted in an ecosystem approach to management that uses the watershed as a water quality planning unit. It results in a better understanding of water quality and quantity and aquatic ecosystem problems and makes it possible to identify sustainable solutions.

Analysis focusing on watersheds as ecological units and on the risks of degradation from human activities that may undermine their ability to provide ecological services and maintain intact the biodiversity within them showed that watersheds ranking highest in biological values are also generally most degraded (Revenga et al., 1998). Biological value was based on the number of fish species and fish endemics, and the number of areas with endemic birds.

### 2.2 Nigerian Irrigation and Development

Irrigation potential estimates in Nigeria vary from 1.5 to 3.2 million ha. The latest estimate gives a total of about 2.1 million ha, of which about 1.6 million from surface water and 0.5 million ha from groundwater (FAO 2005). However, as far as groundwater is concerned, it should be mentioned that while the extractable water resources are sufficient for up to 0.5 million ha in the north of Nigeria, areas suitable for irrigation with groundwater have, as yet, not been assessed.

During the oil boom of the 1970s, an investment programme in support of public irrigation run either by River Basin Development Authorities (RBDAs) or by the States was launched. The programme included the construction of large dams and pumping stations, especially in the drier northern part of the country. By 1990, 162 dams had been constructed with a total storage capacity sufficient to irrigate 725 000 ha. Many of these dams, however, were built with little or no infrastructure and the sites do not always have sufficient irrigable areas close by. The schemes that were developed have not been brought into production fully or they have been implemented with inappropriate infrastructure.

With irrigated land being less than 1 percent of the cultivated area, the contribution of irrigated agriculture to total crop production is small (References Year). The impact of irrigation is felt only with regard to specific crops such as wheat, sugar cane and to some extent rice and vegetables. Between 2003–2004 irrigated grain production contributed 0.9 percent of the total grain production and irrigated vegetable production contributed to 2.3 percent of the total vegetable production.

**Table 1.1 Basic Statistics and Population**

Area of the country	2002	92,377,000	ha
Cultivated area	2002	33,000,000	ha
• As % of the total area of the country	2002	36	%
• Arable land (annual crops+ temp. meadows)	2002	30,200,000	ha
• Area under permanent crops	2002	2,800,000	ha
Population	2006	120,000,000	Inhabitants
Total Population	2004	52	%
Population density	2004	138	Inhabitants/km <sup>2</sup>
Economically active population	2004	50,940,00	Inhabitants

As a% of total population	2004	40	%
Female	2004	36	%
Male	2004	64	%
Population economically active in agriculture	2004	15, 159,000	Inhabitants
As % of total economically active population	2004	30	%
Female	2004	38	%
male	2004	62	%

Source: FAO, 2005

## 2.1 Fadama Farming Practice in Nigeria

Globally, there is increasing interest in traditional systems of agriculture. In particular the efficiency of traditional farming practices in seasonally flooded riverine areas are now being recognised. The seasonally inundated floodplains and other seasonally damp lands (Fadama) in Nigeria are also important. The productivity and extent of floodplain land cultivated using traditional techniques in Nigeria can be contrasted with poor performance, small area and high cost of irrigation schemes.

About 1 million ha are cultivated under traditional irrigation or floodplain adapted cropping in Nigeria, compared with only 30,000 ha developed for formal irrigation (Adams, 1986). A short growing season and the variability of rainfall both within a season and between years, as well as the recurrence of drought are important constraints on agriculture in northern Nigeria, in such circumstances, the Fadama is important for soil water retention to extend the growing season beyond the raining season.

Farming systems in the Fadama areas are mainly smallholder-based and agricultural landholdings are scattered. Simple, low-input technology is employed, resulting in low productivity. Typical farm sizes range from 0.5 ha in the high rainfall south to 4 ha in the dry north. Nigeria's wide range of agro-ecological zones allows for diversity of crop production activities:

- The dry northern savannah is suitable for sorghum, millet, maize, groundnuts and cotton, sorghum and millet being the most important crops;
- In the Middle Belt and south the main food crops are cassava, yam, plantain, maize and sorghum;
- In the south, the main cash crops are oil palm, cocoa and rubber;

Fadama areas are remarkably different from adjacent uplands in terms of ecology and microclimate. Since they are low-lying, flood prone, slow-draining areas, they generally possess finer texture and less acid soils. Increasing pressure from farmers, pastoralists and fishermen, have impacted negatively on the ecology of Fadama areas. Furthermore, the lack of coherent policy and institutional framework for integrated natural resource management, the loss of vegetative cover, intensification of agricultural practices, construction of dams and water reservoirs, and competing land uses have all contributed to land degradation and long-term sustainability of Fadama resources.

Small-scale irrigation "Fadama" plays a key role in the economics of Nigeria as a basic source of food, income, and employment, especially for women. Fadama irrigation practice has increased significantly over the last 30 years because of increasing demand and high cost of vegetables produced by farmers. Fadama farmers obtain water from different sources including rain harvesting, flood water (residual moisture), surface water (direct from stream, river, pond, dam or barrage) and groundwater (hand dug wells, shallow wells, boreholes or tube wells).

Recent studies (Dabi 1999) identified two types of Fadama farmers;

- i. those that use ground and surface water and employ a combination of traditional methods and new technologies (tube wells and water pumping machines) and
- ii. those that use surface water released by government from dams by means of gravity.

The studies also recognised that although the former category of farmers, encountered difficulty in carrying out their activities, in terms of cost of pumping water and other inputs, they were less vulnerable because they have some control over water sources and could use residual moisture along floodplains after the rainy season. Conversely, the latter category suffered from occasional delay in the release of water from the barrage which is restricted to a limited variety of crops.

The major challenges faced by Fadama irrigation farmers include:

- inadequate start up capital
- irregular fuel supply, frequent pump breakdown, low stream flow and well dry ups
- high labour requirement amongst those using furrow system
- stiff competition for the limited lands around the major perennial streams in the area
- Illiteracy and lack basic knowledge of water requirement, irrigation scheduling, and skills in maintaining and operating the pumps.

These affects the crops yield due either over- or under-irrigated, leading to wastage of the little available water. Erosion is a serious problem during the rainy season and coupled with continuous use of land, low fertility results (Ogunjimi & Adekalu, 2002).

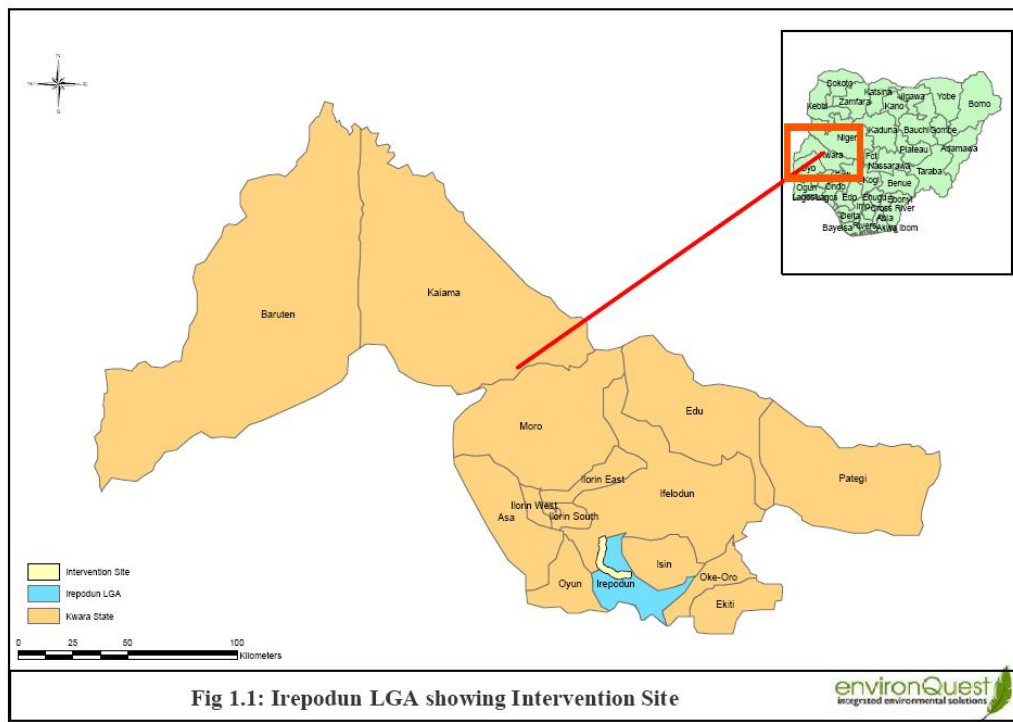
Recent survey of the Komadugu-Yobe floodplain which investigated the local farmers' perception of soil types and management practices revealed that farmers were clearly aware of the differences in soil type in the Fadama and possessed unique skills in managing their farm lands. The farmers classify Fadama soils for recession farming by assessing soil texture and soil drainage conditions by feel and observation. Integrating such local knowledge into soil surveys will lead to better practical definition of mapping units and give soil names that have more meaning for the farmers. (A. M. Kundiri et al, 1997).

## Chapter Three: Study Approach and Methodology

### 3.1 General Description of Study Area

Ajasse-Ipo Watershed Catchment Area is located in Irepodun Local Government Area of Kwara State. The project area lies within Latitude 8° 12' 59" to 8° 21' 45" N and Longitude 4° 41' 30" to 4° 56' 25" E. It covers an estimated 92.94 sq km within the Guinea Savannah ecological zone. The area is well drained by River Oshin and has a large human population which has greatly affected the natural vegetation, which has been reduced to farmlands in many areas.

The 2006 census puts the state's population at 2,371,089; with males being 1,220,581 and female 1,150,508. There are no significant differences in the gender distribution in the state. The population of the entire intervention site based on the settlements identified during the survey is placed at 16,850.



### 3.2 Study Design

#### *Consultations and Preliminary Survey*

Prior to the field study, the project team held consultation meeting with the State Fadama Programme Coordinating Office in Ilorin. The consultation entails reconnaissance survey of the site, review of the organizational structure of the State Fadama Programme, identification of stakeholders involved at the state, LGA and community levels, and scouting for relevant maps, reports and/or other related documentary materials that are relevant to the study.

Information gathered during the reconnaissance visit along with the Satellite Imagery of the project site was synthesized to produce the base map that was used as a guide during the field survey. The base map contained the major and secondary settlements, major and minor roads, rivers, dam, relief, and other important landmarks that could be used as guides during the field survey and community mapping. The geographic coordinates of the settlements, unique soil/land, land use, degraded area, water, and/or forestry resources to be mapped during the field survey exercise were captured using hand-held Global Positioning System (GPS).

Field investigation was conducted by a multi-disciplinary team for a period of 2 weeks and covered all the communities within the watershed including the flood plain areas where Fadama farming is practiced.

### **Literature Review**

Comprehensive literature reviews were conducted for the project environment. The documents reviewed include the project information document, project appraisal document, past baseline surveys of Fadama land, project description documents, maps, and related studies on locations with similar characteristics and environmental issues. Additional data were sourced from the followings:

- Federal Surveys Department
- Kwara State Fadama Development Office
- Irepodun Local Government
- Internet

### **Socio-economic- Study Design**

The survey is designed to be cross-sectional in nature. The approach used was the Rapid and a Participatory Rural Appraisal method, which is suitable for local communities. It involved the use of both qualitative and quantitative methods to gather data from the primary and secondary sources of information, male & female members of the Fadama Community Association (FCAs) and members of the local communities as primary sources of information. A major part of the secondary information was obtained from existing records.

Communities key informants, which include leaders. Table 4.1 shows the list of Fadama Community Associations involved in the survey.

**Table 2.1 List of FCAs included in The Survey**

Nos	FCAs	Communities
1	Agbeloba & Agbelare	Ajasse - Ipo
2	Omolere & God is Able	Esie
3	Boluyo & Precious	Oro
4	Agbelola	Sanmora
5	Ifedapo	Ilalla
6	Olorunshogo	Okeya-Po
7	Unique	Okeola-Oro
8	Idagba Soke	Eggi

### **Data Collection Procedure**

The survey was based on a combination of data gathering methods to collect secondary and primary data. Since a major part of the information required in this study was qualitative in nature effort was concentrated on this area.

#### **3.5.2 Primary Data**

A community check list and focus group guide were designed to capture the required data which was used to obtain information from the key informants and participants. The groups participated in the community resources mapping. Specific information were obtained from the 11 communities within the catchment area on issues relating to environmental awareness, livelihoods, land use practices, water resource management and existing farmer groups. The key groups sampled were women, men, youth and community leaders. A total of 18 focus group discussions were conducted with the Fadama Community Associations to obtain information on Fadama related issues, etc. As it is conventional, taking into consideration, the important of gender related issues, most discussions were conducted for males and females separately. This was to enhance the participation of and the quality of information provided. Thus, participants were carefully selected to reflect a gender balance. Checklists were also used to capture status of infrastructures.



### ***Community and Landuse Mapping***

A draft map showing the catchment area was obtained from previous works, topographical map and satellite imagery. These were combined to produce a base map to serve as a guide for the field work. GPS (Global Positioning System) coordinates were used to delineate the different land use types. The coordinates were superimposed on the draft map layer to get a geo-referenced land use map. For the community mapping, the residents and stakeholders identified land use types within their community. GPS coordinates of identified resources within communities were obtained and overlaid on the base map of the study area.

Marginal information on imagery is as follows;

Type of Image	-	Landsat ETM
Source	-	Space Imagery 1 (8 bands)
Year of Acquisition	-	February 2006
Path	-	190
Row	-	54
Resolution	-	28.5 meters

### ***Biodiversity Studies***

Biodiversity studies were conducted to provide data on the floristic composition and structure around watershed, determine the population density of the key economic plant species within the area, evaluate the level of degradation of the vegetation within the watershed; and suggest measures to conserve or restore the ecosystems within the watershed.

Quadrats were established to study the vegetation, within homogenous plant communities that were identified within the watershed. These include upland farms, fringing forest, Fadama farm, and woodland savanna. Plant species, composition and structure were obtained using 100m<sup>2</sup>, 25m<sup>2</sup>, and 1m<sup>2</sup> quadrats. The quadrats were for trees, shrubs and herbs respectively. Within each plot, all plants were identified to species level and their heights measured with a Haga altimeter. The number of strata in the vegetation was noted and the dominant species recorded. Where counting of individuals are not possible as in situations where there are creeping plants, cover was measured using the Braun-Blanquet scale (Sutherland, 1997). The population density of the trees was determined using 100m<sup>2</sup> quadrats placed within each relatively homogenous vegetation type (Kershaw, 1981). Rare, exotic and endangered species were listed. Samples of plants not identified on the field were collected and carried to the herbarium for identification.

Land use and land degradation study focused on land/soil, water, forestry resources, the relief/geomorphology, forms of soil/land degradation and the extent, farming systems, cropping pattern, land preparation techniques, farm inputs, crop yield estimates, irrigation system, crop combination, crop nutrition, diseases and insect pest incidence, etc.

Visual observations on the field were complimented with adequate still photographs and the coordinates of important features were captured with hand-held GPS. Fadama farmers were interviewed on their farm to confirm what they perceive as the major soil and land resources problems confronting them. The farmers were sometimes asked *on-site* (i.e. on their farm during the field investigations) to suggest solutions to some of the problems they themselves had identified.

## Chapter Four: Environmental Baseline

This chapter presents a summary of the prevailing environmental and social conditions within the project site. The discussion covers the existing physical, biological and socioeconomic environments within and around the site.

### 4.1 Baseline Condition of Natural Resources

#### 4.1.1 Climate and Meteorology

The study area falls within the hot equatorial climatic zone. The climate of the area is driven by the seasonal oscillations of the Intertropical Discontinuity Zone (ITDZ) moving into the summer hemisphere. ITDZ separates two principally different air masses: Atlantic equatorial hot and humid tropical maritime air mass, and tropical warm and dry air mass of the Sahara desert. The north – south oscillation of ITDZ determines the seasonal variations in the weather and climatic conditions in the project area.

The mean monthly climatic data over the project area is given in Table 4.1. Temperature is high throughout the year with mean minimum and maximum values over the study area being 14.4°C and 37.9°C respectively. The mean relative humidity ranged between 15.4% - 77.07%.

The project intervention site is influenced by two seasonal periods (wet and dry season). Wet season starts in April and ends in October with a break in July-August and a peak in September. Evaporation rates are high, and this combined with lack of rainfall during the dry season leads to complete drying up of the seasonal streams.

**Table 3.1 Mean Monthly Climatic Data Over The Study Area**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Temp (oC)	29.5 8	32.0 3	36.5 1	39.1 6	37.9 4	34.61	31.7 1	30.5 1	31.9 8	33.9 8	32.9 7	29.7 9
Minimum Temp (oC)	14.4 1	16.4 1	20.9 3	24.7 2	24.7 4	23.33	21.8 4	21.3 2	21.6 9	20.9 1	17.0 2	14.1 3
Total Rainfall (mm)	0	0	0.35	30.6	85.3 3	177. 0	308. 1	363. 7	171	16.7 7	0.05	0
Rel Humidity 9hours (%)	24.5 3	20.4 7	23.6 7	39.4	54.8	67.33	77.0 7	79.7 3	70.8	47.8	26.4 7	24.8 7
Rel Humidity 15 hours (%)	17.0 7	13.5 3	15.4	21.2	33.8	48	59.6 7	63.2 7	53.1 3	29.5 3	18.7 3	18.1 3

Source: NIMET 2006

#### 4.1.2 Geomorphology and Soils

##### – Geology

The study area is a component of the general geology of south-western Nigeria characterized by the occurrence of a combined Precambrian basement complex and the sedimentary basins. The surface geology is primarily basement complex rocks that are deeply weathered having a lot of fraction and voids. The area is dominated by sandstone and shale with recent alluvium deposits. The formation is well drained and aerated. Depth to the groundwater could not be ascertained but it is believed to be considerably greater than 10 meters.

##### – Soils

The soils within the project area are as ferruginous tropical soils on acid crystalline rock (d'Hoore, 1964). The soils are characterized by brown or reddish-brown gravels and mottled clay containing ironstone, manganese concretions, flakes of mica and fragments of quartz.

The floodplain (Fadama) section of the watershed covers about 10.7km<sup>2</sup> and is generally gently sloping and hence comparatively wider on the eastern flank of river Oshin, whereas in other sections of the watershed, the floodplain is moderately to strongly undulating and therefore very narrow on the western flank of the river. The Fadama land are relatively poor in organic matter, cation exchange capacities and essential macronutrients such as nitrogen, phosphates and potassium, despite the fact that the Fadama receive annual silt deposits from

floodwaters. The soils are, however, more fertile when compared with the sandy upland soils encountered in the study area.

- *Topography and Land use pattern*

The topography of the area is lowland with undulating terrains. The low-lying areas adjoining river Oshin is being used for the cultivation of commercial crops. These include *Amaranthus celosia*, Garden egg, corn, pepper and okra (Figure 4.1). The upland area adjoining the Fadama farms are sometimes planted with arable crops such as guinea corn, yams, and cassava. Scattered populations of wild oil palm abound within the area. Some of these are being tapped for wine. The notorious weed, spear grass (*Imperata cylindrical*) an indication of soil infertility is common in the upland farms within the study area. Most of the farms are in Sanmora, Iludun- Oro and Ajase. New Fadama farms are starting up in Ilala. Common weeds include plants such as *Ageratum conyzoides*, *Pennisetum sp*, and *Scoparia dulcis*.

Across the project site, various land uses are distinguishable, including: crop production, livestock grazing, fisheries, forestry, wildlife sanctuaries, conservation management areas, housing and cottage industry (blocks and burnt-brick production). Land use in the project site is principally agricultural with about 70% of the entire land area cultivated. Agriculture in the area is dominated by shifting cultivation, crop rotation and mixed farming. Although fallow periods vary from site to site, areas close to the homesteads are intensely farmed. The areal extent of the farmland land is 20km<sup>2</sup>. The length of the fallow period generally increases with distance from the settlement. Crops observed include plantain/banana, maize, okra, and varieties of leaf and fruit vegetables (tomato, garden egg, amaranthus, celosia, cocorus, sugar cane, plantain/banana, and maize).



**Figure 1.1: Fadama Farm with A Mixture Of Corn And Okra At Sanmora**

#### 4.1.3 Vegetation

The natural ecosystem of the project area and the Fadama supports varying degrees of natural vegetation ranging from the treeless grasslands/shrub thicket of thorny Acacia on recent levees to the mixed tree-shrub-grass varieties of relatively large trees, woody browse and forage grasses. The native vegetation of the project site is open savanna woodland typical of the southern guinea savanna. Where landuse pressure is minimal, the stocking is still relatively dense at about 2-3 stems per m<sup>2</sup>.

Although, fuel wood currently constitutes the major source of domestic energy, its exploitation is inefficient, while the growing dependence on fuel wood places extreme pressure on the diminishing woodlands, reducing their recovery capacity. Excessive deforestation and denuding land has resulted. Moreover, the use of the Fadama for crop

production is accompanied by uncontrolled clearing of natural vegetation and extreme reduction in biodiversity, while causing increased erosion and flooding downstream.

The plant species composition within the watershed is diverse and consists of trees, shrubs and herbs (Tables 4.1 -4.3). The woodland savanna area is dominated by many fire resistant plants belonging to different life forms. The mean canopy height of the vegetation is 12m. The canopy is open and the scattered trees have wide spreading crowns. Three main strata are discernible. These are the tree, shrub and herbaceous layers. The commonest trees include *Parkia biglobosa*, *Prosopis africana*, *Vitellaria paradoxa*, *Daniellia oliveri*, *Combretum glaucescens* and *Vitex doniana* (Table 1). They have thick barks which may be fissured as in *Vitellaria paradoxa* or flaky *Daniellia oliveri*.

Shrubs include species such as *Detarium microcarpum*, *Piliostigma reticulatum* and *Gardenia ternifolia*. The herbaceous layer is dominated by grasses such as *Pennisetum purpureum*, *Andropogon* spp and *Hyparrhenia* spp. Most of the savanna woodland is typically burnt late in the rainy season or middle of the dry season by hunters, cattle rearers or farmers (Tables 1 and 3). The whole landscape is totally devastated by the fire during the dry season. The surviving trees commonly appear twisted. The annual bush fire also enters into the plantations of *Gmelina arborea* (Table 1 ). Many of the plants are fire resistant and regenerate after the fire event. The chance of survival however depends on the intensity of fire, stage of growth of the plant and local environmental conditions. The exposed landscape is easily eroded during the rainy season with resultant sedimentation of Oshin stream.

Sedimentation is considered a major factor in the decline of fisheries in the United States (Karr and Schlosser 1978). Sedimentation affects aquatic life by decreasing light penetration, reducing dissolved oxygen levels, and by introducing toxins into the stream. This in turn reduces the food base, impairs fish feeding due to reduced hunting success and reduces reproductive success (by covering spawning grounds and eggs, preventing the emergence of newly hatched fry, limiting the availability of oxygen to incubating eggs, and reducing water flow and removal of wastes. Very high levels of sedimentation can cause direct mortality to fish by clogging their gills and by preventing normal water circulation and aeration of the blood. Sediment deposits also affect the survival of insect larvae through the reduction of food, loss of habitat, and by smothering and sand abrasion (Chutter 1969).



**Figure 2.2 A Plantation Of Gmelina Arborea Scarred By Bush Fire At Ilala**

Note the blackened stems and leaf litte

**Table 4.2 Composition, Habit and Distribution of Plants within Ajase Ipo Watershed**

No	Scientific Name	Family Name	Common Name	Habit	Plant occurrence at intervention site				
					Sanmora	Ajase	Iudun	Esie	Ilala
1	<i>Daniellia oliveri</i>	Fabaceae	Copaiba balsam	Tree	X		X	X	X
2	<i>Prosopis africana</i>	Fabaceae	Iron wood	Tree		X	X	X	X
3	<i>Andropogon tectorum</i>	Poaceae	Giant bluestem	Herb	X	X	X	X	X
4	<i>Albizia zygia</i>	Fabaceae	Albizia	Tree	X				
5	<i>Khaya senegalensis</i>	Meliaceae	Senegal mahogany	Tree	X	X	X	X	X
6	<i>Chromolaena odorata</i>	Asteraceae	Siam weed	Shrub	X	X	X	X	X
7	<i>Terminalia glaucescens</i>	Combretaceae	Idi odan*	Tree	X	X	X	X	X
8	<i>Hymenocardia acida</i>	Hymenocardaceae	Fuel wood	Shrub	X	X	X	X	X
9	<i>Detarium microcarpum</i>	Fabaceae	Dahock tree	Tree	X		X	X	X
10	<i>Malancata alnifolia</i>	Sapotaceae	Sedge	Shrub	X	X	X		X
11	<i>Phyllanthusmuellerianus</i>	Euphorbiaceae	Arunjeran*	shrub	X	X		X	X
12	<i>Entada africana</i>	Fabaceae	Mackay bean	Shrub	X	X	X	X	X
13	<i>Pilosigma thonningii</i>	Fabaceae	Camel's foot	Shrub	X	X		X	X
14	<i>Dichrostachys cineria</i>	Fabaceae	Marabou thorn	Shrub	X	X		X	X
15	<i>Bridelia ferruginea</i>	Euphorbiaceae	Benth	Tree	X	X	X		X
16	<i>Parkia clappertoniana</i>	Fabaceae	African locust been tree	Tree	X	X	X	X	X
17	<i>Maranthes polyandra</i>	Chrysobalanaceae		Shrub	X		X	X	
18	<i>Anogeissus leiocarpus</i>	Combretaceae	African birch	Tree					X
19	<i>Sarcocephalus latifolius</i>	Combretaceae	African peach	Shrub	X	X	X	X	X
20	<i>Lophira lanceolata</i>	Loganiaceae	Red ironwood	Tree	X		X	X	X
21	<i>Afzelia africana</i>	Fabaceae	African oak	Tree	X	X	X	X	X
22	<i>Vitellaria paradoxa</i>	Sapotaceae	Shea butter	tree	X	X	X	X	X
23	<i>Vitex doniana</i>	Verbenaceae	Black plum	tree	X	X	X	X	X

**Table 5.3 Composition, Habit and Distribution of Grass within Ajase Ipo Watershed**

No	Scientific Name	Family Name	Common Name	Habit	Plant occurrence at intervention site				
					Sanmora	Ajase	Iudun	Esie	Ilala
1	<i>Imperata cylindrica</i>	Poaceae	Spear grass	Herb			X	X	
2	<i>Ageratum conyzoides</i>	Asteraceae	Goat weed	Herb	X	X	X	X	X
3	<i>Scoparia dulcis</i>	Scrophulariaceae	sweetbroom	Herb	X	X	X	X	X

– *Fringing Vegetation*

Fringing forests exist along the Oshin river course and create well defined habitat zones with much drier surrounding areas. These make up a minor proportion of the overall area; are generally more productive in terms of biomass (both plant and animal) than the remainder of the forest area; and are a critical source of diversity.

They vary considerably in size and vegetative complex because of the conditions that can occur among water sources and physical characteristics of a site e.g. gradient, aspect, topography, soils, and stream bottom, water quality, and plant communities.

Fringing forest buffers play an important role in flood control, as they provide a natural basin where floodwaters may spread out horizontally (Lowrance *et al.* 1985). Along the river bank itself, vegetation helps to stabilize the bank by protecting soils and reducing river bank scouring. Restoring forests along smaller streams means more storm flow is captured and retained higher in the watershed.

The fringing vegetation along river Oshin has a variable width. The dominant species found include *Pterocarpus santalinoides*, *Berlinia grandifoliola*, *Raphia* sp, *Dialium guineense*, *Entada africana*, *Cola* spp, *Combretum* sp, *Alchornea cordifolia*, *Ceiba pentandra*, *Elaeis guineensis* as well as grasses such as *Pennisetum purpureum*, and *Phragmites communis* (Table 4.4). Within the fringing forest is a multi-layered canopy of large trees, an understory of vines, shrubs and small trees, and herbaceous vegetation on the forest floor. Snags and downed logs and limbs provide other important elements to the forest. The dense vegetation and the presence of surface water provide a protective environment and help moderate temperature extremes within the riparian area.

**Table 6.4: Composition and Habit of Fringing Vegetation along Oshin Stream**

No	Scientific Name	Family Name	Common Name	Habit	Plant occurrence at Intervention site				
					Sanmora	Ajase	Iludun	Esie	Ijala
1	<i>Anthocleista procera</i>	Loganiaceae	Cabbage tree	Tree	X	X	X		X
2	<i>Colocasia esculenta</i>	Araceae	Taro/Swamp cocoyam	Herb				X	
3	<i>Uapaca togoensis</i>	Euphorbiaceae	Canariastrum	Tree	X	X			X
4	<i>Elaeis guineensis</i>	Arecaceae	Oil palm	Tree	X	X	X	X	X
5	<i>Ficus sp</i>	Moraceae	Fig	Tree	X				X
6	<i>Berlinia grandiflora</i>				X				X
7	<i>Musa sapientum</i>	Musaceae	Banana	Herb	X	X			
8	<i>Phragmites australis</i>	Poaceae	reed	Herb			X		X
9	<i>Raphia sudanica</i>	Arecaceae	Raffia palm	Tree			X		
10	<i>Sterculia segitera</i>	Sterculiaceae		Tree	X				X
11	<i>Pennisetum purpureum</i>	Poaceae	Elephant grass	Herb	X	X	X		X
12	<i>Dialium guineensis</i>	Fabaceae	Black tamarind	Tree	X				
13	<i>Alchornea cordifolia</i>	Euphorbiaceae	Christmas bush	Shrub	X	X	X	X	X
14	<i>Combretum tomentosum</i>	Combretaceae	Ogan*	Liana	X	X	X	X	
15	<i>Pterocapus santalinoides</i>	Fabaceae		Tree	X	X	X	X	X
16	<i>Gmelina arborea</i>	Verbenaceae	Gmelina/white teak	Tree	X	X	X	X	X
17	<i>Ceiba pentandra</i>	Bombacaceae	Silk cotton tree	Tree					X
18	<i>Entada africana</i>	Fabaceae	Mackay bean	Shrub	X	X	X	X	X
19	<i>Bambusa vulgaris</i>	Poaceae	Bamboo	Giant herb			X	X	

### – Riparian Vegetation

Riparian corridors are elongated edges that attract vegetation species that represent surrounding communities. The increased availability of water, often in combination with deeper soils, promotes a rich and structurally diverse plant community, which provides habitat for a diversity of animals. They are important natural biofilters, protecting aquatic environments from excessive sedimentation, polluted surface runoff and erosion and supply shelter and food for many aquatic animals and shade that is an important part of river temperature regulation.

The riparian vegetation is also critical to maintaining high levels of organic carbon in the soil, necessary to fueling denitrification and other biochemical processes. Within this area, the vegetation slows the speed at which storm waters move through the floodplain, reducing the water's erosive potential, and capturing materials carried by the floodwaters (Gregory *et al.* 1991). In landscapes altered by man, wooded riparian zones provide movement corridors between the remaining blocks of fragmented woodland habitat. Stable riparian vegetation reduces stream bank erosion, provides shade, and contributes organic matter to the stream, thereby improving water quality and fish habitat. It also provides the woody structural components required by many wildlife species for roosting.

The loss of riparian vegetation from the floodplain areas results in an increase in the volume and velocity of floodwaters as they move downstream, since the reduced vegetation and woody debris creates less resistance to water flow.

The riparian strips cover between 10 -15 metres on either side of the rivers. However in some places, Fadama farming activities have impacted seriously on the vegetation, thus threatening the pereniality of the rivers. In such places, gradual siltation of the rivers has set in. The ground flora is dominated by tall grasses of species such as *Andropogon gayanus*, *A. tintorum*, *Panicum maximum*, *Imperata cylindrica* and other herbs such as *Agerantum conyzoides* and *Boerhavia diffusa*.

The species composition of the riparian strips along the major rivers and perennial streams give an indication of the history of the native vegetation which was at a time tropical rainforest. At such places species composition include: *Anthocleista djalonensis*, *Milicia excelsa*, *Khaya senegalensis*, *Nauclea diderichii* and, *Dialium guineense* *Nauclea latifolia*, *Pterocarpus spp*, *Piliostigma reticulata*, *Adasonia digitata*.

#### 4.1.4 Hydrology and Surface Water Quality

The project area is fairly well drained by River Oshin and small seasonal streams. The dendrite pattern of the drainage system reveals seasonal tributaries draining the river. The River Oshin and the streams have large hectares of low land valley suitable for Fadama irrigation farming. They have peak annual storage in September – October and usually cause flood damage to properties along its banks. A section of the river is dammed at the Iludun-Oro community to feed the water works that supply the community with potable water.

The River Oshin is major surface water in the Fadama area. It drains all other surface water bodies, which include spring, stream and lakes.

#### – Water Sources

The primary water sources in the communities are streams, rivers, hand dug well, boreholes, and the dam. The surface water bodies in the area are presented in Table 4.5 below.

The River Oshin is dammed at Iludun-Oro to provide treated water to the community and its environs such as Eggi, Oro and others. Water treatment is by aeration and chlorination. Other water sources include government assisted boreholes, hand dug wells and spring.



**Table 7.5: Surface Water Sources in the Ajasse Ipo Watershed Catchments Area**

Nos	Communities	Surface Water Sources-Streams
1	Ajasse-Ipo	Igbin kekere, Amo, Igbi-nla, Apon
2	Sanmora	Gelewe Akeke, Elere, Ojuododo kotoawo, Oriolomu Obamogun.(lake), Alagba, Ojumigbo
3	Oro	Afin, Agba,
4	Okeya-po	Odun, Isa
5	Buari	Akoko, Bula
6	Esie	Ayaba, Oshin, Oro, Owo, Omikoro, Ododo (Spring), Oyelodun (Lake), Osuolu, Endu
7	Oke-Ola-Oro	Laga, Akinkin, Odo Funfun
8	Eggi	Odo-ira
9	Illala	Akemo, Abese

The river courses are not constant through the year and presently, there is noticeable change in the volume of water in the river. The Fulani Herdsmen has impacted the rivers through their grazing activities (Figure 4.3).

**Figure 3.3: Fulani Cattle Drinking From River Oshin At Sanmora**

Human and Livestock activities are the major threat in the watershed. Fertilizers and/or pesticides used in farms are washed from surfaces by rain yielding polluted runoff or non-point source pollution which impact surface water quality. This can lead to the demise of aquatic insects important in the food web of an aquatic ecosystem, and can affect the health and diversity of marine organisms downstream.

A recent study shows that the average electrical conductivity in river Oshin is 57ms/m while the total dissolved solids (TDS) are about 60mg/l. The pH is less than 6.5 and the rivers are low in nutrients, with an average nitrogen content of 0.20 mg/l and total phosphorus 0.1 mg/l. The data indicate water of high quality, suitable for irrigation farming according to FEPA limits for irrigation water (Fadama ESA, 2006).

#### - Groundwater

The groundwater resource within the project site is presently exploited by UNICEF, Ministry of Water Resources/Rural Development, and Kwara Agricultural Development Project and private individuals. The lithologic logs of boreholes and tube wells reveal deeply weathered saturated aquifers in basement terrains and the sandstone formation of Irepodun LGA containing abundant water (Salawu 1995).

A typical Fadama lithological profile consists of a dry clay top layer 4m thick, a moist sandy clay layer between 4-8m in depth, and underneath saturated sandy clay. Studies carried out by Kwara ADP showed that in most Fadama areas within the project site, groundwater is available within 5-10 meters of the surface.

The groundwater was observed to be mostly utilised by the different communities for drinking and other domestic purposes. The available data indicate that the groundwater quality is generally of high quality. Electrical conductivity of the water is low with average of  $0.7\text{msm}^{-1}$ , pH ranged from 6.9 – 7.5 and total dissolved solids are low. The heavy metals content of the groundwater are also low and may not pose any problem to crops and human (Fadama ESA Baseline Survey, 2006).

Hand-dug wells dry up partially or completely by the end of the dry season due to drastic decline in the aquifer levels, unless they are located near perennial streams or near very sparsely populated settlements. The average depth of the wells range from 6 – 10 m and the average discharge rate of one to five litres per second were recorded. These yields are sufficient to irrigate one or two ha of vegetables or cereal crops.

## **4.2 Current Soil and Water Management Practices**

### **4.2.1 Soil Management**

Existing practice involves the traditional slash and burn, soil tillage, bunding and irrigation. Following the burning of the trash, the soil is tilled using the traditional hoe meant for tilling heavy textured soils such as the Fadama soils. After the tillage, bunds of different sizes and shapes are made for the surface irrigation water curtailment. On completion of bunding, water is pumped to the farm via the hoses using portable pumping machine. Not all the Fadama farms were under irrigation however, however, over 90% of the Fadama farms observed in the watershed area irrigate farms using of electric pumps. Thereafter, planting or transplanting of the seedlings as appropriate is carried out.

No aspect of the practices is mechanization and the practices are devoid of the use of organic and inorganic fertilizer. Furthermore, plant debris is not incorporated into the soil. Within the Fadama land area, 50% of the total available land is currently being cultivated while the remaining is in bush fallow or under forest as in Ilala and Sanmora community area.

Farming practices are dominated by bush fallow followed by shifting cultivation. Compound/homestead farming is characterized by intercropping. Farmers do not practice crop rotation; rather, they shift from an exhausted soil to a fallowed soil. Farmers use the hoe and cutlass as the basic tools. Tractors or other machinery needed for full farm mechanization are not used. Thus, except for the practice of bush fire to clear land, the adverse impact of land cultivation on the environment is minimal. Still, proper leveling of soil is lacking, risking water saturation conditions and potential increases in soil salinity.

### **4.2.2 Water Management**

The main source of water in the watershed especially during the dry season (Fadama cultivation period), is the medium dam at Iludun Oro, located between Latitude  $08^{\circ} 12' 52.60''\text{N}$  and Longitude  $004^{\circ} 52' 28.3''\text{E}$ . The dam was meant to provide water for household use. However, the dam currently serves as the main water reservoir for the Fadama farming activities at the downstream section of the study area. Thus Fadama cultivation activities in the study area are crowded within the immediate upstream area in Iludun Oro dam and at the immediate downstream areas, the Samora area. Water is sourced via pumping through hoses from river Oshin. Tube holes and other related shallow wells serving as sources of water supply were not observed during the field survey.

### **4.2.3 Vegetation**

Riparian management typically focuses on managing or restoring the stable zone of riparian vegetation adjacent to the aquatic system for the enhancement of water quality and wildlife

habitat (Gore and Bryant 1988). Because of the various perceived uses of riparian areas (e.g., livestock range, forestland, wildlife habitat, recreation areas), major conflicts often arise among as to the proper use of riparian areas. Also, each government agency has its own agenda and priorities for its management.

Poor management and uncontrolled livestock grazing have caused severe abuse and habitat degradation in the riparian areas. Caving and erosion of stream banks is a concern because grazing and trampling, as well as high-water flow has resulted in destabilization of the river bank and accelerated bank collapse. Bank stabilization, proper vegetation management and control of grazing activities and enlightenment programme to reduce bush burning will help reduce bank erosion and sedimentation of water body.



**Figure 4.4 A Fadama Farm Being Irrigated From Oshin Stream At Sanmora.**



**Figure 5.5 A Fadama Farm Located up to the Bank of Oshin Stream at Sanmora.**

### 4.3 Current Land Degradation Situation in the Intervention Site

The various forms of land degradation in the study area are outlined as follows:

- Complete Deforestation/Vegetation removal in Fadama farmland areas: trees and shrubs within the Fadama farming areas are completely removed and burnt as part of the land clearing, land preparation activities.
- Unsustainable Tapping of Oil Palms: The un-sustainable exploitation of the natural resource involves felling of the oil palm before wine tapping. The practice worsens the deforestation earlier occasioned by complete deforestation technique of land clearing for agricultural purposes in the area. The practice is wide spread within the study area.
- Sand Mining Activities: These are of particular importance along the bank of river Oshin and in some other upland areas of the watershed. Sand mining along the river bank causes some of the trees in the riparian forest to fall across the river course, which often brings about break in the flow of the water body and significant changes in the river course. The sand evacuation route passes through Fadama farmland thus causing compaction and subsequently enhances soil erosion.
- Establishment of Burrow Pits: Sand mining activities in the upland parts of the study area invariably leaves behind burrow pits. Such pits fragment an otherwise contiguous farmland. However, some of the pits are reported to provide water for cattle to drink at some period of the year.
- Slash and Burn Land Clearing Method: Since no stovers/crop residues are incorporated into the soil, and no green manure or any other form of manure is applied to the soil, the inherent fertility of the soil is rapidly depleted. Furthermore, the bulk density of the soil increases significantly while reducing the water/moisture retention ability. Therefore, the productivity of the soil declines rapidly and thus the land is abandoned or left to fallow.
- Excessive/Uncontrolled Application of Irrigation water: This causes soil erosion in some parts and siltation in other area (Sanmora) of the Fadama farmland. It also encourages leaching and loss of plant nutrients; hence optimal crop utilization of inorganic fertilizer is significantly hindered.
- Soil compaction and Puddling: These are brought about through cattle grazing within the study area particularly within the Fadama farmland areas. Besides grazing, cattle are periodically on daily basis driven to the river course to source for water to drink. Soils along their daily track are compacted and if just irrigated, become puddle and their aeration regime is significantly altered.



**Figure 6.6 An Oil Palm Being tapped For Wine after Being Cut down at Iludun Oro.**



**Figure 7.7: Spear Grass commonly found in some of the Upland Farms.**

The natural vegetation in the area used to be similar to the rain forest, but over exploitation for fuel, wood, charcoal production, bush burning and overgrazing have led to land degradation. The area is gradually becoming a derived savannah.

#### **4.4 Conservation Strategies**

There are no traditional and or modern soil and water conservation methods in place to arrest land degradation in the area. Thus, the following approaches are suggested as the possible, practicable, cost effective and sustainable measures.

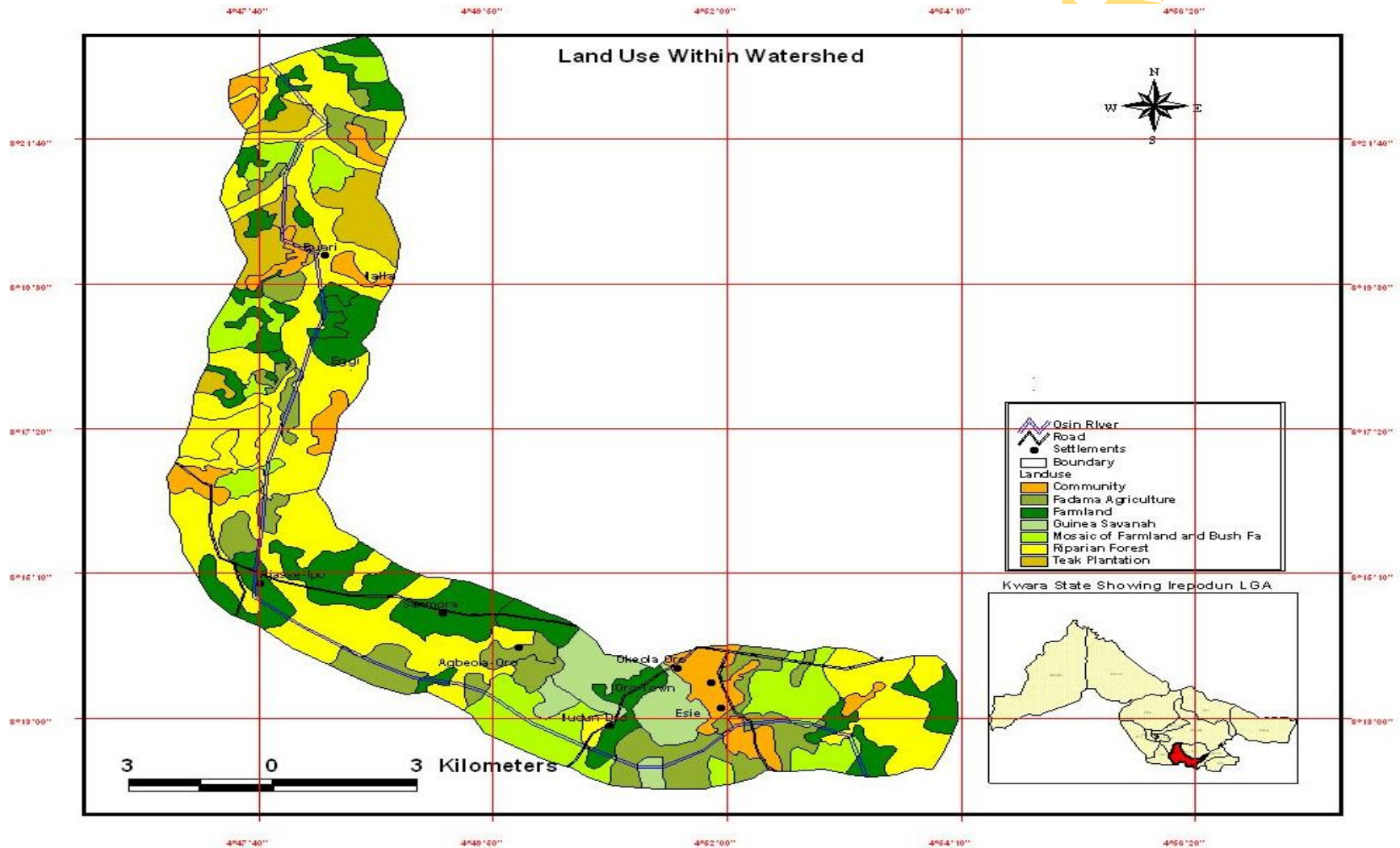
- Controlling deforestation during farmland preparation and for fuel wood. Enlightenment campaign to educate the inhabitants on the need to preserve the trees and shrubs within the watershed which may serve as wind break, make the microclimate milder and ensure biodiversity conservation. Promoting the use of a more environment friendly and cost effective alternative domestic fuel - coal and kerosene. The campaign should be at community, local and state level, using a combination of means of communication strategy such as schools, churches, mosques, market place, radio and television jingles amongst several others.

- Educate the rural dwellers about the dangers of mining sand along the river bank and other parts of the intervention area. Specific area of the watershed can then be surveyed and mapped for the purpose of sand mining and appropriate mitigation measures that would ensure a sustainable environment would be put in place.
- Recruitment of Agricultural Extension Officers and Rural Development Agents to teach the Fadama and other farmers within the area of a more sustainable means of agricultural land clearing wherein only selective tree and shrub removal would be practiced. Furthermore, the extension and development agents will teach the farmers the science and art of trash/stover (plant and crop residue) incorporation into the soil prior to ploughing, ridging and/or bunding. That way, farmers within the watershed would be gradually discouraged from the practice of slash and burn system of land clearing.

Conservation strategies and sustainable farming practices will include;

- Use contour farming techniques to minimise soil erosion.
- Establish woodlot for firewood
- Use of organic manure
- Establish vegetation buffer strips near the riverbank.
- Use of improved seeds on the farms
- Crop rotation should be encouraged.
- Reduce use of fire during land preparation.
- Elimination of noxious weeds.
- Enlightenment campaigns to stakeholders on negative impacts of bush fire on the watershed.
- Prohibit applications of herbicides and pesticides near the stream.
- Reduce trampling by cattle to avoid damage or soil erosion.
- Prohibit fuel wood harvest, including collection of downed timber along the river.

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**Figure 8.8 Ajasse –Ipo Watershed Land Use Map (February 2008)**

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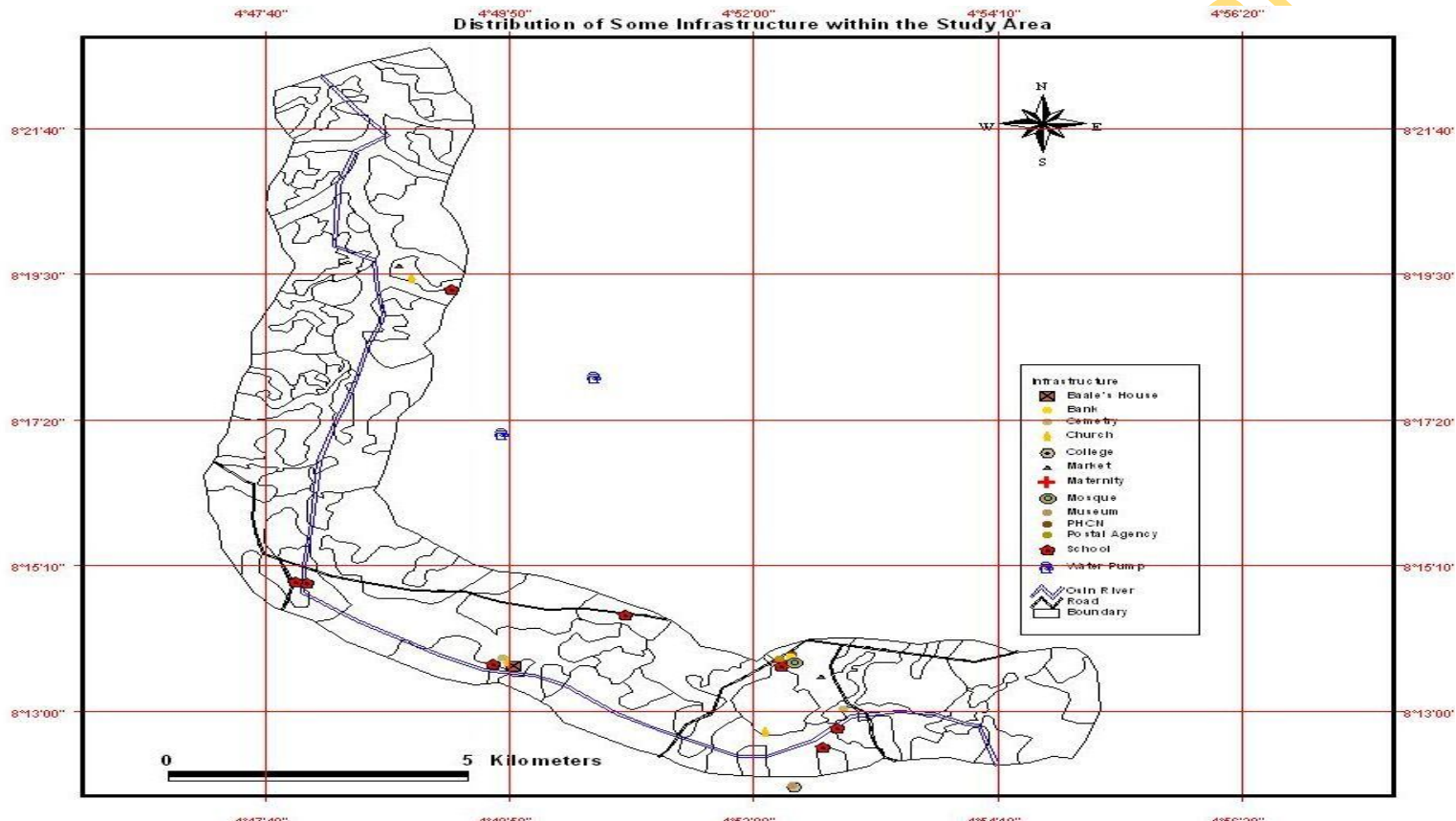


Figure 9.9 Map of Some Infrastructure within Study Area (February, 2008)



#### 4.5 Prevalent Environmental Problems and the Local Responses

Water poisoning, bush burning, overgrazing, deforestation, land excavation (sand mining) etc are the major environmental problems faced by the communities. Table 4.5 presents inhabitants (survey respondents) ranking of these problems. The critical problems in the communities are reported as grazing of farmlands, deforestation, bush-burning, water contamination.

The nomads (bororo) from Niger Republic have settled in the area for as long as 6 years and have continued to constitute a threat to the indigenes. Although, there has been some intervention by the local authorities and in some cases, court adjudication, indigenes prefer to chase away Bororo or alternatively, choose a leader among them who will be serving as a community liaison. It was also suggested that grazing areas should be delineated from farmlands.

Bush burning is also very critical in the area, an act associated with hunting and the nomads' activities. However, in Buari, the hunters association imposes strict measures for participants in the group hunting expedition by disallowing the use of match stick on field. At Sanmora, there is an existing plantation of teak covering a total area of 27 hectares. This is reported by the Kwara State Department of Forestry as belonging to Sanmora community. The plantation is seriously impacted by fadama farming where uprooting, lopping and burning were observed. Another serious threat to the sustainability of the plantation is massive encroachment for housing and industrial constructions and siting of the community cemetery.

At Esie, the catchment is under pressure of intense grazing with the soil being compacted as a result of trampling by grazing cattle. This may be responsible for the low level of fadama activities observed at this place. Intervention efforts should be focussed on reforestation of the watershed through the planting of species such as *Tectona grandis*, *Senna siamea*, *Leuceana leucocephala*, *Albizia ferruginea*, *A.lebbeck* and *Gmelina arborea* in order to rehabilitate the water shed and make it suitable for fadama work. At Iludun-Oro, the Fadama site is located at the upstream where the riparian vegetation is still relatively intact and consist of species like *Albizia ferruginea*, *Ficus capensis*, *F. mucoso*, *Jatropha curcas*, and *Alcornea cordifolia*, The major threat here is cattle grazing which impacts on the regeneration of palatabe species such as *Panicum maximum* and *Pennisetum purpureum*. Farmers and cattle grazers need to be encouraged on the need to keep grazing animals away from watershed vegetation.

Fadama activities at Ilala community are located on the bank of Oshin River, where the riparian strips are well managed. The vegetation is relatively luxuriant and houses species such as *Khaya senegalensis*, *Ficus asperifolia*, *Anthocleista djalensis* and *Nauclea diderichii* indicating that the original vegetation was tropical rainforest which has been savanized over the years due to farming, grazing and bush burning. A sacred grove was noticed at the left bank of the river. This provides an incentive for the protection and sustainable management of this valuable watershed. At Oro, deforestation problem is checked by local vigilante groups but no culprit has been apprehended.

**Table 8.6: Ranking of Environmental Problems in the Study Area**

Environmental Problems	Communities					
	Esie	Oro	Sanmora	Buari	Iludun-Oro	Okeya-po
Road/local Transport	2 <sup>nd</sup>	8 <sup>th</sup>	8 <sup>th</sup>	-	-	-
Water shortage	1 <sup>st</sup>	7 <sup>th</sup>	6 <sup>th</sup>	-	-	3 <sup>rd</sup>
Bush burning	4 <sup>th</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	2 <sup>nd</sup>
Grazing on farms	3 <sup>rd</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>
Deforestation	7 <sup>th</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	4 <sup>th</sup>
Land excavation	6 <sup>th</sup>	4 <sup>th</sup>	9 <sup>th</sup>	-	4 <sup>th</sup>	-
Lack of storage facilities	5 <sup>th</sup>	6 <sup>th</sup>	5 <sup>th</sup>	3 <sup>rd</sup>	6 <sup>th</sup>	-
Soil erosion	8 <sup>th</sup>	5 <sup>th</sup>	7 <sup>th</sup>	5 <sup>th</sup>	5 <sup>th</sup>	-

Water poisoning	9 <sup>th</sup>	9 <sup>th</sup>	2 <sup>nd</sup>	-	-	-
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#### 4.6 Socio-Economic Baseline

The socio-economic baseline information of the communities identified in the Ajasse-Ipo watershed catchment area in Irepodun LGA of Kwara State is presented below. The communities which stretch along the River Oshin area are Ajasse-Ipo, Sanmora, Iludun-Oro, Oro, Okeya-po, Illala, Esie, Buari, Eggi, Igbonla, and Oke-Ola-Oro. They contribute substantially to the impact on the watershed area.

##### 4.6.1 Demographics and Socio-economics

###### *Ajasse-Ipo*

Ajasse-Ipo town has an estimated population of 40,000. It is about 70km from Ilorin. The inhabitants are predominantly Yorubas (Igbominas), and Muslim. The settlement is dispersedly arranged. About 50% of the population are literate.

Information provided during discussions with key informants in the community revealed that the general occupation for members of the community is farming although this is combined with teaching, trading and other business activities. The youth engage in motor bike transport businesses (Okada riders) and some of them are farmers. The farmers cultivate cassava, maize, yam, beans, and rice, potatoes, guinea corn as upland farming. The men plant mostly okra, vegetables, tomatoes, maize and sugarcane during the dry season. There is division of labour. Some people hunt but it is rather a hobby not a profession. There is a gender dimension to the labour involved in farming. Mostly, men cultivate and tilt the ground during the dry season and women harvest the farm produce and market them. Women also own farm lands. The minimum income for a farmer is estimated at N25, 000 per month, this validates the daily expense of about N1,000- N2,000 per day reported for the male breadwinners.

###### *Esie*

Esie community has an estimated population of 25,000 – 30,000 and settlements are dispersedly arranged. The inhabitants are mainly Yorubas (Igbominas). The literacy level in the community is about 50%.

Major occupation for indigenes is farming although some engage in fishing, cattle rearing, teaching, motor-cycle riding and trading. Women in the community plant vegetables (pepper and tomatoes) and men plant maize, yam, cassava, guinea corn, melon. The crops cultivated are usually for consumption and not commercial purpose. An estimate average of N20, 000 is earned on farming while the average daily expenses for Men is estimated at N1,000 and women N500.

###### *Sanmora*

The estimated population of Sanmora is 20,000 - 25,000. Settlements are arranged dispersedly within the community. Inhabitants of this community are mainly Yorubas. The community is small with defined boundaries. Indigenes of Samora generally have a high literacy level. Information from the survey revealed that population above 50 years have a low literacy level while 49years and below has 70% literacy level.

The major economic activity is farming. Other means of livelihoods includes; fishing, carpentry, panel beating, electrical repairs, welding and battery charging. The women in the community engage in farming, sales of farm produce and menial labour during construction of buildings. The crops cultivated in the community include maize, okro and vegetables. The socio – economic characteristics of Sanmora is low. Residents of this community have been farming for an average of 16 years on their own farm holdings. The average daily expense of an individual in Sanmora is between N200 – N500 while the average income a month is N20, 000.

***Iludun-Oro***

Iludun-Oro has an estimated population of 20,000 - 25,000. Literacy level in community is very high (90%) for both men and women. It is a linear settlement along the access road. Information from the survey shows that majority of the indigenes –Yorubas- have migrated to urban cities such as Lagos for greener pastures thus reducing the population to about 10,000 but population increases during festive periods.

Farming is the major occupation for residents of the community but their women engage mostly in petty trading. In time past, women also engaged in weaving but have stopped due to western education. Crops cultivated include okro, maize, vegetables, pepper, Amaranthus and garden egg. The minimum income for the women is estimated at N200 while the maximum is N2, 000 per month. On the average, the daily expense for women is N150 and N200 for the men.

***Buari***

The settlement pattern in the Buari is linear. Buari is a small community with an estimated population of 4,000 people. Indigenes of this community are Yorubas practicing both Christianity and Islamic religion.

The main economic activity for men in the community is farming though some of them also engage in hunting. The women engage in petty trading- and farming. Cassava, yam, maize, melon and cashew trees are mainly planted by the farmers. Average daily expenses for men and women in the community are estimated at N500 and N200 respectively while the monthly income is estimated at the range of N15, 000 – N20, 000.

***Okeya-po***

Okeya-Po is a linear settlement with estimated population of 4, 000. The inhabitants are mostly Yorubas practicing either Christianity or Islam. About % of the population are literate.

The major occupation is farming especially for men while the women trade in farm produce. Though River Oshin does not cut across the community, River Odun and River Isha which are tributaries to River Oshin are used for Fadama farming. River Odun is used to plant sugarcane. The farmers cultivate okro, maize, tomatoes, rice, vegetables and yam. The income of the farmers is on a yearly basis and if crop yield is high they can make 300% profit of start up capital, while the women according to them do not earn anything. However, on the average, the daily expense for women is N500 and between N1, 000 - N2, 000 for the men.

***Igbonla***

Igbonla has an estimated population of about 20,000. Men are mostly farmers and the women trade in farm produce, their involvement in the farming practice is restricted to harvesting and other supports. Average income daily for men and women is put at N500 and N300.

***Illala***

Illala is a small town linearly arranged, population is estimated at 5,000, and the predominant religion is Islam. Inhabitants of this community are mostly Yorubas. Literacy level in the community is generally low.

The major occupation for men in this community is farming though some of them are artisans-welders, tailors, washer men- while the women are marketers/traders. Crops cultivated include yam and cassava while the women trade in farm produce. The minimum amount spent daily by women is N800 and a maximum of N1, 000. However, on market days they spend up to N1, 500 and they earn an average of N10, 000 a month.

***Eggi***

Eggi is a small town with a linear settlement along the road. Which has an estimated population of 5, 000 indigenes. The major ethnic tribe in this community are the Tivs with an understanding of the Yoruba dialect. Literacy in the community is generally low. Inhabitants of this community are mainly Christians.

The major occupation is farming –upland farming- amongst the men while the women engage in crops cultivated include cassava, maize, yam, guinea corn and groundnut. Women make an average of 15,000 per month. On a daily basis, the men and women spend 500 respectively.

#### ***Okeola-Oro***

Okeola-Oro is a disperse settlement with an estimate population of 3,500. The major tribe in this community are Yorubas –Igbominas- who are mostly Christians. The literacy level is high.

The major occupation among the elderly men in this community is farming while the youths are teachers and some artisans. The women trade and are also involved in agro processing, while the female youths are white collar job holders. Crops cultivated in this community include yam, guinea corn, maize, cassava, okro and vegetables. The average spending power of an individual in this community is N500. A farmer can earn a minimum of N40,000 and a maximum of N100,000 a year.

#### ***Oro***

Oro community is a disperse settlement with an estimated population of 7000. The indigenes are Yorubas and majority are Christians. The literacy level in Oro town is very high as the survey revealed that 70% of the indigenes are literate.

The major occupation for residents and indigenes is farming-livestock and arable farming-while others include trading, businesses such as pharmacy shops, private fish ponds etc especially for men. The women engage in trading of the farm produce and other stocks such as provisions, clothing materials etc. The farmers cultivate cassava, yams, vegetables, okro and maize. On the average, the daily estimated expense for women is N500 and a minimum of N1, 000 for the men. However an average of N60, 000 is earned by the men while the women earn N20, 000 – N25, 000 monthly.

#### **4.6.2 Livelihood Activities**

Generally, the inhabitants of the watershed are predominantly engage in farming and trading. The people are generally within the low-income strata with average earnings of N1000-N1200 or less per day, which could be attributed to the predominance of subsistence agriculture. Those that combine farming with other occupation, especially in a few communities earn more. The lack of infrastructures to support agriculture and other activities further compounds the poverty levels of the people.

#### ***Agriculture***

The Fadama Community Association members responded to the survey to a very great degree with lots of expectations, which suggests that members have an interest in the GEF Intervention and its associated outcomes. Members of these associations are within the ages of 30-70 years, some groups are exclusively females while some have both gender as members. Nearly all of them are married with children and while some of them have no primary education, other have advanced degree (M.Sc) and demonstrated different levels of knowledge on environmental issues. Most of the members of the Fadama associations have close to 30 years of farming experience.

Averagely, respondents understood and demonstrated different knowledge of the characteristics and effects of water quality and land resource management especially on the farming practices. Their general belief is that as long as the water sustains aquatic life it is unlikely to be harmful to humans in addition to the fact that the community had depended on rivers for domestic use for ages with no negative impacts recorded. There is a general belief

that the water is therapeutic. According to a resident while speaking on River Oshin, “*The water is sweet. The water cures guinea worm. If you have guinea worm and you enter the water, you get cured. There is a kind of immunity in the water*”.

### 1. Upland Farming

Shifting cultivation is commonly practiced to ensure that the land is sustained. This method entails planting of different crops at different seasons (raining and dry) on the same parcel of land. For example, maize are usually planted in the raining season and later alternated with beans in the dry season. The groups practice both group and individual farming, within the flood plain in order to avoid conflicts, the farmland are demarcated for individual use for preferred crop.

In Ajasse- Ipo, farmlands are acquired at a cost from the indigenous land owners. Conflicts arise when land is used without the owner’s consent. Charges of the land vary depending on the expanse of the land. An acre cost N500 yearly in addition to some farm produce paid as royalty. Sanmora indigenes practice flood plain farming aided by irrigation system from River Oshin and other water bodies such as Akeke, Elene, Otunawo, Ojuododo for not less than 16 years. In Iludun Oro, only the migrant settlers - Hausa farmers engage in Fadama farming. Investigation reveals that they are not educated and according to the members, they do not cause conflict and do not constitute a nuisance to the water.

### 2. Fadama

The Fadama Community Associations displayed varying interest in the GEF intervention. While some have acquired group farmland in anticipation of the project, others have conflicting interest. Members of the association in Sanmora are all cash crop farmers e.g. maize, okoro and vegetable, thus decided to form an association to aid their productivity. During dry season profit is tripled and this helps to generate employment. Buari farmers do not engage in Fadama except rain fed farming. At Illala, the women group expressed interest to buy and sell Fadama produce such as guinea corn, maize, vegetables, melon, palm oil, cashew, all the produce of the palm tree, locust beans any finished product of the farmers. The women prefer to invest in business which is the current practice than get involved with the Fadama farming. At Okeya--po the Nupes and Igbaja are Fadama practitioners.

Currently, most members of the Fadama Cultivation group farmers in the catchment area are indigenes of the respective communities but are not directly involved in actual Fadama cultivation. This was attributed to the different styles involved in both farming. Since the floodplain is flooded during the wet season, migrant farmers move out until it is convenient but the community farmers cannot afford this style so prefer a somewhat permanent location

Majority of the Fadama farmers interviewed on the farm were non natives. Their major complaints were:

That agricultural inputs, mostly, inorganic fertilizers, insecticides and herbicides that are provided either by the Federal, State or Local Government in support of Fadama cultivation go to the wrong hands i.e. they are distributed to members of the Fadama Association at the various tiers of organization but who indeed were not actually involved in the cultivation of Fadama. Therefore, the actual Fadama farmers would have to source the inputs from the indigene at very exorbitant prices. Consequently, the inputs become unprofitable to use by the actual Fadama farmers with the consequent poor crop yield and very little or some time no economic returns to the Fadama farmers.

Fadama farmers claimed to have similar experience on loan disbursement. The natives (Kwarans) are given the loans by virtue of their membership of the Fadama association at one level or the other while the actual Fadama farmers who should directly benefit from such loans are non-natives; hence do not have access to such loans. Consequently, they are just able to manage very small holdings generally with low crop yields. Thus, they do not have the necessary facilities to expand their holdings. They therefore remain poor, peasant, commonly

with poorly kept and poorly maintained small holding farms. The Fadama farmers within the proposed intervention area being non-natives have access to Fadama farmland only on lease basis. Therefore, they are made to pay royalty to the land owners as may be jointly agreed to by the farmers and the land owners.

### 3. *Hunting*

Hunting is a common practice in Buari community. It has a hunters association and members go hunting mostly on Saturdays.

### 4. *Fishing*

Fishing is not a major occupation in the catchment area except for a few migrants; Hausas in Illala, Ajasse-Ipo and Oke-Ola-Oro. The activity is a hobby for indigenes that engage in it. Fish ponds are owned and some parts of the river (Laga) are dug up for this purpose as well.

### 5. *Livestock*

Domestic animals such as poultry birds, sheep, cattle, goat, dog, pig, cat dogs and cattle are reared in all the communities and contribute to households' income. For the Fulani community, cattle are assets and therefore are not usually sold except for critical reasons. At Essi, the herdsmen suffered great loss as a result of mass death of cattle between the months of October 2007 to January 2008. The cattle died of foot and mouth disease in spite of the use of "Dye and Milada" drug administered by the Veterinary Doctors. The interviewed herds' men had limited contact with veterinary officers in the area.

## 4.6.3 **Infrastructural Facilities**

### *Ajasse –Ipo*

The community has a good road network. Five access roads were identified in the community – Ilorin, Oro, Offa, Igba, and Sanmora roads. All the roads are tarred and are in fair conditions. The major markets are the Kara and Ajasse markets which both operate every five days and farm produce are the main goods sold. The facilities are very poorly structured; good are displayed on the ground and tables. Security in the market is provided by night watchmen 'Olode'. The markets lack electricity, water sanitary facilities to dispose refuse and human wastes generated from the market.

There are five primary schools and five secondary schools in the community (Annex 1). The school buildings are a combination of old and new structures equipped with basic education facilities chairs, table etc. Healthcare facilities in the community include Oluseyi Private Hospital, which has 2 doctors and 3 nurses, and manual equipment. The Cottage hospital has a doctor, 6 nurses, and medical equipments. The Maternity Centre has a doctor, 6 nurses, but no equipment.

### *Iludun-Oro*

Iludun has three primary schools ( St. James Anglican, Liewort and Ansaru Islam ) and two secondary schools (Anglican Girls and Iludun Comprehensive High School). The community also has one College of Education. Residents depend on River Oshin, and Omore, Owo (seasonal streams) for their water requirements in addition to the Medium dam located between Latitude 08<sup>o</sup> 12' 52.60''N and Longitude 004<sup>o</sup> 52' 28.3''E. The dam provides water for household use as well as Fadama farming activities at the downstream section of the study area. Health care providers in the area are Community Hospital Iludun and Mobile health centre by UNICEF. For more complicated cases, health care is sought for at the University of Ilorin Teaching Hospital. Iludun Oro-Agbamu road, which is the major road in the community have erosion problems. Community hospital Iludun and UNICEF Mobile Health Centre are the two health centers in the community

The community is served with electricity generated by the dam, which is a product of community's effort of Esie, Oro and Iludun but, presently controlled by the government.

### ***Esie***

The community has a good road network. Only one of the three roads in this community – Oro, Illudun and Arandun is tarred (Oro) but it needs maintenance. The one market that serves the community is Oja Oba market which open daily and goods particularly farm produce are displayed on tables and on the ground in the market. Solid waste generated from the market is disposed in the surrounding bush. No provision for security and electricity and refuse disposal and water.

There are five primary schools, two secondary schools and a Government Technical School (Annex 1). The schools lack educational and sanitary facilities especially classroom, library, and staff quarters. Health facilities which exist in the community are - University of Ilorin Teaching Hospital, Shiloh Private Hospital and Primary Health Care Centre at Elesie Palace. University of Ilorin Teaching Hospital is equipped with doctors, nurses, drugs and medical facilities. The Shiloh private hospital and the Primary health care Centre have no doctors, but nurses attend to the health needs of the people.



**Figure 10.10 Water Well in Esie Community**

The Esie community has a National Museum which was established in 1945, but indigenes of the community had known about the Museum since 1775 before it was formally established. Images for the Museum were brought into limelight in 1933 by N.G.Ramshaw of the Christian Mission Society (CMS). It is the first established Museum in Nigeria. The Museum has the highest collection of images in Africa. It is located 1.7km south –west of Esie Town. Other cultural properties in the community including Cemetery and Royal palaces were also identified.



### Figure 11.11 National Museum, Esie

#### *Sanmora*

The community has three roads. One community market exists in the community but its none functional. The community also has one community health Centre. It was reported that members of the community did not often patronize the health centre and also most medical personnel (especially doctors) did not like working at the health centre.

Sanmora has only one Primary School. There is no electricity and sanitary facilities in the school and there is one Secondary School (Ansil Islam Commercial). Both school buildings are completed with basic infrastructures. There is also a burial ground in the area.

#### *Oro*

There are a network of 5 roads that tranverse the town namely; Ilorin, Omuaran, Agbamu, Esie, and Iludun Roads. The two markets in Oro Town are the Central Market and the Lakele Markets. The Central market has built shops and stalls with and entrance gate that provide security for users. It operates every 5 days and serves the neighbouring communities Unlike the Lakele Market that operates daily

Residents of Oro Town seek health care services at the General Hospital headed by a Medical Doctor supported by other medical personnel. Available information is that drugs are not readily available in this facility. Similarly, Anulu Maternity also renders some health care services to the residents.

Residents gets water supply from the Medium Dam at Iludun-Oro.



Figure 12.12 Oro Town Market

#### *Buari*

There are two major roads in Buari, Buari Okerimi road (tarred) and Buari Oke-Ode (untarred). There are two community markets, but only one is functional. The community is connected to the national electric grid. There are three health centre- one private owned, one primary health centre and one govt owned hospital.

The community has one primary school (Buari Community Primary School) and one secondary school (Buari Comprehensive High School). The schools are equipped with basic facilities, but there are no provision of electricity and toilets.

#### *Okeya-po*



There are two community roads - the Ajasse (tarred) and the Memudu -Esie (not tarred) roads. Ishege is the only community market for farm produce and it operates every five days. Security in the market is provided by Ode-Eshoilu (local vigilante). The main sources of water for the market are boreholes and wells. Solid waste is disposed in the bushes around the market.

There are two primary schools (Ansawu Islam and ECWA) in the community. The primary schools lack basic amenities while the secondary school (Comprehensive High School) needs renovation.

The community is served with electricity and the main sources of water are boreholes, well and river Oshin. The water-closet and pit-toilet are used for sewage disposal. The community has one health care centre which is not adequately staffed and equipped, in fact its staff quarters is yet to be completed. The Police provide security within the community.

### ***Eggi***

The two schools in the community are ECWA Primary School and Jamat Secondary School lack sanitary facilities and teachers. Infrastructure in the community is poor. Amongst the three roads (Ajuba, Buari and Ajasse) roads within the community, one (Ajuba) is untarred. Eggi community market operates every 5 days and it lacks security electricity and sanitary facilities. Residents have no access to healthcare in the community. The major source of water is boreholes. The water-closet and pit toilets are used for human waste disposal.

### ***Okeola Oro***

There are two major roads in the community –Ilorin-Lokoja and Agbamu roads. The schools in the community include Primary (Bestway, Community Schools, Jumat, Faith; and Secondary (Jamat ). there is only one market (Obadan) in the community. The community use pit latrines and water closet for human waste disposal. Security in the community is provided by Police. There is electricity and public taps although not functional always. Healthcare facilities in the area are Ayorinde Maternity, Awoye Maternity and E-Square Maternity.



**Figure 13.13 Local Government Maternity Centre in Oke-Ola Oro Town**

### ***Igbonla***

Igbonla lacks infrastructural development. There are only 2 primary and two secondary schools (Aparin and Ansaru- Islam). The markets have no adequate structures, security and electricity waste is littered around the community. Residents are served with one health centre.

## ***Ilala***

Ilala has one market - Idi Ape market. The market operates every day but lacks basic amenities. There is only one health facility in the area that provides maternity services. The two access roads are in poor state due to erosion. The community schools either lack water or electricity.

Generally, infrastructural developments in the communities are not adequate; educational facilities lack basic amenities, most health institutions are not well equipped and staffed, most of the access roads have been eroded and require repairs and maintenance. Farmers are faced with the problem of storage and preservation of their farm produce.

### **4.7 Monitoring Mechanism**

The proposed GEF intervention aims at three major components- Community capacity Building, Infrastructural development, and project management and coordination. Findings from this survey however, show the need for a more comprehensive and holistic community-based approach which involve capacity and awareness building initiative, outreach and micro- grant support to enhance sound natural resource management practice. Institutional capacity also will be strengthened through planning and analytical tools.

#### **4.7.1 Community Capacity Building and Advisory Services**

Since the communities are mainly agrarian and depend on farming as their major means of livelihoods and agriculture production techniques have remained rudimentary despite years of technological advancement in the field. Training of farmers, pastoralist in the community especially in mitigating activities for environmental hazards of irrigation and common water resources management will improve capacities of Fadama users (Table 5.6). The total number of groups trained will serve as an indicator for the coverage, thus records keeping will be of importance in this area.

#### **4.7.2 Community Infrastructural Development**

The survey revealed that the general state of infrastructural facilities in the Ajaase-Ipo intervention site is poor and inadequate. In all communities assessed, storage facilities and terminal markets, for farm produce were none existence or lacking. These discourage farmers in the community to embark on large scale production of agricultural good. Good accessible roads, electrification, communication, potable water, educational, health and sanitary facilities in most communities assessed were lacking, none existence or in need of repair and maintenance. The establishment and the rehabilitation of infrastructures in Ajaase-Ipo intervention area will help strengthen community development and reduce poverty among Fadama resource users.

Furthermore, urbanization and population growth have lead to increase pressure on the communities resources resulting in land degradation, siltation and depletion of water bodies in the areas. As shown in Table 4.6, the number of infrastructure provided for the community will support the Fadama users both in productivity and income generation activities.

#### **4.7.3 Project Management and Coordination**

Project management activities including monitoring and evaluation, procurement, management audit and financial management are required at the federal, state and local government levels for effective implementation of the Fadama program. Table 4.6 indicates the several specialised surveys that are required to support the project.

**Table 9. 7 Proposed Monitoring Mechanism**

No	Project Component/Indicators	Proposed Intervention	Proffered Monitoring Mechanism	Key Performance Indicators
1	<b>Community Capacity Building and Advisory Services</b>			
	<b>Capacity Building</b>	Capacity building of crop farmers, pastoralists, fisher-men, and agro-forestry farmers to manage natural resources.	Regular appraisal of records and practices Review of records of operation	High sustainable watershed management skill and capacity over time.
		Enlightenment campaigns, training workshops and community mobilization	Records and nature of campaign on the targeted groups.	Increase level of awareness on relevant watershed issues
		Training of key project personnel as trainers in supervising mitigating activities for environmental hazards of irrigation and common water resources management	Assessment of trained personnel for effective levels of knowledge	Number of personnel trained in a period, relative to target number.
		Suitability of resources persons	No of Training held. Suitability of Resource persons	Proficiency of water resource management
		Socio-economic policy reforms in environmental and natural resource protection.	Regular review of socio-economic policies	Policies addressing environmental and natural resource protection issues
		Provision of sustainable technology support for natural resource management (e.g. GIS, GPS, computers, MIS softwares, etc.)	Records of supply technology Appraisal of technology support personnel	Number and types of sustainable technologies introduced over time.
		Formation of environmental and natural resource management / protection groups.	Number of groups	Record/frequency of meetings
		Training in agricultural produce and by-product processing (crops, livestock, fish and forest products.	Assessment of level of knowledge of farmers within the FADAMA community. Records of training	Number trained in a period and over time. Level of awareness
		Development of sustainable watershed management and coordination capacity.	Assessment of ability to sustain planned activities within the communities	Number of watershed management training programmes mounted and number in attendance in a period and over time. Measured output of the coordination effort

		Development of sustainable land and water management practices into communities Local Development Plans.	Review local development plan	Number and percentage of LDPs mainstreamed. Number and percentage of communities that mainstream at least 50 percent of practices into their LDPs
	<b>Advisory Services Facilitation</b>	Production Diversification and Quality Improvement Crop production and combinations with higher yield potential Alternative practices and soil fertility management Integrated and biological pest / disease management Farm tools and practices to increase labour productivity; post-harvest handling of produce and primary processing; Conflict Resolution and Environmental Awareness Improving Access to and returns from use of Farm Inputs Enterprise Management Support		
2	<b>Community Infrastructural Development</b>			
		Development of access roads from farm settlements to market areas	No of access roads constructed No of markets	Improved accessibility of farmers to market
		Development of markets		
		Building of storage facilities for the preservation of harvested farm produce	Number of storage facilities constructed	Increased number of preserved food
		Socio-economic policy reforms in environmental and natural resource protection.	Review of socio-economic policies	Policy addressing environmental and natural resources.
		Degree of sustainable technology support for CEMP		Area of agro-forest farms established by project farmers.
		Formation of environmental and natural resource management /protection groups.	Number of groups	Forest/orchard seedlings actually planted by project farmers

		Training in agricultural produce and by-product processing (crops, livestock, fish and forest products).	Assessment of level of knowledge of farmers within the FADAMA community Records of training	Quantity and value of crop residue reclaimed and utilized (e.g. maize/rice husk).
		Sustainable watershed management and coordination capacity established.	Assessment of ability to sustain planned activities within the communities	Quantity and value of livestock and fish waste products reclaimed and utilized (e.g. livestock dung, poultry droppings, etc).  Marketing of agro-forest products.
3	<b>Project Management and Coordination</b>			
		Effectiveness of project coordination at federal and state levels.	Appraise project coordination effort at various levels. Improve service delivery	Number of coordination meetings held and number in attendance in a period and over time.
			M&E visits to project areas by SFDO LFDO, and GEF Desk Officers.	Number of facilities provided for project coordination activities in a period (e.g. transportation, information and communication technologies, etc).
		Integration of environmental management concerns into community LDPs	External monitoring and evaluation conducted. Perception of the target group on the project	Number of environmental sub-projects approved and implemented as a proportion of all sub-projects in a period and over time.
		Regulation of fertilizer and pesticides use in project areas.	M&E surveys /special studies conducted. Conduct survey on best practice by farmers. Monitor compliance of FMARD	Percentage of users following recommended dosage and recommended application procedures in a period and over time.
		M&E visits to project areas by SFDO LFDO, and GEF Desk Officers. Desk Officers.	Management audit with fertilizer distribution Review of importation policy on pesticide	Number of visits in a period and over time.
		External monitoring and evaluation conducted.	Financial monitoring	Number of external M&Es conducted in a period and over time.
		M&E surveys /special studies conducted.		Number of surveys and special studies conducted in a period and overtime vis-à-vis number planned.

	Management audit	Effective and sustainable project coordination system is institutionalized	Frequency of management audit vis-à-vis the planned frequency in a period. Number of financial monitoring carried out in a period, vis-à-vis the planned number in a period.
	Financial monitoring		
	Procurement monitoring	Environmental management concerns are sustainably integrated into community LDPs	Number of procurement monitoring carried out, vis-à-vis the planned number.
	EIA preparation.		Number of environmental impact assessments (EIAs) conducted for sub-projects vis-à-vis the recommended number in a period.
	EMP preparation and implementation.	Fertilizer and pesticide misuse is reduced significantly.	Number and percentage of prepared EMPs actually implemented in a period.

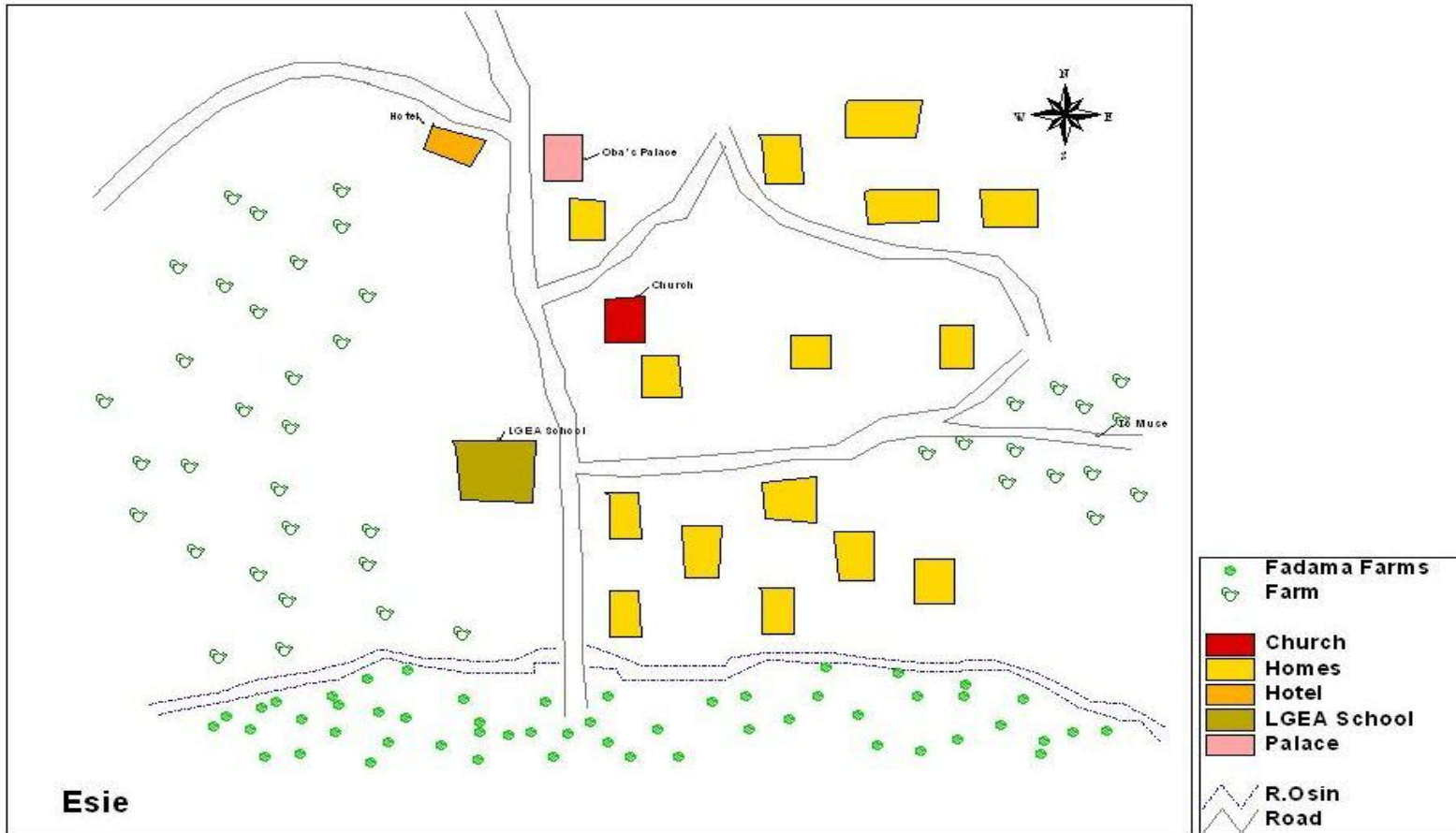


FIGURE 14.14 COMMUNITY RESOURCE MAP OF ESIE COMMUNITY



Figure 15. 15: Community Resource Map Of Illudun-Oro Community



LIBRARY



FIGURE 16.17 COMMUNITY RESOURCE MAP OF OKE-OLA ORO COMMUNITY

UNIVERSITY



Figure 17.18 Community Resource Map Of Ilala Community

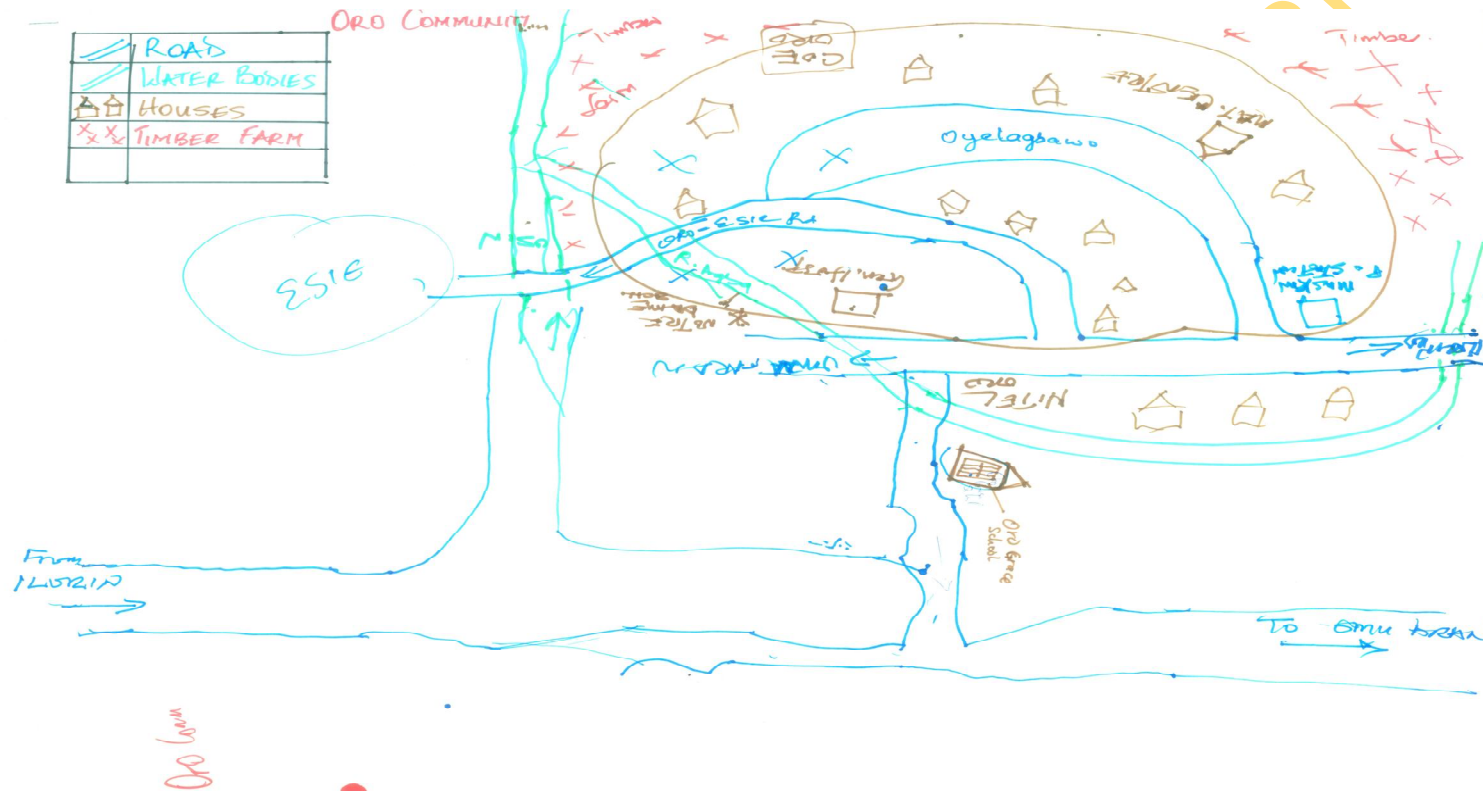


Figure 18.19 Community Resource Map Of Oro Community

### ***Chapter Six: Conclusions and Recommendations***

The survey reveals that the Ajasse-Ipo watershed catchments area is surrounded by more than 10 communities with most of the inhabitant depend on the environment for their livelihood.

The major environmental challenges are:

- Deforestation and land clearing for agricultural purposes in Fadama farmland area.
- The un-sustainable exploitation of the natural resource (oil palm/wine tapping, tree felling) with the catchments area.
- Land degradation and erosion from sand mining activities along the River Oshin and upland areas of the watershed.
- Soil compaction and puddling through cattle grazing within the catchments area particularly within the Fadama farmland areas.
- Soil erosion and siltation of water body from excessive and uncontrolled application of irrigation water to farmland.
- Leaching, loss of plant nutrients and pollution of water body from uncontrolled application of fertilizers, herbicides and pesticides.
- Reduction in water/moisture retention ability of soil and decline in the productivity of the soil arising from uncontrolled slash and burning of farmland.
- Sedimentation of water body due to runoff from cleared land.
- Pollution of water body from surface run off and possible increase in coliform content of the water from cattle grazing activities.

Recommendations to enhance the farmers' productivity and increase their farm hectarge in order to meet the growing demand for their produce and make the practice attractive to women are listed below.

- Enlightenment campaign aimed at preventing indiscriminate bush burning and unsustainable exploitation of the resources within the watershed should be embarked upon.
- Restructuring and strengthening of the Local Government to be able to discharge their duties in support of agricultural development within the community
- Restructuring of the Fadama Associations at the Local Government and community level to include the actual Fadama farmers
- Enhance capacity of actual Fadama farmers at the local level through the provision of loans and fertilizers.
- Encourage the Fadama farmers have access to high yielding crop varieties so as to boost their production and increase their net return.
- Furthermore, there are no grazing areas for the cattle during this time. Consequently, conflict between the crop and livestock farmers is a common occurrence within the area. As part of the intervention programme therefore, adequate provision should be made for grazing and water supply to the livestock during the dry season.
- Improved accessibility to the various Fadama sites within the watershed through the construction of motorable roads.

These measures will promote the sustainable utilization of water, soil and land resources within the watershed and reduced or completely eliminated land degradation.

## Annexes

### *Annex 1: References*

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**Annex 2: List of Schools in the Communities**

<b>Communities</b>	<b>Primary Schools</b>	<b>Secondary Schools</b>	<b>Higher Institution</b>
Illudun -Oro	St.James Anglican Liewort Ansaru Islam College of Education Staff School Arabic School	Anglican Girls Sec School Illudun comprehensive high School Oro grammar School	
Ajasse-Ipo	Baptist Primary School Community Primary School Banwo Primary School Mayokun Primary School Izubilai Primary School	Banwo Ajasse-ipo Comprehensive Government Day Abiola Standard Alade	
Esie	Muslim St. Michael Dominion Nomadic	Esie-Illudun Grammar Esie Community	Government. Technical
Oro	St. Andrew Pry School Mount Camel Pry School Oro Nursery & Primary College of Education Staff School Arabic Pry School	Notridam Girls Sec School Muslim high School Oro grammar School	College of Education, Oro
Illala	Community primary school (muslim)	Oyelagbawo	
Okeya-po	Ansaru Islam LGEA ECWA LGEA	Comprehensive High School	
Okeola-oro	Best way Community School Jammat Nur & pry school Faith Nusery school	Jamat Secondary Faith Secondary	
Eggi	ECWA Primary School		
Igbonla		Aparin sec school Ansaru- Islam Sec school	
Buari	Buari Community Pry school	Buari Comprehensive	

**Annex 3: Data Collection Tools****A. Checklist for Community Survey of Ajasse-Ipo Watershed Catchment Area.**

1. Name of community \_\_\_\_\_
2. Distance of Community to the flood plain \_\_\_\_\_ km
3. Settlement pattern
4. Settlement type (provide low order services e.g.
5. Types of animals are reared in this community
6. List & conditions of the schools
7. Number/State of roads in the community (*Tarred, graded, bush part, maintained*).
8. No and state of markets in the community
  - Types: Modern, night market community market etc
  - Amenities: Availability of Human & refuse disposal facilities
  - Types of goods and services
  - Nature of structure
  - Security
  - Electricity
  - Water
  - Operational days
9. No & Types of health care centers in the community
  - Availability of drugs, doctors, nurses, equipments, beds
10. Observe for land degradation characteristics

## B. FOCUS GROUP GUIDE FOR FADAMA COMMUNITY INFORMANTS

### Introduction of participant

Please give your name age occupation and tribe, marital status, literacy level (association members/Community members).

#### Issues:

##### A Socio-economic

- Give us background information about your association and how your activities relate to the flood plain? How and why people get involved and their expectations from your association?
- Has there been any community problems arising from activities around the flood plain? If yes what is the nature of the problem and why? How was the problem resolved?
- Please enlighten us on what the community people use the flood plain for? Why? Without the area being water shed what would life be like in the community? Are there any cultural ties to the use?
- What are the types of jobs people in this community engage in as a means of livelihoods? What do the men specialise in and what do the women specialised in?
- With respect to the nature of the job people in this community do; what is likely to be the average income (men/women). If possible disaggregate by age and different jobs
- Please mention any past & present community based local organizations involved in watershed management (CBOs etc) Give details of involvement in the watershed issues.

##### B Environmental Awareness

- What have you to say about the water quality (drinking water in the area? Water use practice, its suitability for drinking and.
- Please describe how land in an area of this nature should be managed without damage to the quality of the soil and impact on the crop yield. Is this the current practice here if not why? What do you think is required to achieve best practice?

##### C Water Resources Management

- How is the flood plain protected from contamination? What are their media of pollution? During the wet season, are there persistent run off from the field into the adjoining surface water? Does this run off extend into the early period of dry season?
- Are rivers, streams, ponds, lakes etc within the watershed the main source of drinking water for human and livestock?
- Has there been significant reduction in the flow of surface water within the watershed?
- Are there water courses –rivers, streams, ponds, lakes etc that have dried up since you have been in this community? What do you think is responsible and Why?
- What has been your experience with the water levels (any changes over the years?).To ensure a high yield of fish harvest, what are the general practices in the community? When there is a change in the species or quantity of fishes in the water bodies around what will /do you do and why. At what time of the year do such changes occur and what do you think is responsible?
- Which of the following have you observed in the flood plain characteristics;
  - Change in the absorption capacity of the surface
  - Loss of retention capacity of the vegetation and soil such as soil loss from soil surface
  - Change in the flow of surface water



- What are your plans towards the management of the Fadama area? How do you intend to carry out this plans (Who will be responsible for what? and probe for level of capacity to achieve this.

D Land Resource Management

- How and what methods of waste disposal is commonly practiced in this community. Do you have anything to say about the appropriateness of these methods?
- Tell us if bush burning is common in this area, is this method of bush clearing applied to farms around the community: During land clearing activities, which of the following methods do you use? Manual: *clearing of vegetation and burning*; Mechanical: using heavy equipment such as heavy chains, bulldozers and tractors to do plowing and harrowing. Chemical: using herbicides to establish grown areas.
- What are the environmental problems of your community? (Rank in order of importance). How do you address these problems
- Do you have any experience with the agricultural land being converted to urban development use in recent time? Or part of the conservation zone being converted to cultivated field by the community people?
- How will you categorize the visit of extension officers, forest managers, and conservation experts in your area? (*Always, Often, Sometimes, Rarely*).
- Have you involved in draining and diverting the course of waster bodies around for the purpose of your farm activities? (How? Season? Reason).
- Have you been involved in land boundary or ownership issues with anyone (fellows, colleagues or strangers) in the communities?

*(Joint section)*

- Sketching of the community showing the areas used for farming, hunting, Animal Husbandry and fishing.

**Annex 4: List of Persons Contacted**

Nos	Community	Name	Telephone
1	Ajasse-Ipo (Agbeloba Male Group)	Mr. Gideon Ogundijo	08052271598
2		Mr. Sunday Adegbenjo	08076817132
3		Mr. Micheal Afolayan	08030615526
4		Mr. Gabriel Adeniran	07033500554
5		Alhaji Nasiru Alabi Owolabi	08029064404
6		Alhaji Yusuf Balogun	08034450682
7	Ajasse-Ipo (Agbelore- Women Group)	Mrs. Funke Idris	08038603056
8		Mrs. Omowunmi Ajiboye	
9		Mrs. Nimota Adeyemo	
10		Mrs. Sikiratu Usman	
11		Mrs. Titilayo Ayeni	
12		Mrs. Bunmi Ogundijo	
13	Ajasse-Ipo (Agbelore -Male Group)	Mr. Aremu Abdulai	
14		Mr. Taiwo Paul	
15		Alfa Idowu Jimoh	
16		Alhaji Suliamon Usman	
17		Alhaji Mahmud	
18		Mr. Joseph Oladele	
19		Alhaji Usman	
20	Esie (Omolere Men and Women Group)	Alhaji Saliu Mohamadu	08069512045
21		Alfa Jimoh	
22		Mrs. Habibat Aliu	
23		Mrs. Hadijat Jimoh	
24		Mrs. Fatima Saliu	
25		Mrs. Salimatu Aliu	
26		Mr. Adamu Jimoh	
27		Mrs. Meminatu Usman	
28		Mr. Yusuf Saliu	
29		Mr. Mohammed Saliu	
30	Esie (God is Able Men Group)	Mr. P. O. Adesina	08038324388
31		Mr. D. A. Abolarin	
32		Mr. Samuel Babalola	
33		Mr. S. O. Babalola	
34		Mr. S.S. Adekanye	08057186747
35		Mr. S.O. Babatunde	08039132432
36	Esie (Agbelere Men and Women Group)	Mr. S.A. Aransiola	08030501732
37		Venerable M. A. Abolaji	
38		Mrs. J.B. Adewoye	08065600775
39		Mrs. Felicia Opabola	
40		Chief Mrs. R. A. Ooye	08038131312
41		Mrs. F. D. Aransiola	
42		Chief. J. Agbo Ooye	08033598773
43		Mr. M. O. Ibiyeye	
44		Mr. E. O. Aransiola	
45	Oro (Boluyo Men Group)	Mr. Sunday Adeyemi	07030494878
46		Mr. J. O. Adewunmi	08066029439
47		Mr. Olowafemi Martins JP	
48		Mr. Joseph Ariyo	08038585303
49		Mr. S. O. Oloyede	08058748833
50		Chief G. O. Ogundokun JP	08068789144
51	Oro (Precious Women Group)	Mrs. D.A. Adedoyin	08038264292
52		Mrs. J.O. Obateru	08034655674
53		Mrs. Alaofin	
54		Mrs. Bamigbola	
55	Sanmora (Agbeloba Men Group)	Mr. Tajudeen Raimon	08072709768

56		Mr. Joseph Uhenge	
57		Mr. Oseni Yusuf	
58		Mr. Lawal Abidoye	
59		Mr. Yekini Hassan	08057080683
60		Alhaji Kareem	
61		Mr. Yaya Adigun	
62		Mr. Rasheedi Abolaji	
63		Mr. Samuel Adigun	
64		Mr. Afolabi Sikiru	08055817258
65	Illala (Ifedapo Women Group)	Mrs Isha Saka	
66		Mrs. Isha Disu	
67		Mrs. Fatima Ganiyu	08066724002
68		Mrs. Salamatu Yusuf	
69		Mrs. Fausat Ibrahim	
70		Mrs. Aminat Usman	
71		Mrs. Hajirat Abubakar	
72		Mrs. Zainub Alabe	
73	Okeya-Po (Olorunshogo Men and Women Group)	Alagba S.O Bamidele	
74		Mr. Toyin Afolayan	07032568061
75		Mrs. Aminat Tomori	
76		Chief Esa	
77		Mrs. F.O Bamidele	
78		Mr. Idris	
79		Mrs. Amina Lawal	
80		Mrs. Odunayo Bamidele	
81		Mr. Emmanuel Bamidele	
82		Mrs. M.A Lateef	07038744241
83		Mr. Aliyu Ibrahim	
84	Okeola-Oro (Unique Men Group)	Mr. D.O Alao	08067869037
85		Mr. W.A Illesanmi	08034162491
86		Mr. Jimoh Bolaji	
87		Mr. J.O Adeleye	
88		Mr. James Aremu	
89		Mr. M.O Afolabi	
90		Mr. Olaitan Ojo	
91	Eggi (Idagba Soke Men Group)	Mr. Clement Adaegh	07030099452
92		Mr. Joseph Pius	
93		Mr. Joseph Shaba	
94		Mr. Jacob Ndom	
95		Mr. Sunday Maikia	
96		Mr. Abdul Saliu Ishola	
97		Mr. Joke Ahanmbe	
98		Mr. Saliu Ewedumoye	
99		Mr. Saliu Ishola	
100	Facilitators (NFDO)	Mr. J. O. Aina	
101		Mr. Henry Aina	
102		Mrs Yemisi Olawepo	08062349072

**Annex 5 Key Personnel**

**Labode Popoola** - Responsible for Project coordination and synthesis of findings

**Alani Amusan** – B.Sc (Agriculture), Ph.D (Soil Science): Land Use Baseline/Environmental Impacts.

**Goriola Omisore** - B.Sc (Microbiology), M.Sc. (Microbiology): Water quality requirement, field data quality and HSE management.

**Omololu Soyombo** – B.Sc. (Sociology), Ph.D (Sociology): Socio-economic survey, social impact assessment, consultation, and social data analysis.

**Gladys Fayomi** - B.Sc. (Biochemistry), M.P.H (Environmental Health): Socio-economic survey, social impact assessment, consultation, social data analysis.

**Joseph Bamidele** - B.Sc. (Botany), Ph.D (Ecology): Flora analyses. Review vegetation and land use pattern within and around the site.

**Lekan Taiwo** - M.Sc (GIS): B.Sc. (Geography) . GIS Mapping.

**Lolade Adenekan** – B.Sc (Urban & Regional Planning). GIS field support

**Jimoh S. O.** - B.Sc., M.Sc. (Forestry), Ph.D (Multiple-Use Forest Management): Flora analyses. Review vegetation and land use pattern within and around the site.

**Azeez I. O.** - B.Sc., M. Sc. (Forestry), Ph.D (Forestry Extension): Flora analyses. Review vegetation within and around the site.