TITLE PAGE

AN EVALUATION OF SOME SUSTAINABLE RURAL DEVELOPMENT COMPONENTS IN THE DESIGN OF THE HADEJA-NGURU WETLANDS CONSERVATION PROGRAMME

BY

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DECEMBER, 1999

DECLARATION

I Ibrahim Yusuf hereby declare that this research has been undertaken by me, and has never been presented for any academic purpose anywhere.

Ibrahim Yusuf ----------

CERTIFICATION

The project report/Thesis/dessertation entitled an evaluation of some sustainable rural development components in the design of the Hadeja-Nguru wetlands conservation programme meet the regulations governing the award of the degree of M.Sc. U.R.P of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

Hadeja-Nguru Wetlands Conservation Programme was initially designed by the Royal Society for the Protection of Birds (in the U.K.) to conserve the wetlands as a habitat for migratory waterbirds, as well as the water-resources of the Komadugu-Yobe basin in general.

However, along the line, some rural development components were later introduced into the programme by the World Conservation Union under the concept of 'wise-use' of resources. This development therefore entailed a new set of programme objectives on the existing ones.

However, the programme design has not provided the basis upon which the new objectives will be achieved. Similarly, it is also important to note that there are different strategies for rural development that also have different design requirement, and where these requirements are left out, the expected outcomes will not be fully realised.

The data used in this study were collected from both the primary and the secondary sources, and these were first synthesised in order to group similar information together. These data were later analysed using the simple statistical technique of computing percentages with a view to identify the impacts of the programme on its various components particularly after its introduction.

Outcomes from these activities however revealed that the programme had recorded some impressive results particularly in the aspects of the ecological and hydrological studies. However, the programme is yet to make a remarkable impact in terms of promoting rural development activities in the region. For instance, its attempt to enhance the socio-economic activities of the wetlands inhabitants through enhancing their agricultural outputs mainly centred around the development of pilot projects (such as dyke construction and donkey drawn carts and ploughs) that are designed to promote agricultural production in the region.

However, the programme design has not addressed the need to provide some of the basic infrastructural facilities such as rural feeder roads, modern farm-inputs, credit subsidies etc that will enhance and at the sametime help in sustaining the development process.

To address these problems therefore, literatures relating to rural development were reviewed with a view to propose some appropriate strategies that will accommodate and at the sametime promote the new programme's objectives so as to have better outcomes. In this regard, strategies that will enhance the programme's design, the rural development components, minimising of land use conflicts in the wetlands as well as strategies for enhancing the socio-economic activities of the wetlands communities were all proposed for the programme.

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DEDICATION

This Thesis is dedicated to my wife Hindatu, and my children Shu'aibu, Zakariyya and Hadiza.

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CHAPTER ONE: 1.00 DESIGN OF THE STUDY

1.10 INTRODUCTION

The Nigerian Conservation Foundation (N.C.F) initiated work on the Hadeja-Nguru wetlands conservation project in 1985 because of the areas outstanding importance to the national economy and its significance as a site of international importance for migratory waterbirds. The Hadeja-Nguru wetlands is a natural floodplain that has formed where the waters of the Hadeja and Jama'are rivers meet the lines of ancient sand-dunes aligned in the northeast-southwest, and is drained over an approximate area of about 5000 km^2. Adams and Hollis (1983)

The project was started in 1987 on a partnership basis between Bauchi, Borno and Kano state governments, the Nigerian Conservation foundation and the Royal Society for the Protection of Birds (R.S.P.B.) in the United Kingdom. The creation of the states of Jigawa and Yobe now leaves the wetlands within Bauchi, Jigawa and Yobe States.

The initial focus of the project was to protect the wetlands as a natural floodplain for migratory waterbirds. However, in 1990, the International Union for the Conservation of Nature (I.U.C.N.) at the instance of the partners took over the Management of the project, and since then, its focus has been on the maintenance of the economic and ecological functions of the wetlands in particular, and the promotion of sustainable development in the Komadugu-Yobe basin in general.

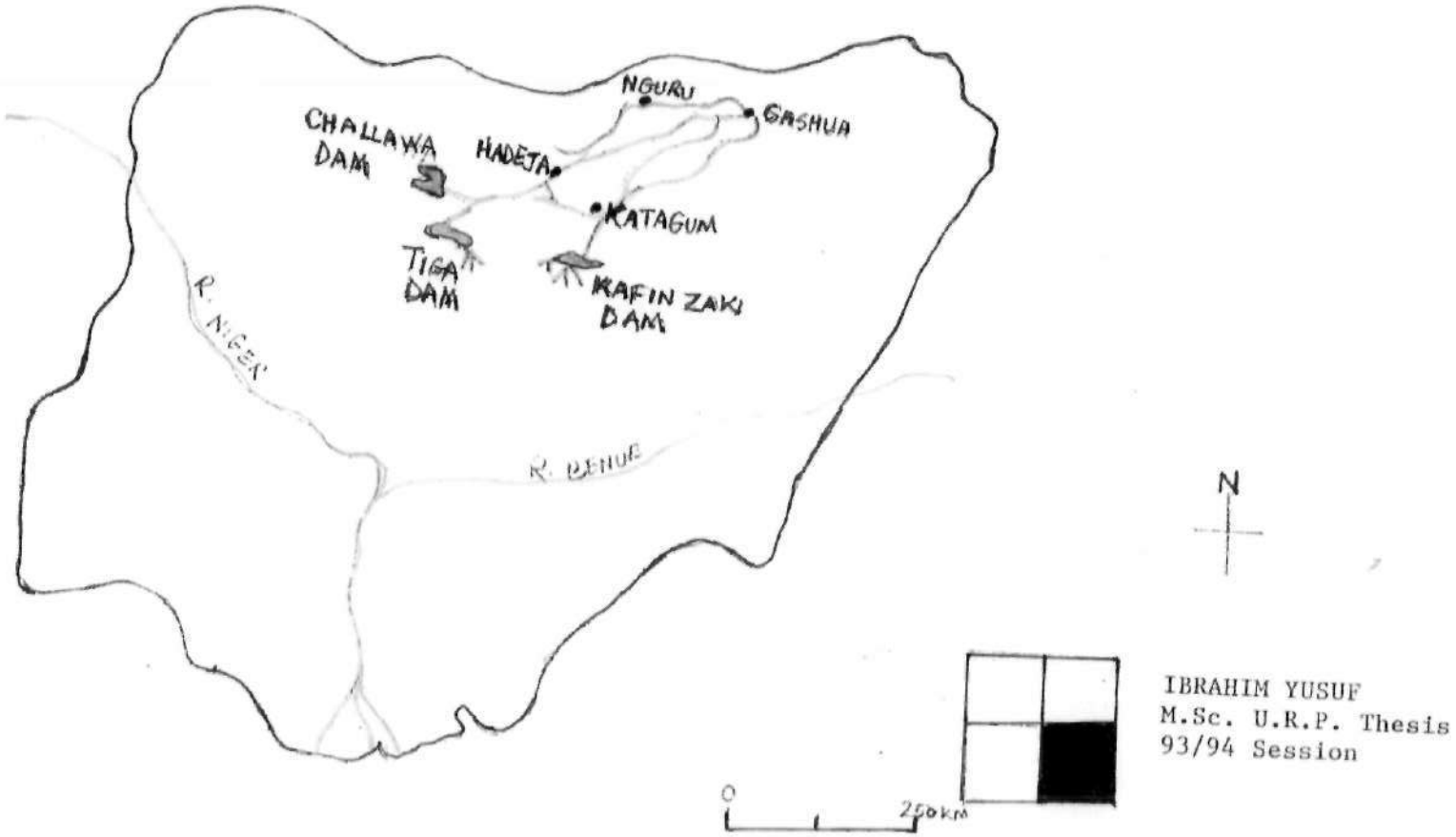


Fig. 1

Locational Map of the H-N Wetlands in Northern Nigeria.

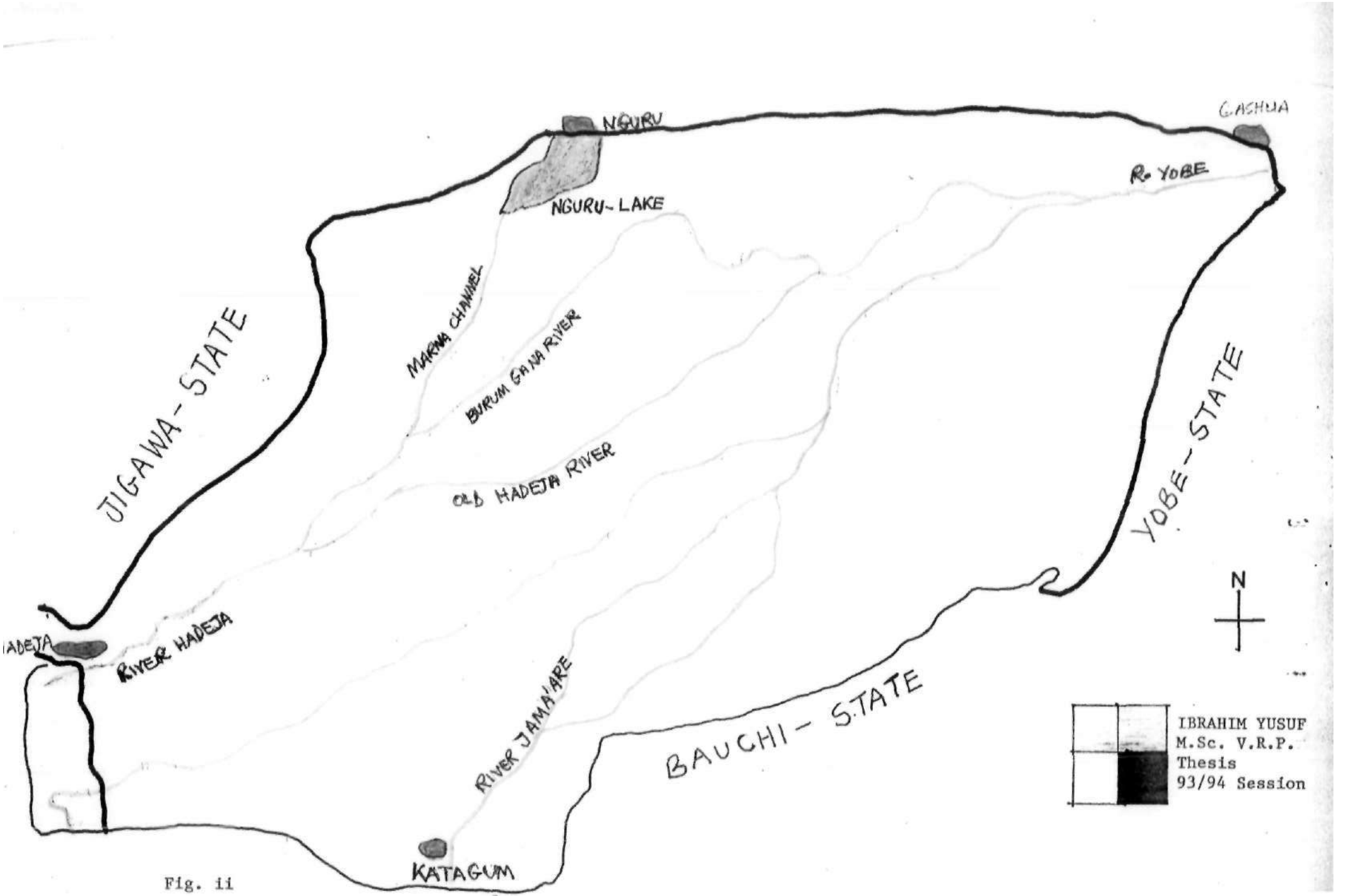

NGURU
GASHUA
R. YOBE
NGURU - LAKE
MARMA CHANNEL
BURUM GANA RIVER
OLD HADEJA RIVER
JIGAWA - STATE
YOBE - STATE
HADEJA
RIVER HADEJA
RIVER JAMA'ARE
BAUCHI - STATE
KATAGUM
N
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M.Sc. V.R.P.
Thesis
93/94 Session

Fig. ii

1.20 STATEMENT OF RESEARCH PROBLEM

Different strategies for rural development have different design requirements. Where the design requirements are left out, the expected outcomes would not be fully realised. Hadeja-Nguru wetlands conservation Programme was conceived by the Royal Society for the Protection of Birds. The Programme was initially designed to conserve the wetlands as a habitat for migratory waterbirds as well as the water-resources of the Komadugu-Yobe basin in general.

However, along the line, some rural development components were later introduced in to the programme by the World Conservation Union under the concept of 'Wise-use' (sustainable use) of resources. This new development therefore entailed a new set of programme objectives in addition to the existing ones thereby making the programme's objectives dual in nature. Similarly, this new development would also have certain consequences on the outcomes of the programme in respect of the following areas.

1. **Strategy:** With respect to the strategy, the existing one will not adequately address the programme's present objectives of conserving the wetlands resources and promoting rural development simultaneously.
2. **The design Requirement:** The initial design requirements will also not fully address the programme's present objectives.
3. **The Anticipated Outcomes:** Because of the problems identified above, the expected outcomes would not be fully realised.

In view of the problems highlighted above, there is the need for the programme to have a new strategy that will simultaneously and adequately accommodate its present objectives of conserving the wetlands resources and promoting rural development in the region on a sustainable basis.

This study will therefore evaluate the extent to which the existing design requirements of the Hadeja-Nguru wetlands programme will help it achieve its desired objectives.

1.30 AIM AND OBJECTIVES

1.31 **Aim:** The aim of this study is to evaluate the design of the Hadeja-Nguru wetlands conservation programme with a view to establishing the sustainability of the rural development components introduced in to it so as to have a basis for making proposals for improving its outcomes.

1.32 **Objectives:** The above aim will be achieved through the following objectives:

1. To review and assess the design objectives and goals of the Hadeja-Nguru wetlands programmes.
2. To evaluate the outcomes of the programme in relation to its design objectives.
3. To make proposals that will ensure sustainability and enhance better-outcomes of the programmes.

1.40 SCOPE AND LIMITATIONS

The scope of this study is to evaluate the design of the Hadeja-Nguru wetlands programme so as to identify the extent to which its design characteristics have helped in attaining the programme's objectives. On the other hand, the limitations of the study are tied to the vastness and marshy nature of the environment which make accessibility difficult. Others include lack of adequate fund, relevant maps and data relating to the area.

1.50 SOURCES OF DATA

The data used in this study are obtained from the following areas:

1. Literature review
2. The programme's books, annual reports and documents
3. Field or reconnaissance survey
4. Interviews with programmes staff and beneficiaries
5. Questionnaire survey
6. Maps

1.60 METHODS OF DATA COLLECTION AND ANALYSIS

1.61 **Data Collection:** The data used in this study are collected through the following procedures:

1. Personal observation of information available on the field.
2. Personal conduct of informal interview with programme's staff and beneficiaries.

3. Administering of questionnaire on a random sampling of settlements with the assistance of the programmes staff and vehicles.
4. Personal consultation of programmes books and annual reports.

1.62 **Data Analysis:** The data collected for this study were first synthesised in order to group similar information together for easy computations. These data were later analysed using the simple statistical techniques of obtaining percentages with a view to bring out clearly the impacts of the programme on its various components particularly after its introduction.

1.70 **DEFINITION OF CONCEPTS**

1.71 **Wetlands:** This is an area of mash lowland that is wholly or partially covered with water that is either natural or artificial, permanent or temporary, and whose water is characterised by alot of coarse grasses and other aquatic plants. Wolfgang, (1993).

1.72 **Sustainable Development:** This is a kind of development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs (U.N.C.H.S.'94).

1.73 **'Wise-Use':** 'Wise-Use in the context of the Hadeja-Nguru wetlands programme is referred to as the sustainable exploitation of the wetlands natural resources.

However, 'wise-use' from planning perspective can be referred to as not only the sustainable use of resources, but also as to how these resources are orderly arranged spatially, exploited and managed.

1.74 **Region:** A region in a general sense is an area of land possessing distinct characteristics which make it a readily identifiable entity. These characteristics may be physical, economic or social. Lewis (1969).

1.75 **Programme:** A programme is an activity that has a wide geographical spread, e.g. the promotion of a national healthcare programme. Peter and Conyers (1992).

1.76 **Rural Development**: Rural development is concerned with the improvement of the living standard of the low-income population living in rural areas on a self-sustaining basis through transforming the socio-spatial structure of their productive activities. Mabogunje (1980).

CHAPTER TWO: 2.00 A REVIEW OF LITERATURE

2.10 The Bottom-up Development Strategy

The concept of development from below is a recent strategy for organising space and resources for regional and rural development. According to Taylor, 1980, development from below considers development to be based primarily on maximum mobilisation of each areas natural, human and institutional resources the primary objective being the satisfaction of the basic needs of the inhabitants of that area.

Development from below strategies are basic needs oriented, labour intensive, small scale, regional resource based, rural centred and argue for the use of appropriate technology (Taylor, 1980). The central objective of this strategy is the full transformation of a regions natural resources and human skills for a people centred development process. Thus, the essential components of this strategy include the following:

1. A fundamental restructuring of rural space and settlements so as to improve the physical and social access of producers to vital national resources.
2. The creation of new rural structures that would facilitate substantial re-investment of financial resources in the rural sector.
3. Mobilisation of farmers through effective organisational frameworks that would promote mass involvement in the development process.

4. Provision of appropriate technology for raising rural productivity and efficient utilisation of resources.
5. Creation of efficient transportation networks for rural and urban areas.
6. Integrated rural development which incorporates not only service provision but also rural industrialisation.
7. Agricultural transformation to ensure massive food production and supply of industrial raw materials.

The success of this strategy towards enhancing rural welfare largely depends on the extent to which the people are enlightened and moblised in to the programme since the strategy is labour intensive and involves the restructuring of the people's rural space and settlements. The main limitation related with this strategy is the issue of what should really be provided that will constitute the basic needs of the communities.

2.20 **Integrated Rural Development Strategy:**

The integrated approach to rural development addresses rural development on a multisectoral basis with a view to improving the living standards of the low-income population living in rural areas. To achieve this objective therefore, the strategy encourages the provision of basic rural infrastructural facilities such as rural feeder roads, schools, healthcare centres, water/electricity supplies, shelters etc.

Lele (1975), identified two types of this strategy these include the strategy that is externally designed and financed, and one that is internally or locally planned and financed.

The externally designed and financed strategy refers to those type of projects and programmes that are initiated and sponsored by philantrophic organisations and international donor agencies, and it is characterised by the use of expatriate staff. The Hadeja-Nguru wetlands programme is an example of this form of development strategy.

The main emphasis of this strategy is on the enhancement of agricultural activities in the rural areas through the provision of basic farm inputs such as pesticides/herbicides, improved seed varieties, tractors hire services etc. Other provisions include the marketing of farmers produce, the provision of credit facilities at low interest rates as well as land preparation services. etc. This strategy is also similar to the integrated Agricultural and Rural Development Projects (ADPs) introduced in 1974.

The ADP system was founded on a simple philosophy of grafting on to the existing rural Socio-economic systems those vital inputs and basic infrastructure which it lacks to be able to raise agricultural productivity and the quality of rural life. Gana J. (1991). Unlike the first strategy, the second form that is internally planned and financed emphasises the use of local planning in both the implementation and financing of its activities by the national governments. The main objective of

this strategy is to bring about self-reliance.

However, the attainment of this objective largely depends on the extent to which the beneficiaries are integrated into both the decision making and implementation processes of the programme. Its success also depends on the level of enlightenment campaigns to the beneficiaries about the roles they are expected to play towards the attainment of the strategy's objectives. An example of this form of development strategy is the Tennessee Valley Authority (TVA) in the United States of America.

2.30 **Institutional Development Strategy:**

The strategy is based on the collective participation of community members towards enhancing their social welfare through the provision of their basic needs. Thus, for this strategy to promote rural development, the rural communities particularly the youth have to be fully mobilised to participate in such self-help developments. This is because the full fruit of social progress is only meaningfully reaped by a society in which the generality of its men and women are not only passive recipients, but also practical contributors. It is as a result of this realisation that people organise themselves into groups under different development associations so as to enhance their societal welfare.

In rural areas, such self-help undertaking sometimes go by the name community 'Development Association' or 'Rural

Co-operative,' a notable example of this is the Harambes Development Association of Kenya. For effective mobilisation of community members, these associations sometimes liase with relevant government agencies for support in terms of mobilisation campaigns and provision of technical assistance.

Some of the basic components of this strategy include the development of agriculture, the provision of roads, water supply and schools. Others include the provision of community centres and the construction of bridges and culverts etc.

However, the major limitation of this strategy is that its success largely depends on the willingness and cooperation of the participants. Similarly, the execution of capital projects such as roads, bridges and dam constructions are in most cases beyond the capability of these associations, and thus, government usually intervenes to assist in solving the problems.

2.40 **Basic Needs Strategy**

The basic needs strategy to rural development is built on the principle that rural development programmes can be fully realised if those basic needs that are considered necessary for enhancing the development of the rural communities are provided. The strategy therefore emphasises the provision of those social amenities such as roads, adequate water supply, schools, healthcare centres, markets and farm service centres for the provision of farm inputs etc.

To achieve these objectives, the strategy therefore calls

for concerted efforts towards the provision of these social amenities. In view of the above, it is important to identify those basic needs that are considered critical towards the development of rural areas so as to ensure the achievement of the desired objectives.

2.50 **Sustainable Development Strategy**

This is a recent approach in the rural development process, and through this view, rural development have gained further improvement in this present time.

The sustainable development's approach to rural development holds that there cannot be a trade-off between environmental and economic developments, both can occur simultaneously. Infact, the first need is to be considered as a necessary tool for the second. This approach becomes a development path which advocates investment in the environment in order to ensure that the flow of services from it are maintained and even expanded.

Thus, the main component of this strategy is the promotion of sustainable use of resources so as to maintain a balance between the environmental and economic developments in order to enhance the development of the rural areas. However, for this strategy to achieve its objectives of promoting rural development, it has to develop a machinary that will enlighten the rural populace about the importance of conserving their environmental resources for sustained

development. It also has to call for the provision of basic infrastructural facilities in the rural areas. In this regard, for rural development activities to succeed under this strategy, natural resources as well as basic rural infrastructural facilities will be required to support development activities for the foreseable future.

2.60 **The Sectoral Approach Strategy**

Unlike the integrated rural development strategy that addresses rural development issues on a multisectoral basis, the sectoral approach addresses rural development problems on a sectoral basis. This involves the identification of a priority area for development and making of separate policy statements towards achieving the identified goals. These policy areas may be in the aspects of agriculture, roadnetworks, industrial and natural resources development etc.

The major limitation of this strategy is that it largely depends on annual budget allocation to the sector earmarked for development, and because it tackles one problem at a time, the pace of development is usually slowed.

2.70 **Assessment Of The Strategies**

This is to identify the best strategies that have more components of sustainability and those that will best enhance better outcomes from the programme. To achieve this, values or weights are assigned to the strategies with 10 as the maximum value and zero as the least.

Table 2.1: Assessment of Rural Development Strategies

S/N	Strategies	Merits towards enhancing Rural Development	Components of Sustain-ability	Total Weight	Remarks
1.	Bottom-up strategy	10	10	20	Recommended
2.	Integrated Rural Dev. Strategy	5	5	10	Recommended
3.	Institutional Dev. Strategy	8	8	16	Recommended
4.	Basic Needs Strategy	3	2	5	Not recommended
5.	Sustainable Dev. Strategy	4	2	6	Recommended
6.	Sectoral Approach strategy	2	0	2	Not recommended

From the table above, it can be seen that the bottom-up strategy, the institutional development strategy as well as the integrated rural development strategy are those that carries higher weights in the order of 20, 16 and 10 than the other strategies, and so therefore, they are hereby recommended for integration into the design of the Hadeja-Nguru wetlands programme.

Similarly, the design characteristics of the sustainable development strategy that calls for the promotion of sustainable use of resources an objective that is relevant to that of the wetlands programme should also be emphasised in the programme.

CHAPTER: 3.00 THE DESIGN, OBJECTIVES AND GOALS OF THE HADEJA-NGURU WETLANDS CONSERVATION PROGRAMME

3.10 THE HADEJA-NGURU WETLANDS DESIGN

The Hadeja-Nguru Wetlands Conservation Programme was first conceived by the Royal Society for the Protection of Birds (R.S.P.B), and was initially designed to conserve the wetlands as a habitat for migratory water-birds as well as the water resources of the Komadugu-Yobe basin in general. (I.U.C.N 1995).

However, at the beginning of the second phase, some rural development components were later introduced into the programme by the World Conservation Union under the concept of 'wise-use' of resources. To achieve these new objectives, the programme management further detailed out its activities in phases with each phase designed to achieve some desired objectives within some specified time period.

3.20 OBJECTIVES OF THE HADEJA-NGURU WETLANDS PROGRAMME

The objectives of the programme are:

1. To conserve the natural resources and functions of the Hadeja-Nguru Wetlands.
2. To promote sustainable development in the use of the Wetlands resources (for the benefits of its human and wild-life population).

3.30 PHASING OF THE PROGRAMME

3.30.1 **Phase-One (1988-1991)**:- The initial phase of the Hadeja-Nguru Wetlands Programme was primarily concerned with data gathering about the bird species and the hydrological characteristics of the wetlands region. The major programme components outlined under this phase include the following:-

1. To conduct an annual study of waterbirds in the wetlands.
2. To identify the most dominant species and their breeding grounds.
3. To conduct studies on the hydrological characteristics of the Hadeja-Nguru Wetlands.

3.30.2 **Phase-Two (1991-1995):-** The major programme components under this phase are geared towards data gathering about the following:-

1. Hydrological characteristics of the wetlands
2. Ecological Studies
3. Socio-Economic Studies

3.30.3 **Phase-Three (1995-1998):-** The third phase of the programme was about the following:-

1. Data gathering and analysis about the hydrology of the wetlands and the development of new policies for water management in the basin. The major

activities outlined under this component include the following:-

A. Taking discharge measurements in the Hadeja-Jama'are Yobe river with particular emphasis on the wetlands.

B. Monitoring a well network in the wetlands area.

C. Monitoring of flood plain recharge rates.

D. Monitoring the extent of wetseason flooding.

E. Preparation of a water management plan for the basin.

F. Providing technical assistance to the stakeholders forum.

2. Ecological Research and Wildlife Monitoring:- This component was about data gathering that are designed to:-

A. identify ecologically important species within the wetlands;

B. identify important natural resources exploited locally for income generation;

C. Develop guidelines for their sustainable management;

3. To develop pilot projects for the 'wise-use' of resources. The major programme activities outlined here include:-

A. Dyke construction for controlling flood

water.

B. The training of donkeys for traction and drawing of carts.

C. The development of agro-forestry nurseries/woodlots.

D. The provision of technical assistance in the design of the clay stoves.

E. Enhancing the techniques of beekeeping. I.U.C.N. Report (1997).

3.40 AN ASSESSMENT OF THE PROGRAMME'S DESIGN AND OBJECTIVES

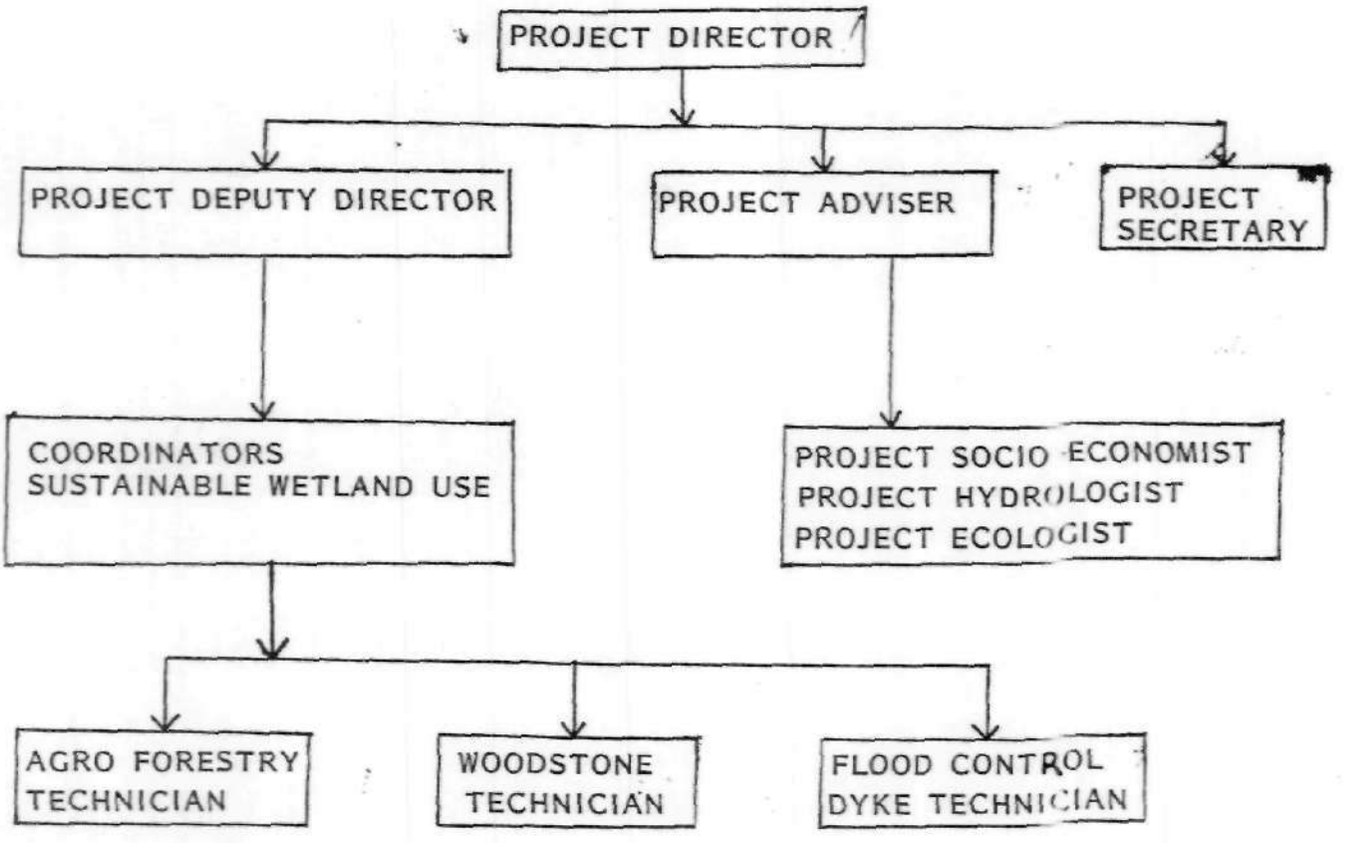
Hadeja-Nguru Wetlands programme was first designed to conserve the wetlands ecological and hydrological resources. However, along the line, some rural development components were later introduced into the programme under the concept of 'wise-use' of resource. This new development therefore entailed some new programme objectives on the existing ones. Thus, the new objectives now include not only the conservation of the wetlands natural resources, but also the promotion of sustainable development in the use of these resources simultaneously.

However, the initial programme design have not provided the basis upon which the new programme objectives will be achieved, but rather it emphasised on the need to conserve the

wetlands natural resources. However, the promotion of sustainable rural development calls for the total mobilisation of an area's human and natural resources for the overall development of the area. Similarly, such programmes also calls for the development of frameworks that will sustain the development process. Alongside these provisions, such programmes also calls for the provision of rural feeder roads, improved hybridbeeds, fertiliser and farm machinaries hiring unit. Other provision required include credit/storage facilities, pesticides/herbicides, water/electricity supplies.

However, neither the programmes design nor its objectives have highlighted the need for the provision of these facilities. As such, the failure to address these needs is now militating against the achievement of better outcomes from the programme.

3.50 ORGANISATIONAL FRAMEWORK OF THE HNWCP



- BEEKEEPING
- TREE NURSERIES
- WOODSTOVE
- BACKYARD GARDENING
- DONKEY TRACTION
- DYKES DEVELOPMENT

Figure iii

CHAPTER:4.00 OUTCOMES OF THE PROGRAMME'S DESIGN

4.10 Phase One: WaterBirds/Hydrological Studies:-

Hadeja-Nguru Wetlands is a specific area of importance to palaeartic and afro-tropical waterbirds. Ash and Sharland (1986). The most abundant species include cattle-egret, little-egret, great white-egret (Egretta-alba), yellow-billed egret (Egretta-intermedia) and long-tailed cormorant. Adams, Boyi and Hollis (1993). However, an annual field record of non breeding waterbirds from Stowe, Coulthard and Boyi (1990) shows that the area hosts about eighteen different species which are indicated in the table on the following page.

Table 4.1: Annual Record of Non-Breeding Waterbirds in the Hadeja-Nguru Wetlands between 1988-1991.

S/NO	SPECIES	1988	1989	1990	1991
1.	Fulvous Tree Duck	274	1,234	1,248	1,160
2.	White Face Tree Duck	1,608	3,279	6,329	6,498
3.	White Fronted Goose	-	1	-	-
4.	Egyptian Goose	-	3	-	-
5.	Pygmy Goose	11	-	17	35
6.	Spur Winged Goose	143	1,682	1,039	2,177
7.	Knobb-Bitted Goose	235	2,784	1,763	678
8.	Pintail	13,937	-	-	-
9.	Shoveler	700	324	79	175
10.	Teal	176	115	22	1
11.	Hottentot-Teal	4	-	5	-
12.	Wigeon	71	17	31	1
13.	Garganey	9,235	8,598	22,458	11,812
14.	Gadwall	7	-	5	-
15.	Pochad	615	60	1	-
16.	Tufted Duck	15	11	26	56
17.	Ferriginuos Duck	1,594	15	280	150
18.	Un-identified Ducks	160	-	3,777	-
	TOTAL	28,775	19,808	57,698	36,597

Source: HNWCP Field Report.

The 1989 survey was not comprehensive as that of 1988 because of high levels of flood waters which made access difficult. Adams, Boyi and Hollis (1993). Prior to the initiation of the programme, it was estimated that an average of 10,000 -

15,000 water birds of various species are lost to human activities annually through shooting and trapping by lines of fishing hooks.

Similarly, studies about the hydrological characteristics of the wetlands, revealed that the region is situated in an area of limited rainfall. However, seasonal inundation occurs when the rivers start to flow less swiftly, and this phenomenon is more pronounced in areas between the towns of Hadeja, Nguru, Gashua and Katagum. Gert Polet and Ina Becker (1997)

4.20 **Phase Two: Period of Hydrological, Ecological and Socio-Economic Studies**

For a more broader knowledge about the hydrological characteristics of the Hadeja-Nguru wetlands, the following hydrological components were established;

Table 4.2: 'A' Hydrological Studies In The H-N Wetlands

S/N	Hydrological Elements	Number Established
1.	Hydrological Units	7
2.	Pieziometer Stations	5
3.	Observation Wells	15
4.	Metreological Stations	2

Source: HNWCP Field Report.

However, the plan of development for the solution of regional water problems may well be a multiagency undertaking at the federal, states, local and private levels since they are likely to be quite complex. Thus, it should involve all aspects of water use and all major aspects of water projects. Floyd, F.C. (1967)

Table 4.2: 'B' Record of Annual Flood Extent In The H-N Wetlands Between 1991 - 1995.

Year	Maximum Flood Extent in (KM^2)
1991	962
1992	545
1993	387
1994	1,728
1995	967

Source: Air-Borne Mapping (HNWCP)

Socio-Economic Studies: Studies relating to the socio-economic components revealed that the wetlands supports a wide range of economic activities. The tables below summarises the outcomes of the various socio-economic activities in the wetlands.

Table 4.3: 'A' Characteristics of Economic Activities In The H-N Wetlands

Activity	Before the Programme	After the Programme	% Change
Farming	78%	91%	13%
Fishing/Mat Weaving	13%	7%	-6%
Trading	9%	2%	-7%

Source: Field Survey.

Table 4.3: 'B' Yield Per Hectare Before and After The Programme

Crop	Before the Programme	After the Programme	% Change
Rice	6 - 8 sacks	15 - 20 sacks	120%
Cassava	5 - 10 sacks	10 - 15 sacks	50%
Guinea Corn/Millet	8 - 10 sacks	10 - 13 sacks	30%
Beans	3 - 5 sacks	5 - 10 sacks	50%

Source: Field Survey

Table 4.3: 'C' Price Per Sack Before and After The Programme

Crop	Before the Programme	After the Programme	%Change
Cassava	N60 - N100.00	N350 - N500.00	40%
Rice	N250 - N300.00	N1,000 - N1,500	120%
Beans	N800 - N1,000	N2,000 - N2,500	150%

Source: Field Survey.

Table 4.3: 'D' Individual Income Per Annum Before and After The Programme.

Before the Programme	After the Programme	% Change
N25,000.00	About N130,000.00	400%

Source: Field Survey.

Ecological Studies:- Studies about the ecological components revealed that the wetlands has about six ecological areas each of which is charaterised by a wide-range of ecological species. These ecological sites include the following:

1. Yamdugu Forest Reserve
2. Gwayo Forest Reserve
3. Sugum Forest Reserve
4. Baturiya Wetlands Reserve
5. Zurgum Baderi National Park
6. Gogaran National Park

Source: HNWCP Land Use Map.

The following map shows the distribution/location of the ecological zones in the Hadeja-Nguru Wetlands region.

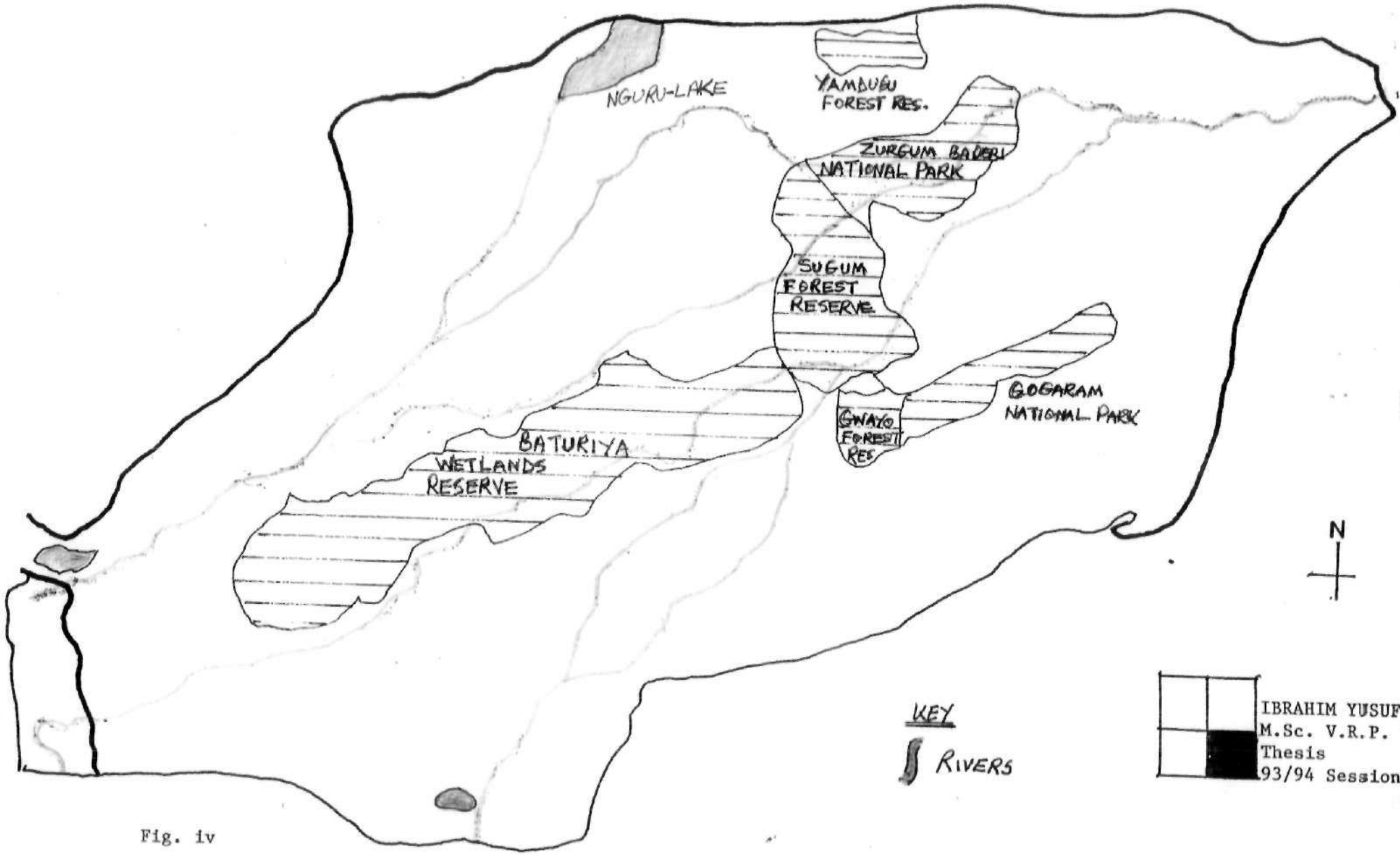


Fig. iv

Distribution/location of Ecological

Table 4.4: Afforestation Activities in the H-N Wetlands

Afforestation Activities

Activity	No Proposed	No Established	% Achievement
Community Woodlot	9	5	50%
Raising Tree Seedlings	18,000	21,200	108%
Community Tree Nurseries	8	8	100%

Source: HNWCP Field Report (Vol.1 Pg. 10).

It is important to note that the target achieved under each category above was as a result of the community's willingness and cooperation to participate in the activity. Where the community members are willing to participate, the intended target is usually achieved.

Table 4.5: Estimated Population Per Hydrological Unit

Hydrological Unit	Estimated Population	Number of Settlement
Hadeja River	262,788	86
Marma Channel/Nguru lake	203,719	48
Burum Gana/Old Hadeja	75,950	24
Kafin Hausa	112,406	66
Jama'are River	565,701	159
TOTAL	1,235,754	383

Source: HNWCP Field Survey (Vol.1 Pg. 8).

The following shows the location of settlement involved in the afforestation projects as well as the distribution of the hydrological units in the wetlands.

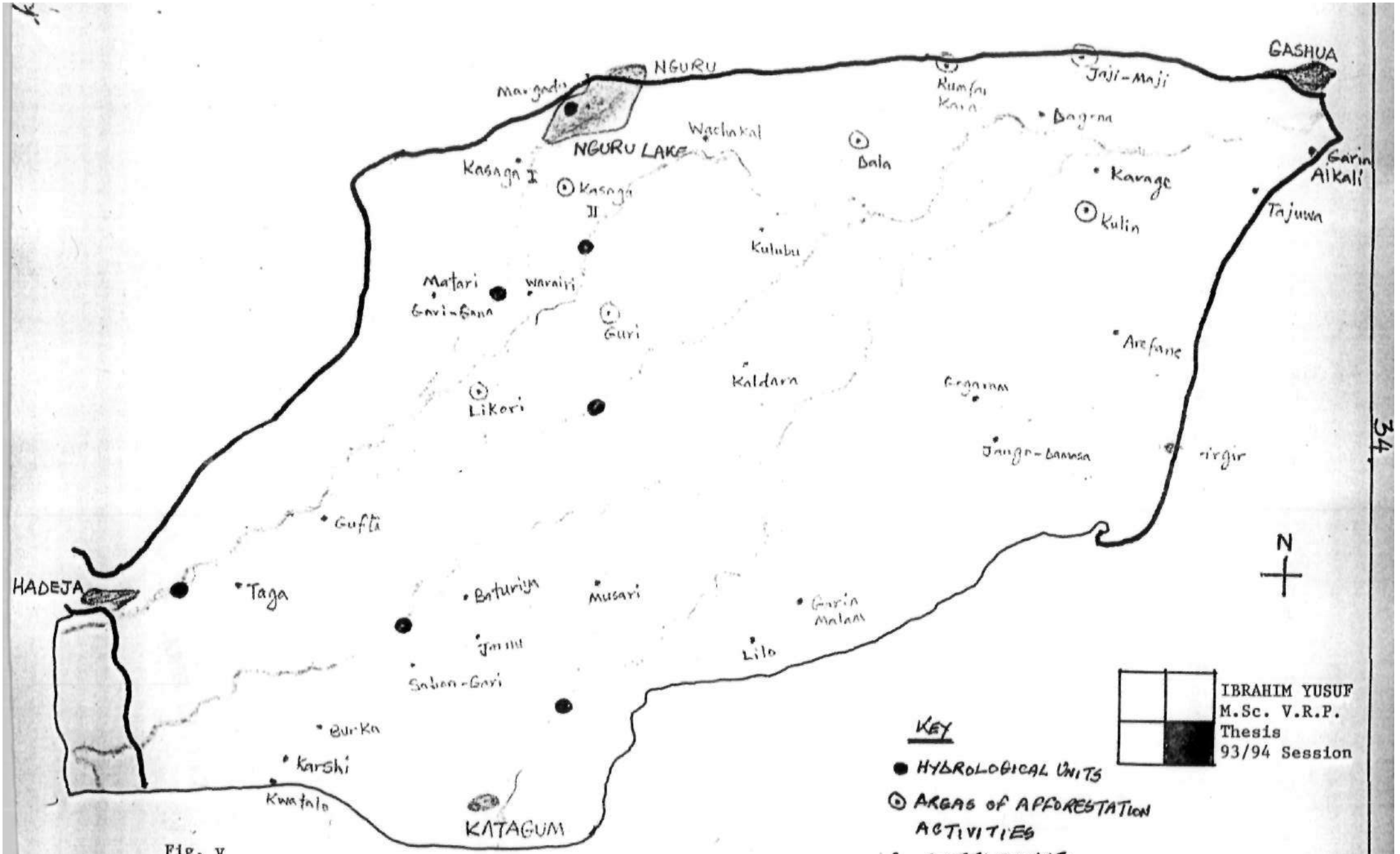


Fig. v Distribution of Hydrological Units in the H-N Wetlands.

Table 4.6: 'A' Estimated Land Area Recovered From Flood in the H-N Wetlands

S/N	Areas of Frequent Flood	Length of Dyke	Estimated Land Lost to Flood Before the Project	Estimated Land Recovered After the Project	% Achieve-ment
1.	Kasaga - One	1Km	53ha	47ha	96%
2.	Kasaga - Two	300metres	29ha	29ha	100%
3.	Garbi	1.3Km	10ha	10ha	100%
4.	Margadu - One	1.5Km	75ha	60ha	90%
5.	Margadu - Two	1Km	82ha	70ha	89%
6.	Kabak	2Km	105ha	100ha	98%
7.	Matari Gari Gana	1.2Km	230ha	200ha	99%

Source: HNWCP Evaluation Report on Pilot Projects (Vol.1 Pg 3).

The target attained in each community was as a result of the peoples willingness to form cooperative associations. Where the community members are fully willing to participate, the intended target is usually attained.

Table 4.6: 'B' Volume of Load Conveyed Using The Donkey Drawn-Carts.

S/N	Products/Goods	Before the Project	After the Project
1.	Grains, Manure, Hay	150kg	300kg
2.	Cornstalks, hay, poles	16kg	30kg
3.	Manure, poles	20kg	40kg
4.	Grains, wood, cornstalk	100kg	300kg
5.	Fuelwood, Manure	3 bundles	5 bundles
6.	Green pasture, hay	5 bundles	10 bundles

Source: HNWCP Evaluation Report on Pilot Projects (Vol.1 Pg 6).

In order to appreciate the viability or the importance of the donkey-drawn carts towards enhancing the transporation of agricultural products in the Hadeja - Nguru wetlands region, it has become necessary to conduct a student's t - Test on the variables tabulated on table 4.6 'B' so as to ascertain whether there is a greater level of significance between the old and the new method of transportating agricultural goods in the wetlands,

The student's t - Test provides an index t to represent the relationship between the difference between the means and the standard error of this difference. This index can be referred to prepared tables or a graph from which the degree of significance of the difference can be assessed. Gregory, S. (1963). The student's t is calculated as follows:

$$t = \frac{\text{difference between the means}}{\text{standard error of the difference}}$$

The variables from table 4.6 'B' are as follows.
Volume of goods conveyed using the Donkey - Drawn Carts:

	Before the project	After the project
1.	150Kg	300Kg
2.	16Kg	30Kg
3.	20Kg	40Kg
4.	100Kg	300Kg
5.	3Kg	5Kg
6.	5Kg	10Kg
TOTAL	294Kg	685Kg

Mean $= \frac{294}{6} = 49$

Mean $= \frac{685}{6} = 114.16$

In this kind of exercise, it is necessary to make a hypothesis testing in order to find out if there exist any significant difference between the two means under consideration i.e. $\bar{X}_1 = 49$, and $\bar{X}_2 = 114.16$.

The hypothesis are as follows:

H_o: There is no difference between the population means, i.e $\bar{X}_1 = \bar{X}_2$

H_1: There is difference between the population means i.e $\bar{X}_1 \neq \bar{X}_2$

The procedures for computing t - value is given by the formula

$$t_c = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad (A)$$

Where S_1^2 is the variance of the first population given by $\frac{\sum(\overline{X}_1 - \overline{X}_2)^2}{n_1}$

Before the Project TABLE: 4.7 'A' Calculation of the variance of the first population before the project.

X	$X-\overline{X}$	$(X-\overline{X})^2$
150	101	10201
16	-33	1089
20	-29	841
100	51	2601
3	-46	2116
5	-44	1936
		18784

$$S_1^2 = \frac{18784}{6} = 3130.67$$

After the Project TABLE: 4.7 'B' Calculation of the variance of the second population after the project.

X	$X-\bar{X}$	$(X-\bar{X})^2$
300	185.84	34536.51
30	-84.16	7082.91
40	-74.16	5499.71
300	185.84	34536.51
5	-109.16	11915.91
10	-104.16	10849.31
		104420.86

$$S_2^2 = \frac{104420.86}{6} = 17403.48$$

Having obtained S_1^2 and S_2^2, we now substitute the values in the formula (A) in order to obtain our t-calculated.

Thus

$$t_{cal} = \frac{(49 - [114.16)}{\sqrt{\frac{3130.67}{6} + \frac{17403.48}{6}}}$$

$$= \frac{65.16}{\sqrt{\frac{20534.15}{6}}}$$

$$= \frac{65.16}{58.50}$$

$$t_{cal} = 1.1138$$

There is the need to obtain another value of t usually referred to as t tabulated from a standardised t-table which can be found in most statistical textbooks.

To do this, we need the degree of freedom given by

$n_1 + n_2 - 2 \Rightarrow 6+6-2 = 10.$

Where n_1 and n_2 are the number of variables working with.

Next is the level of significance i.e the risk level one is ready to take in the exercise. This is usually 0.01 or 0.05.

from the t-table,

0.001, 10 = 2.76

and 0.05, 10 = 1.81

(The rule in this case is that if our t_{cal} is greater than t table, we reject the null hypothesis (H_0) at any of the significant levels chosen).

In the case under consideration, it can be seen that out t_{cal} is less than any of the t table values. This therefore implies that we cannot reject the null hypothesis i.e there is no significant difference between the two methods except at a risk of 0.02 which is very very high and no one can afford to take such a risk.

Conclusion

In the application of the t-test for the difference of two means, it is seen that there is no significant levels or there exist no significant levels between the approaches used in the project for transporting agricultural products in the Hadeja - Nguru wetlands region as far as the variables are concerned.

Table 4.8 Estimated Fuelwood Consumption Per Household in The H-N Wetlands.

S/N	Before the Project	After the Project
1.	Weekly average/household 2-3 bundles (52-78kg)	1-2 bundles/week (26-35kg)
2.	Monthly average 200-220kg	Monthly average 75kg

Source: HNWCP Evaluation Report on Pilot Projects Vol.1 Pg 6.

4.30 **PHASE THREE**

The third phase of the Hadeja-Nguru Wetlands programme was about the following activities:-

1. Hydrological studies and development of a water management plan for the water resources of the Komadugu-Yobe basin.
2. Ecological Research and Wildlife Monitoring.
3. The development of strategies for the sustainable use of the wetlands resources.

Recurrent studies about the hydrological characteristics of the wetlands through data collection and analysis, monitoring of well networks and the extent of wet season flooding lead to the development of a comprehensive data bank about the hydrological characteristics of the area. Similarly, studies about the ecology and wildlife resources of the region revealed that the river channels, the Nguru lake, the ox-bow lakes as well as the ponds are ecologically important areas for fish breeding and

development. Data collected in this regard formed a valuable baseline for the development of a management plan for these important areas.

Similarly, studies about the wildlife and other important wetlands resources have lead to the development of guidelines for their management and sustainable exploitation. Unlike the first two components examined above, the third component generally involve technical interventions partaining to dykes construction for flood control, development of donkey carts and ploughs, assisting the local inhabitants in the design of the clay stoves and enhancing of beekeeping techniques through the development of new harnessing garments.

However, the success of these local intervention largely depends on the level of participation of the beneficiaries as well as on the continuous flow of credit assistance in this regard.

Table 4.9 Village Distribution of Clay Stoves In the Project Areas

S/N	Name of Village	No of Households with Stoves	Average % Savings in Wood	Average No. of Persons Per House-hold
1.	Digilfani	65	55%	5
2.	Rumfar Kara	25	50%	5
3.	Gasma	40	56%	5
4.	Nguru	over 60	50%	7
5.	Birniwa Tasha	25	50%	5

6.	Likori	15	54%	5
7.	Tukuikui	40	58%	6

Source: HNWCP Evaluation Report on Pilot Projects Vol.1 Pg.13.

4.40 **AN ASSESSMENT OF THE PROGRAMME'S OUTCOMES**

4.40.1 **Phase One**:-

The programme commenced with studies about the waterbirds, the hydrology of the wetlands and promotion of public awareness campaigns relating to the programme's mission in the area. The programmes objectives at this stage was to conserve the waterbirds as well as the water resources of the Kamadugu-Yobe basin. As such, there was no any policy that addresses the need to improve the living conditions of the wetlands communities.

Similarly, studies about the hydrological characteristics also centered on data collection relating to the characteristics of flooding, socio-economic activities upstream as well as within the programme area.

However, inspite of the relevance of these two components towards achieving the programmes present and future objectives, there was no any framework even at the community levels that was designed to conserve

these important resources. Even the public awareness campaigns a component of the programmes design could not put a stop to the hunting of the waterbirds and the indiscriminate exploitation of the wetland's wild resources. Similarly, coservation issues may easily become critical and insoluble as time goes on because more and more people may move on to the Wetland fadamas as the Tudu system fails, and as the profits from irrigated/recession cropping continue to grow. Tina, (1979).

On the whole, the programme during its first phase has only succeeded in identifying the important ecological sites in the wetlands together with the characteristics of the wetlands hydrology.

4.40.2 **Phase Two:-**

Activities in the second phase commenced with data gathering relating to the hydrological and ecological characteristics of the wetlands. Information gathered from these sources are analysed for the development of a water management plan for the basin. Similarly, information was also gathered about the annual extent of flooding in the area, and variations in the annual extent could be attributed to climatic factors as well as to the

inefficient operation of the Tiga and Challawa-Gorge dams located upstream. These dams (Tiga and Challawa) with a combine storage capacity of 2,348 million M^3 (1,400Mln M^3 and 948 Mln M^3 respectively), greatly reduces the annual extent of flooding in the wetlands area, this in turn have an adverse effect on the socio-economic activities both within and outside the wetlands region. I.U.C.N. News Letter, No. 14 Winter (1996).

Inspite of the numerous data collected in respect of the hydrological characteristics of the basin, the programme management could not develop a comprehensive water management plan for the basin. With respect to the socio-economic components, activities such as agriculture and afforestation received some improvements.

For instance, table 4.3 'A' shows that before the programme, the number of persons engaged in farming activities was 78%, but after the project had commenced, the number rose to 91%. The reasons for this increase could be attributed to the introduction of the dyke projects and the use of donkeys for traction and drawing of carts. The result of these pilot projects lead to an increase in food production and other allied crops.

However, inspite of these achievements, the programme management have not yet developed a framework that will sustain the continuity of these

projects. Similarly, the success of enhancing agricultural production in the Hadeja-Nguru wetlands not only depend on financing the micro-projects, but also on the development of roadnetworks that will facilitate the evacuation of farm products to the outside markets.

Related to this also, the development of roadnetworks will further encourage outside investors to come and invest in the wetlands. However, the provision/development of this basic infrastructure have not been addressed in the programme's design.

4.40.3 **Phase Three:-**

Unlike the previous phases which emphasised on the collection of data related to the hydrology, ecology and the socio-economic components of the programme, the third phase emphasised on the development of local technologist for the sustainable use of the wetlands resources. Outcomes from these pilot projects are however impressive and promising particularly with regard to the dyke projects.

For instance, from an estimated area of about 584ha being lost to flood annually in seven different localities, table 4.6 'A', the programme through its dyke projects was able to recover and put back into use a total of 516ha in these communities.

Inspite of these achievements, more impressive

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results would have been achieved if the projects had been extended to other parts of the wetlands particularly areas in the South and South-Western parts of the region. With regards to the socio-economic lives of the wetlands inhabitants particularly in relation to income change and employment patterns, the rural development components introduced into the programme showed some promising results.

On the whole, alot of human and financial resources have been committed into the programme since its inception. For instance, a sum of N83million was earmarked to finance the third phase of the programme. However, the impact of this amount on the socio-economic lives of the inhabitants would have been greater if other supporting services such as basic farm inputs, development of rural feeder roads, provision of clean water and markets for the produced goods have been provided.

However, the provision of these facilities have not been addressed in the programmes design even after the inclusion of the rural development components into the programme.

4.50 LIMITATIONS OF THE PROGRAMME

4.50.1 Poor Design Structure

The success of a rural development programme is generally influenced by its design strategy. Where an appropriate strategy is employed, it is expected that there will be better outcomes. Similarly, where the design requirements are left out, the expected outcomes will not be fully realised.

The initial design of the Hadeja-Nguru wetlands programme was to conserve the wetlands ecological/hydrological resources as well as the promotion of public awareness campaigns about the programme mission in the area.

The programmes objectives at this stage are to conserve the wetlands as a habitat for migratory waterbirds as well as to see to the effective use of water resources in the region. However, the first constraint of the programme at its earlier stage was its failure to initiate the concept of public participation into its design. Through this process, it would have set the basis for the formation of voluntary clubs and associations that will later serve as tools for initiating/promoting rural development in the region.

The second limitation associated with the programme design has to do with the rural development components introduced into the programme. The initial

design have not provided the basis for promoting rural development in the region. However, for the project to achieve its sustainable rural development objectives, it should have set out an efficient organisational framework that will promote mass involvement in the development process through total mobilisation of the regions, natural, human and institutional resources. However, these provisions have not been catered for in the programmes initial design.

For instance, outcomes from the questionnaire survey showed that 37% of the respondents indicated their need for fertiliser, 28% for tractor hire services, while 18% indicated their need to enhance roadnetworks in the region, and the remaining 17% indicated their need for credit subsidies. The demand for these farm inputs is an indication that the basis for their provision have not been addressed in the programmes design, and as such, it will be very difficult to promote rural development objectives under this condition.

4.50.2 **Narrow Perception Of The 'Wise-Use' Concept**

The programmes conception of 'wise-use' as viewed from the conservationists point of view was restricted to the sustainable exploitation of the wetlands natural resources. However, 'wise-use' from planning perception is seen not only as the rational use of

resources, but also as to how these resources should be orderly arranged and exploited spatially. In this regard, 'wise-use' is seen as the non conflicting arrangement of landuses so as to have a harmonious and liveable environment.

However, the present arrangement of landuses in the Hadeja-Nguru wetlands where grazing lands are found within forest reserves, farmlands within forest reserve or grazing lands around irrigation and upland farms are some of the problems that bring about recurrent conflicts among landusers in the region particularly between farmers and pastoralists. These situations will therefore not augur well for the promotion of sustainable development in the Hadeja-Nguru wetlands region.

4.50.3 **Sole Dependence On International Organisation For Finance**

The success of a rural development programme is largely influenced by the amount of human and financial resources committed into it, as well as on the continuous flow of these resources.

However, Hadeja-Nguru wetlands programme is solely depended on external financing agencies for the funding of its activities. As such, the sustainability of these activities are not guaranteed whenever these financing institutions cease to commit more funds into the

programme.

4.50.4 **Weak Institutional Status**

The institutional status of the programme as an externally financed quasi-non governmental organisation (that has no firmly established link with any government parastatal or agency in the country) is making it very difficult for the programme's management to initiate their policies and programmes either for approval or implementation.

For instance, the programme management is finding it difficult with the Federal Ministry of Water Resources and Rural Development on who should formulate the management framework for the water resources of the Komadugu-Yobe basin.

CHAPTER:5.00 PROPOSALS FOR IMPROVED SUSTAINABILITY AND BETTER OUTCOMES OF THE PROGRAMME

5.10 Proposals

The proposals presented here are classified into four groups and some of these are based on the assessment of the strategies examined earlier in Chapter two.

5.10.1 Proposals For Enhancing The Programme's Design

1. Mobilising Public for More Participation

The first limitation associated with the Hadeja-Nguru wetlands conservation programme is its failure to effectively integrate the concept of public participation into its design. This effort would have initiated the basis for the formation of voluntary clubs and associations that will later serve as tools for promoting rural development in the region. This objectives can be achieved through a wider framework for mobilising public participation like the one below:

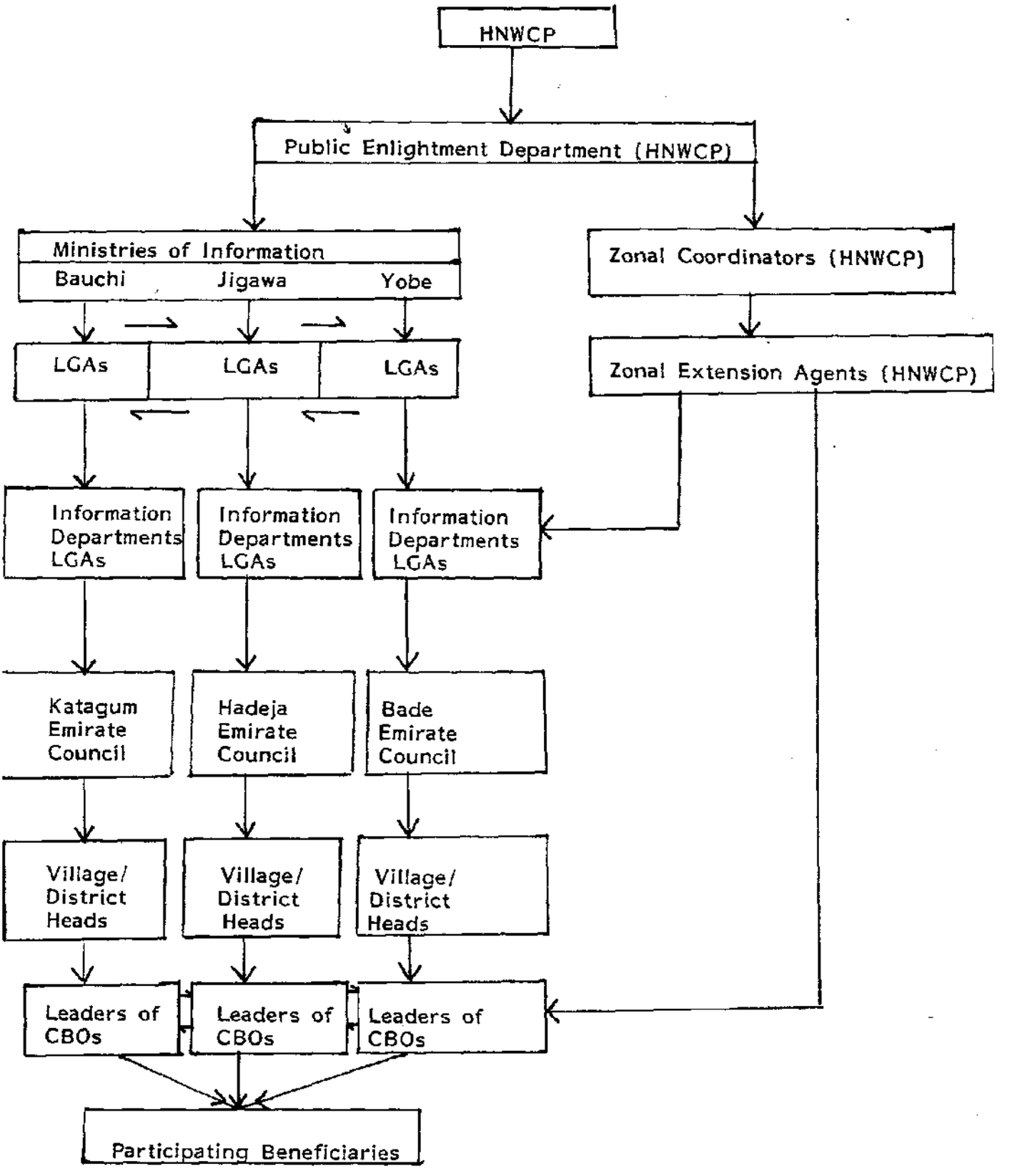


Figure vi

Proposed Framework for Mobilising more Public Participation.

2. **Decentralisation of Operations**

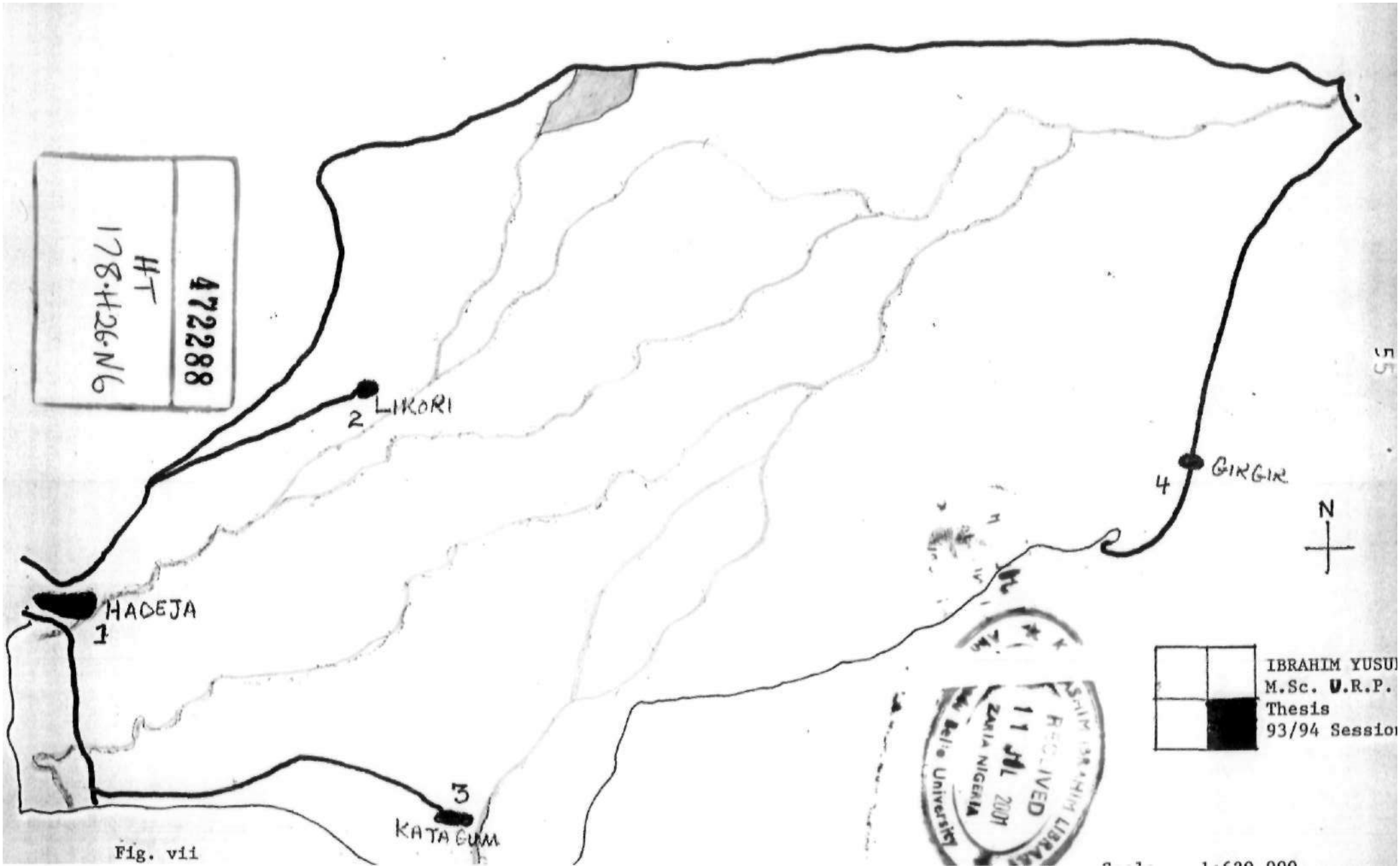
For a more effective coverage and wider participation in the programmes activities, it is necessary to decentralise the operations of the programme so as to enhance the achievement of the desired objectives.

Towards this end therefore, zonal offices that will see to the coordination and implementation of the programme's activities should be established in the following towns:-

1. Hadeja and Likori in Jigawa State.
2. Katagum in Bauchi State.
3. Girgir in Yobe State.

The main objective of this policy guideline is to give each of the three states that formed the wetlands a fair representation in the decision making and implementation processes of the programme. The map below presents the proposed locations of these zonal offices.

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Fig. vii

5.10.2 Proposals For Enhancing Rural Development Components

1. Development of Rural Feeder Roads

Roadnetworks in the Hadeja-Nguru wetlands are inadequate and poorly developed. Apart from the Federal tarmac roads that spans from Hadeja to Gashua, all other roads are either major or minor tracks or barely ordinary footpaths. In this regards, it is hereby proposed that rural feeder roads should be developed between the settlements shown on the proposed rural feeder-roads map (figure viii). In trying to achieve this objective, the development should take note of the following guidelines:-

i. The roads should not interfere much with the other landuses around.

ii. They should avoid swampy and forested areas so as to minimise construction costs and at the sametime conserve the ecological balance within the environment.

Table 5.1: Distribution/Location of Proposed Feeder-Roads.

S/N	Settlements/Location	Distance in KM
1.	Zubbula (NorthCentral)-Guri (NorthWest)	10km
2.	Warairi (NorthWest)-Hadeja-Nguru Rd (West)	13.5km
3.	Musari (SouthCentral)-Kwatalo (SouthWest)	36km
4.	Arefane/Katamma (East)-Girgir (East)	18km
5.	Hadeja/Jama'ar Siga (West)-Hadeja-Tage (W)	12.5km
	TOTAL	90km

Source: Field Survey.

The development of these roads will further enhance the integration of socio-economic activities both within and outside the wetlands region. At the sametime, it will also enhance the programme's objective of promoting rural development in the region as a whole.

For better appreciation of the above proposals, the second map shows the integration of the existing major tracks and the proposed rural feeder-roads.

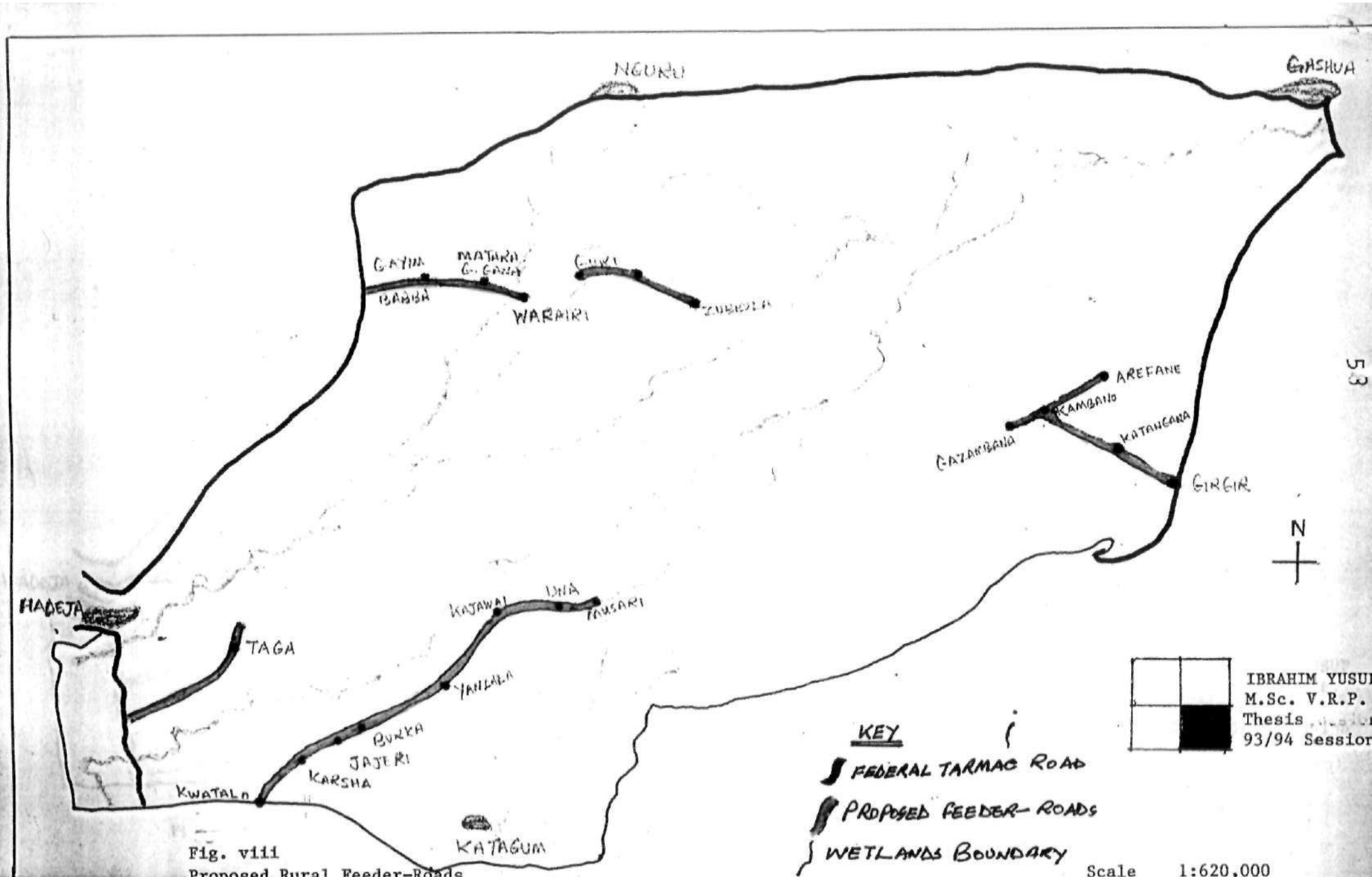


Fig. viii
Proposed Rural Feeder-Roads

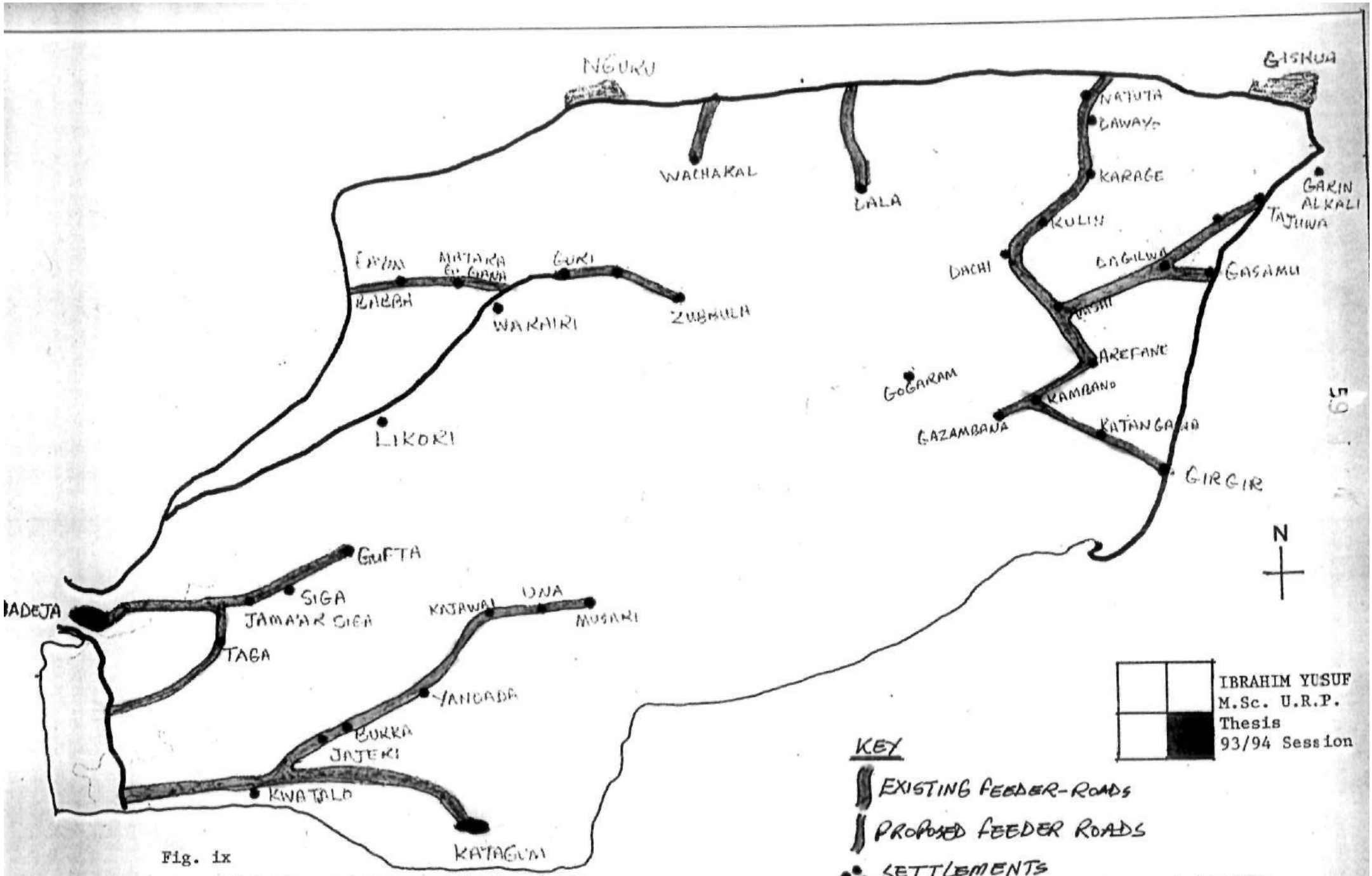


Fig. ix

Existing and Proposed Feeder-Roads

2. **Integration of New Strategies**

The programme management should integrate into its design the design characteristics outlined under the bottom-up development strategy, the institutional development strategy, the integrated rural development strategy (the externally designed and financed form) as well as the sustainable development strategy. This objective can be achieved by creating a separate department under the programme that will be charged with the responsibilities of promoting rural development activities in the wetlands.

For effective implementation of these strategies, the programme management should liaise with the State Ministries of Works, Housing and Transport, Agriculture and Rural Development Agencies as well as the State Agencies for Agricultural Development programmes of Bauchi, Jigawa and Yobe States for technical and strategic assistance. The following framework provides the guidelines for achieving the above proposals.

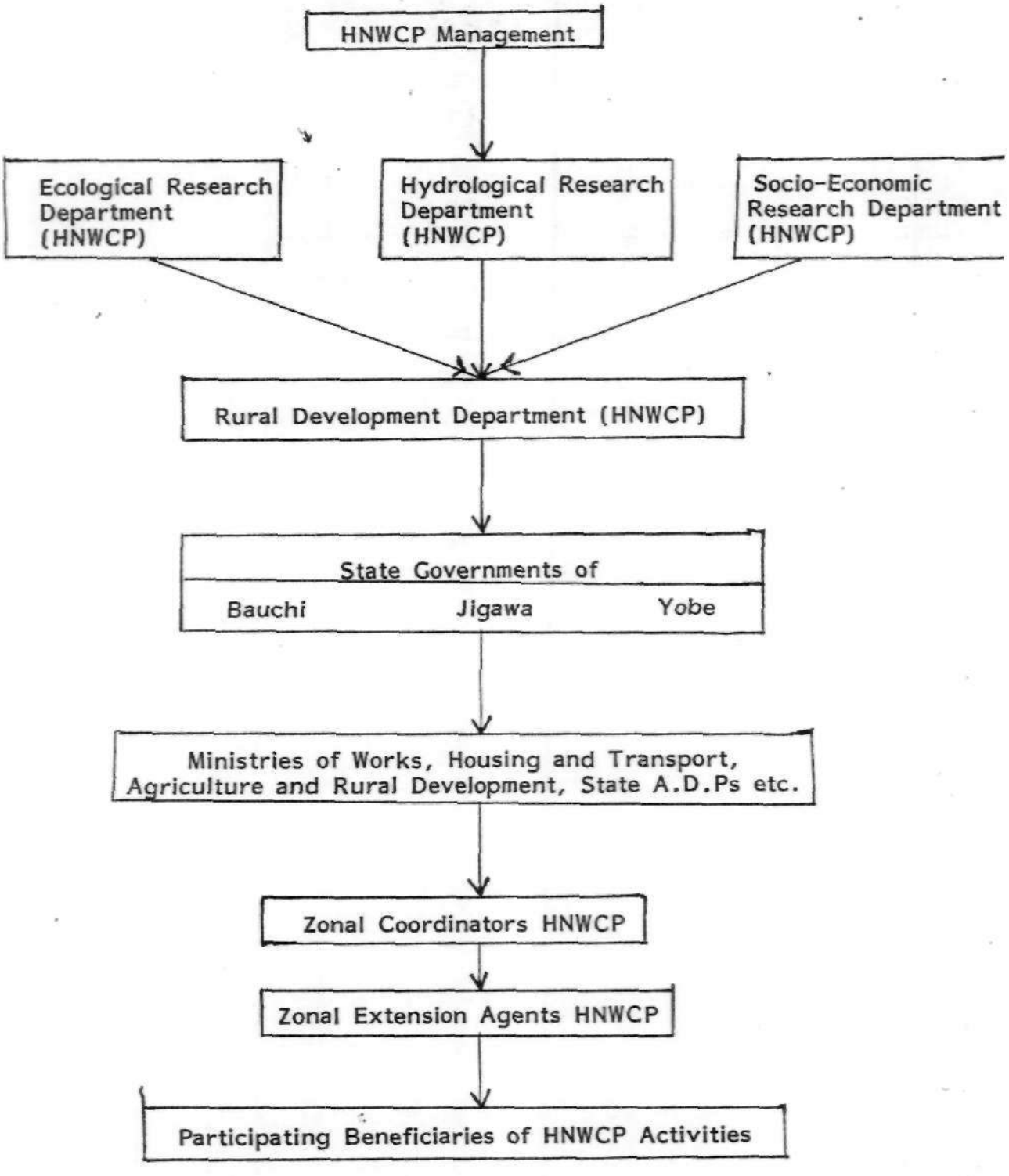


Figure x

Proposed Framework for implementing the new strategies.

5.10.3 **Proposal For Enhancing Sustainable Development And Minimising Landuse Conflicts In The Wetlands**

1. The indiscriminate expansion of farmlands as well as the over exploitation of the wetlands natural resources should be checked. This can be achieved through taking legal actions and enforcing of heavy-fines against defaulters.
2. The stake-holders forum should initiate the formation of a conflict resolution committee that will see to the settling of disputes between persons and communities inhabiting the wetlands.
3. The Federal Environmental Protection Agency (FEPA) through the assistance of its sister organisations in the states should closely monitor the spread of socio-economic activities in the wetlands as no sustainable development can thrive well under an endangered environment.
4. A buffer-zone of community woodists should be developed between the settlements closer to the forest reserves and the reserves. This objective can be achieved through the assistance of the agroforestry department of the HNWCP and the benefitting communities.
5. Socio-economic activities particularly fishing should be discouraged around the sanctuaries especially during the bird's wintering seasons. This can be achieved through

closer monitoring from the socio-economic research departments of the HNWCP.

6. **More Sources of Finance**: In order to sustain the operations of the programme, it has become necessary to broaden its financial base. This objective can be achieved through earmarking of some annual grants from the following bodies:-

   1. The Nigerian Conservation Foundation (NCF)
   2. The Federal Ministry of Water Resources and Rural Development.
   3. Federal Environmental Protection Agency (FEPA)
   4. The State Governments of Bauchi, Jigawa and Yobe.
   5. The Local Government Councils that abuts the Wetlands.

7. **Enhanced Institutional Status**: In order to enhance the institutional status of the programme so as to make its activities widely recognised and accepted among government ministries and parastatals, it is hereby proposed that more agencies/institutions should be involved in the programme. The framework below provides the guidelines for achieving the above objectives.

7. **Enhanced Institutional Status**: In order to enhance the institutional status of the programme so as to make its activities widely recognised and accepted among government ministries and parastatals, it is hereby proposed that more agencies/institutions should be involved in the programme. The framework below provides the guidelines for achieving the above objectives.

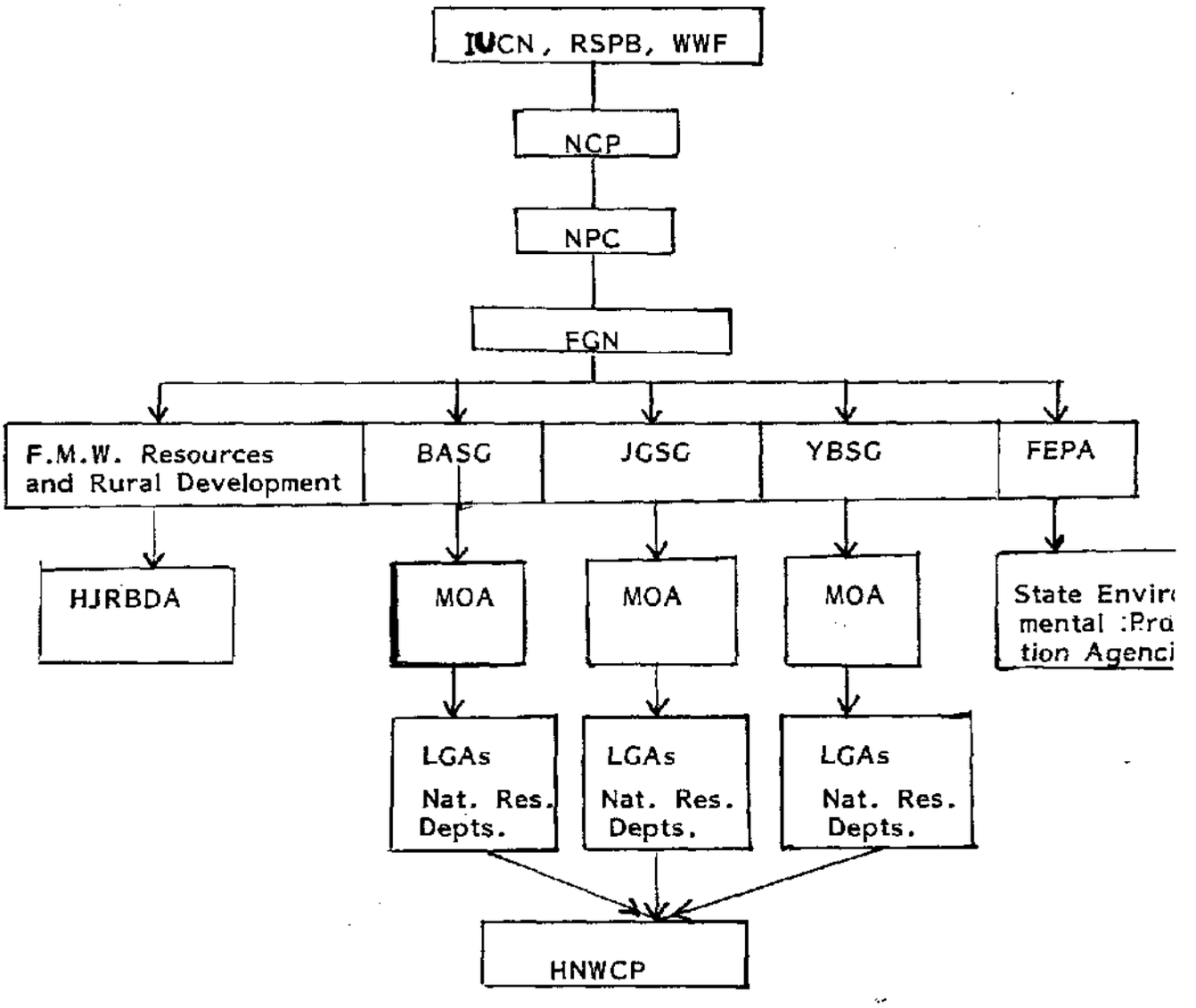


Figure xi

Proposed Framework *for* Enhancing the Institutional Status of the Programme.

I.U.C.N	-	International Union for the Conservation of Nature
R.S.P.B	-	Royal Society for the Protection of Birds
W.W.F.	-	World Wildlife Foundations
N.C.F.	-	Nigerian Conservation Foundation
N.P.C.	-	National Planning Commission
F.G.N.	-	Federal Government of Nigeria
F.M.W.R & R.D	-	Federal Ministry of Water Resources and Rural Development.
BASG	-	Bauchi State Government
JGSG	-	Jigawa State Government
YBSG	-	Yobe State Government
FEPA	-	Federal Environmental Protection Agency
H.J.R.B.D.A.	-	Hadeja-Juma'are River Basin Development Authority.
M.O.A.	-	Ministry of Agriculture
L.G.A.	-	Local Government Areas (that abuts the wetlands)
HNWCP	-	Hadeja-Nguru Wetlands Conservation Programme.

5.10.4 Proposals For Enhancing Socio-Economic Activities

1.(a) **Dyke Projects**: Dykes should be designed in such a way that they allow easy flow of water into farmlands. This can be achieved through incorporating into their designs a wide and adequate number of slince-gates that will facilitate easy/quick flow of water into farmlands.

(b) The beneficiaries of this project should be trained on the technical aspects involved in the dyke construction. Similarly, they should also be mobilised to finance the costs of constructing the dykes themselves instead of relying on the programme management for credit subsidies.

(c) Dyke building/fadama development has been successful, and is very popular among the wetlands communities. This is a way of increasing agricultural production without resorting to large-scale engineering projects. This programme should be continued, however, it should be restricted to hand-dug operations only, as large machine built dykes could have detrimental effects on the ecology and hydrology of the area. Robert and Pius (1997).

The following map shows proposed locations for future dyke projects.

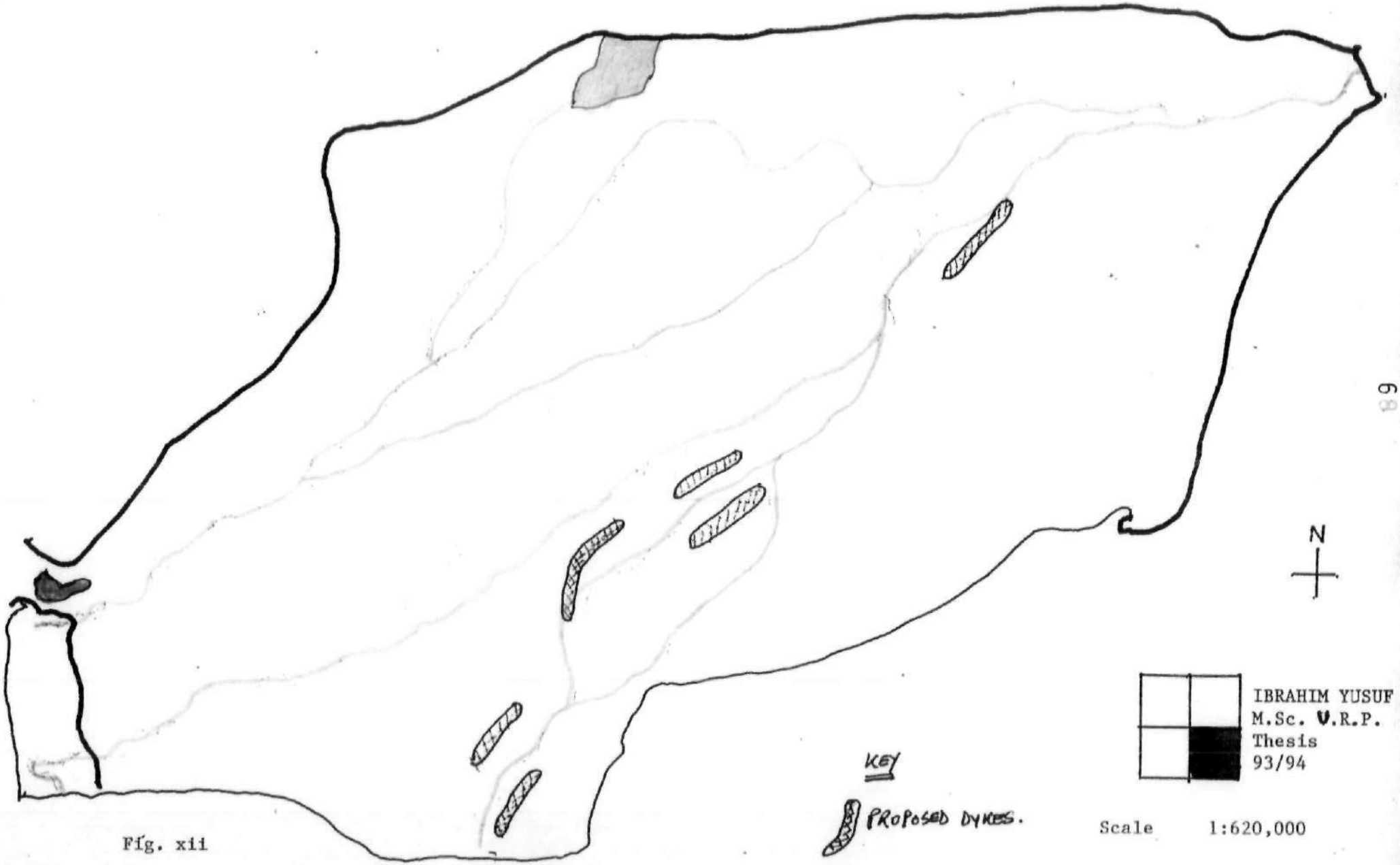


Fig. xii

Proposed Locations for Future Dyke Projects

2. **Donkey Carts and Ploughs**: The effectiveness of these local technologies can be sustained and enhanced through the following ways:-

   a] For effective results and easy work, the donkeys should not be employed to plough rocky and clayey areas because of their difficulty in traction.

   b] The ploughs should be made out of simple/light materials so as to facilitate easy work on the farms.

   c] The local government councils that abuts the wetlands in collaboration with their state governments should promulgate laws that will prohibit mass trading of donkeys outside the wetlands region.

3. **Fuelwood Stoves**:-

   a] The existing design should be modified so as to make it accommodate bigger and medium size cooking pots.

   b] The stoves should be pre-heated so as to enhance their durability.

   c] Periodic opinions should be sampled from the users of the stoves about its efficiency and durability with a view to incorporate such opinions into its design for better outcomes.

   d] A common site for excavating the raw materials

(clay) used in the stove construction should be designated so as not to trigger-off a widespread soil erosion problems in the region.

4. **Community Tree Nurseries/Woodlots**:-

a] The planting of drought resistant tree species as well as economic trees should be emphasised, while legal actions should be taken against persons found sabotaging the efforts of the programmes.

b] The wetlands communities should be fully mobilised to participate in the development of tree nurseries/woodlots around their farms and settlements. The following framework provide the guidelines for a wider community participation.

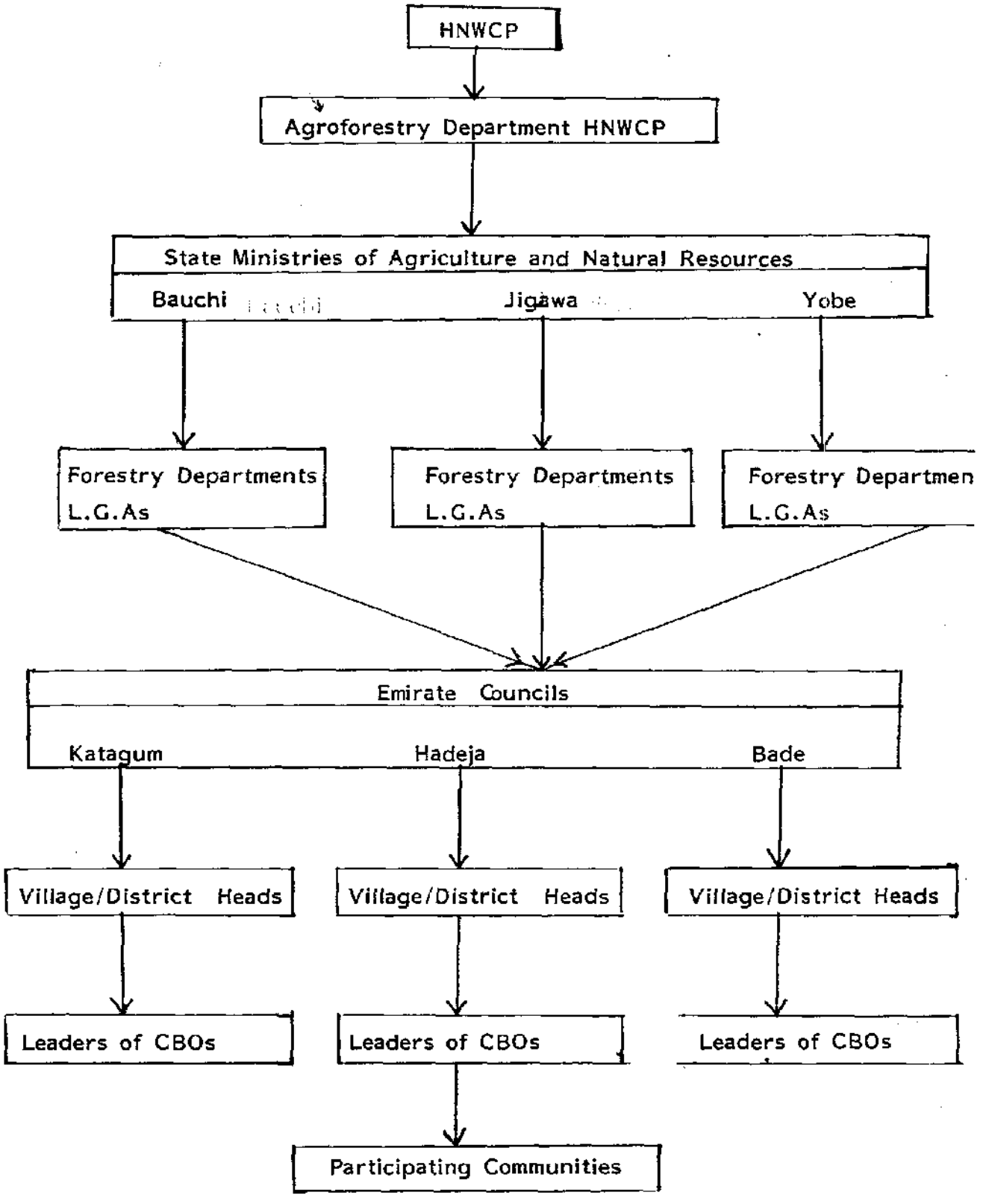


Figure xiii

CBOs = Community Based Organisations.

Proposed Framework for Effective Community Participation in the Development of Tree Nurseries/Woodlots.

5. **Beekeeping Techniques**

   a] The programme management should produce large quantities of the new harnessing garments and sale them at subsidised rates to the beekeepers.

6. **Agricultural Activities**

   a] Wheat and cotton irrigation farms should not be sited in areas under waterlogging conditions as these crops do not thrive well in such environments.

   b] The programme management through its socio-economic research department should closely monitor the use of standard fishing nets throughout the wetlands so as to sustain the fishing economy. This objective can be achieved through collaborating with the leaders of the community based organisations in the wetlands. The following maps presents proposals related to the proposed limits for existing upland farms as well as proposed location for dry season irrigation farms.

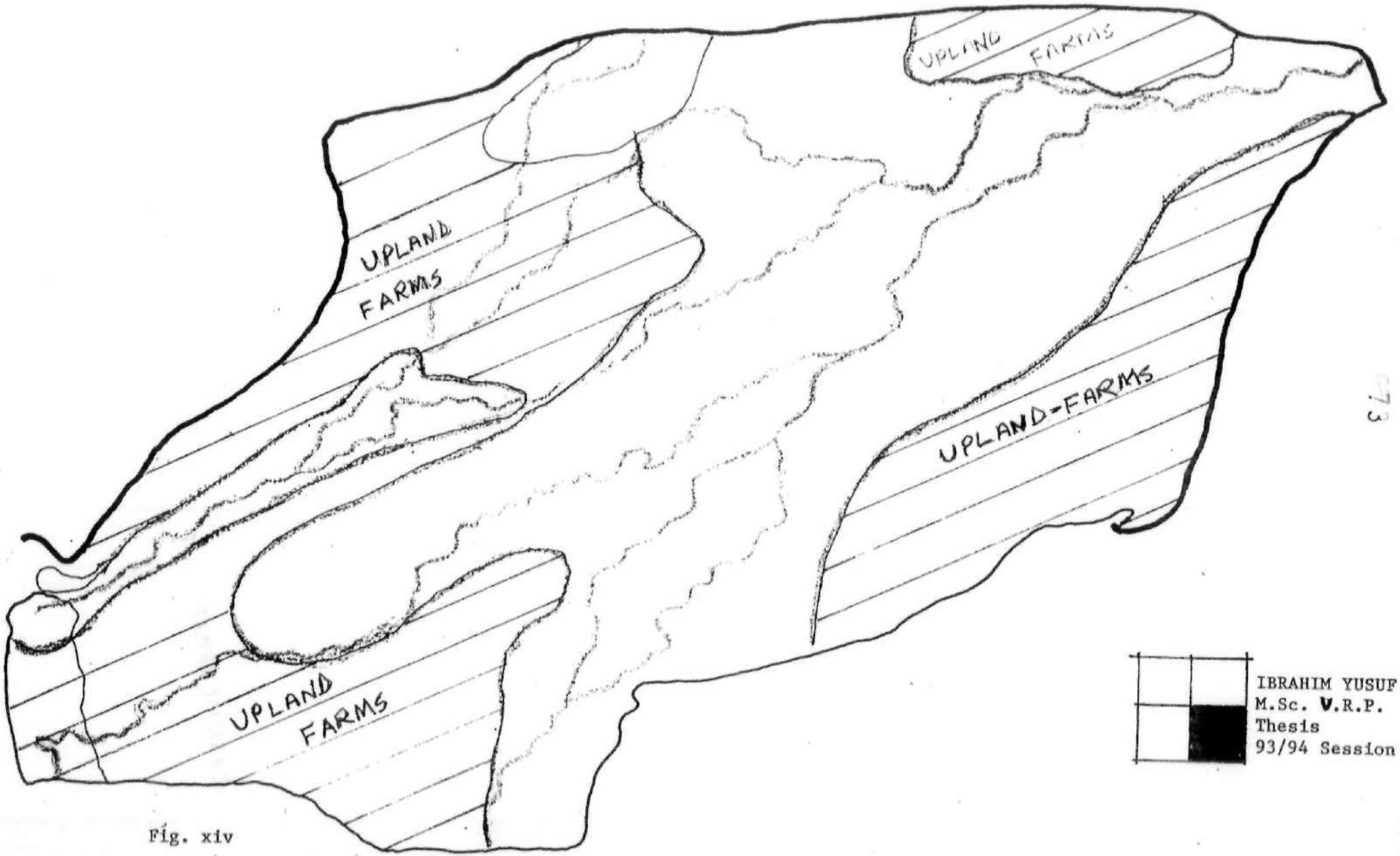


Fig. xiv

Proposed Limits for Existing Upland Farms

Scale 1:620,000

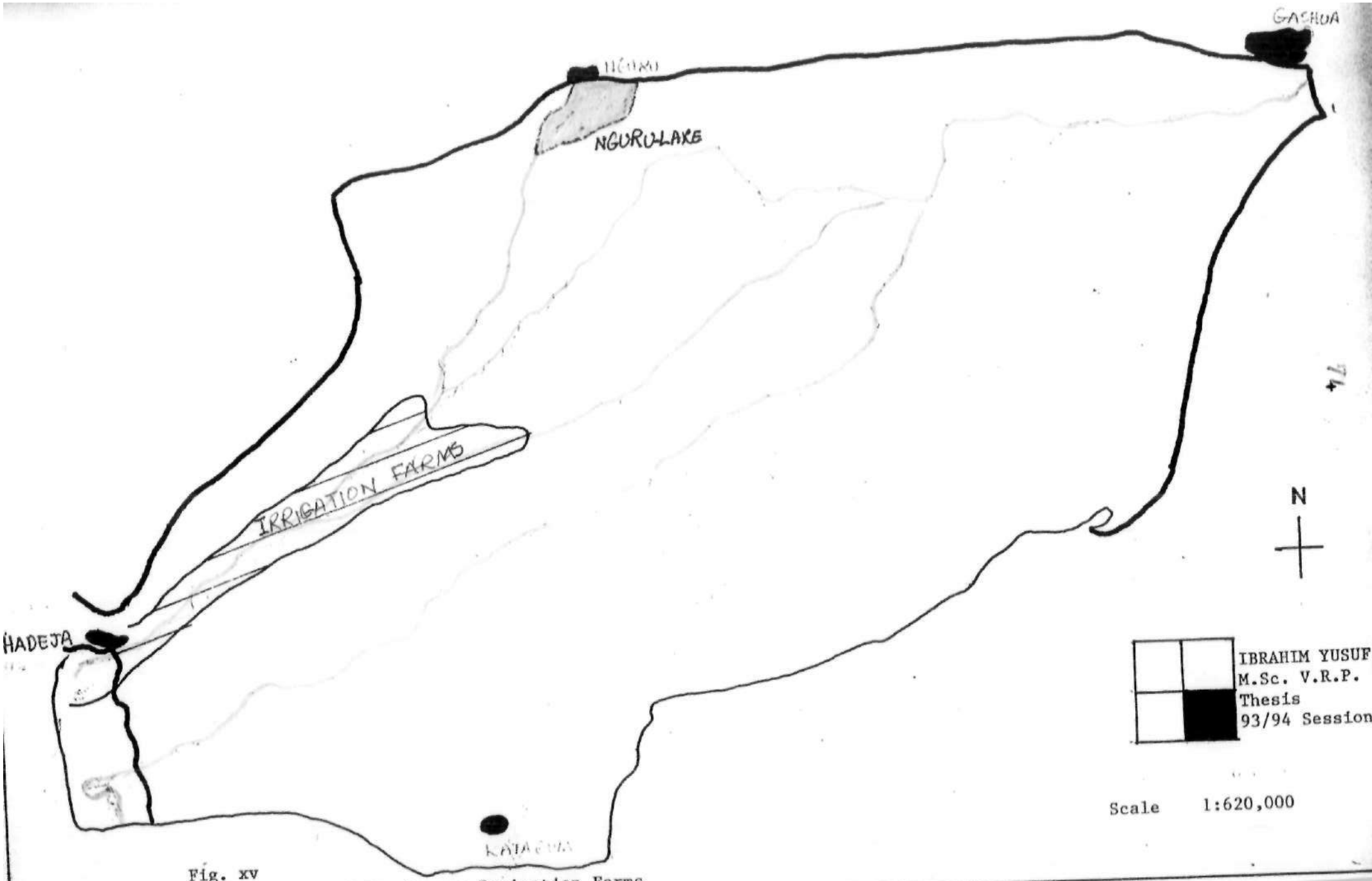


Fig. xv Proposed Dry Season Irrigation Farms

5.20 SUMMARY AND CONCLUSION

Hadeja-Nguru wetlands Conservation Programme was first initiated by the Nigerian Conservation Foundation in 1985, and this was later conceived and designed in 1987 by the Royal Society for the Protection of Birds (R.S.P.B.) in the U.K., and by 1988, actual work commenced on the programme.

Its initial design was to conserve the wetlands as a habitat for migratory waterbirds as well as the water-resources of the Komadugu-Yobe basin in general. However, at the beginning of its second phase, some rural development components were introduced in to the programme by the world conservation union under the concept of 'wise use' of resources. This development therefore entailed a new set of programme objectives on the existing ones thereby making the programme objectives dual in nature. However, the initial design have not provided the basis upon which the new objectives will be achieved.

To achieve these objectives therefore, chapter one examines the background of the study together with its aim and objectives.

The second chapter reviews and evaluate literatures relating to rural development strategies and thereafter recommend those that will best help in promoting sustainable rural development in the wetlands regions.

Chapter three reviews and assessed the design, objectives and goals of the programmes. Under this chapter, various components of the programmes goals and objectives were reviewed and also the limitations of the programme were also identified.

Chapter four reviews the outcomes from the various components of the programme, and thereafter made an assessment of these outcomes with a view to identify the areas where the programme have failed to make remarkable impacts particularly with regard to the promotion of sustainable rural development in the wetlands region.

Chapter five is about proposals that will ensure sustainability and at the same time enhance better outcomes from the programme. Under this chapter, strategies that will enhance the programme's design, the rural development components, the sustainable development components as well as the socio-economic components were all proposed for the programme.

In conclusion, rural development programmes are essential tools for uplifting the living conditions of rural dwellers. However, there are different strategies for

rural development that also have different design requirements, and where these requirements are left out, the expected outcomes will not be fully realised. In this regard, the recommendations for the programme are a combination of different strategies, and for it to effectively promote sustainable rural development activities in the Hadeja-Nguru wetlands and at the sametime maintain its earlier objectives of conserving the wetlands natural resources, it has to integrate the design characteristics outlined under the bottom-up strategy, the institutional development strategy as well as the integrated rural development strategy in to its own design so as to have better outcomes.

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