

Land Resource Study

29 Land resources of central Nigeria Agricultural development possibilities Volume 5A Kaduna Plains

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Land resources of
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Agricultural development
possibilities
Volume 5A
The Kaduna Plains
Executive Summary

ACCESSION NO.	00 3144
CLASS NO.	SURVEYS: NIGERIA LRD
AUTHOR	LAND RESOURCES DEVELOPMENT CENTRE
TITLE	Land resources of central Nigeria

ISSN 0305-6554
ISBN 0902409 88 3

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Land resources of central

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**Agricultural development
possibilities**

Volume 5A The Kaduna Plains

Executive Summary

Land Resources Development Centre

Central Nigeria Project Team

(ed. J R D Wall)

(J G Bennett, A Blair Rains, P N Gosden, W J Howard, A A Hutcheon, W B Kerr, R M Lawton,
J E Mansfield, L J Rackham, R Rose Innes)

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Land Resource Study 29

L LRD
CA Land Resources Development Centre, Ministry of Overseas Development, (LRDC)
Tolworth Tower, Surbiton, Surrey, England KT6 7DY
1979

LAND RESOURCES DEVELOPMENT CENTRE*

The Land Resources Development Centre of the Ministry of Overseas Development assists developing countries in mapping, investigating and assessing land resources, and makes recommendations on the use of these resources for the development of agriculture, livestock husbandry and forestry; it also gives advice on related subjects to overseas governments and organisations, makes scientific personnel available for appointment abroad and provides lectures and training courses in the basic techniques of resource appraisal and development.

The Centre works in close cooperation with government departments, research institutes, universities and international organisations concerned with land resources assessment and development planning.

*The name of the former Land Resources Division was changed to Land Resources Development Centre in June 1978.

CENTRE DE DEVELOPPEMENT DES RESSOURCES DE LA TERRE*

Le Centre de Développement des Ressources de la Terre (l'un des organismes scientifiques du Ministère britannique de Développement Outremer) apporte son aide aux pays en voie de développement en matière de cartographie, recherche et évaluation des ressources de la terre et fournit des recommandations quant à l'exploitation de ces ressources pour le développement de l'agriculture, l'élevage et la sylviculture. Le Centre conseille également, dans les domaines annexes, gouvernements et organismes outremer, se charge de trouver du personnel scientifique pour les postes à pourvoir à l'étranger et organise des conférences et des stages de formation sur les techniques de base relatives à l'évaluation et la mise en valeur des ressources.

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*L'ancienne Division des Ressources de la Terre (Land Resources Division) a été renommée Centre de Développement des Ressources de la Terre (Land Resources Development Centre) en juin 1978.

List of volumes

Title: Land resources of central Nigeria: agricultural development possibilities. LRDC Central Nigeria Project Team (Eds I D Hill and J R D Wall)

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| Volume 1B | The Bauchi Plains |
| Volume 2A | The Jos Plateau, Executive Summary |
| Volume 2B | The Jos Plateau |
| Volume 3A | The Jema'a Platform, Executive Summary |
| Volume 3B | The Jema'a Platform |
| Volume 4A | The Benue Valley, Executive Summary |
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| Volume 5A | The Kaduna Plains, Executive Summary |
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NOTICE TO READERS

This report is derived from a draft issued to the Nigeria Federal and State authorities in 1977.

Readers concerned purely with administrative or policy decisions in relation to agricultural development will find in this volume a summary of the types of development considered and a brief account of the locations of the various development possibilities. There is also an introductory précis of the whole of the Executive Summary.

The attention of readers is drawn to the section in Part 1 on the use of the present report and other associated documents on the Kaduna Plains issued by LRDC.

Readers requiring more detailed information and discussion should consult Volume 5.B.

Throughout this report the word 'agriculture' has been used in a broad sense to include crop production, range management and forestry.

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- 3 Crop options based on environmental limitations -
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- 4 Agricultural development possibilities - the
Kaduna Plains (Sheets a and b)

MICROFICHES (inside back cover of Volume 5B)

BENNETT J G, BLAIR RAINS A, HUTCHISON A A, KERR W B, LAWTON R M, MANSFIELD J E,
RACKHAM L J & ROSE INNES R (1978) Land resources of central Nigeria.
Environmental aspects of the Kaduna Plains. Volume 1, Landforms and soils.
Volume 2, Climate and vegetation. Volume 3, Land systems. Land Resource
Report 19.

Précis

This report summarises agricultural development possibilities in an area referred to as the Kaduna Plains. The area, shown on the accompanying Separate Maps and on Text Map 5.3 in relation to administrative boundaries, falls mainly within Kaduna State but includes small sections of Niger, Plateau, Bauchi, Kano States and of the Federal Capital Territory. It is part of a much larger area in which land resources surveys have been undertaken as part of a British technical cooperation programme - See Text Map 5.1.

The Plains contain large areas of land with considerable scope for agricultural development. During the 5-6 month growing period, conditions are generally satisfactory for many annual crops; also for grass growth and for a small number of economic trees. The area is densely cultivated only near the northern and eastern borders, around Kaduna and in small areas in the south. Elsewhere, cultivation tends to be sparse, in particular in a large tsetse-infested belt* extending from the north-west to centre. Present-day agriculture is based on a labour-intensive, non-mechanised subsistence economy in which sorghum, maize and yam play the most important part as both food and cash crops.

There appears to be considerable room for extension of all currently grown crops, especially in north-central and southern areas, the chief initial limitations being availability of labour and machinery over the growing period. Similarly, there are areas where all the forms of agriculture under consideration can be established. The most versatile and extensive areas i.e. those in which most forms of development would be possible, largely occur in the southern and north-central parts of the Kaduna Plains. Elimination of tsetse would extend the options for cattle husbandry in areas in the centre and north-west to make these equally versatile.

A number of different types of agricultural development have been identified in consultation with State and Federal authorities. These are:

1. Establishment of integrated agricultural development projects
2. Establishment of large mechanised farms

*See Separate Map 2 where information on Glossina morsitans distribution is derived from Federal Livestock Department Map TTD334A, 1975

3. Improvement of traditional grazing
4. Establishment of grazing reserves
5. Establishment of cattle ranches and dairy farms
6. Forestry development for timber production
7. Forestry development for production of firewood and poles
8. Establishment of new forest reserves for erosion protection

The areas suitable for the different types of development are shown on Separate Map 4, on Text Maps 5.4 to 5.11 and in Table 2. Some areas which have few environmental limitations are suitable for more than one type of development so there may be a number of agricultural development options in one area. It must be emphasised that the various development possibilities have been assessed on environmental criteria: no attempt has been made to rank them on the basis of socioeconomic or political factors.

Some types of agricultural development preclude other types and may also have consequences for the existing occupants of the area. For example, the development of an integrated agricultural development project might mean it is necessary to move settled farmers, but it may also be necessary to consider the needs of pastoral communities when traditional grazing areas are involved; development within a grazing area may affect both the pressure on adjacent land and the level of stocking in distant parts of the country. Thus a decision to undertake a specific type of agricultural development cannot be made by departments in isolation.

Areas in which the limitations to the growth of maize, millet, sorghum, groundnuts, cotton and yams are at a minimum are shown on Separate Map 3 and in Table 3. Although the information is generalised it is relevant to 'Operation Feed the Nation'.

The conclusions are based on extensive field work by a team of nine scientists over a period of 7 years. There is therefore a large amount of information on present land use, farming systems, rangeland, forestry, land forms, soils and natural vegetation, which is contained in supplementary reports (see p.xi). Consequently, detailed surveys for development projects undertaken in future should not require an extensive reconnaissance phase.

List of LRDC reports on the Kaduna Plains

A full list is given below of the reports on the Kaduna Plains issued by the Land Resources Development Centre. They contain information for the specialist. They are obtainable only with the agreement of the Nigerian Government.

BAWDEN M G & RACKHAM L J (1969) The physiography of the basement land province: interim report on the land resources of central Nigeria. Miscellaneous Report 75.

BENNETT J G, BLAIR RAINS A, HUTCHEON A A, KERR W B, LAWTON R M, MANSFIELD J E, RACKHAM L J & ROSE INNES R (1978) Land resources of central Nigeria. Environmental aspects of the Kaduna Plains. Volume 1, Landforms and soils. Volume 2, Climate and vegetation. Volume 3, Land systems. Land Resource Report 19.

BLAIR RAINS A (1975) Livestock production in the Central Nigeria Project area. Miscellaneous Report 198.

BLAIR RAINS A (1977) Land resources of central Nigeria. Rangeland and livestock production. Land Resource Report 18.

GOSDEN P N (1978) Land resources of central Nigeria. Farming systems. Land Resource Report 17.

HOWARD W J (1976) Land resources of central Nigeria. Forestry. Land Resource Report 9.

MANSFIELD J E (in preparation) Land resources of central Nigeria. The interpretation of environmental data in terms of limitations to crop growth. Land Resource Report 22.

POSNETT N W, REILLY P M & WHITFIELD P (1971) Nigeria. Volumes 1, 2, 3. Land Resource Bibliography 2.

Part 1

Part 1 Introduction

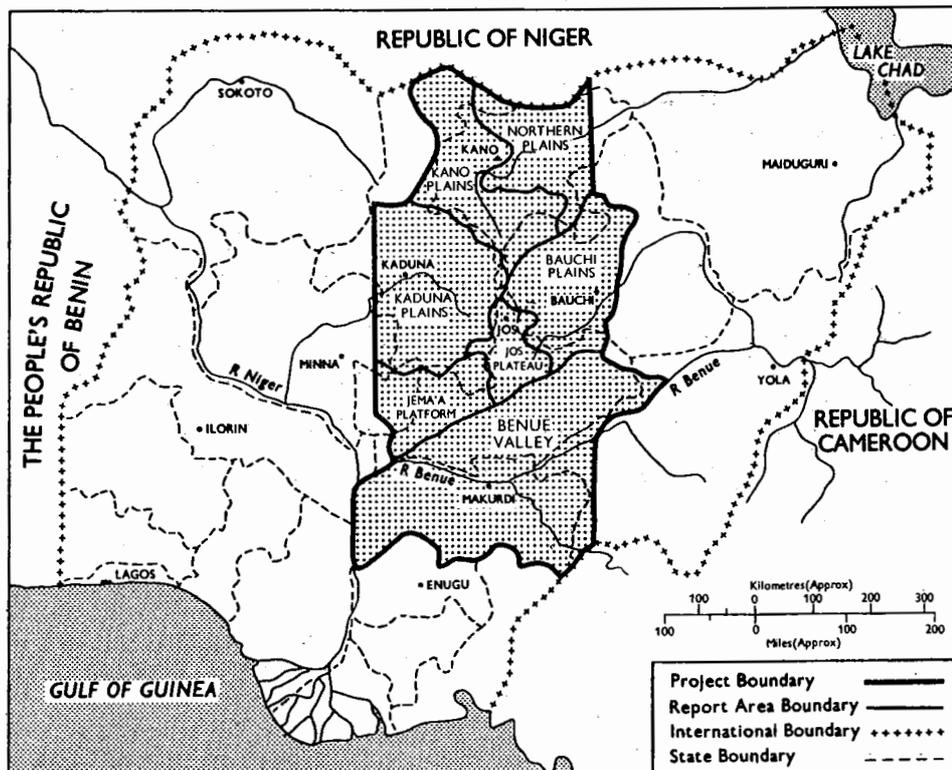
PREFACE

In June, 1968, the Nigerian Government asked the British Government to investigate the land resources of parts of what were then the six northern States of Nigeria. The investigations have been undertaken by the Land Resources Development Centre of the British Government's Ministry of Overseas Development. The project area covers almost 230 000 km². Its western and eastern boundaries are marked approximately by 7° and 10° longitude and it extends from south of the Benue Valley northwards to the border with the Niger Republic (Text Map 5.1).

The Kaduna Plains occupy some 17% of the project area and lie largely within the newly designated Kaduna State, formerly North-Central State (Text Map 5.2).

TEXT MAP 5.1

LOCATION OF CENTRAL NIGERIA PROJECT



D.O.S. 3271A

Prepared and printed by Directorate of Overseas Surveys 1978

OBJECTIVES

The objectives of the project are to investigate and describe the upland (non-floodplain) with particular reference to their agricultural development potential. More specifically, at the request of State and Federal authorities, an assessment has been made of the areas suitability for the growth of seven annual rainfed crops-maize, millet, sorghum, yams, rice groundnuts and cotton together with its rangeland and forestry potential. Agricultural development in the more suitable areas has been considered in the context of improving and expanding existing agriculture and establishing new large-scale, capital-intensive schemes. Mapping the areas where the environment offers the greatest scope for the above crops and forms of development was the final objective.

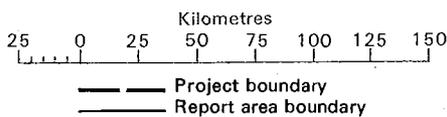
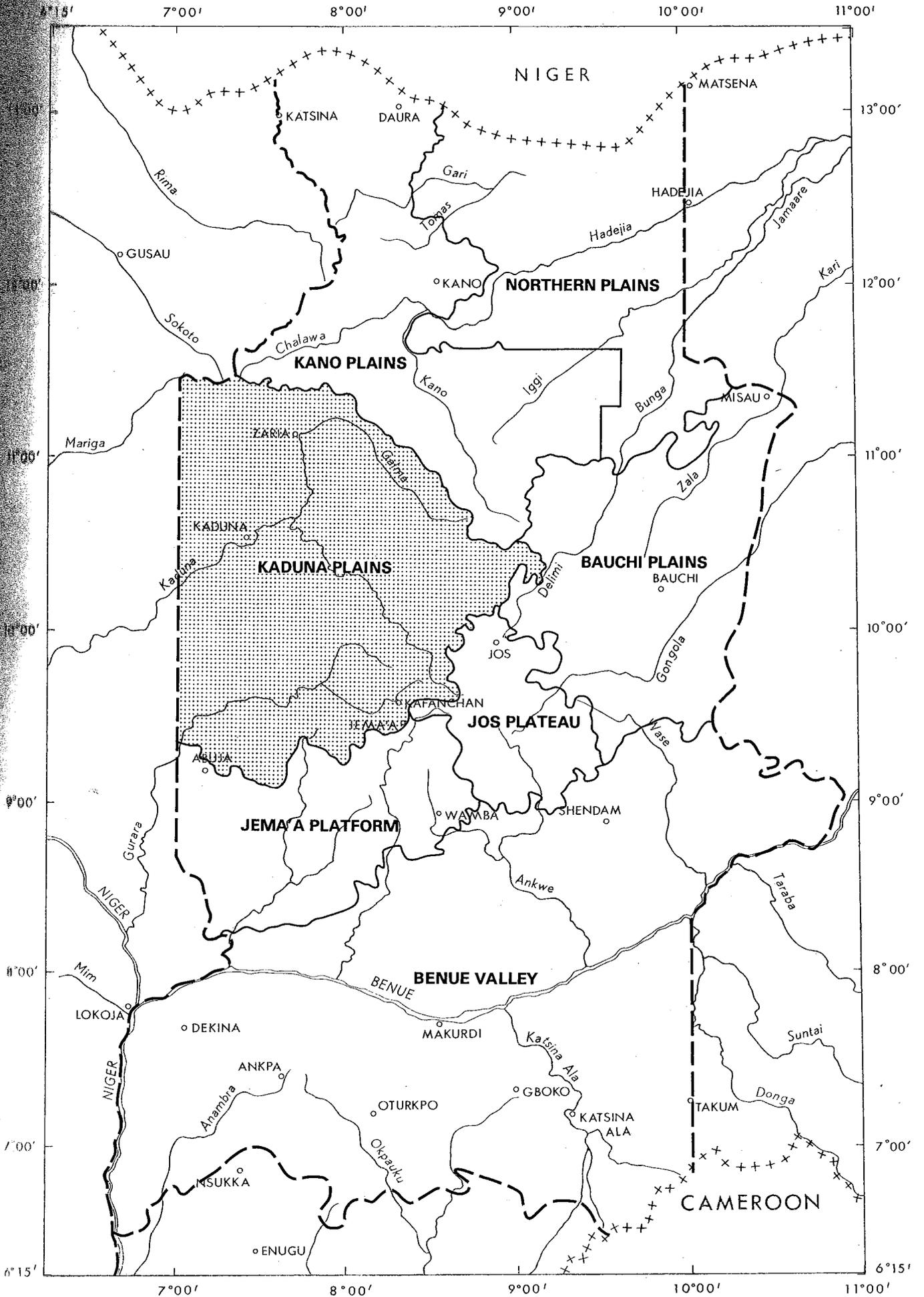
METHODS

From a study of aerial photographs the area was divided into units with similar landforms. Ground investigations of the soils and vegetation within these units, linked with climatic studies, enabled areas with the same pattern of climate, landform, soil and vegetation to be defined. Such areas are called land systems. These land systems are identified by numbers, are shown in Separate Maps 1 - 4 which accompany this report and are referred to whenever development possibilities are discussed.

The environmental data for each land system were interpreted in terms of suitability for various crops, grazing and forestry. This information, taken in association with studies of present land use was used to identify a number of development possibilities. More details of the methods used are contained in the reports listed on page xi.

LOCATION OF THE KADUNA PLAINS

TEXT MAP 5.2



FIELDWORK AND TEAM COMPOSITION

Fieldwork in the Kaduna Plains started in October 1974 and continued until January 1977. Details of the progress of fieldwork have been given in 6 - monthly progress reports issued by the Land Resources Development Centre to the Federal Department of Agriculture.

The project team included agriculturalists, ecologists, a forester, a rangeland specialist, geomorphologist and soil scientists. Details of the team composition which surveyed the Kaduna Plains are given below.

Team

Project manager	I D Hill	1974-75
	J R D Wall	1976-77
Agriculture	J E Mansfield	1974-76
	P N Gosden	1976-77
	S Kalejaiye**	1976-77
Ecology	J Abah*	1976
	R Rose-Innes	1975-76
	R M Lawton	1975
Forestry	W J Howard	1974-76
Rangeland	A Blair Rains	1974-76
Geomorphology	L J Rackham	1974-75
Soil science	A A Hutcheon	1974-75
	J G Bennet	1974-75
	W B Kerr	1974-75
	J Ibanga*	1975
	J Valette*	1975

REPORTING

As the project area is so large it has been divided into six major physiographic regions, the Bauchi Plains, the Jos Plateau, the Jema'a Platform, the Benue Valley and the Kaduna and Kano Plains. These physiographic regions are shown on Text Maps 5.1 and 5.3 in relation to state and administrative boundaries. Each region has been reported on separately.

* Staff of the Institute of Agricultural Research, ABU Samaru

**Staff of the Federal Department of Agriculture

The agricultural development possibilities in each region are discussed in separate volumes of this Land Resource Study: the six volumes are listed on p.v.

Environmental data collected during the survey for each of the major physiographic regions is contained in a series of reports published by this Division; those relating to the Kaduna Plains are listed on p.xi. The list also includes reports dealing specifically with farming systems rangeland and forestry for the whole project area.

USE OF THE REPORTS

Land Resource Study, Volume 5A, The Kaduna Plains, Executive Summary

This summary will be of use to administrators in deciding development possibilities. Following discussions with Federal and State authorities, the report has been structured so that it can be used in three ways:

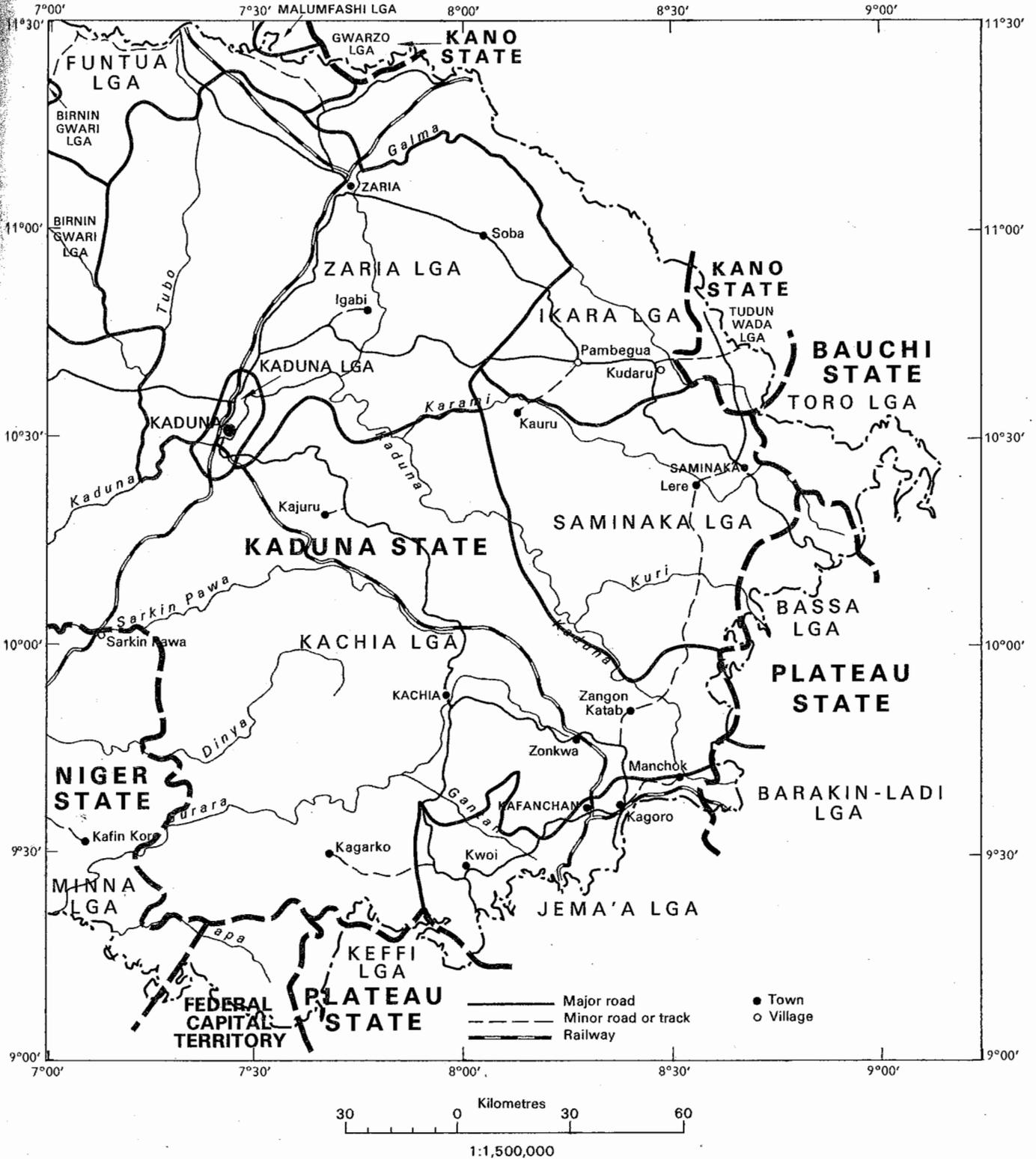
1. Selection of areas for a particular type of agricultural development
2. Selection of areas for increasing the production of a given crop
3. Selection of types of agricultural development within particular administrative units

1. Selection of areas for a particular type of agricultural development
The types of development are summarised in Table 1 and discussed more fully in the main report. The areas in which the environmental limitations to particular types of development are at a minimum are shown on Text Maps 5.4 to 5.11. They can be located more specifically by reference to Table 2, where the areas are identified by land system numbers which are shown on the separate maps accompanying Volume 5B.

2. Selection of areas for the production of particular crops Areas in which the environmental limitations to the growth of particular crops are at a minimum are listed in Table 3 in relation to administrative units. They are identified more specifically by land system numbers which are shown on the separate maps.

3. Selection of types of agricultural development within particular administrative units Table 2 shows the location of particular types of development in relation to administrative units. Similarly Table 3 shows land systems for the production of specific crops in relation to administrative units. The administrative units are shown on Text Map 5.3

POST-1976 ADMINISTRATIVE BOUNDARIES OF THE KADUNA PLAINS



Using the report in one or all of these three ways enables a number of agricultural developments to be identified. They have been assessed on environmental criteria and no attempt has been made to rank them in economic terms. The further action necessary to decide which of the development possibilities should be implemented is outlined in Part 2.

Land Resource Study. Volume 5B, The Kaduna Plains

This volume will be of use to technical and planning officers concerned with the formulation of plans or responsible for the implementation of planning decisions. It contains general information about the environment and more detailed environmental and present land use data in relation to development possibilities. It also contains a discussion of the various types of development and the areas in which these could be located.

Land Resource Reports and Miscellaneous Reports

These reports are listed on p.xi Land Resource Reports 9, 17, 18 and 22 are for the use of technical and planning officers; they contain more detailed assessments of forestry, present land use, cattle production and limitations to crop growth than are contained in the Land Resource Studies. The remaining Land Resource Reports and Miscellaneous Reports should be of use to specialists concerned with implementation of particular projects as they contain detailed environmental information.

ADMINISTRATIVE UNITS

The boundaries of the new States announced in January 1976 have been derived from Federal Surveys 1:1 500 000 map of Nigeria (1976). Data have been referred to Local Government Areas in all States. The boundaries of these Divisions have been derived from the best available published maps. (See Text Map 5.3)

ACKNOWLEDGEMENTS

We wish to thank the staff of the Federal and State Ministries of Agriculture and Natural Resources for assistance during the project.

Thanks are also due to the Director and Staff of the Institute for Agricultural Research, Ahmadu Bello University, for help and cooperation in all stages of the survey and to the staff of the International Institute for Tropical Agriculture, Ibadan, for technical advice.

Part 2

Part 2 Summary of agricultural development possibilities

TYPES OF AGRICULTURAL DEVELOPMENT

Different types of agricultural development have been considered with reference to the Third National Development Plan, 1975-80, and after discussions with Federal and State authorities and the staff of research institutes in Nigeria.

The definitions summarised in Table 1 are based on these discussions and experience of similar development projects in Nigeria. They are more fully discussed in Volume 5B.

Significant factors concerning agricultural development on the Kaduna Plains are as follows:

1. Extensive areas are environmentally suitable for several major crops large-scale mechanised farming, rural development projects, cattle and forestry.
2. The cultivation density, and hence inferred population, is low except on the borders with the Kano Plains, Jos Plateau and around Kaduna
3. Tsetse fly remains to be eradicated over central and north-western areas
4. The existing densely settled and cultivated Kano Plains immediately to the north and the establishment of the Federal Capital Territory immediately to the south will create increasing demands for food, grazing, firewood and manure/compound refuse (fertiliser) from the Kaduna Plains
5. The climate, specifically the length of the rainy period, is inadequate for yams in the northern plains and for certain forestry plantation species

TABLE 1 Types of agricultural development

Type of development		Summary definition of development
1. Integrated agriculture	(a) In densely cultivated areas	Establishment of integrated agricultural development projects aimed at increasing existing agricultural production per ha by improving infrastructure (communications, supply of agricultural inputs, produce marketing, credit facilities and extension service coverage). Run by a semi-autonomous project authority and making use of self-help wherever possible. Allied to general improvement of social services.
	(b) In sparsely cultivated areas	As above but also able to increase production by increasing the area under cultivation and/or introducing 'mixed farming'.
2. Mechanised farming		Establishment of large mechanised farms (> 1 000 ha) requiring a high level of management expertise and mechanisation of all stages of production from land preparation to harvest. Good planning and adequate conservation measures are essential. Limited to sparsely cultivated areas.
3. Traditional grazing		Improvement of traditional grazing including control of herd numbers, the elimination of unregulated lopping and the introduction of forage species into natural grassland. These measures, together with the establishment of grazing reserves and the allocation of grazing rights, are components of a suggested programme to be organised at inter-State level. Limited to sparsely cultivated areas.
4. Grazing reserves		Establishment of reserves in the major traditional wet and dry season grazing areas and along migration routes, with additional reserves within areas free or being freed of tsetse by the eradication programme. Provision of adequate water supplies, veterinary services and improved natural grassland, coupled with strict control of stock numbers. Limited to sparsely cultivated areas.
5. Cattle ranches and dairy farming		Establishment of ranches for 'growing out' cattle drawn from Fulani herd. Stock numbers restricted to 2 000 head until the viability of the ranch is established. Area not less than 2 000 ha per 1 000 head of cattle, with 1 200 ha for wet season and early dry season grazing and 800 ha for fodder grass to provide additional dry season roughage. Supplementary dry season feeding by cottonseed, cottonseed cake, groundnut cake, brewers grains or molasses as available. Limited to sparsely cultivated areas. Establishment of dairy herds of not more than 100 milking cows. Total area not less than 250 ha, with 130 ha improved pastures for wet and dry season grazing and 50 ha to provide additional dry season feed, supplemented by locally available concentrates and crop residues.
6/7. Production forestry	6. Development for production of timber	Development financed and managed by Government and covering a few to 100 ha in one location, usually for sawn timber production for local use, alternatively by a commercial company at minimum annual planting rate of 400 ha for sawn timber or pulp. Confined to forest reserves.
	7. Development for production of firewood and poles	(a) Production by State and Federal Departments in forest reserves.
		(b) Production by farmers on small woodlots, backed by extension service and management of indigenous forests.
8. Protection forestry, reservation to protect areas against erosion or strict conservation resources		(c) Extraction from areas of natural vegetation in forest reserves.
		Protection of existing and establishment of new forest reserves in areas with slopes greater than 10% (6°) where conservation is required. Protection required only in parts of area.

6. Road communications are in general moderate, in that large areas lie within 5 km of a hard-top road or are served by reasonably good dirt roads
7. The current level of agriculture is one of an intricate, labour-intensive, family-based subsistence economy with limited cash crop production, largely in balance with the environment

ASSESSMENT OF AREAS FOR AGRICULTURAL DEVELOPMENT

Any particular form of development should result in increased agricultural production almost anywhere in the Kaduna Plains, but to be most effective it should be located in areas where environmental and present land use limitations are at a minimum. In assessing whether an area is suitable for a particular type of development the following factors have been considered:

Climate

Size and distribution of the land system

Soil limitations to crop growth

Slopes in relation to erosion hazard

Distribution and intensity of present cultivation

Present farming systems

Existing extension coverage

Present grazing status and cattle movements

Existing forestry activities

Communications

These factors are considered within the framework of land systems.

For convenience the land systems have been grouped according to the number of crop options, that is, the number of crops for which there are few environmental limitations. This grouping, shown on Separate Map 3, gives an indication of the versatility of the land for crops.

It must be emphasised that the various development possibilities have been assessed on environmental criteria: no attempt has been made to rank them in economic terms.

SUITABLE AREAS FOR PARTICULAR TYPES OF AGRICULTURAL DEVELOPMENT

The areas suitable for particular types of agricultural development are shown on Text Maps 5.4 to 5.11, and given in Table 2 in relation to administrative units and land systems. The boundaries of both administrative units and land systems are shown in more detail on the separate maps.

SUITABLE AREAS FOR PRODUCTION OF PARTICULAR CROPS

The areas in which the environmental limitations to the growth of certain crops are at a minimum are given in Table 3 in relation to administrative units and land systems shown on the separate maps. Although this information is generalised it is relevant to 'Operation Feed the Nation'.

POSSIBLE AGRICULTURAL DEVELOPMENTS IN EACH ADMINISTRATIVE UNIT

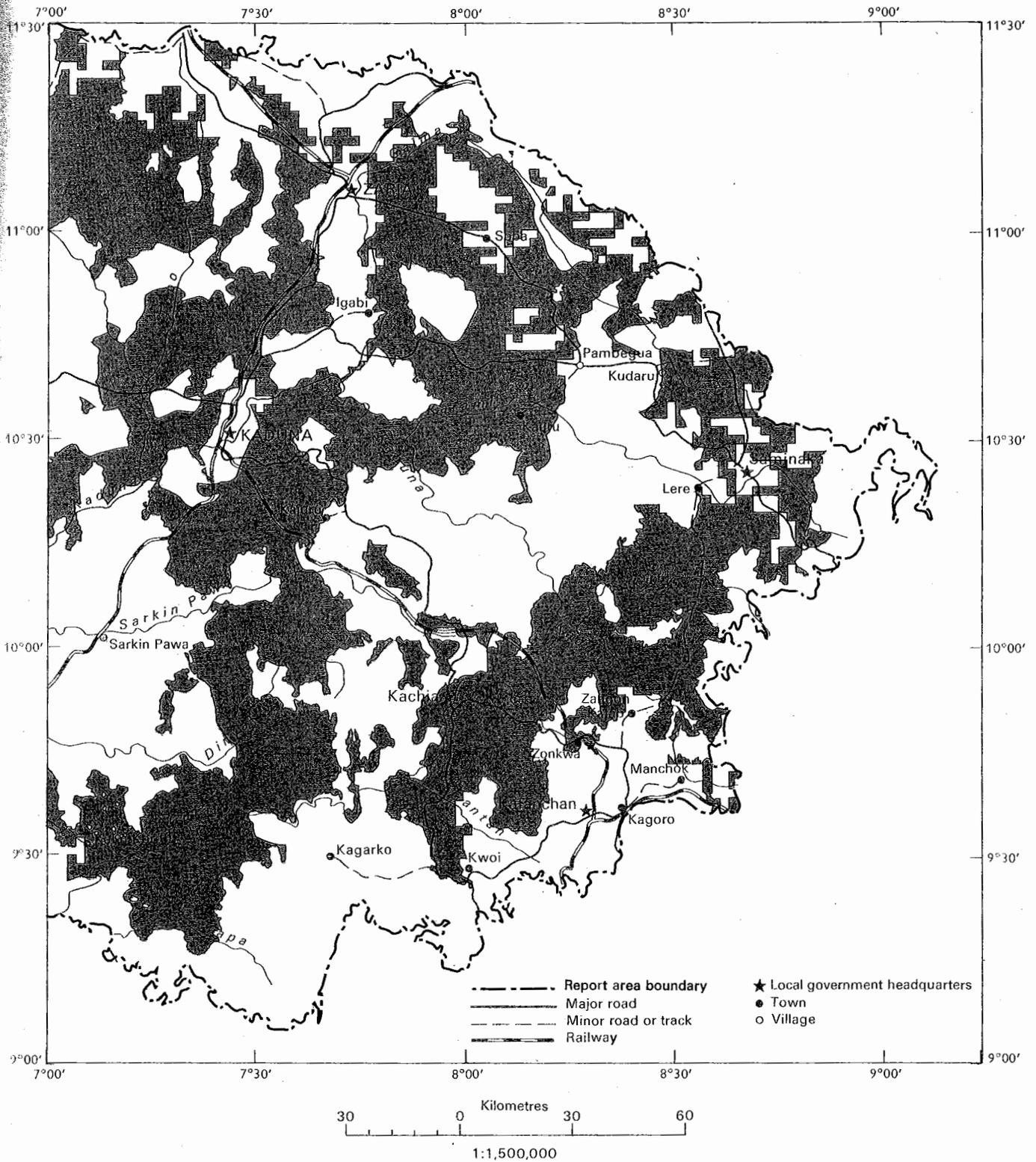
The types of development possible in each administrative unit can be derived by reference to Table 2.

ACTION PRIOR TO AGRICULTURAL DEVELOPMENT

Various agricultural development options have been set out in this report based on reconnaissance investigations of the environment and present land use. The further actions necessary to implement development are discussed below, but as both State and Federal Government agencies may be involved, coordination is important.

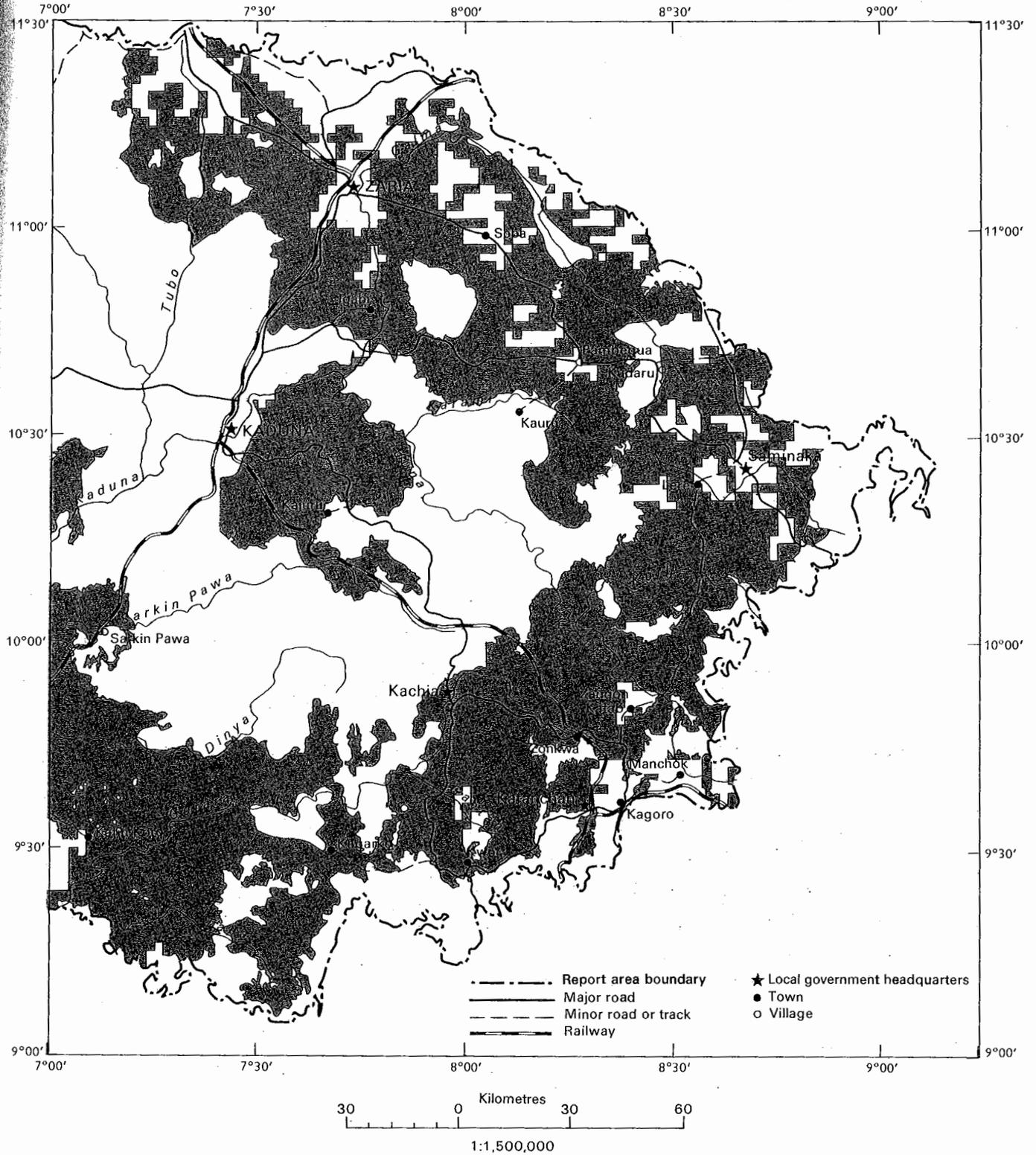
KADUNA PLAINS

AREAS SUITABLE FOR LARGE MECHANISED FARMS (based on environmental and present land use factors only)



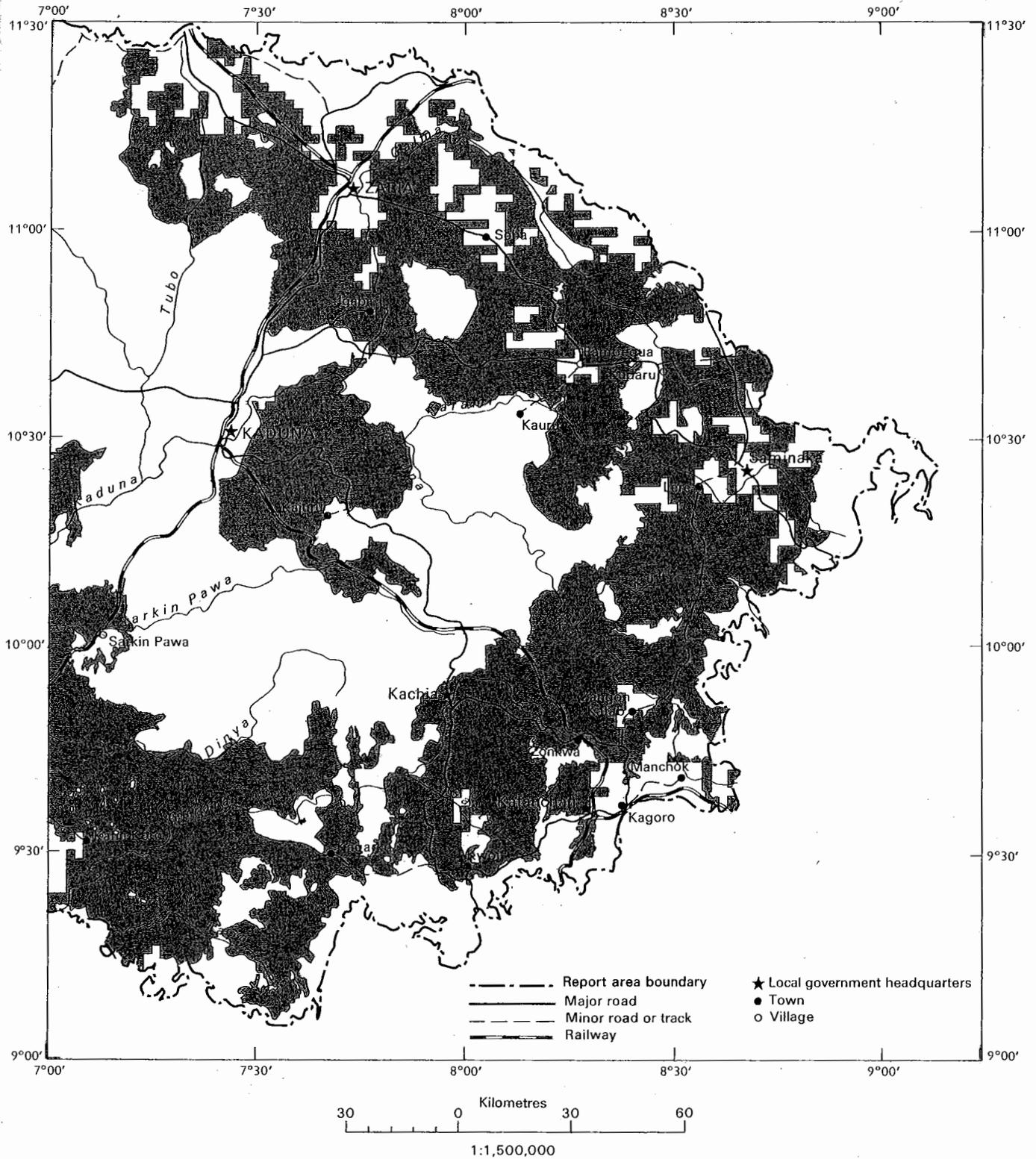
KADUNA PLAINS

AREAS SUITABLE FOR IMPROVEMENT OF TRADITIONAL GRAZING
(based on environmental and present land use factors only)



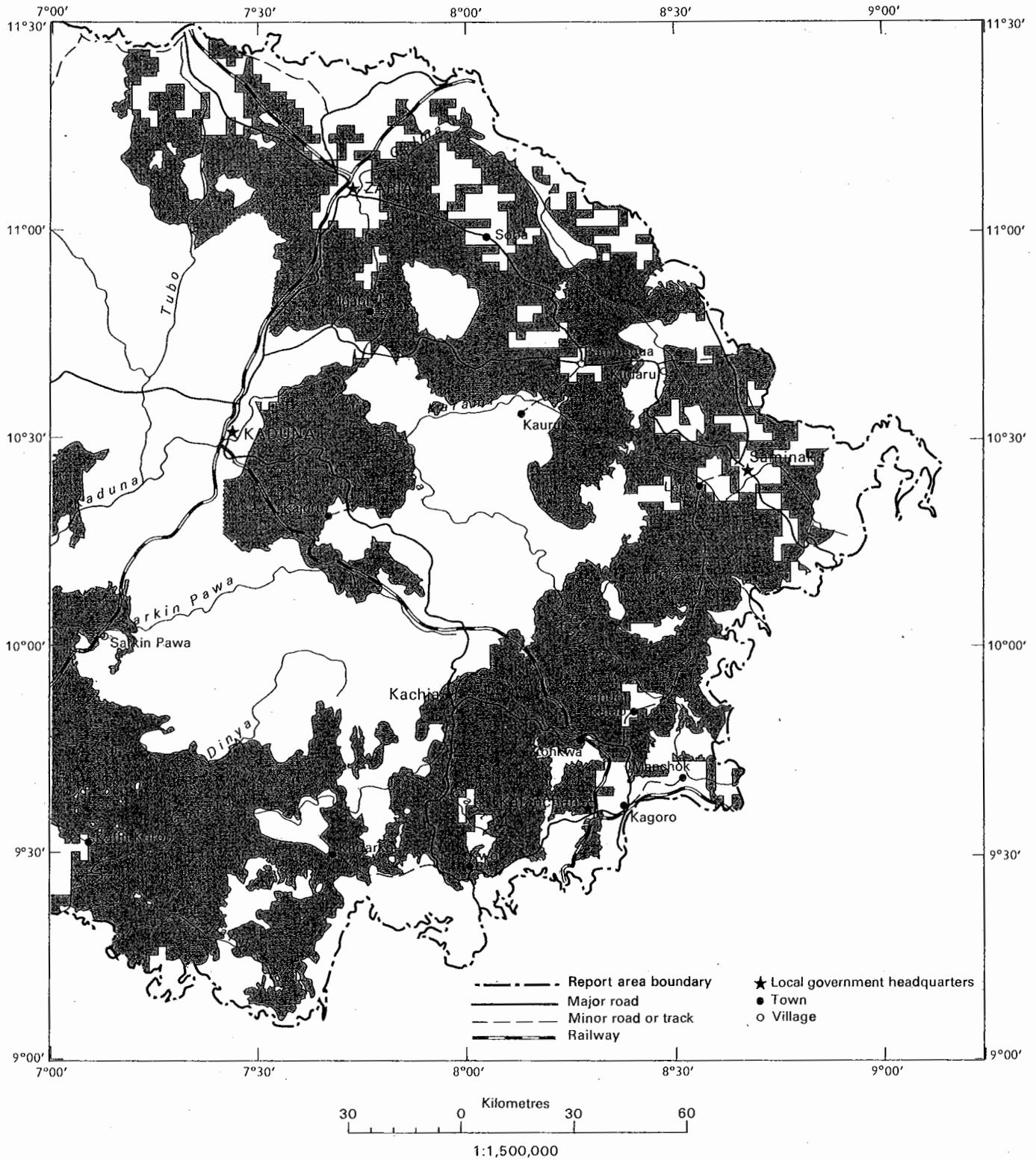
KADUNA PLAINS

AREAS SUITABLE FOR ESTABLISHMENT OF GRAZING RESERVES
(based on environmental and present land use factors only)



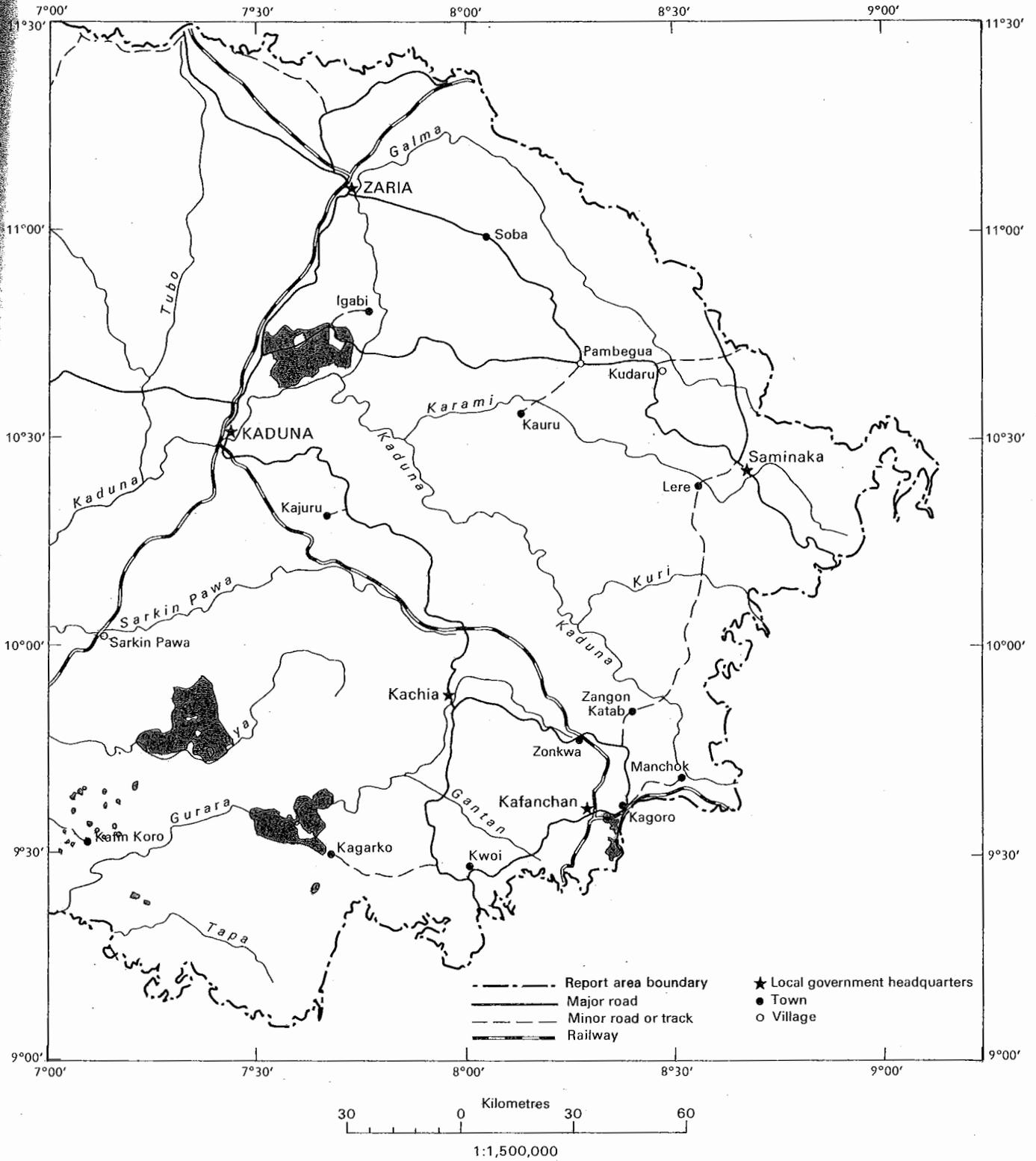
KADUNA PLAINS

AREAS SUITABLE FOR CATTLE RANCHES OR DAIRY FARMS
(based on environmental and present land use factors only)



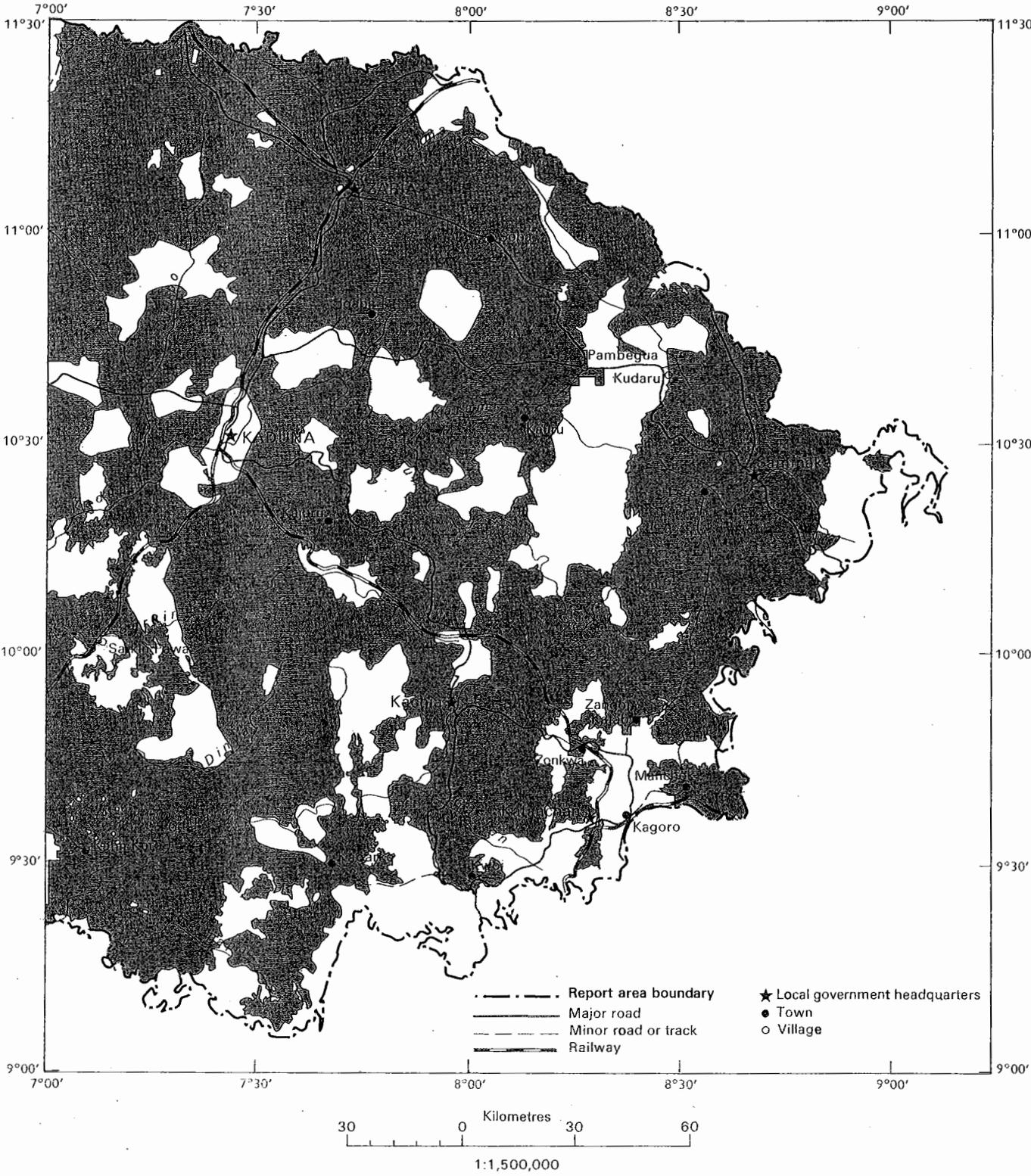
KADUNA PLAINS

AREAS SUITABLE FOR DEVELOPMENT FOR PRODUCTION OF TIMBER



KADUNA PLAINS

AREAS SUITABLE FOR INTEGRATED AGRICULTURAL DEVELOPMENT PROJECTS (based on environmental and present land use factors only)



KADUNA PLAINS

AREAS REQUIRING RESERVATION OR STRICT CONSERVATION

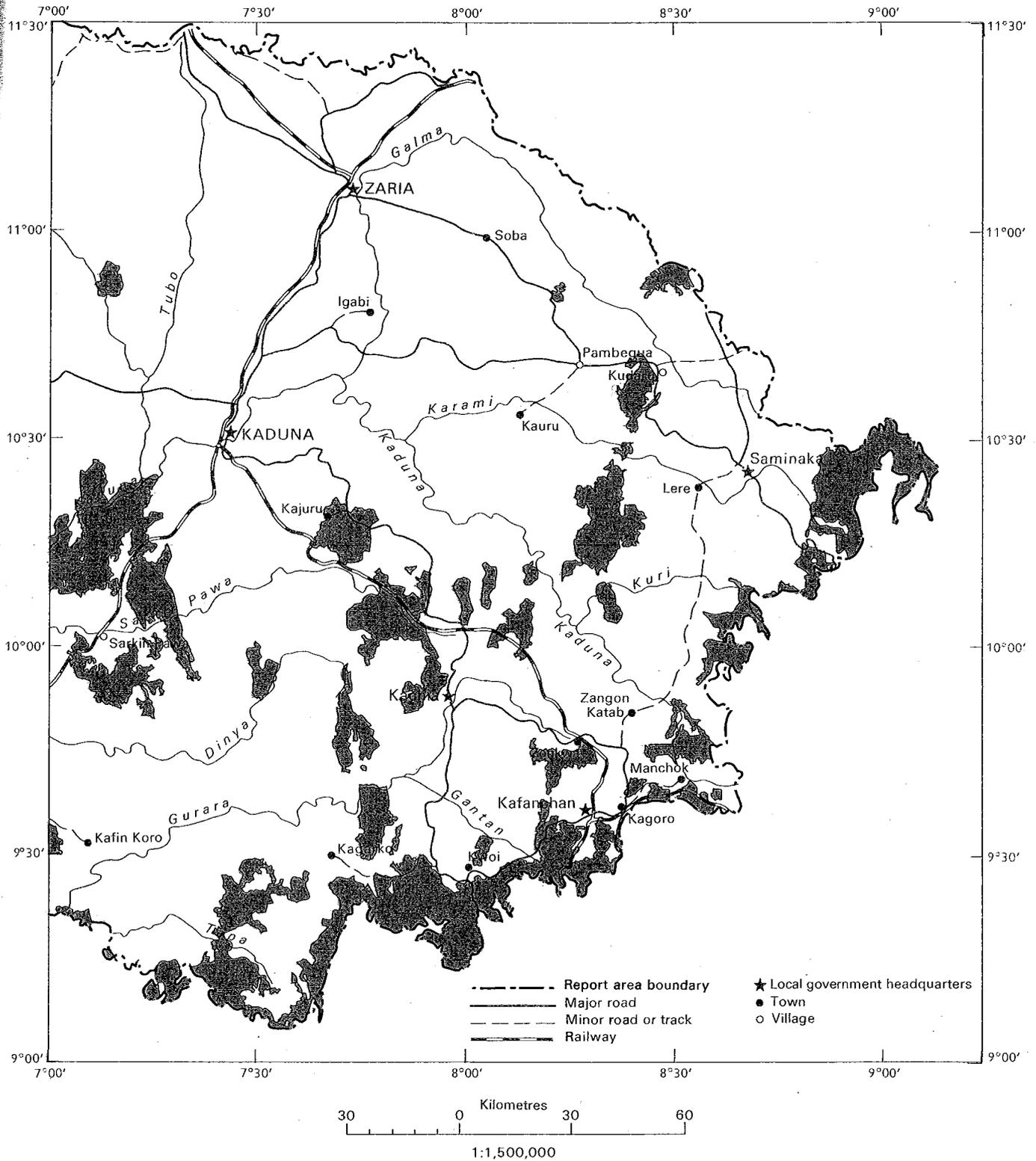


TABLE *2 Agricultural development possibilities in relation to administrative units and land systems in the Kaduna Plains

Administrative unit	Land systems suitable for different types of development									
	1. Integrated agriculture		2. Mechanised farming	3. & 4. Traditional grazing and grazing reserves	5. Cattle ranches and dairy farming	6. Timber	7. Firewood and poles production from			8. Protection forestry
	(a) In densely cultivated areas	(b) In sparsely cultivated areas					(a) Forest reserves	(b) Farmers woodlots	(c) Natural vegetation	
						Name	LS			
<u>Kaduna State</u>										
Birnin Gwari LG area	-	418,421,422,426	418,422,426	-	-	-	-	-	-	-
Funtua LG area	421,422,426,449,450	418,421,422,426,444,449	418,422,426,449	421,422,426,444,449	421,422,426,444,449	-	Tudun Iya Tumburkai	449,449	421,422,449,450,426	-
Ikara LG area	425,429,445,448,450,451	425,429,434,445,448,450,451	448,451,425,429,434,445,448,450,451	413,425,429,431,434,436,443,445,448,450,451	425,429,434,448,445,451,450,431	-	Nasarawa Guaraka Ancha W. Kurmin Kogula River	443,448,448,448,451,443,448	443,448,450,451	425
Jema'a LG area	422,431,436,437,438,439,440	410,415,422,435,436,437,438	422,438	410,412,415,422,423,431,436,437,438,439,440	410,415,422,431,436,437,438,440	404,439	-	-	422,431,436,437,438,439	-
Kachia LG area	416,431,435,440	402,405,406,409,410,411,416,419,420,421,422,424,429,431,427,428,429,431,432,433,434,435,436,438,440	411,419,422,424,427,428,429,431,432,433,438,439,440	405,406,409,410,411,412,413,416,417,419,420,422,424,427,428,429,431,433,436,438,439,440	406,409,410,411,416,419,420,422,424,427,428,429,431,433,436,438,440	406,419,420,427,428,429,431,432,433,438,439,440	Kagerko Kabara Kubacha Bayide Kurmin Bi Kaguru Tukuruwa Kakau Mando N. Mando S. Chawal Esc Libere Doka Hills Mai Ido Kurmin Birn Akwana E w Rahama Esc	420,404,420,404,422,422,422,421,422,431,435,438,430,430,430,432,411,422,419,428,436,438	416,424,439,440	401,402,406,411,413,418,422,428,430,432,429
Kaduna LG areas	-	-	-	-	-	-	-	-	422,446	-
Saminaka LG area	405,407,414,424,425,431,435	402,403,405,407,414,418,424,425,429,430,431,433,433	414,418,424,425,429,431,433	403,405,407,413,414,424,425,429,431,433,436	403,405,407,414,424,425,429,431,433,436	-	Bakin Kogi Kurmin Mal Kwogin Kerami Libere	424,441,414,414,431,418	407,414,431	418,429
Zaria LG area	422,444,445,446,447,448,449,451	418,422,426,429,444,445,446,447,448,449,451,402	418,422,426,429,445,448,449,451	422,426,429,444,445,446,447,448,449,451	422,426,429,444,445,446,447,448,449,451	422,446	Idasu Fatika Kakangi Guga Maje Kabama Mairabo Afaka Rigachikum Ribako Kona	422,422,422,444,444,444,446,446,422,422,413,429,429,446,447,451	443,447,449	413,422,429,446,451
<u>Niger State</u>	406,428	402,405,406,427,428,436,438	419,427,428	405,406,419,427,428,436	405,406,419,427,428,436	406,428	-	-	406,428	-
<u>Plateau State</u>										
Barakin Ladi LG area	437,438	435,437,438	-	437,438	437,438	-	-	-	438	-
Bassa LG area	431,435	403,431,435	-	403,431	403,431	-	Jere Limoro Chokobo	434,431,434	431	-
Keffi LG area	-	420	-	420,436	420,436	-	-	-	-	404
Toro LG area	414,431	414,431,435	414,431	414,431	414,431	-	-	-	431	-
<u>Kano State</u>										
Gwarzo LG area	450	-	-	-	-	-	-	-	-	-
Tudun Wada LG area	414,425	414,425	414,425	414,425	414,425	-	-	-	414,425	-
<u>Fed. Cap. Terr.</u>	-	406,419,420,428,435	406,419,428	406,419,420,428,436	406,419,420,428,436	-	-	-	-	401

TABLE 3 Land systems with few limitations to the growth of particular crops, in relation to administrative units

Administration unit	Land system					
	Maize	Millet	Sorghum	Groundnut	Cotton	Yam*
<u>Kaduna State</u> Birnin Gwari LG area	418,421,422 446	418,421,422 446	418,421,422 446	418,421,422 446	418,421,422 446	418,421,422 446
Funtua LG area	418,421,422 426,444,449, 450	418,421,422 426,449,450	418,421,422 426,444,449 450	418,421,422 426,449	418,421,422 426,444,449 450	418,421,422
Ikara LG area	425,429,434 436,445,448, 450,451	425,429,445 448,450	425,429,434 436,445,448 451	425,429,445 448	425,429,436 445,448,450 451	413,425,429 434,436,445
Jema'a LG area	402,404,410 415,416,422 431,435,436 437,438,440	402,404,410, 412,422,431 435,438,440	402,404,410 415,416,422 431,435,436 437,438,440	402,422,435 440	402,404,416 422,431, 435 436,437,440 410	401,402,404 410,412,415 416,422,423 431,435,436 437,438,439 440
Kachia LG area	402,404,405 406,409,410 411,416,418 419,420,421 422,424,427 428,429,430 431,432,433 435,436,438 440	402,404,405 406,409,410 418,419,420 421,422,427 428,429,431 432,433,435 436,438,440	402,404,405 406,409,410 411,416,418 419,420,421 422,424,427 428,429,430 431,432,433 434,435,436 438,440	402,406,418 420,421,422 427,429,433 435,440	402,404,405 406,409,411 416,418,419 420,421,422 424,427,428 429,431,432 433,435,436 440, 410	402,404,405 406,409,410 411,412,413 416,417,418 419,420,421 422,423,424 427,428,429 430,431,432 433,435,436 438,439,440
Kaduna LG area	422	422	422	422	422	422
Saminaka LG area	402,403,405 414,418,424 425,429,430 431,433,435 436	402,405,414 418,425,429 431,433,435	402,403,405 407,414,418 424,425,429 430,431,433 435,436	402,405,407 418,425,429 433,435	402,405,418 424,425,429 431,433,435 436	402,403,405 407,407,413 414,418,424 425,429,430 431,433,435 436
Zaria LG area	418,422,426 429,444,445 446,447,448 449,451	418,422,426 429,445,446 447,448,449	418,422,426 429,444,445 446,447,448 449,451	418,422,426 429,445,446 447,448,449	418,422,426 429,444,445 446,447,448 449,451	413,418,422 429,445
<u>Niger State</u>	402,404,405 406,419,427 428,436	402,404,405 406,419,427 428	402,404,405 406,419,427 428,436	402,405,406 427	402,404,405 406,419,427 428,436	402,404,405 406,419,427 428,436
<u>Plateau State</u> Barakin Ladi LG area	404,435,437 438	404,435,438	404,435,437 438	404,435	404,435,437	404,435,437 438
Bassa LG area	403,431,434 435	431,435	403,431,434 435	435	431,435	403,431,434 435
Keffi LG area	404,420,436	404,420	404,420,436	420	404,420,436	401,404,420 436
Toro LG area	414,431,434 435	414,431,435	414,431,434 435	435	431,435	414,431,434 435
<u>Kano State</u> Gwarzo LG area	450	450	450		450	
Tudum Wada LG area	414,425	414,425	414,425	425	425	414,425
<u>Fed Cap. Terr</u>	404,406,419 420,428,436	404,406,419 420,428	404,406,419 420,428,436	406,420	404,406,419 420,428,436	401,404,406 419,420,428 436

* Refer to Separate Maps 2 and 3 for northern, climatically unsuitable areas in some administrative units

Coordination of agricultural development

Although obvious, it must be emphasised that any form of agricultural development will profoundly affect existing forms of agricultural activity. For example, initiating an integrated agricultural development project, as outlined previously, will influence the amount of land available for grazing: the consequent displacement of nomadic pastoralists may effect rangeland 100 miles away.

Decisions on agricultural development are usually taken initially by a professional committee. Details vary but at the state level the committee includes the Permanent Secretary MANR, the Planning Officer, Chief Agricultural and Veterinary Officers, Chief Irrigation Engineer and Chief Conservator of Forests. At the federal level the committee includes the Permanent Secretary MANR, the Planning Officer and the Directors of the Departments of Agriculture, Livestock and Forestry.

It is very important that these committees should consider the interrelationships of the various forms of agricultural development. A decision to undertake a specific type of agricultural development cannot be made by one department in isolation.

To ensure coordination of agricultural development between States and between State and Federal Government programmes, a representative from the Federal MANR should attend State MANR committees. To ensure coordination of agricultural activity with overall development policy a representative from the Ministry of Finance and Economic Planning should also attend.

Once the MANR Planning Committee has approved a particular agricultural development on technical grounds, final approval for implementation is usually the responsibility of the Ministry of Economic Planning.

Sequence of actions prior to development

The further actions necessary to implement development are listed in sequence and summarised in Table 4, and further discussed below. They represent the successive applications of more intensive studies to test the feasibility of the options indicated by the reconnaissance surveys.

TABLE 4 Sequence of actions prior to development

Action	Information available
1. Decide i. Type of agricultural development ii. Type of crop whose production should be increased iii. Area for development	Results of Central Nigeria Project ie agricultural development options determined from environmental factors. Economic information from Nigerian sources
2. Undertake preliminary socio-economic studies	"
3. Review decision from 1.	Results of Central Nigeria Project and studies from 2.
4. Undertake more detailed environmental and socioeconomic studies	"
5. Final decision on implementation of development	Results of Central Nigeria Project and studies from 2 and 4.

Decision on type of development, type of crop, or the area for development

A decision on the types of agricultural development required or on the type of crop whose production should be increased should be taken by State or Federal MANR Planning Committees in the light of the overall agricultural policy laid down in the Third National Development Plan. Relevant information has been provided in this report and attention is again drawn to the section on the use of the report.

Socioeconomic studies

In order to complement the reconnaissance environmental investigations, preliminary socioeconomic studies are required. This involves the collection of data on inputs and outputs, prices and costs, systems of tenure, credit and marketing, social structures and group interrelationship, personal values and capacities, and attitudes to risk and migration.

Analysis of this data will enable alternative crops, farming systems or projects to be compared in terms of their social and economic consequences for individual farmers and communities. Similar studies are required where development is to be undertaken by companies or government corporations.

These studies could be made either by the Planning Units in the State or Federal Ministries of Agriculture and Natural Resources, or by external agencies.

Review of decisions

It is important that there should be a formal review of the decision to implement a proposal for development, based on the reconnaissance environmental information and the preliminary socioeconomic data.

Detailed environmental and socioeconomic studies

Once decisions about the development options have been made on the basis of reconnaissance studies, more detailed investigations of environmental and socioeconomic factors are necessary. Frequently these studies are undertaken by consultants. It is important that there should be coordination of the consultants' activities so that there is no unnecessary duplication of effort.

This coordination could most effectively be done by the Federal Department of Agriculture, possibly through its Land Resources Division keeping a register of all agricultural surveys and development projects in progress.

Final decision on implementation

If the results of the more detailed surveys indicate that development should proceed, the decision is usually made by the MANR Planning Committee in conjunction with the Ministry of Economic Planning. In the case of developments affecting more than one Ministry, responsibilities need to be clearly defined and a project authority designated.

CONSTRAINTS ON AGRICULTURAL DEVELOPMENT

The Third National Development Plan, 1975-80, discusses the constraints on agricultural development as follows:

"The constraints are several but the most serious are:

- i. Shortage of qualified manpower in key areas
- ii. Inadequate supplies of agricultural inputs
- iii. Inadequate extension service
- iv. The poor condition of feeder roads and other transport facilities
- v. Inadequate or lack of effective supporting services such as farm credit, marketing facilities, etc
- vi. The problem of land ownership imposed by the land tenure system in most parts of the country
- vii. The problem of diseases and pests
- viii. The problem posed by labour shortage in the rural areas in consequence of rural-urban migration
- ix. Lack of appropriate or complete packages of technology for many food crops
- x. Drudgery in farm work and low returns from agriculture which forces rural youth to migrate to urban areas rather than go into farming."

Interviews with about 45 farmers in 22 villages scattered throughout the Kaduna Plains (see Separate Map 2) confirmed that these factors are indeed constraints to agricultural development. Those factors for which data are available are discussed below and more fully by Gosden (1978).

i. Shortage of qualified manpower in key areas and iii. Inadequate extension services

1. No data were available on the ratio of field agricultural extension workers to farming families for the Kaduna Plains area but is known to be very low. Taken in conjunction with poor communications and lack of

transport available to the extension worker, this means that a large proportion of the farming population has little or no contact with advisory services. FAO suggest that a ratio of one extension worker to 1 000 farming families is an absolute minimum and existing integrated rural development projects in Nigeria are aiming at a ratio of 1:400.

2. There are very few staff directly concerned with range management in the Kaduna Plains. Veterinary assistants are responsible for animal health rather than range management and consequently there is very little extension work on grassland improvement.
3. Professional forestry staff and their field assistants are mainly concerned with development of plantations and reserves. They are supported by a considerable number of forest guards in the local authorities. Lack of staff will be a constraint to the development of an extension service intended to encourage farmers to grow woodlots and the local authority staff could be used for extension work.
4. With any extension service, whether it be for crop production, grassland improvement, or forestry, there is a conflict between the need to encourage and advise the population and the need for policing to eliminate malpractices. The two functions should be kept entirely separate and policing done by special inspectors.

viii. The problem posed by labour shortage in the rural areas in consequence of rural-urban migration

Gosden (1978) has produced farming calendars for a number of localities in the Kaduna Plains that show that shortage of labour is a common constraint to production, particularly at weeding times. Lack of money at this time prevents additional labour being hired, though the labour is available from other areas.

Additional constraints

1. There is a lack of effective farmers' organisations which would enable farmers to request and benefit from more effective extension advice, bulk purchase of inputs and handling of produce, credit facilities and tractor hiring units.
2. Large areas infested by tsetse fly limit animal production and discourage their use by either hoe or ox cultivators due to the presence of both human and animal trypanosomiasis.
3. The widespread occurrence of Striga results in reduced crop yields.
4. Lack of satisfactory water supplies in many areas, especially during the dry season.
5. Competition for fadama areas between farmers and cattle owners has reduced the area of dry-season grazing in the northern part of the area. This in turn has led to the increase in intensity of lopping browse species which is now causing the death of these valuable species.

