REVIEW OF RURAL LAND USE IN FIJI

Opportunities for the new millennium

BY

DAVID LESLIE & INOKE RATUKALOU

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Abbreviations and Acronyms

ADB	Asian Development Bank
ADF	Agricultural Development Facility (replaces CDF)
ALTA	Agricultural Landlord and Tenant Act
ALTO	Agricultural Landlord and Tenant Ordinance
ASF	Area Sampling Frame
AusAID	Australian Agency for International Development
BLV	Bose Levu Vakaturaga (Great Council of Chiefs)
CAL	Crown Agricultural Leases
CEO	Chief Executive Officer
CDF	Commodity Development Framework
CPO	Central Planning Office
CSR	Colonial Sugar Refiners (became FSC)
CWG	Catchment Working Groups
DCS	Development Control Section, DTCP
DOE	Department of Environment
DOS	Directorate of Overseas Surveys
DTCP	Department of Town and Country Planning
EEC	European Economic Commission (became European Commission)
EI	Erosion Index
EIA	Environmental Impact Assessment
EPD	Economic Planning Division, MAFF
ESA	Ecologically Sensitive Area
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FAB	Fijian Affairs Board
FAO	Food and Agriculture Organization of the United Nations
FCA	Fiji College of Agriculture
FD	Forestry Department, MAFF
FDB	Fiji Development Bank
FESLM	Framework for Sustainable Land Management
FLIC	Fiji Land Information Council
FLIS	Fiji Land Information System
FLISSC	Fiji Land Information System Support Centre
FPD	Forward Planning Division, DTCP
FPL	Fiji Pine Limited
FSC	Fiji Sugar Corporation
FSLC	Fiji School Leaving Certificate
FSP	Foundation for the Peoples of the South Pacific
GDP	Gross Domestic Product
GIS	Geographic Information System
GOF	Government of Fiji
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Co-operation)
IBSRAM	International Board for Soil Research and Management
ICM	Integrated Catchment Management
INR	Institute of Natural Resources, USP
IUCN	International Union for Conservation and Nature (The World Conservation Union)
JICA	Japanese International Cooperation Agency
JPC	Joint Parliamentary Committee
LCB	Land Conservation Board
LCI	Land Conservation and Improvement Act
LDA	Land Development Authority
LDRU	Land Development and Resettlement Unit, MAFF
LHC	Land Husbandry Committee

LIS	Land Information System
LRD	Land Resources Division
LUC	Land Use Capability
LWRMD	Land and Water Resource Management Division, MAFF
MAF	Ministry of Agriculture and Fisheries
MAFF	Ministry of Agriculture, Fisheries and Forests
MAFFA	Ministry of Agriculture, Fisheries, Forests and ALTA
MFED	Ministry of Finance and Economic Development
MLMR	Ministry of Lands and Mineral Resources
MOE	Ministry of the Environment
MPI	Ministry of Primary Industries (see MAFF and MAFFA)
MPIC	Ministry of Primary Industries and Co-operatives (see MAFF and MAFFA)
NCOLP	National Code of Logging Practice
NCS	National Conservation Strategy
NES	National Environment Strategy
NGO	Non-Governmental Organisation
NLC	Native Land Commission
NLDC	Native Land Development Commission
NLTA	Native Land Trust Act
NLTB	Native Land Trust Board
NLUCC	National Land Use Co-ordinating Committee
NZODA	New Zealand Official Development Assistance
PGRFP	Pacific German Regional Forestry Project
PIANGO	Pacific Islands Association of Non-Government Organisations
PRA	Participatory Rural Appraisal
PWD	Public Works Department
PWWSD	Public Works, Water and Sewerage Department
RMA	Resource Management Act (New Zealand)
RMU	Resource Management Unit
SCOF	Sugar Commission of Fiji
SCRC	Sugar Cane Research Centre, FSC
SLM	Sustainable Land Management
SOE	State Owned Enterprise
SPACHEE	South Pacific Action Committee for Human Ecology and Environment
SPC	Secretariat of the Pacific Community (previously South Pacific Commission)
SS	Subdivision Section, DTCP
TCPD	Town and Country Planning Department
TOR	Terms of Reference
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USP	University of the South Pacific
WCED	World Commission on Environment and Development
WWF	World Wide Fund for Nature

All monetary units are in Fiji dollars, unless otherwise specified.

Foreword

Fiji's economy and society as part of the global community is undergoing constant change and its lifestyle is in transition. Many tensions are created by change, which may put the natural resources at risk. Sources of conflicts include the traditional way of life and rights of farming communities versus the needs of expanding urban and industrial centres, the rights of use of land and water, electric power generation, and the need for settlement of the landless. The need to intensify the use of the land for agriculture versus the need to sustain forests and biodiversity is another key issue. Today, the call for access to land is accompanied by the call for access to income. This is forcing us to reconsider our existing concepts and to analyse the new demands on land, agriculture and lifestyle, which in turn require new policies.

Fiji, like the rest of the world, is facing the challenge of balancing the needs and wants of higher living standards and economic growth against the maintenance of the environment, which is the very foundation of prosperity. There is an increased awareness that an integrated institutional approach is necessary to cope with those challenges. Such an approach gives due attention to all potential functions of the land in order to sustain it in the long term. An integrated approach takes into account the needs and aspirations of all population groups that have a stake in the future of the land – all this against the backdrop of increasing scarcity of land and its diminishing quality in relation to increasing population pressure.

Fiji is mainly a country of agriculture and forestland with growing industrial development. Its economy is agrarian based. The process and rate of destruction of Fiji's natural resources have become a concern. Accordingly, as prerequisite for change, it is essential to have in place an overall, broad, long-term land use policy and plan. These would furthermore indicate the direction in which major developments should proceed.

There is an urgent need to implement policies that will ensure that development is sustainable in a true spirit of constructive co-operation between all appropriate sectors. This spirit is reflected in Agenda 21, the inter-governmentally agreed action programme of the 1992 United Nations Conference in Rio de Janeiro, and the ensuing discussions in the UN Commission for Sustainable Development (CSD) created at Rio to monitor the progress at international and national level. The land cluster of that action programme, Chapters 10 to 15, is of relevance; Chapter 10 is entitled 'Integrated Approach to the Planning and Management of Land Resources'.

At the end of 1998, the SPC/GTZ – Pacific German Regional Forestry Project, collaborating with the Land Use Section, Research in Koronivia since 1997 (now Department of Land Resources Planning and Development (DLRPD)) welcomed the opportunity to contribute to a Rural Land Use Policy for Fiji. We acknowledge the good use made by DLRPD of the German assistance and the impressive effort that have resulted in a Review Report and Policy Statement on Rural Land Use in Fiji. The draft report and policy were presented at two stakeholders' workshops and the views and opinions from the workshops have been incorporated in the papers.

The papers produced provide an excellent example of commitment and assistance to the people of Fiji. Special appreciation must go to the primary authors of the report, Mr Inoke Ratukalou and Mr Dave Leslie, who brought the information together in such a cohesive way. Thanks also to the workshop participants for their valuable contributions, which made the report more meaningful. With gratitude we also acknowledge the editing by Mr Robin Yarrow.

The *Review of Rural Land Use in Fiji Islands: Opportunities for the New Millennium Report* contains a valuable synthesis of previous national reports and studies concerning sustainable development in Fiji.

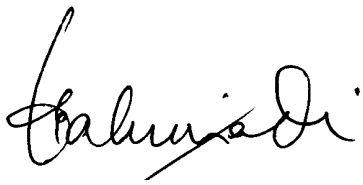
The report further signifies issues and constraints in development and the resolve to take immediate action upon the burgeoning environmental problems now evident in Fiji. The report gives basic information on planning procedures and processes to facilitate change. There is a wide understanding that sound planning

and management are crucial and will be so increasingly in the future, to impress upon government the urgency of the need to adopt the Policy Paper.

The *RuralLand Use Policy Statement for Fiji* and its supporting documents reflect the commitment to find sustainable mechanisms of development that will create the necessary preconditions to achieve environmentally sound, socially desirable and economically appropriate forms of land use. This commitment is accompanied by an awareness that this is especially urgent due to the scarcity of land resources and the fragility of the environment.

The German Technical Co-operation (GTZ) welcomes the Rural Land Use Policy Paper as tangible evidence of the mutually beneficial relationship existing between all sectors involved with the sustainable development of Fiji's natural resources.

'It is thoroughly understood that the control of our lands is in our hands, but the owner of property has an important duty to perform.... It is the bounden duty of landowners to utilise what they possess for the benefit of all. It is their duty to the State.' Ratu Sir Lala Sukuna, 1936.



Honourable Mr Jonetani Galuinadi
Minster of Agriculture, Sugar and
Land Resettlement
Republic of the Fiji Islands
20 March, 2002

PREFACE

Land Use is a dynamic process, changing over time because of a number of factors, including increasing population, income changes, technologies, the general structure of the overall economy and political policies. Fiji, like most developing countries, is facing the crucial issue of proper allocation and sustainable uses of its land and water resources.

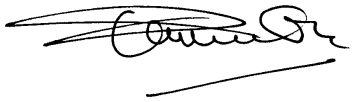
Fiji does not have a rural land use policy and plan. This is a major constraint for wise allocation and management of resources in the rural sector. The current administrative and institutional framework responsible for resources allocation and management is highly sectoralised. Attempts at coordination have proved to be ineffective. These factors have constrained the development process, increased inter-ministerial friction and in many cases have promoted unsustainable use of resources.

The report gives insight into the need to have a national rural land use policy and plan, describes previous studies and reports, the land and water legislations, the good and bad land use practices, their issues and impacts, the participatory process of land use planning, the availability of information on land resources and the need to request external assistance to implement new project proposals that need to address important issues before the national rural land use policy and plan is drawn up. We should all recognise that a sound rural land use policy and plan should manage land for sustainable uses, balance production with protection, enhance diversity and leave an enhanced heritage for future generations.

The aim of the review and the accompanying policy statement is to assist policy makers and politicians to seriously consider that Fiji now needs a participatory rural land use policy and plan. In order to create these, a holistic and multi-disciplinary effort is required by all stakeholders, with firm commitment from government and the political will for it to be workable and sustainable.

The *Review of Rural Land Use in Fiji Islands* and the formulation of the *RuralLand Use Policy Statement for Fiji* represent an important step in the long-term process initiated by the 1992 Earth Summit in Rio de Janeiro. One of the major outcomes of this Conference was Chapter 10 of Agenda 21, entitled, 'Integrated Approach to Planning and Management of Land Resources'. In this Chapter, participatory approach to land use planning and sustainable land development are two of the key issues in the global debate on land resources and their development. The Conference also reinforced Fiji's commitment as signatory to the United Nation's Convention to Combat Desertification/Land Degradation, the United Nation's Framework Convention for Climate Change and United Nation's Convention for Bio-Diversity.

Mr Samisoni Ulitu
Deputy Permanent Secretary - Operations
Ministry of Agriculture Sugar
and Land Resettlement



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It would not have been possible to produce this report without the support provided by the GTZ Pacific German Regional Forestry Project to the authors to undertake an appraisal of rural land use issues and practices, and to develop policy and strategies for consideration by the Government of Fiji.

We would particularly like to acknowledge the Ministry of Agriculture, Fisheries and Forests (MAFF) including the Land Conservation Board who provided interest and support throughout the assignment, and a genuine commitment to address a number of the issues raised during the study.

Many people have contributed their time and have shown support in a variety of ways and it would be impractical to attempt to list them all here. However, the significant support from MAFF, the interest and assistance from Dr Niumaia Tabunakawai, Permanent Secretary; Samisoni Ulitu, Deputy Permanent Secretary; and Dr Joeli Vakabua, Director of Research, is gratefully acknowledged.

We thank Maria Elder, Mereseini Nagatalevu, Taito Nakalevu and Joeli Waradi for undertaking community PRAs and synthesising the results that will be published in detail separately. We also acknowledge the contributions made by Taito, Maria and Isoa Korovulavula (GTZ) during the workshops that were conducted.

We thank the many friends, colleagues and officials in the various government ministries, State-owned enterprises, NGOs and the private sector for their invaluable contributions and comments and participation at the workshops organised to facilitate input on the initial draft document.

Typing of the drafts was undertaken without complaint by Emele Salele, Nickola Overall, Margaret Leslie and Lynn Forbes; their patience and accuracy is gratefully acknowledged by the authors, as has been the overall supportive role provided by Vilimaina Civavonovono and Kasaqa Tora of Land Use Section of MAFF Research Division.

We are particularly indebted to Robin Yarrow for reading through the draft manuscript and making valuable suggestions for improvement.

Finally the authors recognise the support and vision of Evelyn Reigber, GTZ Team Leader in undertaking this analysis of Fiji's rural land use practice and the urgency to develop strategies and policy for the rural sector. Evelyn's facilitation of this study is acknowledged with much appreciation.

Executive Summary

Setting for the review

Sustainable development is an imperative choice that must be made by both developing and developed countries. For a developing country like Fiji, perhaps a precondition for sustainable development is development itself, i.e. the path of economic growth must be taken first in order to satisfy citizens' desires for higher living standards, etc. before the conditions for supporting sustainable development can be fully provided. While Fiji's economy develops, it will be necessary to ensure rational utilisation of natural resources and protection of the environment.

Demands on the land resources are increasing. If the ongoing expansion of commercial cropping onto marginal lands, cropping on fragile soils without land conservation practices in place, deforestation and burning of grasslands continue, then Fiji will experience further land degradation, lower yields and an increase in poverty. It is not too late to reverse the current trends but it will require a far-sighted government with determination to implement a land use policy for sustainable development, supported by technical teams. These teams will provide sound information and operate in an integrated manner with a commitment accorded to farmers and other rural stakeholders who have an ownership in sustainable land management.

The Fiji economy has a very narrow base and performance is heavily dependent on the success of the tourism and sugar industries. Exports of traditional commodities such as *dalo*, kava and coconut oil are also growing due to increasing demand in niche markets. Forestry is also expected to grow; however, agriculture remains the mainstay and the largest sector of Fiji's economy, accounting for almost 43% of foreign exchange earnings. It provides nearly 50% of total employment and contributes 19% of Fiji's GDP.

In the 40-year period 1956 to 1996, total population increased by 427,655 (124%) and the amount of land used for agriculture increased by 178,259 ha to 393,272 ha; clearly an increasing number of people had turned to the land for their livelihood. However, the total rural population declined by 23,826 in 1996 compared to 1986 (about 5%). Thus the rural population has been declining over the last 10 years by an annual average of 0.6% per annum, with numbers of Indo-Fijians showing the greatest decline as a result of urbanisation and emigration.

Although socio-economic development has improved dramatically over the last three decades, considerable disparity still exists in the distribution of the benefits. Increasing levels of unemployment, low literacy rates and poor living conditions that disadvantage the rural from the urban population further exacerbate this. Furthermore, poverty is common in some rural areas.

Fiji does not have a rural land use policy or a national land use plan. This is a major constraint for wise resource allocation and management in the rural sector. The current administrative and institutional framework responsible for resource allocation and management is highly sectoralised. Attempts at co-ordination have proved to be ineffective. These factors have constrained the development process, increased inter-ministerial friction and in many cases promoted unsustainable resource use.

There have been many discussions and a number of papers written about the need for a national land use plan and policy. A sound rural land use policy should manage land for sustainable uses, balance production with protection, enhance diversity and leave an enhanced heritage for future generations.

Previous studies

Previous studies and reports provide an insight to the information that is available to planners and decision-makers and are of direct relevance to the objectives of the study. Analysis of these reports and maps demonstrates the wealth of knowledge available about the natural resources of Fiji, the rural land use issues,

problems and their causes. Most previous studies include recommendations that are of equal relevance today. They answer many of the basic questions about land use and soil conservation in Fiji such as what the problems are, where they occur, why there are problems, how to treat them and the institutional and human resource needs to facilitate change.

Land and water legislation and responsibilities

The legislation and institutions responsible for law enforcement are discussed as a background to the land use policy recommendations that come out of this study. Chapter 3 provides a thorough critique of legislation relating to subdivision of lands, and the conservation and management of land and water resources.

Land use practices, issues and impacts

The primary rural land use issues are analysed and summarised as follows:

- Increases in Fiji's population over recent decades have placed pressure on the land, particularly marginal land, and this has resulted in significant land degradation and soil erosion.
- Land availability and quality, land tenure, labour mobilisation, depopulation in some outer islands and sugar cane areas and, in the Fijian village context, a changing balance between subsistence and commercial agriculture are all contributing factors to the fact that fewer people are being supported directly in primary production.
- The environmental impacts of uncontrolled urbanisation combined with land degradation are seriously impacting on the quality of living and the sustainable income-generating capacity of Fiji's natural resources.
- The small size of farm holdings (60% are less than 3 ha) force farmers into intensive cultivation (often monocropping) for high output, short-term production without (or with only minimal) fallow periods.
- Because of the competition and pressure for land, subsistence gardens are increasingly being forced onto steeper slopes because of the expansion of cash cropping and grazing on the flatter lands.
- Soil-loss measurements clearly demonstrate that the agricultural productive base in many sugar cane areas, and with ginger on slopes, is eroding at a rate that is higher than would be regarded as economically acceptable.
- Pressures on land indicate an urgency to increase sustainable production per unit area. However, there is poor understanding throughout the agriculture sector about a much closer match between land use/crop type and land capability if productivity goals are to be met.
- The burning of cane trash is a widespread practice and over repeated years, combined with long fallows every four to five years, results in serious depletion of fertility and soil loss.
- There is a widespread culture of burning, and a growing incidence of wild fires in the indigenous forests and pine plantations.
- Because of the predominantly poor adoption and application of land husbandry practices and the resultant degradation of land and water resources, the impacts from natural disasters are becoming increasingly more acute, in particular vulnerability to droughts and flooding.
- There is serious under-resourcing by Government for line ministries having responsibility for agriculture, forestry and land use in general. The public sector also commonly lacks effective funding, resources and trained technical staff to undertake environmental planning, management and enforcement.
- The Land Conservation Board is not utilising the powers vested in it and, while the Board has 'ownership' of the problems and solutions, there is minimal government support and intervention for the Board to fully implement its 'powers to exercise general supervision over land and water resources'. Expenditure has been on coastal zone/floodplain drainage schemes, not toward solving the causal factors responsible for the downstream problems.

- Expertise in the areas of agricultural extension, soil conservation, land use planning and environmental planning, management and enforcement is below critical mass in the responsible line ministries.
- The resources devoted to soil conservation are inadequate for the implementation of significant measures, either in terms of providing information or incentives, and there is a reluctance by NLTB to exercise its legal rights with respect to bad land-husbandry practices.
- There is a poor awareness of the interdependence of conservation and development. There are widely held views in some influential ministries that conservation and environmental management are obstacles to development or, at best, irrelevant to it.
- There is a very poor public understanding in the rural sector about the various laws pertaining to land, land use practice and soil conservation. This situation results in part from the fact that the majority of government and corporate (e.g. NLTB, FSC) field officers responsible are themselves not conversant with the laws. Also, there have been no public awareness programmes to inform about the land husbandry provisions in these laws and how they can be written into rural leases. For 30 years there has been in essence no enforcement or policing of these provisions; thus a whole generation has been kept in the dark since land conservation laws were last seriously regarded and enforced.
- There is a general lack of information at the farm level on an appropriate 'package' of best practices and 'officials' responsible for disseminating information rarely visit new technologies and commodities.
- There is a lack of clear guidelines on what constitutes 'bad' land-husbandry practices, and poor institutional understanding about the magnitude of the soil erosion problem. There is very little literature about land use farming practices available in Fiji Hindi or Fijian.
- The level and standards of technology transfer from officials to farmers is poor on matters of: land use diversification and intensification; farming systems and their development needs; and for new systems – costs of inputs and gross margins, post-harvest support and marketing.
- The intensification of land use will be constrained by the land ownership system, the rigidities of which will need to be modified if optimum use of existing arable land is to be achieved.
- Poverty can be seen in all communities. Although the relatively high level of subsistence and food security offsets the impact of poverty, 25% are living below the poverty line. This percentage has probably increased as a result of the impact on land use from the recent droughts and subsequent floods. Clearly, rural incomes have been reduced (both for farmers and those on wages) and greater rural unemployment exists as a result of these climatic events.

Land use planning

A major limitation to sustainable rural development in Fiji is the lack of a National Land Use Plan and an institutional responsibility for land use planning to facilitate the national plan. Land resources are limited and finite. If demographic trends continue, there is an increasingly urgent need to match land systems, soil types and land uses in the most national way possible, to maximise sustainable production and meet the needs of society. Land use planning is fundamental to this process.

The desirable outcomes from national, divisional and local land use and rural sector development objectives cannot be realised without the following:

– increased 'bottom–up' planning;
– changing the current national centralisation of control;
– the introduction of legislation that segregates national, divisional and local issues;
– integration of land capability and community needs; and
– laws and processes for co-ordination of watershed management, land zoning, land use planning and sustainable natural resource management.

Land resource information

Reliable information on land resources is needed if sound land use and conservation policies are to be developed. Some of these data are more widely available in Fiji than is generally realised. In planning for sustainable land use, the first major task is to find out what data are available and where they are located. The second is to gather existing data together, arrange them in a usable form, assess their utility and decide what additional data still need to be gathered.

Processes to facilitate change

Rational and informed land use will lead to sound utilisation of limited resources with improved socio-economic outcomes. The challenge, however, is how to generate rational and informed land use decisions and if these are accomplished, how to convince other land users/stakeholders to adopt them. Land use planning may be at national, regional or village level. The process ideally involves the participation of the land users. It entails bringing together a wide array of data: physical, technological, economic and institutional, and integrating them systematically for the purpose of developing a workable plan and programme of action.

The land use planning process advocated for Fiji should be based on *Guidelines for Land Use Planning* (FAO 1993); a system that is now adopted as a national planning tool in many countries. While national objectives and local situations vary, the 10 sequential steps in the FAO system are generic and can be adapted to meet such variations.

Irrespective of the level and degree of Government intervention in planning, a suitably qualified team is required to create informed opinion on the management of land, and advise decision-makers on the available options and the ramifications of alternative decisions. This team needs both the support of the rural people on the ground and the authority and resources of Government.

The most effective role for the land use planning unit is as a direct support to the executive. At the highest level, land use planning might be dealt with by a small committee of permanent members drawn from appropriate departments and agencies with a technical (rather than administrative) secretary. This committee should make recommendations on priorities, the allocation of resources and the establishment, approval and co-ordination of land development programmes. It would also need the professional support of a land use planning unit responsible for technical aspects of planning, a national resources database and training. Ultimately land use planning would have a human presence at the divisional level with the divisional land use planner reporting directly to the national CEO, not to a particular department.

There is an urgent need to implement a national awareness campaign to explain to landowners and tenants the current legislation related to land use, sustainable land management and the practices and techniques available to achieve sustainability. As a complement to a national awareness programme and to assist the development of communication and interaction at the grass-roots level, Land Husbandry Committees (LHCs) should be established in rural communities with an overall goal of working toward sound land management and improved productivity from the land.

New projects

The Fiji Government will require external assistance in implementing some of the recommendations plus the methodological and institutional changes proposed. Seven projects have been identified:

- Development of an Institutional Capability for Integrated Land Use Planning;
- National Land Use Planning;
- National Land Zoning;
- National Contemporary Land Use Mapping;

- Integrated Rural Resource Database Development and Applications;
- Adaptive Research and Extension to Land Husbandry Technologies; and
- National Sustainable Land Management Education and Awareness Programme

Why a land use policy

There are three primary reasons why a formally adopted rural land use policy is required for Fiji. Firstly, an effective national policy is contingent upon informed public opinion as much as it is on legislation or the activities of sectoral interest groups; a policy can be an effective educational tool.

Secondly, a policy provides a long-term national framework. If Fiji has a declared rural land use policy that is in harmony with national interests and enjoys public support, the potential to deviate from policy (for short-time expediency) is greatly reduced. Any deviation from policy would be subject to public scrutiny and debate. Thus, policy can serve to set a standard(s).

Finally, decisions about land use are made continually by Government ministries, other institutions and individuals. While most are not of great issue, others will have policy implications. Decision-makers will make more effective decisions if there is a clearly written and well-understood policy to provide guidance. Policy can therefore serve as a guide.

Policy principles

The following principles are considered of importance when developing rural land use in Fiji:

- Originally much of Fiji was covered in forest, and the climate and soil are well suited to supporting trees and perennial crops.
- Sustainable farming systems, trees, agroforestry and forests can play an integral role in soil and water conservation and management.
- Sustainable rural land uses are capable of providing a wide range of multiple-use benefits, products and services.
- Some land uses may not be desirable in all landscapes.
- Sustainability of Fiji's natural environment and heritage are of paramount importance.
- All land in Fiji can be used within its capability.
- Land use decisions should be based on whole watershed/regional land management planning concepts.
- A land use policy embraces all rural and peri-urban areas irrespective of land ownership.
- All land users and levels of government must meet their respective responsibilities in attaining sustainable rural land development and management.
- Real and effective co-operation is required between all sectors of the community, government agencies and institutions involved in the rural sector.
- The community needs to adopt a land conservation ethic (a Rural Code of Land Use Practice).
- A long-term planning perspective should be taken.

Policy outcomes

This study has identified outcomes that should evolve from the development of a rural land use policy and from the establishment of sustainable land use systems in Fiji. These are listed below.

(i) Increased public awareness that:

- land resources, including soil, water and flora are interdependent and must be managed in an integrated way; and
- individual land users and the community have a responsibility for preventing and mitigating land degradation.

(ii) Increased public recognition of the values of trees and forests.

(iii) A regulatory framework for the protection and sustainable development and management of rural land resources that recognises that:
- sound land husbandry practices maintain and improve soil qualities;
- planning processes address causes of land degradation as well as the symptoms;
- indigenous forests will be protected and managed for their biodiversity and conservation values;
- plantation forests, both hardwoods and pine, will be considered in terms of sustaining site quality; and
- protection of the environment and management of natural resources are carried out in an appropriate and ecologically sustainable manner.

(iv) Appropriate mechanisms to protect farmlands and forests from fire, pests and pathogens.

(v) Research, training and education to improve land assessment and evaluation, land husbandry practices, farm and forest productivity and values, and land use planning.

(vi) Institutional reform to support and enhance capabilities in all rural sector activities.

(vii) Protection of water and soil values.

(viii) Good governance strategies to expand and diversify sustainable economic activity, increase employment, add value to earnings and promote social development goals.

(ix) An effective Fiji involvement with and contribution to global issues and laws related to the environment, rural development, sustainable land management, and more.

The outputs from this study have been a review of relevant previous studies, analysis of current legislation, identification of issues and land use practices, presentation of tools to facilitate change and a rural land use policy statement.

These should be used as a basis for debate and critique, which, with revision, might culminate in nationally adopted policies, strategies and action plans for sustainable development and land management in Fiji.

Recommendations

Recommendations arising from this study that relate to land and water conservation and management policy and land use planning are as follows:

1. Primary recommendations:

1.1 Review and assess current administrative policies, laws and regulations pertaining to land and water conservation and management and land use planning.

1.2 Government support proposals for external funding (Appendix 12) to facilitate capacity-building, institutional development and generation of required information for planning purposes.

1.3 Review the existing systems and establish decision-making mechanisms tailored to the conservation and management of land and water resources; including adjustment to the functions of existing ministries and mechanisms to ensure consultation and co-operation amongst ministries and other agencies.

1.4 Introduce initiatives to develop awareness amongst policy-makers and managers in ministries about natural resources, the consequences of their mismanagement and the value of biophysical information for land and water conservation and management and land use planning.

1.5 Establish a National Land Use Council (NLUC), as a technical body to oversee all aspects of land resources development and management at the national level.

1.6 Re-constitute the Land Conservation Board into the Land and Water Conservation Board (LWCB) with functions and legal responsibilities to ensure enforcement of laws and policies designed to conserve and properly manage land and water resources and to facilitate land use planning.

1.7 Establish land use planning groups at the provincial or divisional level to operate at an intermediate level between the Land Husbandry Committees and national Government (NLUC, LWCB); functions to include identification of priorities, allocation of resources, approval of plans and making land use plans and zoning schemes for their area.

1.8 Establish Land Husbandry Committees to operate at the grass-roots community level (village or district) in co-ordinating activities and deciding priorities for the communities' long-term interests, contributing (bottom–up approach) to national planning and sustainable development policy within the LWCB framework.

1.9 Adequately resource NLUC, LWCB and MAFF to carry out their responsibilities for integrated national and regional land use planning.

1.10 The technical support for the NLUC and LWCB in developing integrated land use planning, and land and water conservation and management at all administrative levels be vested in the MAFF Department of Land Resources, Planning and Development.

1.11 Make technical training (targeting young professional staff) in natural resources survey, participatory planning and land use planning a priority; preferably conducted in Fiji.

2. Secondary recommendations:

Tenancy and leases

2.1 Create security of land tenure (ALTA) as an inducement for tenants to adopt land and water conservation measures.

2.2 MAFF/NLTB publish relevant land husbandry standards and guidelines in English, Fijian and Fiji Hindi; these to be attached to tenancy documents and be freely available to landowners and tenants.

2.3 Initiate measures to bring ALTA statutory obligations under 'good husbandry practice' clauses to the attention of tenants.

2.4 The LWCB apply its powers under Section 7 of the Land Conservation and Improvement Act to make a Conservation Order in respect of the land and oblige the tenant to undertake such works as may be directed in the Order.

2.5 Through participatory processes, initiate measures to inform tenants of their obligations under tenancy agreements to maintain minimum standards of 'good husbandry practice'.

2.6 Give special attention to the training and enhancement of skills of all relevant extension officers in counselling farmers in land conservation practices and enforcement of leasehold conditions.

2.7 Forestry Department maintain strict surveillance over logging practice and continue to evaluate the effectiveness of the National Code of Logging Practice revising its provisions as required.

Institutional

2.8 The LWCB's administrative powers under the Land Conservation and Improvement Act be strengthened to see it as the lead agency to promote and co-ordinate watershed management programmes.

2.9 MAFF be proactive in developing watershed management goals: including a National Integrated Catchment Management (ICM) Strategy; establishment of Catchment Working Groups to assist in the preparation of regional priorities and plans for an ICM strategy; and preparation of national drought management and flood management plans.

2.10 MAFF co-ordinate development of an all-media educative land conservation National Sustainable Land Management Education and Awareness Programme, targeting landowners, tenants and the rural sector at large.

2.11 LWCB establish a large demonstration soil conservation farm (for example, in a closed area) with secondary on-farm pilot areas to demonstrate sustainable integrated farming practices to farmers.

2.12 MAFF resolve apparent duplicity of roles that exist between the Land and Water Resource Management (LWRM) Division, and the Department of Land Resources, Planning and Development.

2.13 Fiji Sugar Corporation re-examine contractual arrangements and administrative procedures for cane growers with the purpose of reducing land degradation.

2.14 NLTB and Lands and Survey, in collaboration with partners (MAFF, FSC) as the principal landlords, be proactive in establishing an image as 'guardians of the land'.

Information and planning

2.15 MAFF review how adaptive research and extension, particularly in sustainable land management can be better integrated and applied.

2.16 MAFF undertake a contemporary land use survey, based on new aerial photography as an adjunct to the national land use plan and to measure land use change against previous surveys.

2.17 Government ensure that a national land use plan (1:50,000 scale) with zoning provisions is prepared and available for public comment in 2006.

2.18 MAFF develop an Integrated Rural Resource Database (IRRD) with spatial capability to support environmental and land use planning, rural development, and research and extension services in soil and water conservation.

2.19 Government provide the resources to improve collection, processing, storage and interpretation of hydrological data.

Chapter 1
Introduction

1.1 Background to the review

Fiji does not have a rural land use policy or a national land use plan. This is a major constraint to wise allocation and management of resources in the rural sector. The current administrative and institutional framework responsible for resource allocation and management is highly sectoralised. Attempts at co-ordination have been ineffective. These factors have constrained the development process, increased inter-ministerial friction and in many cases have promoted unsustainable resource use.

There have been many discussions and a number of papers written about the need for a national land use plan and policy. In 1960, the Commission of Enquiry into the Natural Resources and Population Trends of the Colony of Fiji (known as the Burns Report), recommended that Fiji needed an overall long-term land use plan and policy to guide farmers on what major type of crops they might grow in the different ecological regions of the Colony.

During the 1970s and early 1980s, several attempts were made to establish a national body that could deal effectively with co-ordination and proper use of the land resources of Fiji. The Ministry of Agriculture, Fisheries and Forests[1] (MAFF) played a major role in the formation of the following committees whose objectives included land development and land use planning and co-ordination. Membership of these committees comprised government and non-government organisations involved with land management and the major stakeholders – e.g. MAFF, Native Land Trust Board (NLTB), Forestry Department, Town and Country Planning Department (TCPD), Lands Department, Public Works Department (PWD), and Central Planning Office (CPO). The committees were as follows:

- 1976 National Land Development Committee;
- 1978 National Land Conservation Board (discussed the need for a co-ordinated National Land Use Plan);
- 1982 Western Division Land Use Co-ordination Committee;
- 1982 National Land Use Co-ordinating Committee;
- 1984 Fiji Institute of Agricultural Science (discussed the need for a National Land Use Plan and Policy);
- 1985 National Land Use Co-ordinating Committee (revived);
- 1988 Agroforestry Working Group (formed to co-ordinate and steer all agroforestry activities in Fiji).

In 1993, the National Environment Strategy (NES) of Fiji (Watling and Chape 1993) recognised that Fiji needed a national land use plan that was based on the capacity of the land; this was to assist in determining appropriate land use and resource allocation for the sustainable development of Fiji's natural resources. In 1995, Cabinet approved the concept for a comprehensive and integrated new sustainable development bill that would revise and consolidate existing environmental and resource management legislation, and create new legal frameworks, among others, for integrated resource management. This legislation would give effect to the goals identified in the NES, which recognised that, without a nationally recognised mechanism for matching land to appropriate land uses there would be increased land degradation and continued exploitation of the natural resources base.

[1] The Ministry has had several name changes during the last two decades – and during the preparation of this report – including Ministry of Primary Industries (MPI), Ministry of Agriculture, Fisheries, Forests and ALTA (MAFFA) and Ministry of Agriculture, Sugar and Land Resettlement (MASLR). The generic MAFF is preferred throughout this report irrespective of the actual name at the time.

Many individuals (Seru 1994; Nagatalevu and Ratukalou 1995) noted that the lack of a national land use planning process to formulate plans and policy is a barrier to wise allocation and sustainable development of land resources in Fiji.
In 1996, David Howlett, PACIFICLAND Network Regional Co-ordinator, and Inoke Ratukalou, MAFF Principal Research Officer (Land Use), prepared a proposal that was endorsed by MAFF, Department of Environment, NLTB, Lands Department, and Forestry Department. This paper sought FAO assistance to support Fiji in developing a land use planning process that will lead eventually to the formulation of a national land use plan and a policy.

In 1997, Evelyn Reigber, Team Leader for the Pacific German Regional Forestry Project (PGRFP), co-ordinated an Agroforestry Policy Working Group comprising extension officers, researchers and farmers. The Group discussed and prepared a two-part draft Agroforestry Policy Paper for Fiji. After further discussions and review of the draft policy, the Group realised there was a vital need for a national land use plan and policy as an umbrella to ensure adoption of the Agroforestry Policy. A national land use plan and policy was deemed necessary to progress the sustainable development of Fiji's land and water resources.

In 1998, Joeli Vakabua, MAFF Director of Research, Evelyn Reigber and Inoke Ratukalou discussed the need to have a national land use plan and policy. However they saw it as important, in advance of developing policy, to review current rural land use practice, previous studies, legislation, issues and constraints. David Leslie from Landcare Research of New Zealand Limited was contracted in November 1998 to undertake the study and develop a rural land use policy for Fiji.

The field study was undertaken from 24 November to 12 December 1998, and 24 March to 24 April 1999. Participatory rural appraisals were conducted by MAFF staff through January to February 1999. Briefing and debriefings were undertaken at the PGRFP office in Suva, Fiji. The terms of reference for the study are outlined in Appendix 1. The people consulted during the course of the study, along with those who participated in the workshops to consider the draft version of this report, are listed in Appendix 2. Some 50 copies of the draft report were circulated one month in advance of the workshops.

Box 1

The Vision of the World Bank Group for Rural Development

- Rural growth is widely shared, with private and competitive agriculture and agribusiness as the main engines of growth.
- Family farms and non-farm enterprises provide ample remunerative employment opportunities to men and women.
- Rural people manage the soils, water, forests, grasslands and fisheries in a sustainable manner.
- Rural people are linked to well-functioning markets for products, inputs and finance.
- Rural people have access to medical care, clean water and sanitation, family planning services, educational opportunities and sufficient nutritious foods.
- Essential legal frameworks, public investment and productive social services are provided and financed in a decentralised and participatory manner.

World Bank 1995

1.2 Setting for the review

1.2.1 The land

The Republic of the Fiji Islands comprises an enormous archipelago with diverse landscapes and climate. Contrasts between the wet and dry sides of the large islands, and between landscapes that reflect different rock types, and different erosion and depositional histories are best appreciated from the air. The archipelago, comprising over 340 islands, lies between 12° (Rotuma) and 22° (Ono-i-lau) south and between longitude 175° east and 178° west. The area included within these limits exceeds 650,000 km^2, but of this, 18,300 km^2, or less than 3%, is dry land. Islands vary in size from Viti Levu, the largest, which occupies 10,388 km^2 to small, unnamed islets, some little more than rocks and sandy cays. Vanua Levu, the second largest island, has an area of 5535 km^2; thus the area of the two main islands represents 87% of the total land area. About 105 islands are inhabited.

The larger volcanic islands are dominated by steep, deeply incised mountainous terrain. The highest summit, Tomaniivi (Mt Victoria), is 1323 m; there are 30 peaks over 1000 m. Table 1 sets out the balance of land based on slope classes. The land use capability (LUC) classes for each category based on the Fiji LUC classification system (1977) are also included. There is a sharp contrast in Viti Levu between the steep mountainous terrain (67%) and the flat land (16%) of the coastal plains and river deltas. The latter are the main areas of settlement and production. A great many of these plains, but not all, are subject to inundation during periods of prolonged rain in the interior. Undulating to rolling land (4–15°) makes up 17% of the Viti Levu land area. A similar terrain distribution pattern occurs in Vanua Levu (Table 1) but with a larger area of steepland.

Table 1: Slope and LUC classes

Slope group(s)	LUC Class	Viti Levu	Vanua Levu
Flat (0–3°)	I	16%	15%
Undulating to rolling (4–15°)	II – IV	17%	13%
Steepland (16°+)	V – VIII	67%	72%

Source: Twyford and Wright 1965, Fiji Land Use Capability Classification 1977

Geologically, the islands of Fiji have formed from volcanic materials and sedimentary rocks deposited towards the eastern margin of a massive oceanic plate or platform of great age. The Fiji landscape results from an intricate series of processes that constructed and shaped these rocks. These geological processes have operated over millions of years and are still active – earthquakes are not uncommon and occur on active fault systems. In geological terms the extensive volcanic eruptions in Rotuma, Koro, and Taveuni Islands are youthful events, and raised limestone reef and alluvial terraces indicate crustal mobility.

The natural geological erosion rate in Fiji is high because of the youthful landscape, lithologies and the uneven topography. Galletly and Swartz (1974) calculated the erosion index (EI) to be very high – 700 for the dry zone and 800 for wet zone – and high by world standards where EIs average between 200 and 400. Where EIs exceed 500, extreme care is required in agricultural land, irrespective of soil type. In general, erodibility increases from the dark coloured Inceptisols with swelling clays to the red, strongly weathered Oxisols at the other extreme. The authors state, ‘By world standards, land with slopes greater than 8° would be considered incapable of growing sugar without unacceptable damage.’

1.2.2 Land utilisation classes

Appendix 3 (with table) shows the areas in the primary divisions of Fiji of the major land utilisation categories as determined by Twyford and Wright (1965). The basis for this classification is whether land in its natural state is suitable for agriculture or not and, if not, how much modification is necessary to render the land suitable. The following categories were proposed:

Table 2: Major land utilisation categories (%)

Class	Viti Levu	Vanua Levu	Total Fiji
I	21.46	14.66	19.36
II	7.67	12.61	10.51
III	29.01	41.67	31.93
IV	41.86	31.06	38.20
Total (%)	**100**	**100**	**100**

The first major category (I) may be described as first-class land in that it is considered suitable without modification for some form of land use, although the particular kinds of usage are not specified. This is to avoid the fallacy that, in a group of mountainous islands, particular forms of land use are 'higher' than others. Good cocoa, mango or *dalo* land is just as first-class as good cane land in that 'first class' returns can be achieved if the land is properly farmed. It is evident that only 355,902 ha in Fiji (19.4%) fall into this category. In Viti Levu, the proportion is 21.5% whilst in Vanua Levu it is only 14.7%.

Category II may be thought of as second-class land, i.e. good land if some fairly minor improvements are made. There are 193,277 ha of these soils in Fiji (10.5%); 7.67% of Viti Levu is of this class, 12.6% of Vanua Levu and as much as 42.8% of Taveuni. (This land is mostly that for which minor conservation works would be required on the predominantly steep slopes if the potentially very productive soils were fully developed; the figure compensates for the perhaps surprisingly low proportion of first-class land).

Category III lands, of which there are 587,002 ha (31.9%), are third-class lands in that they need a great deal of attention before they can be adequately developed and fully utilised. Many of these lands may be truly described as 'problem soils'. They cover a larger area than both of the 'good' groups of soils added together – a fact that highlights the difficulties that must be overcome in any expansion of agriculture. Category III lands lie chiefly in the two main islands, especially in Vanua Levu (41.7%; Viti Levu has 29.0%).

Finally, the largest class of all comprises the 702,391 ha of category IV lands, those considered quite unsuitable for agricultural development according to present knowledge, though they may be of limited use for productive forestry. No less than 38.2% of Fiji is composed of these poor classes of land. Viti Levu has the largest proportion of this type of land (41.8%) and Taveuni the smallest (24.4%). The proportion of Vanua Levu that consists of category IV land is 31%.

The total amount of class I and II soils in Fiji is 549,179 ha or 29.9% of the total land area. This is the extent of the area for sustainable agricultural land use, i.e. those classes of land for which moderate to no modification is needed before they can be developed fully for some form of agriculture. However, these soils are mainly those on which current agriculture already exists, so that much of the possible new development lies in the agronomic and land conservation improvement of present practices. An accurate present land use survey would show how much undeveloped land is available that is easy to farm. Commonly there is more

than one subclass type recognised and an Arabic numeral is added to the subclass symbol (for example, III E 1; III E 2).

1.2.3 Climate

Fiji lies within the tropical belt but towards the southern margin, at distances ranging from 1800 to 2500 km from the equator. Although Fiji's climate is described as tropical, it is not uniform across the islands due to the relief of the high islands and the impact of the easterly maritime airstream – known as the 'South East Trades'. This airstream predominates throughout eight months of the year. Seasonally, climate ranges from hot and dry to warm and wet. From April to November – the period of the SE Trades – the windward lowland regions of the main islands experience cloudy conditions, frequent rain, a moderate amount of sunshine and even temperatures. The leeward lowland regions are dry, with clear skies, a limited temperature range and abundant sunshine. The smaller and low-relief islands generally have a climate that approximates that of the leeward or dry regions. Mean monthly temperature ranges from 23°C in July and August to 27°C in January; humidity from 75% during winter to 88% in summer.

At one time Fiji was virtually covered with forest (Twyford and Wright 1965). The present plant cover forms a complex mosaic comprising fernland, open grassland, reed grass, shrubland, a savannah-like transitional vegetation and tall forest. The areas of open grassland, fernland, and reed grass and savannah are largely man-induced and, when given complete protection from fire and other interference (particularly by humans), the ecological succession shows a slow but steady return towards a forest cover. However, the extensive areas of the introduced mission grass seen in the dry zones are considered to be a fire climax association and will therefore not return to forest unless there is some intervention such as re-afforestation.

1.2.4 Soils

Detailed information for the specific soil series is found in the Soil Taxonomic Unit Description Sheets (STUDs) (Leslie and Seru 1998). The soil pattern for Fiji shows 65% of soils develop on steep slopes (>21°), 20% on rolling and hilly land (4–21°) and 15% on flat land (<4°).

Soils of the uplands are separated from those of the lowlands to reflect the different soil temperature regimes above and below 600 m altitude. Soil temperature has a major influence on plant growth. Similarly soil moisture regimes further influence land use and crop options and are used as primary criteria for differentiating soils between the dry, wet and very wet moisture zones. Soils are further subdivided into the general type of genetic process that produced them and their resultant soil profile. They are generally called by the name in the soil legend that accompanies the soil maps (Leslie and Seru 1998).

Young, very sandy soils from various coastal deposits are found on or near the shores of the islands. Soil of the regularly inundated coastal flats, at or near the mean tide level, fringe significant areas of the main islands and for the most part support mangrove forest marsh. Free-draining soils derived from river deposits occupy valley floors. These are generally fertile, deep and agriculturally valuable. Soils with high water tables and impeded internal drainage occupy low-lying depressions in valleys and on terraces and peneplains. In shallow depressions where the water table lies at the surface during much of the year, peats formed from rush and fern develop. Often some of the most developed soil profiles are found on near flat, stable remnants of old peneplain surfaces and very old river terraces. Those from non-acidic rocks have deep red profiles often with subsoil mottling and iron oxide concretions in the upper horizons. These represent the most advanced stage of soil development from non-acidic parent materials. Profiles from acid rocks are commonly in high rainfall areas and tend to be yellow mottled red, clayey and not well drained.

The other soils not included in the foregoing groups occur on sloping land. Soils from:

- *Young volcanic materials* have silty, deep profiles with unweathered parent material still present but are fertile and excellent cropping soils;

- *Volcanic ash over reef limestone* have silty thin profiles with good physical properties on rock but, due to shallowness, have limitations of rooting volume and droughtiness;
- *Calcareous tuffs and marls* have shallow black profiles, are nutrient rich and mainly used for pasture because of shallowness. This group can be subdivided into those that occur in the wet zone and those found in the dry zone;
- *Older weathered volcanic rocks* occur mainly in the dry zones and are typified by deep, friable, bouldery clays from basalt. They are generally fertile with a high base status.

1.2.5 The economy

The Fiji economy has a very narrow base and performance is heavily dependent on the success of the tourism and sugar industries. The sugar industry remains the largest contributor to total domestic export earnings with sugar representing 36.7% in 1996. Exports of traditional commodities such as *dalo* (taro), kava and coconut oil are also growing due to increasing demand in niche markets. Forestry is also expected to grow and export earnings from this sector are expected to rise to $100 million by the year 2000. However, agriculture remains the mainstay and the largest sector of Fiji's economy, accounting for almost 43% of foreign exchange earnings. It provides nearly 50% of total employment and contributes 19% of Fiji's GDP. The forestry sector contributes 2.5% of GDP and some $50 million foreign exchange annually. Forest products are now the fifth most important export commodity.

There is a significant degree of uncertainty surrounding the issue of land that has to some extent affected investment in the farm sector. There is also concern at the likely erosion of preferential access for sugar into the European market. This will mean productive, higher-cost farms are unlikely to be viable. This is also affecting the investment climate.

Political and external factors have significant impact on the rural economy and indirectly on land utilisation and land use change. Current impacts of importance to the rural sector include:

- Cyclones – the recent one-in-100-year drought and industrial disputes have seen a serious decline in sugar production. However, the year 2000 cane crop was one of the largest ever.
- Similarly, a decrease in rural investment due to the uncertainty about renewal of leases for land use for sugar cane production has adversely affected the agriculture sector.
- The Government of Fiji (GOF) devalued the currency by 20% in January 1998 in an attempt to increase the competitiveness of Fiji's export products.
- The new constitution and readmission of Fiji to the Commonwealth will most likely see an improvement in the domestic and foreign direct investment and a decline in the rate of emigration.
- While an increase in exports is forecast with economic activity growing by 2–3%, global trade liberalisation policies could have adverse effects on the sugar industry because of the preferential trade arrangements provided by the sugar protocol under the Lomé Convention of the EU.
- Land tenure issues related to expiration of ALTA leases; some 6496 leases are due to expire by 2005.
- Policy measures are available to the newly formed Land Development and Resettlement Unit of MAFF to resolve the problem of possible displacement of a large number of ALTA leaseholders over a short period of time.
- Inconsistencies and uncertainty of government policies discourage private sector investment in agriculture. The Agricultural Development Programme (ADP), which replaced the Commodity Development Framework (CDF) in 2000, is one example of government initiatives that are inconsistent with its stated aim of reducing the level of involvement in the economy, in particular direct production and investment (by MAFF).

A 12-point strategy for growth in the agricultural sector was identified by an ADB-funded Agriculture Sector Study in 1995 and endorsed by Cabinet in 1996. These points have been incorporated into the sector's overall policy and strategies. The essential components are:

- Promoting export development through market-oriented expansion, intensification and diversification of agricultural production;
- Encouraging the transformation from subsistence to commercial farming;
- Emphasising on-farm demonstration;
- Revitalising agriculture research and improving access to technology;
- Infrastructure development;
- Industry organisation, and industry self-management;
- Encouraging the private sector to invest in agricultural development;
- Ensuring environmental sustainability through education programmes on the negative consequences of burning, enforcement of existing laws and regulations relating to environment protection, and creating awareness of the adverse consequences of the excessive use of chemicals.

1.2.6 The people

The population of Fiji in December 1996 was 772,655, with Fijians comprising 51.1% of the total. Indo-Fijians comprised 43.6% and the balance was made up of Rotumans, Chinese, Europeans and other Pacific Islanders. While 54% of the total population live in rural areas, migration to the urban areas is significant and increasing. In 1986, the urban population was 39% of the total population, increasing to 46% by 1996. Almost 50% of the total increase in the urban population occurred in the Central Division. This trend in urbanisation is having a major impact on agricultural land in the peri-urban zones.

In the 40-year period 1956 to 1996, total population increased by 427,655 (124%) and the land used for agriculture increased by 178,259 ha to 393,272 ha; clearly an increasing number of people had turned to the land for their livelihood. However, the total rural population declined by 23,826, or about 5%, in 1996 compared to 1986. Thus, the rural population has been declining over the last 10 years by an annual average of 0.6% per annum with the Indo-Fijian component of the rural population showing the greatest decline as a result of urbanisation and emigration. Both out-migration and in-migration are related to the degree of urbanisation in the provinces. Provinces with no urban centres have the highest out-migration.

Movements from one rural area to another are influenced largely by economic factors such as the seasonal migration to sugar cane and ginger growing areas. The rural-to-urban migration is of concern to government and to reduce the trend, efforts will be directed at raising living standards in rural areas, stimulating the growth of small farms and creating employment through improved infrastructure and other services.

The large informal sector of mainly self-employed persons in very small enterprises outside any fixed working place, plus the agriculture sector comprising self-employed agricultural workers and seasonally employed wage workers, accounted for about 58% of the total labour force in 1996.

1.3 Current status and trends in the agriculture sector

Components of the agriculture sector in the broadest sense include arable farming (including subsistence cropping), livestock, fishing and forestry (including indigenous). For the purpose of this discussion, fishing is excluded in order to focus on the land-based elements of the agriculture sector.

MAFF recognises agriculture's importance to the economy and the rural community and in its strategic plan has committed itself to the sustainable development of Fiji's primary sector resources. Environment, poverty

alleviation, women in development, management of natural resources, greater diversification and export enhancement are deemed crucial in supporting growth and sustainable development.
The Commodity Development Framework (CDF) programme, which was implemented by MAFF with an investment of $69.1 million, was designed to accelerate the nation's diversification efforts. The programme specifically encourages priority 'comparative advantage' commodities for production on a commercial basis for processing and marketing; it does not address land conservation issues.

1.3.1 Sugar

Raw sugar accounts for about 40% of the total merchandise exports and around 12% of GDP. The industry directly engages about one fifth of the total labour force and creates significant multiplier effects. Sugar production has declined in recent years. Droughts, cyclones and industrial disputes have had a direct impact on sugar production. A priority for the industry is to fully implement the strategies described in the Sugar Industry Strategic Plan (SCOF 1997). The seven primary function areas are: communication, investment, quality control, railway restructuring, productivity incentives, new technology and reconstruction of industry organisations. Some (selected) of the proposed activities of relevance to the review and land use include:

Strategy 1.1: Communicate the steps towards best practice goals

- Formulate 'best practice' guidelines for farm management, planting, husbandry, harvest and delivery.
- Produce and distribute videos.
- Embark on a systematic media campaign, including TV and cinema.
- Print various best practice steps and objectives.

Strategy 2.5: Encourage development opportunities in Vanua Levu

- Commission a survey of Vanua Levu development priorities.

Strategy 3.1: A Land Utilisation Board to integrate stakeholder interests

- Start a Land Utilisation Board (NLTB, Lands, TCPD, SCOF).
- Create best practice clauses defining management of cane leases including crop rotation to improve soils.
- Create a policy for the review of leases that break minimum standards.
- Map the productivity of all cane farm types for various analyses.
- Share information with other stakeholders through a GIS database.
- Start industry planning systems to monitor and quality control land use.
- Create a notification, appeal and disputes procedure.
- Ensure that land taken out of production is replaced, to assure supply.

Strategy 3.2: Promote sector targets for crop quality and farm viability

- Initiate a joint GIS mapping project with NLTB, Lands Department, TCPD.
- Initiate SCRC research of historical farm output, soil data etc., and a document and site map on an optimum variety strategy for each sector.
- Calculate and map existing versus ideal performance outputs.
- Use satellite information for computer analysis.

Strategy 5.2: Dismantle hidden incentives causing stale and burnt cane

- Commission academic research on burning by harvesting gangs.
- Examine what causes can be regulated and those requiring introduction of new incentive programmes.
- Promote legislation outlawing burning for environmental reasons.
- Ensure that the police take the prosecution of burning seriously.
- Track the improvement of early cutting and burning on maps, showing best and worst sectors, etc.
- Produce a statistical analysis of all gangs/farmers (and all sectors) that logs the percentage of burnt cane and cane de
- lay for each year, etc.

Strategy 6.2: Centralise industry information management

- Design and build an integrated data bank to monitor the environment, collect data on land use, and assess growers'/sector productivity.
- Explore satellite monitoring of the environment and regional land use.

Strategy 7.3: Empower new sugar cane research and extension services

- Widely promote research findings amongst the community of growers.

1.3.2 Other crops

(refer Table 3, below)

Copra: After many years of declining production, copra output increased in late 1996 due mainly to improved world prices. Replanting of senile palms with high yielding hybrid varieties has begun in Vanua Levu, Taveuni and Lau Province. Logs from senile palms are being used in a highly successful export-oriented furniture manufacturing business and for coconut timber.

Fruits: Mango, pawpaw and pineapple offer considerable export potential, particularly in Australia and New Zealand. In 1996, mango production was 70 t, pawpaw 37 t and pineapple 2161 t. Opportunities also exist for value-added products such as freshly prepared pouched fruits, dried fruits, fruit juices and purees.

Root crops: Potentially lucrative export opportunities exist for export of root crops and *yaqona* (kava), provided continuity of supply and quality are maintained. Apart from fresh exports, opportunities exist for value-added exports such as *dalo* chips, *dalo* flour, and processed baby food. For *yaqona*, two primary markets have been established – one for raw material to the pharmaceutical industry in Europe and the USA, the other as a beverage for Pacific Island communities. Ginger is now a major diversification crop but is experiencing increased competition from other ginger producing countries. Ginger production figures for 1996 were: mature 1140 t, immature 1080 t. Niche export markets for cut flowers and spices are being encouraged under CDF.

Table 3: Agricultural commodity production (1996)
(tonnes) by area and number of farmers

Crop	Area (ha)	Farmers (number)	Production (tonnes)
Sugar	73,900	22,337	453,000
Coconut	64,953	n.a.	11,003 (copra)
Cocoa	578	2220	126 (dry bean)
Ginger: Mature Green	24 46	700	1140 1080
Rice	8411	11,320	18,888
Pineapple	193	1428	2161
Vegetables/Fruits	4280	14,320	22,000
Root crops: *Dalo* Yam Cassava *Kawai/Kumala*	 2400 428 2610 1328	 n.a. n.a. n.a. n.a.	 22,613 4401 40,247 7821
Yaqona	2200	n.a	2,685

Source: MAFF 1996 Annual Report

The crop sector is vulnerable to cyclones, flooding and droughts. Other constraints include unorganised markets, insufficient credit, poor quality-control, quarantine restrictions, high freight charges and a shortage of quality planting materials. Some of the more controllable problems are being addressed by CDF. There is also a potential for vegetable export, with the development of bilateral quarantine agreements and the establishment of a hot-air treatment facility at Nadi Airport.

1.3.3 Livestock

Beef: Commercial beef production has declined, despite initiatives to develop several beef schemes (Uluisaivou, Yaqara, Yalavou) over the last 30 years. While Fiji is self-sufficient in the lower grade beef, much of the high-quality cuts used by the hotel industry are imported. There are plans by MAFF to increase efforts to improve pasture quality, provide improved genetic material to farmers and to support downstream industries, such as the leather industry.

Dairy: Domestic production has been poor, with continued heavy reliance on imported milk powder and butter. Fiji is currently around 10% self-sufficient in dairy products. The CDF programme is being utilised for pasture development, improved milking facilities, roading, water supply and training.

Sheep: Sheep for meat are now well integrated into other livestock and crop farming systems. Production is not sufficient to meet local demand and large quantities of sheep meat are imported. Domestic production is constrained by poor pastures and internal parasites.

The major constraints facing the livestock industry relate to poor-quality pastures, the high cost of feed concentrates, the unavailability of good-quality breeding stock and high mortality rates. These have all contributed to low fertility rates and productivity at farm level. There is scope to substantially increase beef production through improving management in existing farms, greater encouragement of grazing under coconuts (as in Vanuatu) and more attention to product pricing. Discouraging bush and backyard slaughtering can also increase the output of hides. The domestic whole-milk producers will continue to operate after full deregulation. The sheep industry has a good future with increased willingness of farmers to purchase and rear locally bred sheep. Sheep can also be integrated into a variety of farming systems.

1.3.4 Forestry

The forestry sector currently contributes 2.5% of GDP and some $50 million in foreign exchange annually. Forest products are now the fifth most important export commodity. Earnings from this sector in foreign exchange were expected to increase by approximately $100 million by the year 2000 as plantation hardwood processing commenced, generating more than 4000 rural jobs.

Over the last five years, in addition to continuing the replanting of *Pinus caribaea* and hardwoods, the sector has also focused on processing, marketing and the export of forest products. Fiji's mahogany plantings, which amount to approximately 50,000 ha in area (38,850 ha in eastern Viti Levu, 11,000 ha in the Northern Division), are recognised as possibly the most valuable in the world. Other hardwood plantings comprise 11,000 ha.

The inventory of the indigenous forest resource was completed in 1995. These indigenous forests cover 858,000 ha, representing 47.5% of Fiji's total land area. The government fully supports the sustainable use of the forest resources but at all times giving full consideration to the interests of stakeholders. Fiji has a real opportunity to implement sustainable forest management on an economically viable basis given all the 'ingredients' are put together.

The rate of deforestation is modest compared to that in some neighbouring Pacific nations. Also, the institutional structure does not allow direct dealing between logging companies and landowners and there is a

long-standing ban on round-log exports. The pine softwood plantations have been an environmentally positive development providing ground cover to a large area of degraded soils. The enrichment mahogany plantings in the wet zone combined with the pine plantations might have minimised the need to harvest the remaining natural forest, but the interest in logging indigenous forest is still high.

Some of the threats to forest resources include the growing incidence of wild fires, environmental damage resulting from inadequate enforcement of the National Code of Logging Practice (NCOLP) and direct landowner dealings with logging companies. At the time of introduction of NCOLP in 1990 there remained only 15% of indigenous forest not yet logged and suitable for production forestry.

1.3.5 Land development and resettlement

Over the period 1997–2026, approximately 11,800 leases issued under the Agricultural Landlord and Tenant Act (ALTA) will expire. MAFF's Land Development and Resettlement Unit (LDRU) was established in 1998 to develop and make available land for farmers whose leases have expired. The unit has begun the process of determining the number of farmers requiring resettlement and identifying land for development. Current indicators are that only 3500 farmers (30%) will require resettlement. To date, several properties have been purchased (in Nadroga, Serua, Namosi, and Macuata), which will accommodate approximately 300 farmers.

Some potential negative impacts include: shortage of good land in suitable locations, unwillingness of farmers to move to new areas, and a lack of credit to the agricultural sector. However, there are real opportunities for high returns from non-sugar agricultural commodities if the resettlement programme can be implemented smoothly.

1.3.6 Regional and rural development

Fiji's rural area is important for the economy as it represents over 50% of the population. Fiji's geographical spread, remoteness from markets, vulnerability to natural disasters, high cost of transportation and communication constraints between urban and rural areas constitute significant development challenges. Although socio-economic development has improved dramatically over the last three decades, considerable disparity still exists in the distribution of the benefits. This is further exacerbated by increasing levels of unemployment, low literacy rates and poor living conditions that disadvantage rural as opposed to urban populations. Furthermore, poverty is common in some rural areas. Many rural areas/regions offer good prospects for development, given their potential to generate commercial investment. It will be necessary to market the potential of rural areas/regions in investment promotion programmes. There is an urgency to create employment opportunities in the rural areas. Rural growth and development is highly dependent on improved infrastructure.

1.4 Historical aspects

Various early references have indicated the likelihood that the majority of Fiji's land area was under forest in the early 1800s. However, it appears that parts of the western areas of the two main islands were grasslands when the first Fijians arrived. The increasing slash and burn approaches and the farming activities of settlers resulted in the removal of significant areas of forest cover in the dry zones. Some writings from the 19th century described large fires, which burned for as long as a week or more.

Commercial farming commenced as both resident traders and villagers sold food supplies and coconut oil to visiting vessels. Farmer settlers began arriving from Australia and New Zealand in the 1860s; cotton and sheep were among the early farm activities. Land acquisition and the alienation of Fijian land became more commonplace and contentious. In some areas, significant friction and ill-feeling resulted. No clear procedure

or institutional arrangement existed initially for land sales and leases and in some cases land was sold by those other than the real owners. Some resident consuls, in particular those of the UK, subsequently attempted to assist in this area.

Fijian discontent increased and the first Land Commission to resolve land disputes was set up in 1871. Soon after cession in 1874, the Land Claims Commission was established by the Colonial Government to determine the validity of European claims to land. Criteria that this Commission required to be met before a claim could be allowed included:

– proof that the vendor was the rightful owner; and
– proof that the price was fair.

Of the 1683 applications received, only 517 freehold claims were fully granted, equivalent in total to 10% of Fiji's land area.

The sale of Fijian land was prohibited from 1875 and this has continued (except for a brief three-year period from 1905). A Native Lands Commission was formed in 1880 to determine the ownership of and the customs associated with Fijian land. However, the first Native Lands Commission and its successors did create suspicions, apprehension and even some resentment among many Fijians. The reason for these ill feelings included the belief that the system was open to abuse and that some Commissioners were too easily influenced.

The Fijian word for land, *vanua*, not only means the physical soil but it also refers to the people attached to that area. It can therefore be said that the land and the Fijian people are indivisible. Moreover, the concept of ownership of land by Fijians is as a form of trust for future generations. In fact there has been considerable debate in the past as to whether Fijians can ever knowingly alienate their land by absolute sale.

The notion of this collective ownership in trust for future generations could perhaps be utilised as an argument to support and even enhance good husbandry of native land. It is interesting to note that the Fijian term *qaravi qele* which means to 'look after the land', is used quite commonly.

Some of the important historical milestones related to land use follow below in chronological order:

1940 Native Land Trust Act introduced and Native Land Trust Board established.

1946 Town Planning Act introduced.

1953 Land Conservation and Improvement Act introduced and Land Conservation Board established.

1953 Extension Division of the Department of Agriculture appoints a Soil Conservation Officer (G.E. Whitehead).

1953 Forest Act introduced. Forestry Board never established.

1955 G.E. Whitehead's report, *Soil Erosion and its Control in Fiji* published as Bulletin 28 of the Department of Agriculture, in Fijian, Fiji Hindi and English.

1957 Soil Conservation Unit established. The Unit was equipped with bulldozers and graders, and provided a hire service to landholders to develop soil conservation works on their properties.

1959 Comprehensive mapping and assessment of Fiji soils initiated culminating in *The Soil Resources of the Fiji Islands* (Twyford & Wright 1965).

1961 Drainage Act introduced and Divisional Drainage Boards established.

1961 B. Marsh appointed Soil Conservation Officer with Extension Division of Department of Agriculture. Advocate for planned development of land according to its capability under the Land Development and Improvement Act.

1961 Land Development Act introduced and Land Development Authority established.

1963 Land Use Section established within Extension Division. Its primary role was to conduct land evaluation investigations and assess the land capability of proposed development areas.

1966 Mining Act introduced.

1966 Agricultural Landlord and Tenant Ordinance (ALTO) introduced.

1966 Soil Conservation Officer's position vacant, 1966–69. Land Use Section transferred to Research Division then (1968) into the Division of Economic Planning and Statistics. Operationally, Land Use Section functions become remote from the activities of the Soil Conservation Unit.

1966 Land Conservation Board inactive.

1969 G. Lewis appointed Soil Conservation Officer and stationed in Lautoka. The work of the Soil Conservation Unit concentrated on construction of banks on steep land in existing agricultural areas. There was an increasing utilisation of unsustainable land for sugarcane in this period due to sugar industry incentives and absence of effective controls over land use.

1970 National Trust for Fiji Act introduced.

1971 Soil Conservation Unit advocated creation of a large-scale demonstration area, east of Lautoka where recommended land use and management practices would be encouraged; the demonstration to be a focal point for an extension programme (not implemented).

1972 Land Conservation Board reconstituted so as to perform additional functions required of it under the Drainage Ordinance.

1973 Soil Conservation Unit transferred to the Drainage and Irrigation Division, and the Soil Conservation Officer position localised (K. Naidu).

1974 Land Conservation Board requests Government of Australia to assess soil erosion and land degradation problems, determine factors contributing to the problems and recommend techniques of amelioration; review legislation, statutory responsibilities and institutional requirements to implement recommendations. The investigation culminated in *Land Conservation in Fiji* (Galletly and Swartz 1974).

1976 Agricultural Landlord and Tenants Act (ALTA) introduced.

1976 Draft Water and Related Land Resources legislation prepared.

1976 Department of Town and Country Planning initiated the formation of the Land Development Committee. Members included DTCP, Housing Authority, NLTB, CPO, PWD, Lands Dept, and MAF. The terms of reference were: 'To identify land that can be made available for development and promote a programme for the co-ordinated release of land, in order to achieve consistency and continuity in the preparation and execution of economic, social and physical planning in Fiji'. The Committee functioned for 1½ years from January 1977.

1978 Based on a CPO paper, 'Population Density and Land Availability', a National Land Classification Study Committee was established to 'locate and quantify the three major identifiable land use classes within Fiji' viz.

- urban and associated uses (roads, airports, etc.);
- existing agricultural land and land potentially suitable for agricultural development or afforested land; and
- other land not suitable for agrarian development, mainly mountains.

Members included CPO, DTCP, Lands Dept, NLTB and MAF. The overall purpose was to 'ensure land will be allocated to its optimum uses and its potential maximised'. It functioned for one year (1979).

1980 The 44th Land Conservation Board meeting (in October) discussed the need for and preparation of a National Land Use Plan starting with land for agriculture, forestry and conservation (parks and forest reserves). A subcommittee was established to co-ordinate the work. Land Use Control Guidelines were prepared and approved by the LCB for use in the preparation of the plan that was to be based on MAF's Land Use Capability Classification System.

1981 National Soil Resources and Classification Project was initiated. Funded by the Government of New Zealand, the project involved detailed soil mapping (1:50,000), modern characterisation of soil series and soil classification. The two-volume technical information published as Soil

Taxonomic Unit Descriptions (Leslie and Seru 1998), with the soil maps in the GIS at Land Use Section.

1982 Western Division Land Use Co-ordinating Committee under the chairmanship of the Commissioner was formed (in September). Apart from a co-ordination role, the Committee also identified land use problems and endeavoured to find solutions. One of the Committee's first tasks was to co-ordinate and control the expansion of sugar cane cultivation onto marginal land.

1982 Rivers and Streams Act was introduced.

1982 Ministry of Forests initiated (in December) the establishment of the National Land Use Co-ordinating Committee (NLUCC). The initial intent was to prepare a National Land Use Plan for Forestry. The working sub-committee formed to prepare the forestry plan decided that it should be an overall plan covering all aspects of land use. It also recommended that CPO prepare the TOR for the NLUCC and that CPO take over the co-ordinating role.

1983 The Government of Fiji requested NZODA to fund an investigation and make recommendations about strengthening the administrative and technical capabilities of the Land Use Section. The investigation resulted in the *Report of Fiji's Water and Land Resource Legislation, Organisation and Administration as it affects the Management and Use of the Water and Related Resources* (Dixie 1983).

1984 Fiji Institute of Agricultural Science (FIAS) discussed (in September) the need for a National Land Use Policy/Plan at a land use workshop in Lautoka. The workshop passed the following resolutions:

- That MAF initiate steps to develop a National Land Use Policy and introduce legislation to enforce it. 'This policy would cover all aspects of land use both urban and rural with special attention being paid to soil conservation, protection and prudent land utilisation to ensure that all socio-economic factors are considered in future land use allocation.'
- That co-ordination of land use activities in each division be regulated by a Regional Co-ordinating Committee. The Committee would be chaired by the Divisional Commissioner and would meet frequently to consider land use issues within the framework of the new National Land Use Policy.

Resolutions were also passed on Urban Encroachment, the Land Conservation Board, a Land Bank, National Trust Development Strategy, Land Statistics, Water Conservation Board, Water Resources Study, Research Co-ordination and Market Research.

1985 The Land Conservation Board together with CPO discussed further the formation of a National Land Use Plan and developed an associated policy.

1987 Watershed management legislation was reviewed by Standford Clark.

1990 National Code of Logging Practice was introduced.

1992 Forest Decree 1992 was introduced.

1992 The IUCN *State of the Environment Report* was published. Funded by the ADB, this review provided a 'stocktake' of Fiji's environment and natural resources, how these are used, environmental policy and law and their administration. The report laid the basis for a natural strategy.

1993 The IUCN *National Environment Strategy* was published. Funded by the ADB, the report provided a framework by which the GOF could manage and plan environmental issues from a policy and legal base and administrative structure.

1.5 Functions and structures of institutions involved in the rural sector

1.5.1 Ministry of Agriculture, Fisheries and Forests

The relevant objectives, critical activities and key strategies of MAFF divisions involved in the rural sector are discussed below. The corporate organisation structure for MAFF is given in Figure 1.

Crop Research Division

The stated objectives for the Crop Research Division are listed below.

- Develop appropriate crop improvement and management practices and maintain genetic resources for sustainable agricultural development (Agronomy Section).
- Develop a package of practices and maintain plant genetic resources for horticultural and field crops (Horticulture Section).
- Evaluate and manage Fiji's land (soil) resources in order to optimise productivity through the development and promotion of sustainable land management technologies (Land Use Section).
- Provide appropriate mechanical tools and mechanised production systems to the production, preparation and delivery to market of fresh products for sustainable development and management of Fiji's agriculture (Mechanisation Section).
- Provide quality analytical chemistry, product development, advisory and training services through scientific and technical research expertise to clients (Chemistry Section).
- Develop and recommend pest management systems for adoption at all levels of production (Plant Protection Section).
- Provide, facilitate, maintain and monitor manpower, financial and farm services for the effective operation of the Research Division (Administration).

Figure 1: Corporate MAFF Organisation Structure

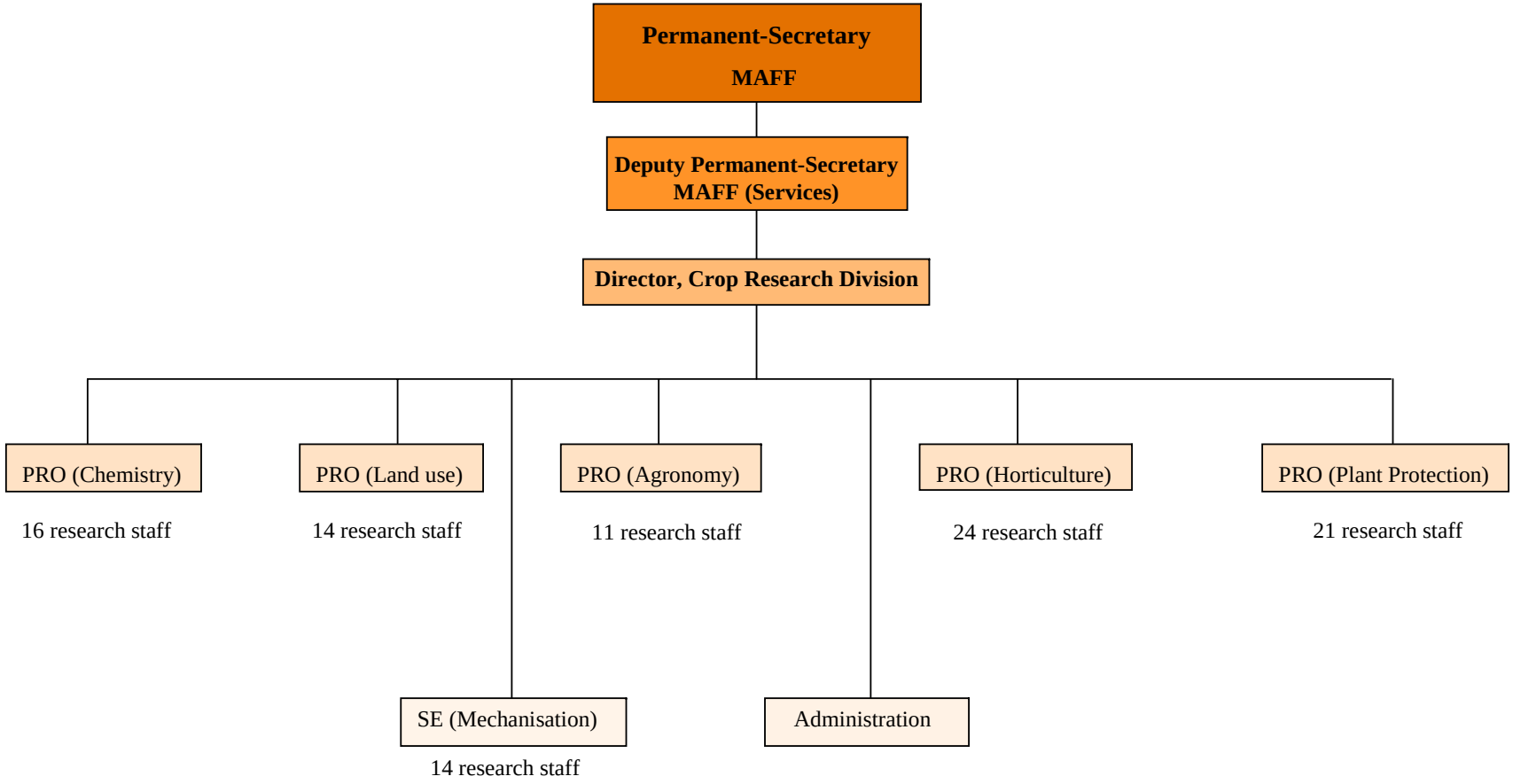


Table 4. Crop Research Division: relevant and selected activities and strategies

CRITICAL ACTIVITIES	STRATEGIES
Agronomy/Horticulture	
Develop package of management practices for improved production and sustainable agricultural development.	Conduct research on crop agronomic management practices to improve yield and quality of crops for export and food security. Conduct collaborative research for flat and sloping lands.
Establish, characterise, conserve and improve plant genetic resources.	Collect/introduce, characterise, establish and conserve plant germplasm. Evaluate germplasm for crop improvement.
Develop and implement package of practices to suit client needs for sustainable development.	Conduct agronomic research to suit the particular crop developed. Conduct collaborative research with GOs and NGOs (internal and external).
Maintain national plant genetic resources of fruits, vegetables and field crops and produce seeds for recommended varieties not commercially available.	Collect and introduce and establish and conserve plant germplasm. Evaluate and select varieties for release to farmers. Produce seeds of released varieties (not commercially available).
Land use	
To evaluate and develop appropriate research in sustainable land management technologies on different agro-ecological zones.	Conduct biophysical surveys; LUC and soil surveys. Conduct socio-economic and farming system surveys; PRAs/economic analysis. Conduct soil loss research on sloping land management technologies (Pacificland trial). Conduct soil fertility improvement trials through agroforestry (tree components) and cover crops. Conduct species (trees and shrubs) performance trials.
To promote, re-evaluate, package and transfer appropriate sustainable land management technologies.	Establish demonstration plots. Organise field days. Extension officers' training on sustainable land management technologies. Collaborative efforts with research/extension/farmers. Conduct farmer acceptance surveys.
Development and management of the Geographical Information System.	Data collection, capture and acquisition. Data management. Information dissemination.
To ensure that the provisions of the Land Conservation and Improvement Act are implemented.	Provide secretariat to the Land Conservation Board. Provide secretariat to Divisional Conservation Committees. Co-ordination of all stakeholders on matters related to soil conservation. Develop conservation awareness and education programmes.
To ensure that land is used sustainably according to its capabilities.	Develop the national land use plan and policy. Conduct biophysical surveys: LUC surveys; soil surveys; land subdivision. Conduct feasibility studies of agricultural development projects. Promote land use capability guidelines. Disseminate information and advice on land use for sustainable production Advise on land subdivisions
Mechanisation	
Design, modify on-farm machinery to suit local needs.	Design, develop and implement strategies for on-farm mechanisation. Conduct research and develop prototype machines and implements.
To develop mechanisation for on-field trials (flatland and hills).	Determine crops, areas, farm organisations, etc. to which different mechanisation inputs will be applied. Combine traditional, animal and mechanical technology which will best meet the power requirements for production.

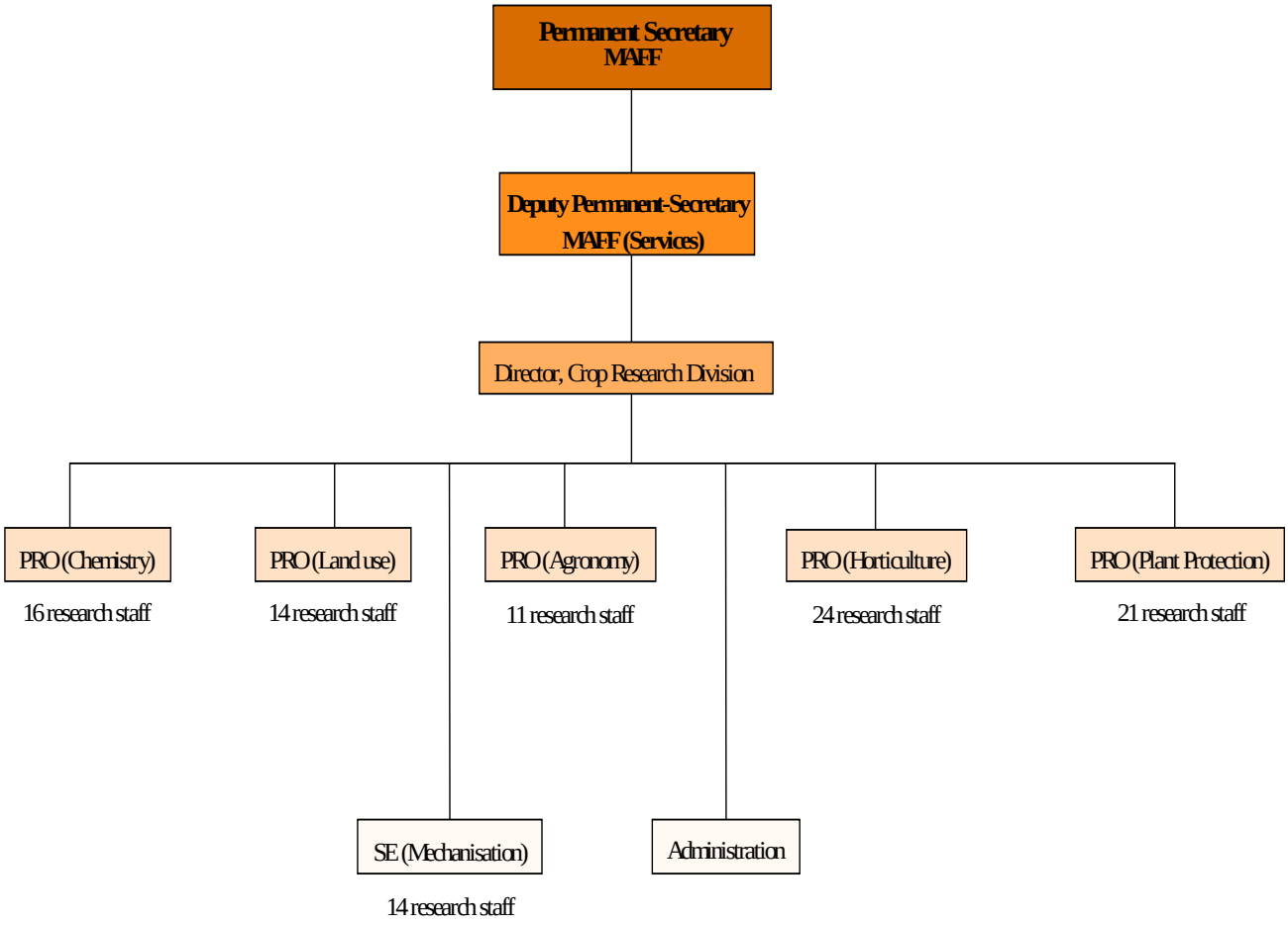
CRITICAL ACTIVITIES	STRATEGIES
Chemistry	
To design post-harvest technology.	Provide training to the post-harvest sector of the industry on handling, transportation, preservation, etc.
Provision of analytical chemistry, training and advisory services through scientific and technical research to MAFF, private sector, other Government departments and NGOs.	Strengthen analytical services through scientific and technical research work. Co-ordinate and implement appropriate training.
Provision, management and evaluation of value-added products through the Products Development Unit.	Develop and evaluate value-added products.
Plant protection	
Research and provision of advice on pest management systems.	Implementation of applied research programmes. Insect pests management of coconut, taro, *yaqona*, fruits and vegetables. Disease pest management of *yaqona*, ginger, banana and sweet potato. Weed pest management of ginger, coconut, pasture and natural vegetation. Provision of surveillance and diagnostic services and advice to government and non-government clients. Development of pest management systems and quarantine treatments of fruit flies.
Provision of advice on pesticide registration and usage.	Regulation of pesticide importing and usage. Screening and evaluation of candidate pesticides (fungicides, insecticides, herbicides and household chemicals.
Development of policy and provision of advice on plant biodiversity.	Implementation of regulations/procedures into intellectual property rights (IPR): Material Transfer Agreement (MTA); Memorandum of Understanding (MOU); Plant Variety Protection Bill. Biodiversity – National Biodiversity Strategy Action Plan (NBSAP); Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES). Bioprospecting – pharmaceuticals; handicrafts. Collection, identification and maintenance of economic crop germplasm – tissue culture of taro, ginger, field and horticultural crops; herbarium/museum; weeds, insects, yams, taro, ginger (dried specimen preservation).
Efficient management of Plant Protection Section.	Identify internal/external funds for research. Ensure sufficient operation of Plant Protection Section – research programmes; finance; facilities.

Table 5: Land and Water Resource Management Division: relevant and selected activities and strategies

CRITICAL ACTIVITIES	STRATEGIES
To provide advice to facilitate sustainable use of the nation's agricultural land and agricultural water resources.	Provide and maintain high-quality technical and management advice to clients in sustainable and long-term productive use of agricultural land and water resources. Provide recommended package of management programmes/practices and a Code of Conduct for resource utilisation and development relating to agricultural land and water resources.
To assess and, where necessary, implement measures that will ensure the sustainable use of the nation's agricultural land and agricultural water resources.	Implement effective management, assessment, monitoring and surveillance programmes in the development/utilisation of agricultural land and water resources. Implement commercially-oriented management strategies/programmes. Pursue/monitor/implement appropriate practices and measures for soil conservation works on slopes to protect water catchments.
As an interim measure, to implement engineering programmes for flood mitigation.	Implement engineering programmes for – river dredging works as an interim measure; construction of drainage infrastructure including river/creek diversions, retention dams, weirs, etc. Establish an integrated approach to watershed management. Formulate watershed management master plan.

The organisation structure for the Crop Research Division is given in Figure 2, with the key activities and strategies presented in Table 4.

Figure 2: Research Division, MAFF - Organisation structure



Land Use Section

The Land Use Section is one of seven sections within the Crop Research Division. The Section's key activities and strategies are given in Table 4 with current and proposed organisation structures presented in Figure 3. MAFF, through the Land Use Section, provides the technical support to the Land Conservation Board and the PRO (Land Use) acts as Secretary to the Board.

Land Conservation Board

The secretarial services to the LCB were transferred from Drainage and Irrigation Division to Land Use Section in January 1993. At that time the duties of the Secretariat were restated. These are:

- Attend to land conservation issues covering functions, fact-finding, ground-truthing, socio-cultural studies and assessment, environmental studies, recommendation, implementation and monitoring.
- Conduct trials/demonstrations in order to promote good land use practice including soil conservation measures by training and educational programmes such as:
  – farm demonstration;
  – training of extension officers (FSC, MAFF and others);
  – formal education (FCA students and others); and
  – awareness programmes through propaganda or other effective means to stimulate public interest.
- Liaise with various ministries and agencies dealing with land development works to ensure they do not damage the natural vegetation indiscriminately and all precautions are in place to minimise soil erosion.
- Adequately implement personally, or through other experts and agencies, the LCB's policies and powers of the Land Conservation and Improvement Act pertaining to general land resources.
- Liaise with Fisheries Department on marine conservation issues and keep the LCB fully informed.
- Ensure the Drainage Boards keep the LCB, being the Controlling Authority, informed of its operations and progress and are performing their functions efficiently and effectively as stipulated under the Drainage Act.
- Monitor environmental degradation around the country and keep the LCB informed.
- Co-ordinate the works of Land Conservation Officers and carry out the legal enforcements as required.
- Perform any other duties as required by the LCB and MAFF.

The Land Conservation Board (LCB) has wide powers at its disposal under the Land Conservation and Improvement Act. Its primary functions under the Act are to:

- Exercise general supervision over land and water resources;
- Stimulate, by propaganda and other means, public interest in the conservation and improvement of land and water resources;
- Recommend to government legislative changes necessary for proper conservation and improvement of land and water resources;
- Make conservation orders controlling or regulating or prohibiting the use of land and activities on land;
- Make closing orders stopping nominated activities on identified pieces of land; and
- Develop an integrated approach to land use.

A proposed organisation structure for the LCB is given in Figure 4.

Figure 3: Land-Use Section - Current Organisation structure

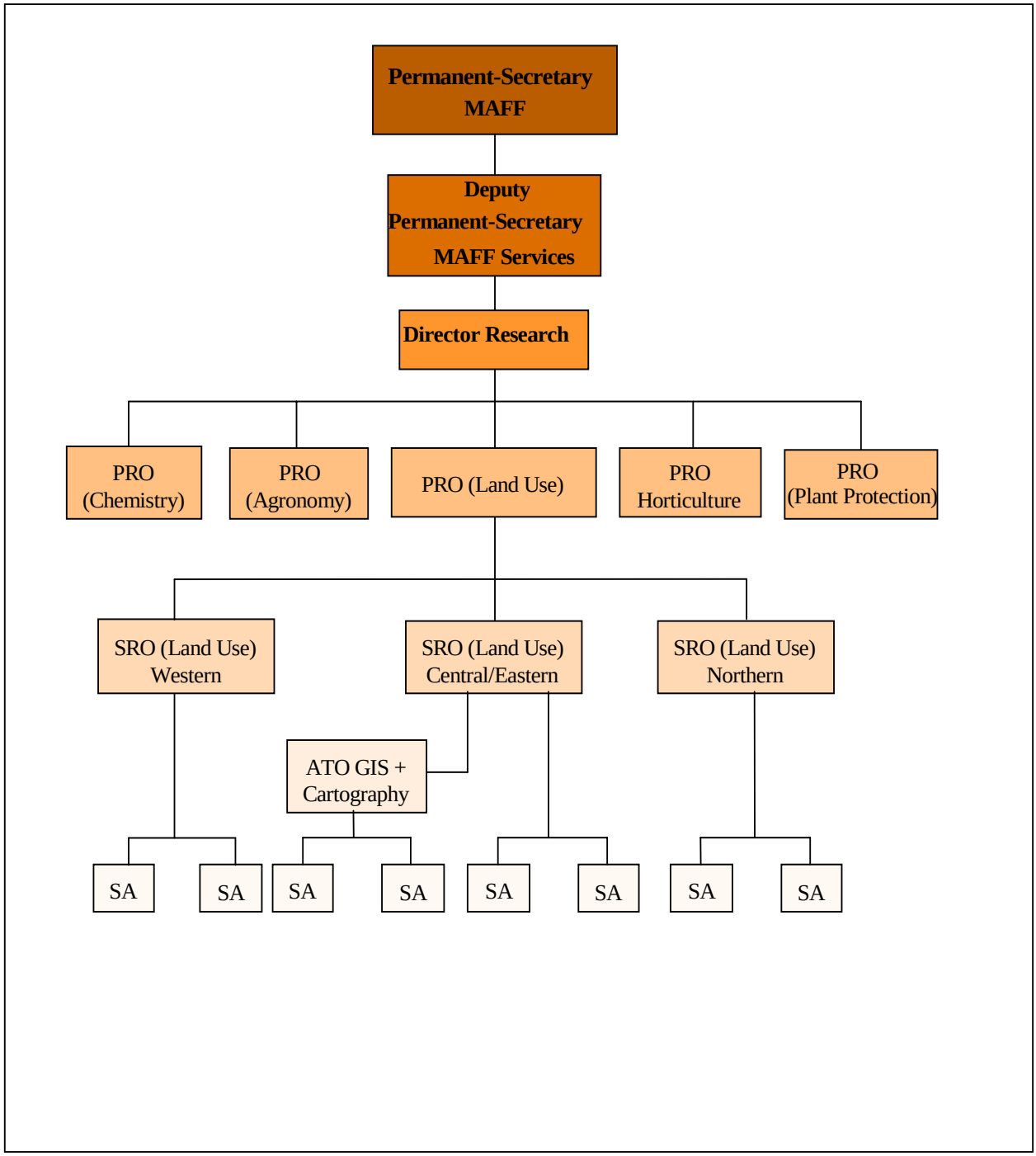
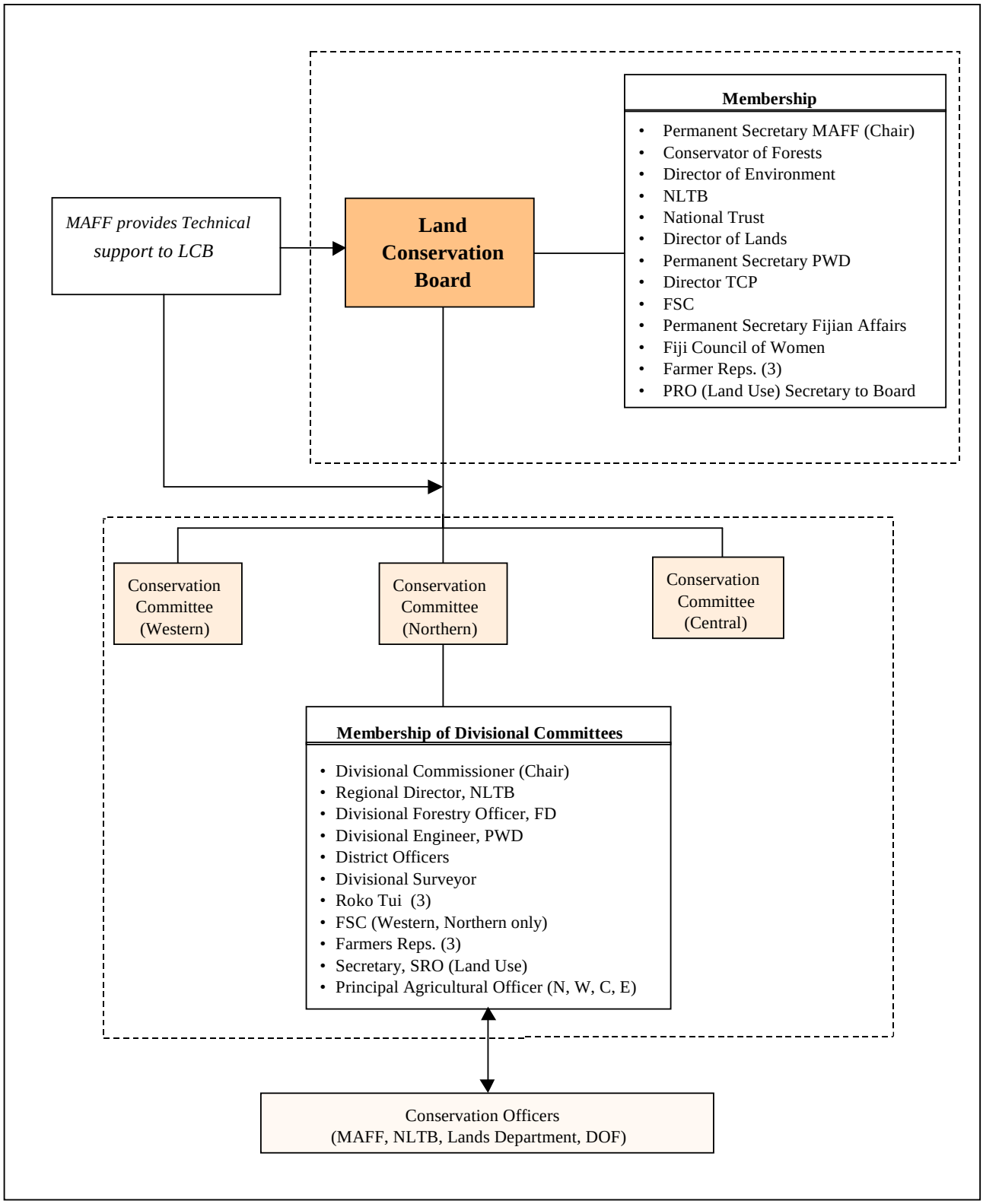


Figure 4: Land Conservation Board - Proposed Organisational Structure



Crop Extension Division

The Crop Extension Division has a primary objective to provide advice for, and promote better management with emphasis on CDF priority programmes. Its four critical activities are to:

- Increase contact with crop farmers, directly or through the media;
- Compile and disseminate relevant information to farmers on sustainable crop production;
- Effectively implement the CDF priority programme focused on crop sector development; and
- Facilitate Fiji's food security programme.

The Crop Extension Division is supported by the Information and Communication Unit of MAFF that has a responsibility to produce extension and technical publications. This unit is also expected to promote MAFF activities to the public and to generally promote good public relations.

Land and Water Resource Management Division

The Land and Water Resource Management Division (LWPMD), previously the Drainage and Irrigation Division of MAFF, is charged with managing the nation's agricultural land and agricultural water resources in order to achieve optimum utilisation of those resources in an environmentally sustainable manner. It is also responsible for promoting better land use practice and management and sustainable use of resources to optimise productivity. The organisation structure for LWPMD is given in Figure 5.

As there are apparent conflicts in the stated objectives, activities and strategies between Land Use Section and those of LWPMD, the activities and strategies for the latter are presented for comparative purposes in Table 5. Clearly there is duplication of responsibility and possible resources and this situation requires review.

Economic Planning Division

The Economic Planning Division (EPD) of MAFF is responsible for the formulation of agriculture sector policy, project design and appraisal, commodity planning, development and marketing and compilation of production and marketing statistics within the ministry. Within this broad objective EPD has a role in:

- Monitoring and evaluating the economic impacts of national and international economic policies and reforms and agreements/protocols on the agriculture, fisheries and forests sector;
- Compiling and disseminating within the public and the private sectors, statistical information on agricultural sector production, prices and marketing; and
- Assessing the socio-economic viability of new or alternative agriculture and forestry farming systems to enhance farming activities.

Figure 5: Land and Water Resource Management Division (LWRMD) Organisation Structure

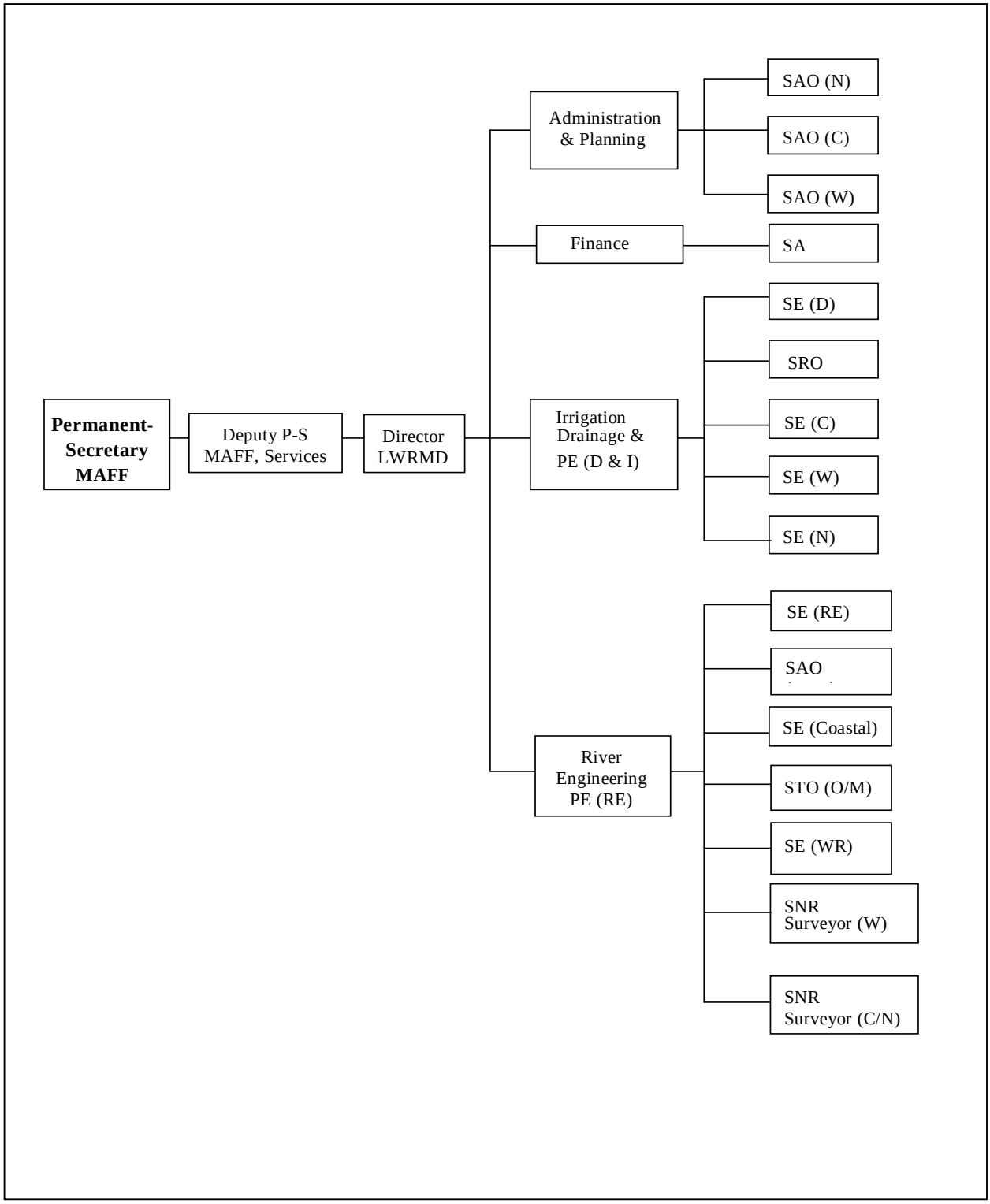
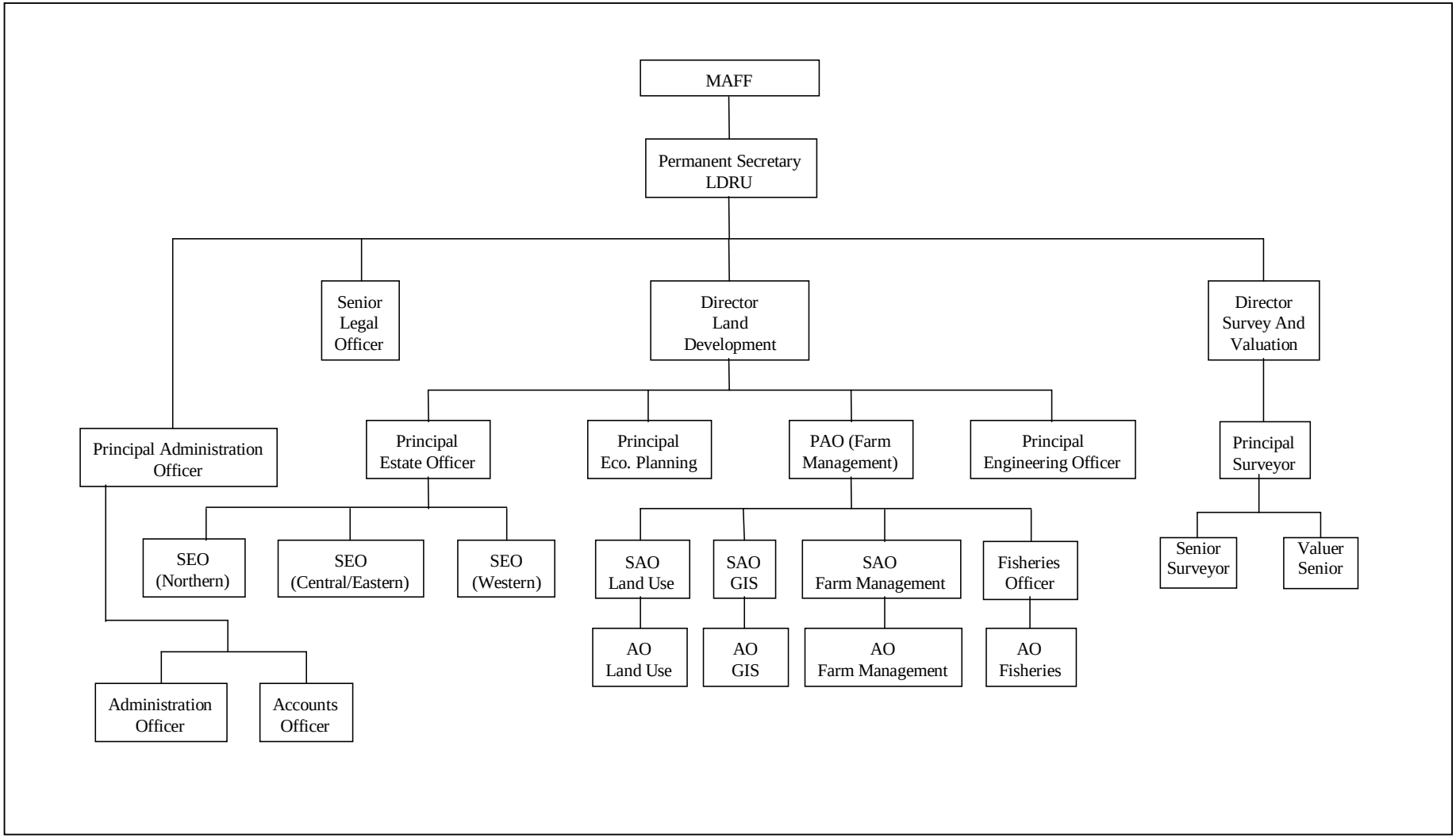


Figure 6: Land Development and Resettlement Unit (LDRU) Organisation Structure

(at April 1999)



Land Development and Resettlement Unit

The Land Development and Resettlement Unit (LDRU) of MAFF was established as a temporary unit specifically to address the ALTA legislation issues on behalf of government and in collaboration with the NLTB. The organisation for the LDRU is presented in Figure 6. The primary objectives for LDRU are: Ensure that a long-term equitable and sustainable relationship is regulated between the landlords and tenants of agricultural leases, so that all gain long-term mutual benefits from the productive use of agricultural lease lands;

- Ensure that a widely acceptable revised ALTA legislation is put in place;
- Ensure that either leases are renewed or, where they are not renewed, that compensation is paid as per the ALTA Act, and that displaced tenants are resettled;
- Ensure that tension and unrest is minimised during and after the review process.

Forestry Department

The Forestry Department (FD), whilst placed with MAFF in the government structure, is in fact a separate department with its own Act. It has developed its own three-year (1999–2001) Corporate Plan. The stated responsibilities for FD during the planning period include:

- Support and monitor the rational development of the sector through research, training and development, technical support services and regulatory control;
- Facilitate the development of Fijian forest-based businesses to include value-added processing, well co-ordinated marketing and exporting of forest products;
- Implement sustainable forest management practices;
- Establish additional reserves, genetic resources, biodiversity protection and non-destructive forest uses;
- Protect forest resources from introduced foreign pests and diseases through stringent quarantine control;
- Assemble and evaluate available data related to timber resources and the characteristics of products from the various species;
- Assess likely consumption trends within the domestic market for native species and exotic plantation timbers;
- Assess the potential supply available for export;
- Analyse the organisational needs to develop the export market;
- Analyse product options.

To deliver on its Mission Statement, FD will concentrate on the following key areas:

- Research and development;
- Forest resource management;
- Forestry awareness and public relations;
- Forestry Management Information System;
- Forest industry and trade development;
- Human resource development and management' and
- Management of physical and financial resources.

The organisation structure for the Forestry Department is presented in Figure 7.

Fiji College of Agriculture

The Fiji College of Agriculture (FCA) comes under the auspices of MAFF and is a primary source of future MAFF staff, in particular, for the Crop Extension Division.

FCA has the responsibility to:

- Provide farm management and technical manpower for the agricultural sector in Fiji;

- Develop and implement in-service and vocational training programmes that are consistent with the employment and market needs;
- Co-ordinate and facilitate in-service training (IST) programmes for staff, farmers and fishermen.

1.5.2 Other Government Departments

Town and Country Planning Department

The Department of Town and Country Planning (DTCP) is divided into three sections: Forward Planning, Development Control and Subdivision. The organisation chart for the DTCP is given in Figure 8.

The principal functions of the Forward Planning Division (FPD) include:

- Prepare Town Planning Schemes in respect of all lands within cities/towns in accordance to Section 18 of the Town Planning Act Cap 139;
- Consider objections in accordance with Sections 20–23 of the Town Planning Act Cap 139 and make appropriate recommendations to the Director;
- Consider modifications or alterations to approved town planning schemes of cities/towns and make appropriate recommendations to the Director in accordance with Section 26 of the Town Planning Act Cap 139;
- Consider development and subdivision applications referred to it by other sections of the Department and make appropriate recommendation based on appropriate zoning;
- Consider foreshore development proposals and make recommendations as appropriate;
- Attend meetings of various committees with Government for which the Director's advice and assistance have been sought.

The FPD is divided into three main areas of responsibility: Central Division, Northern/Eastern Division and Western Division. The Principal Town Planner is responsible for the overall administration of the FPD, while each of the three divisions is headed by a Senior Town Planner.

FPD staff of the TCPD sit on various committees within the Government mechanism. Current committees of relevance to this study include:

- National Solid Waste Disposal Committee,
- Technical Committee on Study of Watershed Management and Flood Control,
- Levuka Conservation Committee,
- FLIS Urban Utilities and GIS User Forum,
- National Squatter Council,
- Mangrove Management Committee, and
- ALTA Resettlement Scheme, Navua.

Apart from ongoing projects, FPD is involved in the following current projects of relevance:

- Nadi–Lautoka Corridor Disaster Management Plan,
- Legal boundary descriptions for Nadi, Lautoka and Ba towns proposed extensions,
- Review of legislation, and
- Updating of Town Planning Schemes.

Figure 7: Forestry Department, MAFF Organisational structure

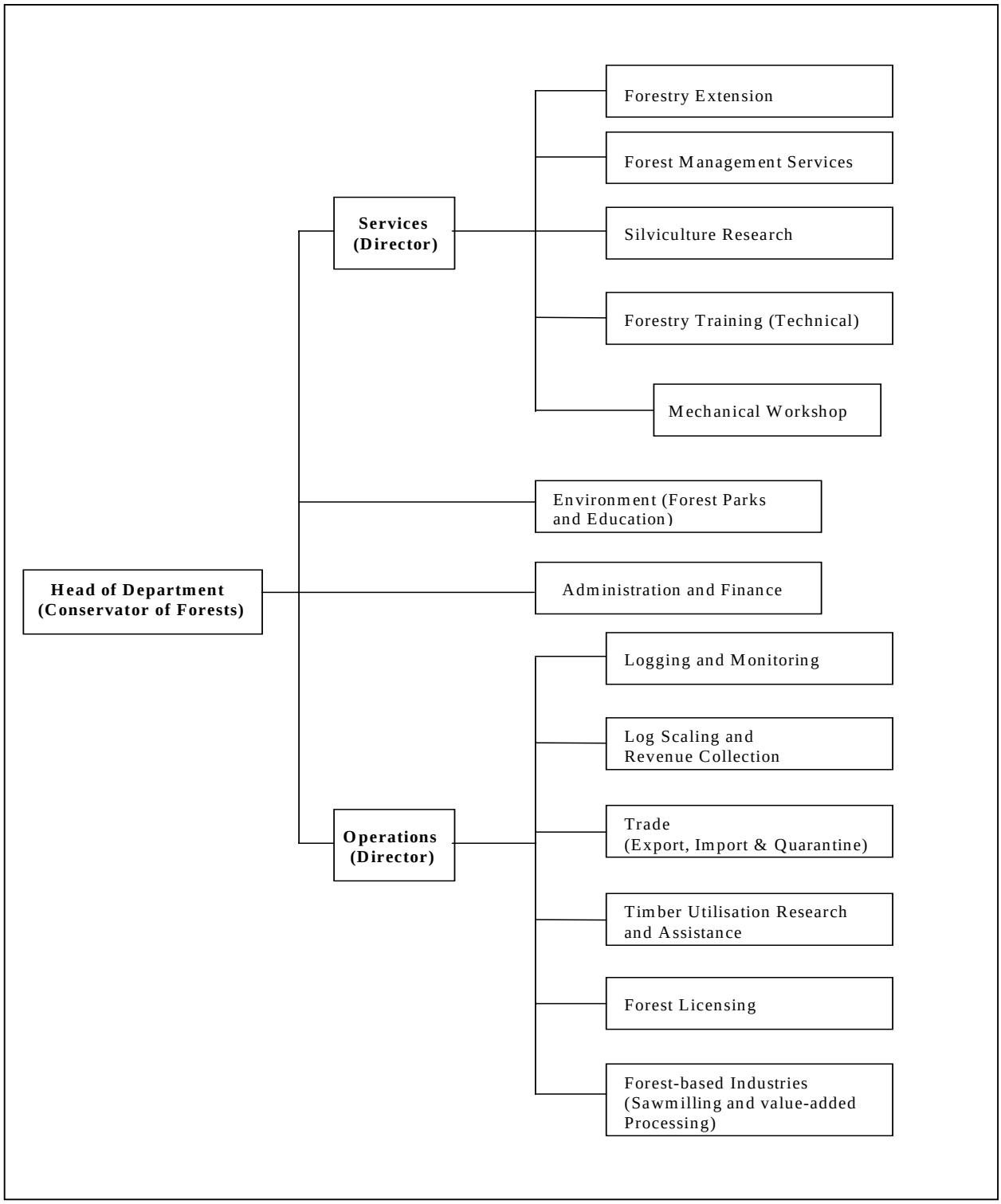
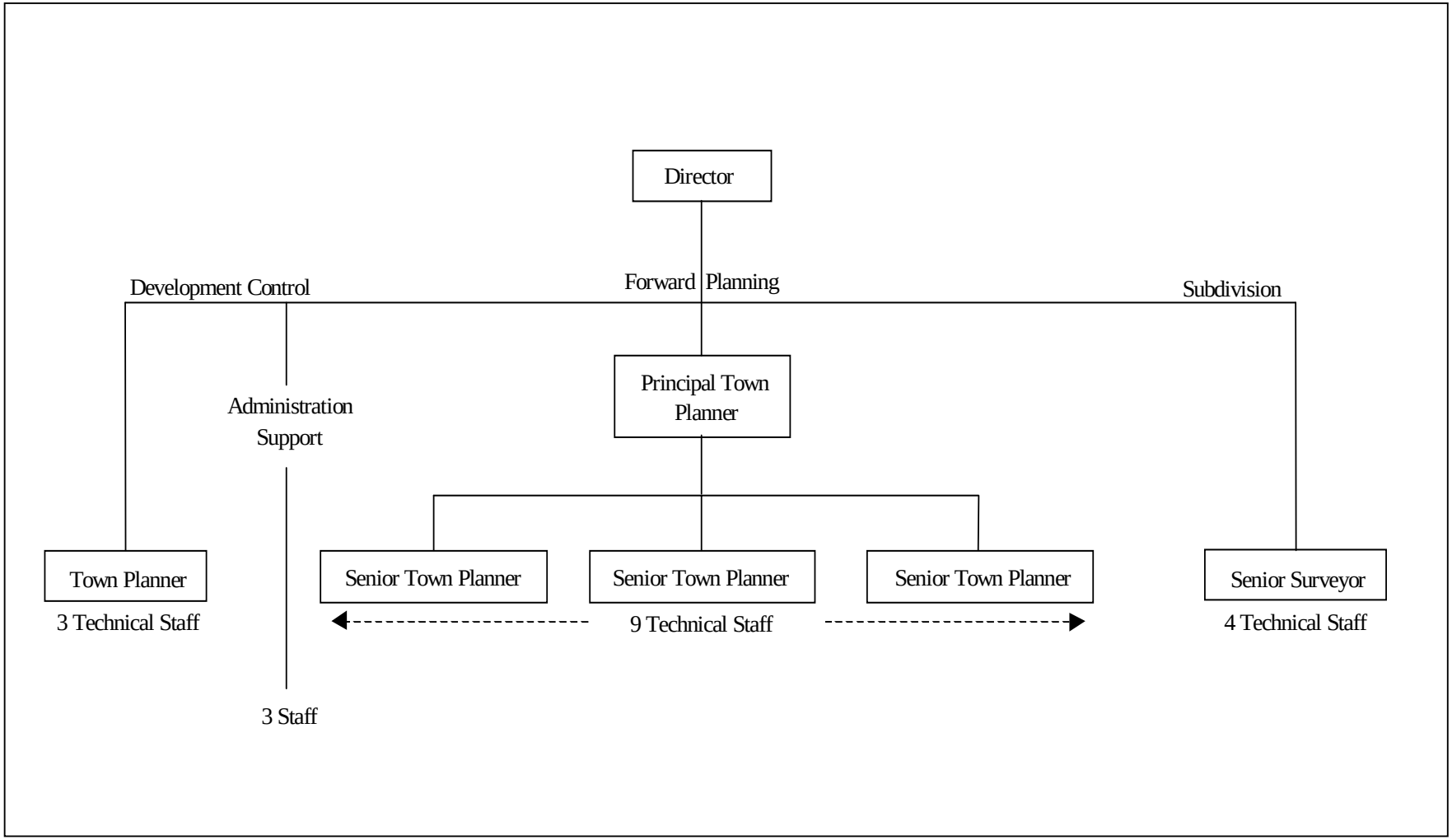


Figure 8: Department of Town and Country Planning (DTCP) Organisation structure



The principal functions of the Development Control Section (DCS) include:

- Consideration and decisions on all types of building applications received from various parts of Fiji;
- Advising local authorities, developers and their agents/consultants on matters pertaining to control of developments;
- Actioning correspondence, enquiries and queries related to development control matters and building applications;
- Providing the Minister of Housing and Urban Development with detailed answers on appeals made to him against refused building applications;
- Ensuring the prompt input of application data into the computer database.

The principal functions of the Subdivision Section (SS) include:

- Processing and making decisions on all types of land subdivision applications received from all parts of Fiji except the cities of Suva and Lautoka;
- Processing and making decisions on all engineering plans and drawings associated with major approved subdivisions;
- Providing advice to land consultants, developers, landlords or agents on matters related to land subdivision concepts, standards and tactics;
- Assisting Local Authorities and landowners in the proper implementation and execution of approved land subdivision schemes and survey plans in accordance with legislation and conditions of approvals;
- Assisting and consulting with other agencies such as the Fiji Sugar Corporation, Ministry of Agriculture, Fiji Electricity Authority, Ministry of Infrastructure, Public Works and Maritime, and the Department of Environment for the preservation of good agricultural land and the environment;
- Providing the Minister of Housing Urban and Environment with detailed explanations on appeals made to him regarding the subdivision of land.

Department of Lands and Survey

The Department of Lands and Surveys is responsible for providing the following services:

- Management and administration of State Land;
- Provision of land for Government Ministries and Departments;
- Provision of valuation services to Government, Statutory Bodies and Local Authorities;
- Aerial photography, compilation of maps and plans and continuous updating and maintenance of land records;
- Examination and approval of all land surveys undertaken in the country;
- Maintenance and upgrading of the geodetic network of Fiji for a sound survey system;
- Provision of National Land Information System for Fiji;
- Ongoing education and training for surveyors, valuers and cartographers.

The organisation for the Department of Lands and Surveys is given in Figure 9.

1.5.3 Native Lands Trust Board

The organisation structure for NLTB is presented in Figure 10. Staff numbers are as follows:

Location	Full time	Projects
Regional Client Service Centres		
– Western	40	
– Northern	28	
– Central/Eastern	22	
Head Office		
– Executive Services	6	
– Strategic Land Use Services	7	
– Financial and Administrative Services	17	
– Information Technology Services	7	2
– Human Resources Services	4	
– Legal Services	4	1
– Reserves	4	1
Total Positions	***139***	***4***

Figure 9: Department of Lands and Surveys Organisation Chart

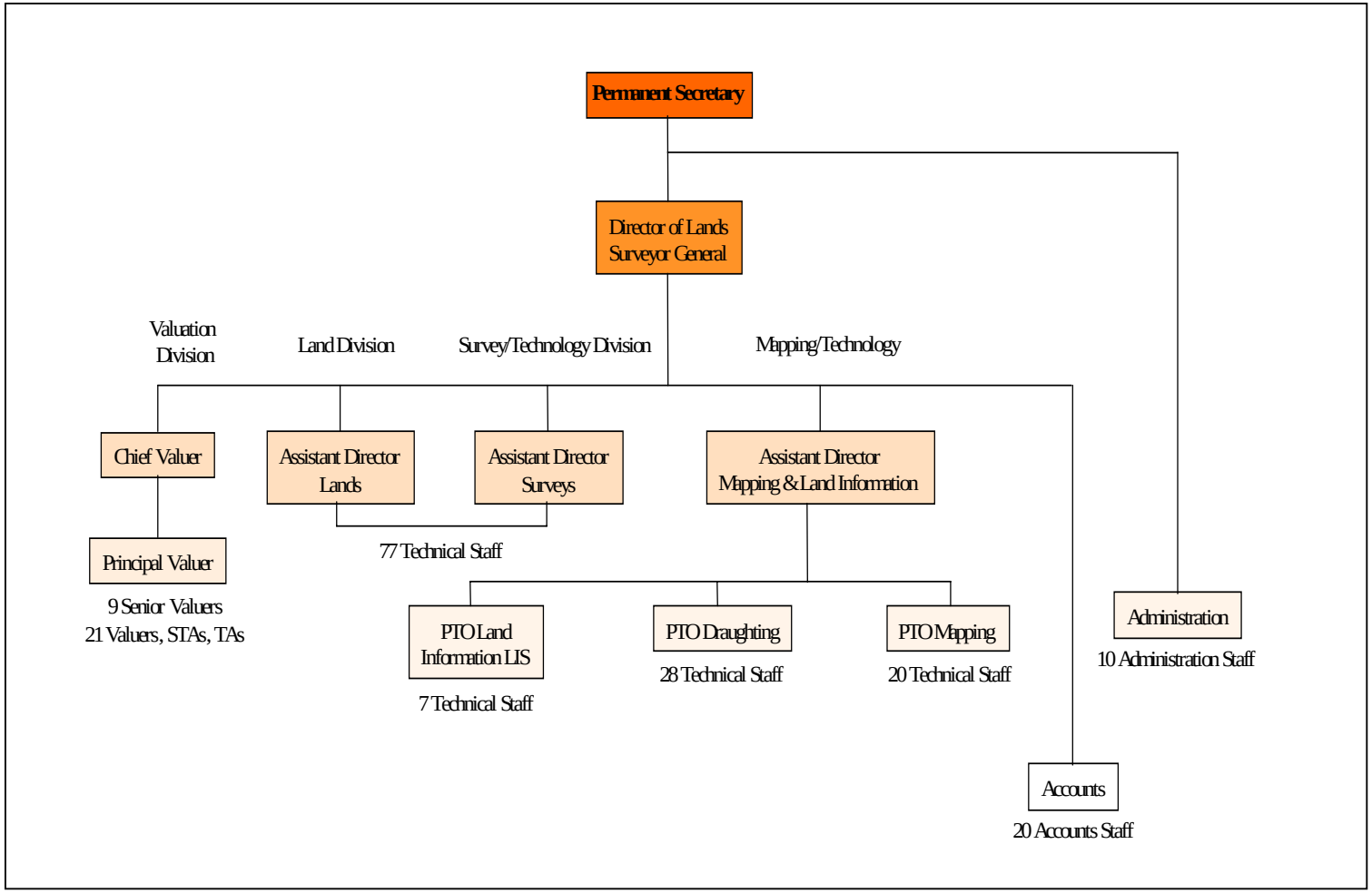
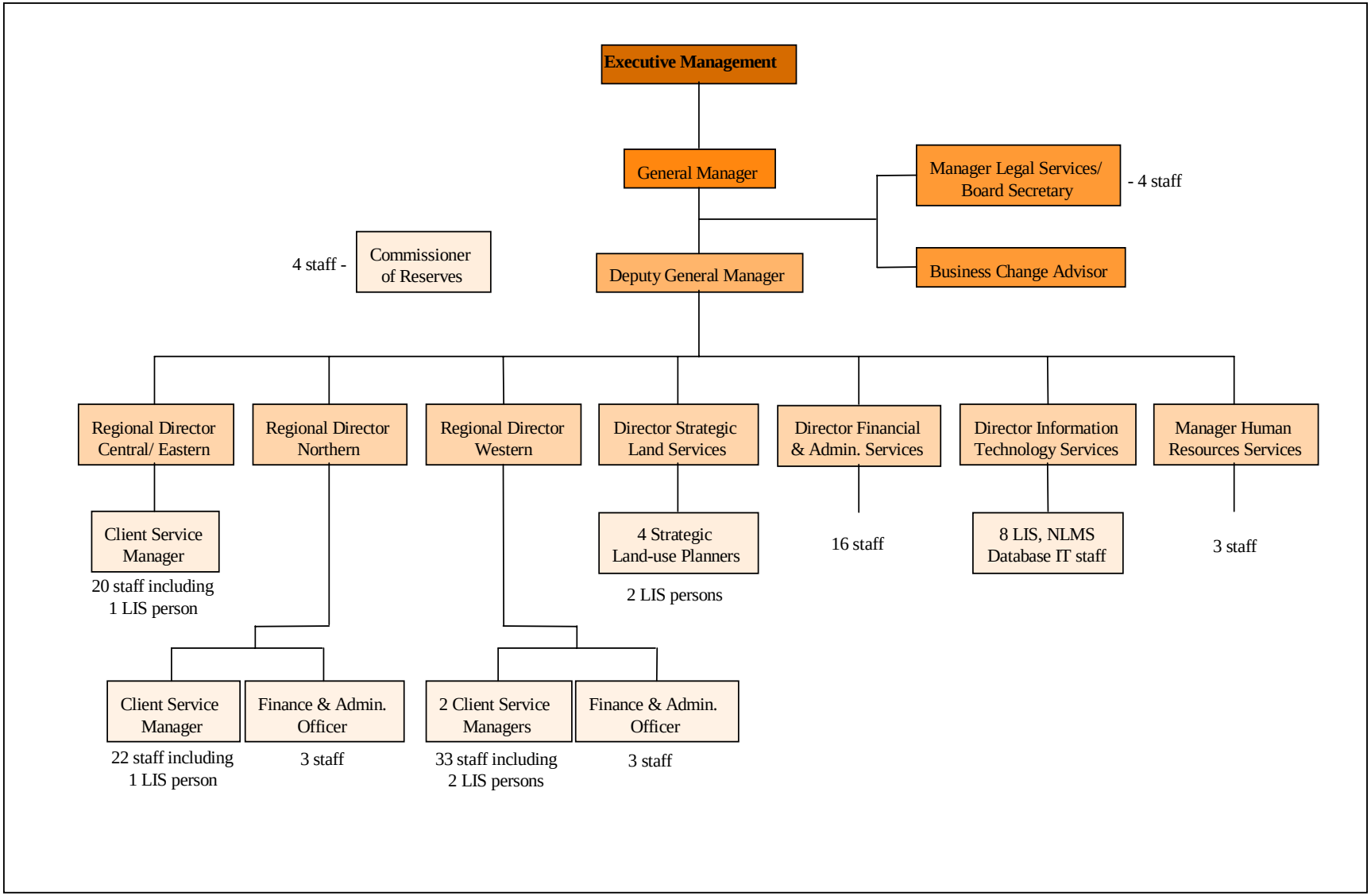


Figure 10: Native Lands Trust Board (NLTB) Organisation chart and functions



Chapter 2
Previous Studies

2.1 Introduction

Previous studies and reports provide an insight into the information that is available to planners and decision-makers and that is of direct relevance to the objectives of the study. Analysis of these reports and maps demonstrate the wealth of knowledge available about the natural resources of Fiji, the rural land use issues, problems and their causes. Some of this knowledge has been available for over 30 years. Most previous studies include recommendations that are of equal relevance today. They answer many of the basic questions about land use and soil conservation in Fiji, such as what the problems are, where they occur, why there are problems, how to treat them and the institutional and human resource needs to facilitate change.

2.2 Important previous studies about the environment, natural resources, land use and conservation

2.2.1 The Soil Resources of the Fiji Islands
(I.T. Twyford and A.C.S. Wright, 1965)

This two-volume bulletin – Volume 1 (570 p.) and Volume 2 (23 maps) – is a most comprehensive treatise on the soil resources of Fiji. It provides a scholarly description of the Fiji environment – the landscape, geology, soil-forming parent materials, climate and plant cover; an excellent geographical, historical and economic background; and an overview on the population, land tenure, agricultural production and the land use problems for which basic soil information was needed. The major part of the bulletin provides the detail about the soils, their origin, fertility and classification for land use. The soil resources are discussed on an individual island basis. Some 80 pages are devoted to land use – the history of land use in Fiji, the current pattern, the land use potential of the soils and an analysis of those factors which tend to impede achievement of the optimum use of the soils. Volume 2 contains the national soil map (8 sheets) at 1:126,720 scale, the land classification map (8 sheets) and 1:506,880 scale maps of generalised land use, geology, climate, alienated land, population distribution and land slope. The authors recognise increased agricultural production as the primary purpose of their work but stress that production must be on a sustainable basis.

For the 238 soils mapped in this survey, supporting soil morphological description and analysis of laboratory results are voluminous. For each soil the authors consistently give comment in the text on land condition, suggested land use and conservation practice. An example of such advice for Nanukuloa bouldery clay is as follows:

> *Nanukuloa bouldery clay* (19a) (1.75 square miles)
> This soil, of only small extent, is a shallow, dark coloured soil containing many augite crystals. It typically shows ten inches of very dark grey, friable gritty clay, with a strongly developed medium and fine nutty structure, strongly sticky and strongly plastic when moist, containing many fine pieces of weathered rock, on eight inches of yellow brown friable clay of moderately developed medium and fine nutty structure, containing much rock, on hard andesite.
> At present Nanukuloa bouldery clay gives moderate crops of maize, *tavioka* and sugar cane and is also used for cattle grazing on rough pastures. Crop yields are reduced when the soil, which is shallow over rock, dries out in the winter droughts. Sheet erosion is a particular hazard on such a shallow soil, especially when it is regularly burnt and several areas around Nanukuloa have been eroded to bare rock. Soil and water conservation measures, such as contour furrowing and ploughing in of green manures and crop residues, would slow down sheet erosion and increase the water holding capacity of the soil, enabling crops to survive droughts better.

The authors address many other issues that are relevant to this study. At the time they wrote, (1965) they observed that most arable land was occupied and that future development would be in hilly terrain. They pointed out the need for research to help subsistence agriculture to become more efficient. Their main concern was the severity of the soil erosion in the sugar cane belt that they said had resulted from a 'deplorable lack of land husbandry'. Further, they noted that much of Fiji was not suited for significant new agricultural development and 'the present difficulties of agricultural development are due not to any serious deficiency in the natural resources of the Colony, so much as to the adverse relationship between the farmer and his land.'

The authors identified problems with the administration of land in those pre-independence days that are at the heart of current land use problems; 'the various bodies concerned with land in the Colony, the Lands, Agriculture, Forestry and even Public Works Departments, the Native Land Commission and Native Land Trust Board, the Fijian Economic Development staff and Fijian Affairs Board, and the Colonial Sugar Refining Company, often seem to pull in different directions as far as land use development and conservation of resources are concerned'. Each was seen to have its own particular agenda and when these clashed, as was sometimes the case, the way was open for inefficient or wrong land use practices to develop: 'The Land Conservation Board, composed of representatives of all the above bodies and of some members of the general public, has so far failed to achieve satisfactory control over the gross exploitation of the soil resources of the Colony'.

In 1999, there were scenarios that model trends in the world sugar market and indicate an increase in flat land production that will lead to decreased pressure to produce sugar cane on the less suitable and marginal soils in Fiji. This probable development repeats observations made over 30 years ago by Twyford and Wright. The following quotation starts with the assumption that there will a cutback in the area under sugar cane, then goes on to describe a land management situation that is still valid today:

> With improved yields of sugar per acre, the industry approaches closer to its permitted production quota. Land that is marginal for cane growing need no longer be exploited so vigorously and there are signs of a retreat to more suitable soils of the flats and gentle slopes, in areas where the natural fertility of the soil and soil depth are better adapted for cane growing. This, of course, is very desirable; such land can be made to produce high yields of cane and the less suitable land can be abandoned. However, mere abandonment of old cane land does not solve the problem of achieving optimum land use. Something has to be done with this land.

The authors further observe that:

> Erosion over the years has led to thinning of the topsoils, especially on shallow nigrescent and talasiga soils and has lead to progressive siltation of rivers resulting in deterioration of drainage on river flats, frequent inundation and the formation of shallow bars across the river mouths. Dredging of rivers has thus become necessary; the maintenance and construction of drains on flat land is an urgent matter and on adjacent slopes, contouring, contour planting, the building of new terraces and bunds will have to be tackled. Moreover, every season that the work is deferred or only partially attempted means that the problem becomes bigger. To cope with this situation, farmers are being encouraged to install their own soil conservation measures and, in some localities, the Department of Agriculture's Soil Conservation Section has achieved notable success in stimulating farmers' awareness of the problem.

2.2.2 Land Conservation in Fiji

(J.G. Galletly and G.L. Swartz, 1974)

Perhaps the most thorough review of soil conservation in Fiji, this was conducted at the request of the Land Conservation Board at a time when the Fiji Government was searching for a new strategy for land conservation. Statements in the report to the effect that there was no land conservation programme in Fiji that integrated the required range of activities, and that the conservation-related construction they emphasised was ineffective, may have contributed to the termination of soil conservation efforts at that time.

The report begins with a review of soil conservation activities. It highlights that since 1953 there was a series of expatriate soil conservation officers with different perceptions of what the problems and remedies should be, rather than an overall coherent conservation programme.

Several fundamental assertions that affect possible decisions on soil conservation at the present time were made. Some examples:

- Geological rates of erosion are high and agricultural land use will probably increase these rates but the ecosystems are well buffered and will probably allow significant erosion increase without permanent damage to land.
- Fiji has an identifiable soil erosion problem but it does not appear to be as serious as some previous reports had suggested.
- Village subsistence agriculture does not appear to present a major land degradation problem.
- Roads contribute significantly to the soil erosion problem.

The authors reviewed the major land uses and made detailed recommendations to reduce the impact of each. For sugar cane, for example, they recommended that slopes not steeper than 8° be cultivated. They also discussed designed grass strips. In grassland management, they saw future overgrazing as having a greater impact than fires. They considered the impact of logging operations environmentally acceptable at that time.

The principal organisations involved in conservation were examined and it was concluded that the NLTB and the Land Conservation Board were not discharging their responsibilities to soil conservation. The authors noted that all governmental organisations using land had conservation responsibilities and that the Land Conservation Board had the lead role based on the existing legislation.

A new approach to conservation based on a combination of statutory controls, extension and land use planning was recommended. This last element – planning – was based on the observation that the worst problems were related to land use that was unsuited to particular land or soil type and not to bad management. The conservation programme was to be conducted by a Land Conservation Branch, a support unit to the Land Conservation Board. This Branch was to be independent of pressures to increase crop production. It would have two divisions: Research and Investigation, and Field Service. The authors outlined a complete administration programme including the organisation of land conservation districts. They also identified the overseas aid requirements and recommended: ‘There is a requirement of new expertise and a change in attitude to the role and responsibility of the Land Conservation Board and its staff. It is highly desirable that in the initial stages, the programme has the benefit of expatriate officers…’

2.2.3 Water and Related Land Resources Management Bill for Fiji, Draft Legislation

(Stanford D. Clark, 1976)

Over two years (1975–1976), a Working Party of senior Fiji Government officials developed proposals for a Water and Related Land Resources Bill for Fiji, together with ancillary regulations concerning drainage, groundwater, irrigation, land conservation and improvement, water permits and water supply, sewerage and urban drainage. Where legislation existed, these drafts were closely based on existing Acts. Although these proposals attracted widespread support from the public service, and a Cabinet submission was drafted to proceed with legislation, political factors intervened and the Bill was not passed.

The draft legislation recognised the need to have effective co-ordination between Government agencies both in the planning and implementation of development proposals concerning water and related land resources. The Working Party considered the advantages and disadvantages of a number of administrative forms to achieve co-ordination. An independent Commission or Authority, a Special Department of Government, an individual Commissioner, based on the modes in the Irrigation Act, or such a Commissioner with an Advisory Board, were all discussed and discarded. A preference was expressed for a Board consisting of the

Permanent Secretaries of the key departments concerned with land and water, together with some public representation. A model was seen to exist in the Land Conservation Board, which administered the Land Conservation and Improvement Act and the Drainage Act.

It was not intended that the draft Bill would supersede existing legislation, apart from the Rivers and Streams Ordinance. Instead, it was proposed that existing sectoral Acts, such as the Land Conservation and Improvement Act, Irrigation Act, Drainage Act and legislation concerning water supply and sewerage, would be retained in somewhat modernised form, but promulgated as regulations under the principal Act.

As the name implies, the draft ensured that ample powers over 'related land resources' were conferred; in particular, clause 7(1)(c) specified that one of the functions of the Water and Land Resources Management Board would be: 'To ensure the application of appropriate standards and techniques for the investigation, use, control, protection, management and administration of water and related land resources'.

Clause 7(2) directed the Board to make proper provision for:

> The control and prevention of flooding, soil erosion and damage to watershed areas; the reclamation of land and the protection of inland and estuarine fisheries, flora and fauna; and procedures to ensure that the possible consequences of particular development proposals on the environment are properly investigated and considered before such proposals are approved.

Administrative powers of the Board include power, in clause 10(i): 'To require the owner or occupier of any lands to construct and maintain on such lands such works for the conservation of land or water resources as are specified by the Board'. In the case of non-compliance, there was power to construct the necessary works and to recover the costs from the owner or occupier.

Other functions and powers of the Board included:

- Declaration of water districts for better use, control, management and administration of water and related land resources;
- Prevention of flooding, soil erosion, or damage to beds and banks of surface water resources as watersheds;
- Registration of existing users of water and hydraulic structures; and
- Issuing of licences for investigating water resources, construction of hydraulic structures, and discharge of waste effluents.

Taken together, and recognising that this legislation contemplated the continuation of powers contained in the Land Conservation and Improvement Act as ancillary legislation, there is no doubt that adequate statutory authority would have existed to pursue an active and effective watershed management strategy for Fiji.

2.2.4 Report on Fiji's Water and Land Resources Legislation, Organisation and Administration as it Affects the Management and Use of the Water and Related Land Resources

(R.C. Dixie, 1983)

The purpose of this assignment was to investigate and make recommendations to the Fiji Government on the feasibility for strengthening and modernising the administration, organisation and technical capabilities within the Land Use Section of the then Ministry of Agriculture and Fisheries (MAF).

Most of the report supports 27 recommendations, many of which deal with subjects directly affecting soil conservation and watershed management. There is a raft of recommendations dealing with additional outside assistance, revision of legislation, reorganisation of the Department of Agriculture and extending the Land Conservation Board's activities to include soil and water conservation. The author's objective was to strengthen the Land Use Section, particularly its role in soil conservation. Implementation of the recommendations would have provided a very effective organisation to deal with conservation problems.

The recommendations of relevance to this review are that:

- MAF (now MAFF) restructure the present Land Use Section, and redeploy manpower and other resources, both at national and divisional levels, into a multi-disciplinary Water and Land Resource Division.
- The restructured Water and Land Division service the Land Conservation and Improvement Board, thus co-ordinating under present Ordinances: irrigation, drainage, soil conservation, planning, water and land resources investigations and research.
- Priority be given to the appointment of three Soil Conservation Officers.
- The Land Conservation Board accept the catchment control concept and consider priority catchment areas, and gazette these for an immediate start of Water and Soil Conservation Catchment Control projects.
- The catchment control project works required for water and soil conservation management be financed in full as a project. This will encourage land occupiers to change rapidly their present land use practices, and incorporate recommended changes as appropriate on their land.
- The Land Conservation Board investigate the need for Government assistance to land occupiers to help meet the cost of water soil conservation practices for on-farm work.
- Scientists experienced in catchment control schemes and planning of water and soil conservation works be seconded to Fiji to assist with planning and implementation of catchment projects for water and soil conservation, administration and management.
- No new leases be approved, unless land use capability recommendations and conditions are enforced, to ensure that the water and soil resources will be protected from soil erosion.
- On existing leases, where erosion is occurring, these be investigated and action taken to stop imprudent land use practices.
- The Land Conservation Board approve the preparation of soil and water conservation farm plans, for the various land development and aid projects (Yalavou Beef Grazing, Tailevu Beef Grazing, Uluisaivou Grazing, Batiri Citrus, NLDC Nasarowaqa Pigeon Pea, Dreketi Rice) now being promoted, to ensure that soil conservation practices and land use capability recommendations can be put into practice on a farm scale.
- The Land Conservation Board investigate soil and water losses that are now occurring, under various land use practices.
- The impasse between NLTB and MAF re the monitoring of lease conditions, where imprudent use of water and land resources is occurring, be resolved.
- The Land Conservation Board issue information and publicity materials regarding water and soil conservation and management.

2.2.5 Work and Income for the People of Fiji. A Strategy for More Than Just Survival.

Final Report to the Government of Fiji by the Fiji Employment and Development Mission *(M. Bienefeld, 1984)*

This report, sponsored by the EEC and prepared at the request of the Fiji Government, provided an independent evaluation of the country's unemployment problem. It identifies land and water as the main basis of the economy and reaffirms the 'predominant importance of small scale agriculture' in absorbing labour. Its overview of land in relation to employment reiterates an observation made nearly 20 years

previously by Twyford and Wright (1965) that 'virtually all economically usable land is already in use or allocated'.

The study developed much information about land use planning, the rural economy and soil conservation. Some pertinent comments include:

- Less than 20% of the total land area is suitable for permanent arable farming and about 40% is too steep or has soils such that are only suitable for watershed conservation, forestry, or carefully controlled extensive grazing.
- Rainfall erosivity levels are high by world standards so the risks of cultivating or grazing steeper lands are also high. Conservation measures are essential for long-term use of such lands.
- The move to commercialise farming often brings private benefits but imposes social costs. Two of these costs are loss in employment opportunities and soil erosion.

From an employment opportunity perspective, the report concluded that 'if present patterns (of land use) continue unchanged, the capacity of rural areas to absorb additional labour will rapidly decline'. Further: 'when the quality of presently unused land is examined, it is clear that new subdivisions or other forms of land occupation will in many cases support only relatively low densities of population'.

The author was of the opinion that Fiji would need to develop different land use strategies for the 1990s. Specifically on soil conservation, the author recommended that a high priority should be given to soil conservation with the establishment of a strong, well-staffed executive authority to co-ordinate work in this area. The report went further, stating:

> A common result of increasing pressure on land is increased erosion, and many examples can now be found in Fiji. Over the last 20 years, conservation measures appear to have been neglected. It is reported that 10° slope is considered by the FSC to be the maximum desirable for sugar cane cultivation but that in the mid 1970s NLTB staff would classify any land then growing cane as 'arable', irrespective of slope, and that co-ordination and standardisation of land use planning practices was obviously needed. Conservation will become increasingly important as more of the poorer classes of land are brought into use. Conservation will only be effective if there is a strong, executive authority, close integration between government departments and other 'actors', and strong political will.

2.2.6 A Report on the Consultancy on Some Agricultural Incentive Measures

(A. McGregor and W. Lee, 1984)

This report is a follow-up to a study conducted on the agricultural sector made as part of the preparations for the Ninth Development Plan (DP9). The report deals with three problem areas identified in the earlier study: pricing policies, land management and agricultural credit. The section on soil conservation under land management is of primary interest. It identifies agricultural expansion to marginal soils and lack of awareness of the resulting soil erosion as major problems. Limitations in the amount of suitable land available for development led to an emphasis on increasing productivity from existing land resources in DP9.

Sugar cane and ginger cultivation receives most attention in the land conservation section. The MPI Land Use Section recommends restrictions of sugar cane cultivation to slopes of 11 degrees or less but the FSC and NLTB allow cultivation on much steeper slopes. Growing ginger on steep slopes has caused severe erosion in many fields in Naitasiri. McGregor and Lee compare the relatively slight impact of traditional agriculture and the new system of cash cropping where the method is to move into a new area, clear a relatively large block (10–20 ha) by slash and burn methods, cultivate the land until it has worn out or slipped away, and then, if more land can be obtained, move to a new area and begin the process again.

Cattle and goat grazing and its detrimental effects are noted. Research shows goat grazing to be more damaging than cattle grazing. Goat-grazed areas tend to be overstocked due to the typical farmer's need to recoup expenses as quickly as possible and an ignorance of controlled grazing techniques.

The authors identify several needs for research into erosion and land use. They point out that no quantitative research on soil losses due to improper grazing or other land uses has been conducted in Fiji. Based on a few site studies and many field observations of degraded lands the authors conclude that: 'The agricultural productive base is running down at a rate that is well above what would be regarded as economically acceptable'.

The authors review both general and specific land use practices needed to reduce soil erosion. Detailed prescriptions are given for use of vegetation strips, agroforestry methods and cropping practices for ginger and sugar cane. The effect of land tenure in application of these practices is also reviewed. The conclusion is that:

> Despite improvements in the security of land tenure for land obtained from NLTB over the last two decades, there remains little incentive for lessees to invest in conservation measures. Although the benefit/cost relationship of conservation practices cannot be quantified, there is no reason to delay action on the erosion problem in Fiji. Worldwide experience points to generally accepted measures, the successful implementation of which would significantly improve the situation.

Obstacles to more stable land uses include: 'Absence of effective government controls, lack of resources devoted to soil conservation, the high preponderance of leaseholders and the lack of information at the farm level on an appropriate package of practices'. The authors identify three actions that would encourage stable land use:

- Dissemination of information about the detrimental effects of erosion and the benefits from implementing conservation measures;
- The imposition of public incentives and constraints; and
- Decreasing or eliminating key constraints that lead to detrimental land use.

Regarding constraints, they suggest some reasons for NLTB's reluctance to exercise its legal rights regarding bad husbandry practices:

- Lack of clear guidelines on what constitutes bad land-husbandry practices;
- Limited resources;
- The training and background of the NLTB estate agents;
- The priority given to rent collection; and
- A lack of appreciation of the magnitude of the soil erosion problem.

The authors conclude with a set of requirements to make the MPI Land Use Section a more potent force in soil conservation:

> The resources currently devoted to soil conservation are inadequate for the implementation of significant measures, either in terms of providing information or incentives. Further, the limited resources that are made available to the MPI Land Use Section are mainly directed at planning land use with regard to production potential rather than to longer-term land degradation potential. A reorientation of priorities is now justified considering the DP9 policy shift toward increasing productivity and making better use of existing land resources.

2.2.7 Land, Land Use and Land Availability

(R.G. Ward, 1985)

This work, undertaken in 1982/83 was originally prepared as a working paper for the Fiji Employment and Development Mission (Bienefeld 1984). The author is well qualified, having conducted the first land use survey (at a scale of 1:50,000) of Fiji in 1958 – this model repeated by Directorate of Overseas Surveys (DOS) in 1968 and by MAF Land Use Section in 1978. Ward examines in detail the land resource information available (land capability classes by area, by major islands, for agriculture, the slope factor, other constraints etc.), land tenure, changes in land use (since 1958) and the issue of unused land.

The paper explains how the buoyant agricultural sector of the 1970s was largely predicted because of the availability of unimproved land that could be brought into permanent cultivation; this was especially important for sugar cane expansion. However, by the end of the 1970s, this expansion had approached its limits. It notes that a number of rural sector trends are creating situations where fewer, rather than more, people are likely to be supported directly in primary production. These trends relate in part to land availability and land quality, land tenure, labour mobilisation and, in the Fijian village context, a changing balance between subsistence and commercial agriculture. The paper further argues that:

> *Policies which depend on subsistence farming absorbing (at a satisfactory level of living) those who cannot find work in the urban or fully commercial sectors, will become increasingly difficult to maintain. At the same time, several of the processes of change in agriculture and land use have the effect of undercutting the foundations of Fijian social structure and so are at odds with the other policy of supporting that structure.*

Since 1960, the area of land in use has trebled in both Viti Levu and Vanua Levu, yet rural populations on these islands have increased by only one-third and one-half respectively. Expectations of rising income, the conversion from subsistence to commercial agriculture or pastoralism, and the poorer quality of each parcel of land brought into use, have all meant that the average new rural family requires more land than its predecessor.

Box 2

It is thoroughly understood that the control of our lands is in our hands, but the owner of property has an important duty to perform...It is the bounden duty of landowners to utilise what they possess for the benefit of all. An idle landowner neglects his duty to his State. Should his holding be more than he can utilise, he should lease the surplus to those that can make use of it...This is why I insist that, as leaders of the Fijian people, it is our duty to use our influence, our power, to open up waste Mataqali lands for agricultural purposes, whether they be taken up by Europeans, Indians or Fijians.

From a speech to the Council of Chiefs by Ratu Sir Lala Sukuna, 1936

The author, in endorsing the need for a national land use policy, points out that future land use planning and strategies for increasing rural production will have to be directed towards increased yields from land already in use and towards a closer match between land use and land capability. This intensification of land use will be constrained by the land ownership system, the rigidities of which will need to be modified if optimum use of existing arable land is to be achieved. Also, a closer attention to soil conservation will be required, both in future land development projects and on existing farmland. Ward notes that in 1978 the Land Conservation Board agreed that work should start on a National Land Use Policy.

2.2.8 Sustaining Fiji's Development

(R. Prescott-Allen, 1986)

The primary objective of this project was to prepare a detailed project proposal for developing a National Conservation Strategy (NCS) for Fiji; essentially a policy document intended to determine the most appropriate measures for achieving sustainable development and to build public support for them. Part 2 of the report explains why Fiji needs an NCS. Two of these reasons are: firstly, the nation's current and future

prosperity depends on the productivity and diversity of its natural resources; and secondly, Fiji's cultural and national identities are closely tied to the land, yet conservation of this heritage is inadequate.

The author makes observations of particular relevance to this study:

> Soil erosion is clearly the most immediate and widespread threat to Fiji's development. Many rivers have high sediment loads, often due to poor agricultural practices (such as cultivation of excessively steep slopes), but also due to careless road construction and logging. The results include loss of agricultural productivity, frequent coastal flooding, and damage to coral reefs. The most commonly voiced concerns of persons interviewed related to soil and water management: the lack of a mechanism for ensuring land use is in accordance with land capability; the lack of coordination of the several acts concerning planning and management of water and land; the lack of capacity to police the Land Conservation and Improvement Act; and failure to ensure adherence to the conservation provisions of native land leases. The Environmental Management Committee (1985) reports that neither the Native Land Trust Board nor the Ministry of Forests has the resources to monitor leases and enforce good management; and that the Land Conservation Board is in a similar position.

This report explains the aims, scope and main elements of an NCS for Fiji and identifies the organisation needed to develop the NCS. It concludes with a fairly comprehensive workplan. The workplan emphasises interdepartmental participation citing lack of interdepartmental co-ordination as one of the major obstacles to conservation as the Government was too focused on rapid development. The author makes the following statement that probably reflects the heart of the conservation problem in Fiji:

There is a general lack of awareness in Fiji of the interdependence of conservation and development. There appears to be a widely held view in influential circles that conservation and environmental management are obstacles to development, or at best irrelevant to it. Institutions concerned with conservation and environmental management are weak and insufficient for Fiji's needs.

2.2.9 Land Management and the Development Imperative in Fiji

(W. Clarke and R.J. Morrison, 1987)

This paper describes and explains the current soil conservation situation in Fiji. The authors present detailed data from soil erosion studies and discuss the causes of erosion, concluding for sugar cane that: 'The question is one of management, both the manner in which cane is cultivated, and the tenure and other conditions on which land is held and worked'. They note that poor conservation practices in many countries are attributed to poverty and land tenure problems, but after studying Fiji's situation, they draw no conclusions concerning the relationship of poor farming practices either to insecurity of tenure in recent years or to lack of resources. They quote Ward (1985) who, in effect, said that if the Government implemented existing regulations pertaining to soil conservation, there would be no problem.

The authors review the trends and describe the institutions that characterise today's land conservation situation:

> After national ownership (of the sugar industry) in 1973, concern that tenants carry out conservationist practices diminished, partly because of the drive for production and partly because any punitive measures against damaging practices took on political overtones, associated with the sensitive issue of land. However, the possibility for improved practices on sugar lands does exist in the detailed conservationist instructions provided to Fiji Sugar Corporation (FSC) field officers in their manual, even though the officers can only advise, not enforce.

This situation is the result of national priorities: 'The first problem is that of generating employment and income, to sustain further improvement in living standards which are among the Pacific's highest, and which are important for internal harmony'.

The political climate underlies weak support given to conservation during the recent years of economic expansion. The authors are not optimistic about the short-term prospects of a national effort in land conservation because of concern generated by declining pricing for export crops, balance of payment problems and rising unemployment.

2.2.10 Watershed Management Study: Land Conservation in the Rewa and Ba Watersheds

(D. Nelson, 1987)

This investigation by the Food and Agriculture Organization (FAO) of the Rewa and Ba watersheds, representing the wet and dry zones of Viti Levu, was initiated out of concern over the wise use of lands in these two watersheds and the high cost of dredging in the lower reaches to reduce flood peaks. Officials decided that dredging must be supplemented by reducing sediment production at its source in the watershed. Thus, the purpose was to identify the watershed problems and suggest some remedies for them.

The approach involved interviews with people (farmers, officials, scientists) who had knowledge of the watersheds and the activities affecting their use and condition; a review of past work; and reconnaissance surveys of the two watersheds. Soil conservation and soil erosion are the main concern of the report. It explains that as impact to soil is the primary, most permanent effect of land use, and is an indicator of overall physical conditions in the area, a soil erosion perspective predominates through the report.

The investigation concluded that:

- *Much of the soil erosion is natural.* Most landslides and much of the stream bank erosion would have occurred whether or not man used the area. Land use tended to speed up the natural erosion processes.
- *Row crops on steep land are the biggest single source of man-caused erosion.* The type, severity, and cause of soil erosion differed from place to place. Soil erosion caused by man was a function of natural conditions, the kind of land use and how the use is applied. Heavy rainfall, steep slopes, and deeply weathered rocks set the natural stage for severe erosion if the other two factors are not carefully selected and applied. Land uses, from an erosion perspective, ranged from the devastating to the benign. Row crops in combination with steep slopes were the biggest problem areas particularly when appropriate mitigating measures were not used. The two 'hotspots' in the watersheds, the ginger farms in the hilly Waibau catchment and the sugar cane farms on the foot slopes of the Ba valley, exemplified this situation.
- *The reconnaissance survey showed a pattern of land areas with different conservation needs.* About one-tenth of the area required changes in land use and implementation of vetiver grass strips, bench terracing or other conservation practices. Outside assistance and, in a few cases, penalties may be needed in these areas. The users of over half the land could probably make their own conservation improvements if they become aware of the problems and were shown how to make them. There was a need for an education approach. The remainder of the land in the watersheds tended to be steep, fragile and obviously unsuited to many uses. These were mountainous, forested land units where land use planning must precede development.
- *Fiji's 'easy' land has been taken up.* All the suitable flat land was put into use over 30 years ago. Agriculture expansion could only go out to the hills but it could not use flat-land farming systems on the hills and expect to be sustainable. Conservation practice had to be part of the package.
- *Fiji has most of the information, technology and legislation needed for conservation.* The Land Use Section had made soil and land capability maps of the country. The Meteorological Service and Hydrology Section, PWD had one of the most intensive climatic station networks in the world. Most of the techniques needed were well known and publicised in the 1950s. Lack of stream sediment data was a major information gap. A programme to correct this was recommended. The Land Conservation and Improvement Act gave government considerable power to meet conservation needs. The agricultural and logging leases on crown and native lands had great potential for controlling conservation problems.

- *There was no programme to deliver the blend of direct assistance, education and planning needed to respond to the soil conservation needs.* The potentially effective conservation tools in legislation and lease agreements hadn't been used for a number of years. If the country was to control soil erosion, it needed a programme with strong leadership, a well-trained and versatile staff, co-ordination among several government agencies, NLTB and FSC, and the money and political support to make it all happen.

Nelson made the following recommendations:

(i) *Approve financing for the Dept of Agriculture's Waibau Integrated Soil Conservation Pilot Project.*
This would help reactivate the involvement in conservation of the Land Conservation Board and NLTB. It would test some rusty conservation tools. It would be an important psychological breakthrough in soil conservation nationally.

(ii) *Assign a strengthened Land Use Section to the Land Conservation Board as its support unit.*
The Land Conservation Board is powerless without some means to carry out a programme on the ground. The Land Use Section is buried in a Division where conservation is a low priority. Solve both problems by putting the Board and the Section together.

(iii) *NLTB and the Lands and Survey Division should build their images as 'guardians of the land'.*
NLTB has taken the first step in this direction by hiring a land use planner. Other steps that should be taken are: (i) emphasis on good husbandry requirements in leases with the lessors, (ii) training of field staff to recognise conservation problems and, in collaboration with extension services, counsel land users in proper land management, (iii) impose sanctions when all else fails.

These organisations, as the principal landholders in the country, should not only participate in the conservation movement, they should become leaders of it by co-sponsoring field days, seminars, award programmes, workshops and publications. Their partners in these activities could include the Department of Agriculture, Fiji Sugar Corporation, the Department of Forests, and the Fiji Institute of Agriculture Science.

(iv) *Implement the programme outlined (in the report).*
It starts with the decision that something will be done about soil erosion, describes ways to revitalise the Land Conservation Board's and NLTB's conservation activities and then lists seven projects intended to build experience, reduce isolation among participants in conservation and to build the information base as well as get something done on the ground.

2.2.11 Rewa/Ba Watershed Management Study Project Summary and Ba Project Proposal
(J D. Clark, 1989)

This in-depth study formed part of the ADB-funded project to improve watershed conditions in the Rewa and Ba watersheds (refer 2.2.10). The project was to yield upstream benefits through greater productivity from the land. Downstream benefits would result from less sedimentation due to better watershed conditions and, therefore, lower flood peaks and less investment needed in downstream flood amelioration measures. The latter refers mainly to the hope that river dredging can be reduced or become unnecessary if human-caused sediment production in the watershed could be reduced.

Clark's assignment was to review present and proposed legislation pertaining to conservation of land and water and make recommendations in policies and institutional changes required to implement these laws. Some of his observations and recommendations affecting soil conservation and watershed management include:

(i) Tenancy and leases

- good husbandry clauses in leases and the authority of the local agricultural officers to impose conservation conditions should be called to the attention of the farmer;
- there is a need to set specific conservation standards by land classes. ALTA should be revised to allow forfeiture if the standards are not met;
- the 76 per cent of the agricultural tenancies under provisional approval notices and tenancies at will should be converted to proper leasehold interest and registered. This would enhance the farmers' security of tenure and improve his interest in soil conservation;
- NLTB field officers should be trained to counsel farmers in conservation practices and the enforcement of leasehold conditions; and
- enforcement of lease provisions must be reviewed. Minimal enforcement activity suggests they are not effective.

(ii) Planning controls

- legislation bringing native reserve land under land use planning should be considered;
- recommendations attached to planning approvals should automatically be made conditions of any tenancy granted by NLTB or the Lands Department; and
- regional planning is not binding under the proposed revision of the subdivision of Lands Act – this should be re-examined.

(iii) Administrative direction and intervention

- strengthen the Land Conservation Board's administrative powers under the Land Conservation and Improvement Act;
- make the Land Conservation Board the lead agency to promote, co-ordinate and impose a national watershed management programme;
- Land Use Section of MPI (now MAFF) should hire additional staff and serve as the technical support unit for a reactivated Land Conservation Board;
- soil conservation provisions could be attached to licences for water diversions under the Rivers and Streams Ordinance;
- the Irrigation Act gives Commissioners the authority to define and impose conservation standards on project participants;
- field staff from various agencies, with proper training and a common field manual, could help in the enforcement of conservation requirements.

2.2.12 Watershed Management Study on Fiji

(S. Clark, 1987)

This was not a national investigation, rather a watershed specific study. However, it did give serious consideration to the major national conservation issues, in particular comments on legislative, land use practice and institutional issues. The author observed that:

> There are five ways through which people are influenced to accept and embrace land conservation measures. These are listed below.
>
> 1. Education and incentives.
> 2. Conditions attached to tenancies and leases.
> 3. Planning controls imposed on the use of land under a land use plan.
> 4. Administrative directions authorised by legislation stopping or prohibiting improper land use practices.
> 5. Prosecution and imposition of penalties.

Clark further proposed additional provisions to the Land Conservation and Improvement Act (1953). These provisions would strengthen the LCB. making it the most appropriate agency of Government to act as a focus for all other Government bodies who promote and have some responsibility for the enforcement, conservation and preservation of the nation's land resources. In this way, the LCB would become the co-

ordinating authority for discussion, land use planning, land and water conservation and management, and for ensuring that the spirit of various legislation is implemented.

The additional provisions to the Land Conservation and Improvement Act recommended by Professor Clark were as follows:

> In carrying out its functions, the LCB shall have regard to the need to make proper provision for the following:
>
> (i) classifying all land within Fiji in terms of its suitability for the various uses to which land may be put,
>
> (ii) indicating those uses of land in any area which would be detrimental to the conservation or protection of land or of the environment,
>
> (iii) specifying techniques of land management which may contribute to the better conservation, protection or improvement of any land,
>
> (iv) the conservation, protection and improvement of all lands, including:
> - lands devoted to the cultivation of sugar, of grain, or of gardens,
> - natural grasslands and forest lands,
> - pine plantations and planted forest lands,
> - lands affected by the construction of roads or by other forms of development,
>
> (v) education of the public in the need for land conservation, protection and improvement and appropriate techniques of land management and the provision of proper educational and extension services,
>
> (vi) the regulated change from existing uses of land which are detrimental to the conservation or protection of land to uses which are less detrimental thereto,
>
> (vii) ensuring that the policies and programmes adopted pursuant to these Regulations are properly and efficiently implemented by public authorities.

2.2.13 Fiji Forestry Sector Study

(FAO, 1988)

This large report represents the most comprehensive review of the forestry sector in Fiji. The objective of the sector review was to formulate a strategy for the development of forestry over the next 25 years (from 1990). The strategy was 'to maximise the sustainable contribution of the sector to the development and diversification of the economy…and at the same time protecting and enhancing the effectiveness of the country's forests in environmental conservation'.

The review established how much forest and what types existed. Also, for what purposes in the long-term interests of Fiji should the forest resource be developed and the accruing benefits provided and secured for stakeholders. It was estimated (in 1988) that the remaining indigenous forest was around 750,000 to 800,000 ha. Together with the afforestation that had brought some 50,000 ha of long-deforested land back into production, Fiji has just under half of its total land area (1,830,000 ha) under forest. Details of the national forest cover as at December 1997 are presented in Table 6.

The examinations made of land use policy and practice, and of the environmental issues in forest and plantation development confirmed the validity of the classification under the Land Resources Division survey of 1966–69 of 30 to 33% of the indigenous forest as protection forest for streamflow and watershed conservation. They found that the classification did not go far enough especially in view of the broader environmental perspective now applying. They also confirmed that encroachment by logging and clearing was common and increasing.

Table 6: Estimate of the Fiji forest resource

	Production Forestry	Hectares	%
(i)	**Indigenous forests**	**187,700**	**10.25**
	State land	5,240	
	Reserve land	940	
	State lease	840	
	Native land	167,340	
	Freehold	13,340	
(ii)	**Forest Plantation**	**112,490**	**6.14**
	State land	5,180	
	Reserve	6,080	
	Hardwood plantation lease	49,850	
	Fiji Pine Ltd Lease	43,680	
	Private	7,700	
(iii)	**Protection Forests**	**260,330**	**14.22**
	Protection forest	242,310	
	Mangrove	18,020	
Indigenous Logged Forest		**309,940**	**16.93**
Total Forest Area		**870,460**	**47.56**
Total Land Area		**1,830,000**	**100.00**

Source: Forestry Department Annual Report, 1997

The review concluded that the timber production potential would depend, as planned, on afforestation, on conversion of non-commercial indigenous forest to plantation and reforestation after harvesting to increase the productivity of the indigenous forest. However, without an authoritative land use plan, the review found it hard to say how far expansion of the forest resource could go. From the review of existing land use information and criteria it seemed safe to allow for the possibility of at least doubling the present plantation areas. That would take afforestation by pine to 120,000 ha and hardwood reforestation in the indigenous forest to 100,000 ha, leaving around 60,000 ha for timber production under a natural management regime. These projections, based on current knowledge, are too high and the rate of conversion of natural forests into plantation as done in the past can no longer be recommended.

The review expressed concern at the poor regard given in practice to the national and local importance of the environmental value provided by the forest cover. Given the topography, geology and climate of most of Fiji, protection of the watersheds, the streams and the soil resources is fundamental to the future of the country and its people. Therefore the implementation of silviculture mechanisms and the NCOLP are vital to sustaining the indigenous forest for the future.

Further, two features of the importance of land use practice were deemed as fundamental in any strategy for the development of the forestry sector. These were firstly, protection and the prevention of damage to the still existing forest cover; and secondly, rehabilitation of the damaged forests and deforested land with environmental significance. In consideration of the first, and to some extent the second, deficiencies in policies and practices that must be corrected include:

- The ease with which protection forest can be logged through the loophole of agricultural development;
- The ease with which stream flow, soil erosion and ecological considerations can be disregarded in logging;
- The inattention given in some logging operations to legally established reserve areas;
- The ease with which de-reservation can be effected; and

- The difficulty of bringing areas of ecological significance, even at the international level, under protection before they are disturbed or destroyed.

Largely based on land use assessments of Twyford and Wright (1965) and taking recommendations from other surveys into account, the review concluded that some of the nation's land area should be permanently under forest with no major disturbance for the following reasons:

- Water catchment and soil conservation, 119,000–202,200 ha
- Ecological and species diversity conservation, 200,000–210,000 ha
- Natural area/aesthetic tourist value, about 40,000 ha
- Subsistence forest needs of village communities, 75,000–100,000 ha
- Special natural features, archaeological or other historical sites should be included as much as possible in the areas under categories (a), (b) and (c) above.

The Forestry Department reported a balance of 237,300 ha of production forest by the end of 1986. Assuming an annual reduction rate through logging of 3,000 ha to 4,000 ha, this leaves about 233,700 ha for utilisation from 1988. Using the results of the LRD surveys (1969) and noting the comment by Galletly and Swartz (1974) that good logging practice does not create significant soil erosion, the review agreed that all forests classified by the LRD survey should be logged (sustainably is now recommended). The degree of control should however be much more stringent for some areas than for others, particularly with respect to roading design and construction and bullock tracks where bullocks are used. These are largely determined by the general topography of the areas concerned as follows:

- Log with extreme care about 33,000 ha of production forests on steep slopes;
- Log with extra care about 181,550 ha of production forests on moderate to steep slopes; and
- Log under normal conditions some 18,230 ha of production forests on flat, or gentle to moderate slopes.

The Forest Sector Review made two significant concluding observations related to land use. Firstly, that soil erosion is an important national issue. Soil erosion through improper land use and forestry harvesting practices that are at variance with the guidelines prescribed in the Forestry legislation and other regulations has reached alarming proportions. The negative environmental impact of uncontrolled land use was also cause for concern. The Review recommended that the problem should be tackled through concerted efforts by ministries and agencies. Legislation provides sufficient power for effectively addressing land conservation, preservation and environmental issues. The difficulty lies in the priority allotted and the insufficient resources that have been made available for the administration of the legislation. It also appears that these important problems have not been favoured with the political will and resolve that they manifestly deserve. Secondly, that a national land use policy is urgently required both for planning purposes for technical planners and for formulating an institutional mechanism for involving landowners in planning the appropriate use of their own land. This will also require an extensive and intensive awareness/education programme for extension officers of the Agriculture and Forestry departments, and for the officials of NLTB, Ministry for Rural Development and Ministry for Fijian Affairs. It may even be necessary to influence the curriculum of primary and secondary schools.

2.2.14 Report on the Fiji National Agricultural Census 1991

(G. Otanez, D. Narayan and S. Tubuna, 1992)

This document provides statistics on the structure of the agricultural sector; these data were intended to assist in the formulation of effective development strategies for the agricultural and rural sector. The agricultural census in 1991 was the third; two previous censuses were conducted in 1968 and 1978; a fourth was under preparation for 2001.

Given the problems experienced in the two previous censuses, a new methodology – Area Sampling Frame (ASF) – was introduced for the 1991 survey. This had the advantage of being used as an ongoing Agricultural

Statistics System for estimating crop production and yields. The types of data attributes collected/measured included:

- Farmer (holder) – identification, race, age, education, and occupation;
- Farm (holding) – legal status, total land, land use, land tenure, type (subsistence only, mainly sale);
- Temporary crops – planted, irrigated, and harvested areas (in pure and interplanted stands);
- Permanent crops – planted, irrigated, and productive age; age and number of planted and bearing trees (in pure, mixed, interplanted, and associated stands;
- Number of scattered plants, trees, and vines (planted and bearing);
- Types of pastures (areas);
- Livestock and poultry – number of cattle by sex, age and use (dairy, beef, non-dairy and non beef); other livestock; poultry (non-industrial) in the farm;
- Farm employment – with and without remuneration by gender, cash, kind;
- Farmer household population – age, sex, race, and work status (full-time, part-time), and number of hours spent on the farm;
- Stock of machinery by type. Machinery hired and/or borrowed;
- Use of fertilisers – organic, inorganic, agro-chemicals;
- Farm management and existence of fisheries activities in the farm.

Results of relevance to the review include:

- *Total Land Under Farms and Non-farms*
  From a total area of 1,306,607 ha, 591,407 ha (45.3%) was estimated to be under farms and 715,194 ha (54.7%) was classified under non-farms. The land use in the non-farm category was as follows: 453,609 ha (63.4%) natural forest, 196,967 ha (27.6%) non-agricultural land, and 64,624 ha (9.0%) in planted forest. The information is further divided into the various divisions (Table 7). The detail for each province is given in Appendix 4.
- *Number of Farms and Total Land under Farms*

  The 95,400 farms in existence on census day comprised a total land area of 591,407 ha with the average farm size 6.2 ha. This is lower than the 1968 average (7.2 ha) and higher than the 1978 average (4.5 ha). 93% of the 95,400 existing farms were in the rural zone with the remaining 7% in the peri-urban zone.
- *Actual Land Use*
  Of the 591,000 ha under farms, 231,000 ha (39%) was cultivated land (area under temporary/permanent crops and fallow of one year or less), 173,000 ha (29.4%) was under pasture and unimproved grazing land, and the remaining 187,000 ha (31.6%) – classified as 'other' – included fallow of more than one year (20,398 ha), natural forest (104,338 ha), planted forest (8359 ha) and non-agricultural areas (54,025 ha). It was noted that 28,300 ha were in pasture under coconuts.

In addition to these land use data, the report contains a brief analysis of all the final census results plus the tables containing the raw data.

Table 7: Area (ha) of land use type (1991) by administrative division

Division	Agriculture	Planted Forest	Natural Forest	Other Land Uses	Total Land Area
Central	76,719	3,492	130,536	17,376	228,123
Western	269,743	41,773	120,332	131,566	563,414
Northern	190,039	15,207	165,284	28,207	398,737
Eastern	54,906	4,152	37,457	19,818	116,333
Total	**591,407**	**64,624**	**453,609**	**196,967**	**1,306,607**

2.2.15 *Environment: Fiji. The National State of the Environment Report*

(D. Watling and S.P. Chape [eds], 1992)

This review or 'stocktake' was the essential first step toward developing the overall National Environment Strategy (Watling and Chape 1993) for Fiji. The report covers all the major environmental issues of importance and concern. It reviews Fiji's historic and existing situation with respect to environmental quality, natural resources and the way they are used, environmental policy and law and their administration, and so on. In the section of the report dealing with natural resource use and environmental issues, the editors summarise the situation as follows:

> The almost complete utilisation of first-class arable land determines that the current expansion of agriculture into marginal hill areas and steeplands will continue and increase. Consequently, even a small increase in the population can be expected to dramatically expand localised land degradation. Some agricultural practices, such as steepland sugar cane and ginger production are not sustainable; they dramatically increase natural erosion rates that are already high. This results in loss of topsoil and sedimentation of rivers and streams. The lack of security of tenure for many farmers who must lease land does not encourage careful husbandry of soil resources, while the Government's institutional land conservation measures have been ineffective. The drive for increased agricultural production has led, in the past, to extensive reclamation of mangroves. The practice has proven to be economically unviable and resulted in considerable national financial losses.
>
> Deforestation in Fiji is moderate but continuing. Since the mid-1960s an estimated 90–140,000 ha (11–16%) of the nation's forests have been converted to non-forest land use. These figures are not so severe as to cause immediate concern about the disappearance of the forests of Fiji. However, there is a severe imbalance in the distribution of forest with the drier parts of the larger islands and many of the smaller islands having suffered severe deforestation. Fiji has embarked on some highly successful plantation establishment programmes. The softwood (pine) plantations are established primarily in the dry zones, as reforestation of degraded lands. In contrast, the exotic hardwoods have been established within existing native forests, with some potentially adverse environmental implications. Current logging practices cause a great deal of avoidable environmental damage. The adoption of a National Code of Logging Practice is a welcome move, but is only as good as its enforcement.

With respect to environmental law and administration, the Report sees Fiji environmental laws as many, varied and sectoral. At least 25 Acts have some important role in what is today perceived as environmental management, and they are administered by at least 14 different ministries, statutory bodies or other agencies. The Report describes the laws as old and ineffective in a modern environmental management context or as suffering from lack of enforcement of regulations through inadequate staffing, lack of technical resources and funding, or through administrative failures.

The Report concludes that Fijian land ownership and customary rights and their future management are central to sustainable development and sound environmental management. It recommends three approaches be undertaken:

- A natural resources survey to accurately identify all elements of the natural heritage;
- Preparation of a national land use plan derived through both technical land-capability assessment and consensus, based on full community participation; and
- A major effort to provide a special form of community education to give traditional community decision makers the technical and other knowledge they would need to manage the environment and resources in a modern development context.

2.2.16 *The National Environment Strategy: Fiji*

(D. Watling and S.P. Chape [compilers], 1993)

The National Environment Strategy (NES) provides a flexible framework that would allow the Government to manage the various environmental issues from a strengthened and appropriate policy and legal base and administrative structure. It builds on the overview of the environmental issues presented in the 'State of the

Environment Report' and includes a number of findings and recommendations pertinent to the review. The NES identifies six environmental issues of major significance. These include:

- The Government is unable to manage natural resources on a sustainable basis because of inadequate policies, legislation, forward planning and administration;
- Pollution is effectively uncontrolled and emerging as a serious issue;
- Municipal waste management is a conspicuous national dilemma;
- Serious soil degradation is becoming prevalent in the marginal hill lands which are Fiji's agricultural resource base of the future;
- Deficiencies in physical planning are being compounded by significant urban drift resulting in widespread informal development in peri-urban areas which host many environmental and social problems; and
- Heritage and biodiversity values are inadequately appreciated, while losses are increasing through ill-directed development activities and lack of management and knowledge.

From all the recommendations made, the following have a direct bearing on rural land use policy:

(i) General recommendations:

- Because of its unique position as custodian on behalf of landowners and future generations of landowners, it is particularly important that the NLTB has a specific environmental policy.
  - » NLTB's Environment charter be a credible and comprehensive policy document extending to all environmental components of its estate.
  - » Several reports have already been prepared on the land and water resource management issue and these should be reviewed with the view to implement the recommendations, or adopt an alternative strategy, whichever is appropriate.
  - » There is an urgent need for effective legislation for land and water resource management.
- Comprehensive resource management legislation
  - » New Zealand's Resource Management Act, Britain's Environmental Protection Act 1990 and other similar legislation be evaluated in the context of Fiji's requirements for new resource management legislation and extensive amendment to existing legislation.

(ii) Specific sectoral recommendations:

- Forestry
  - » The National Code of Logging Practice and silvicultural prescriptions be supported by extensive training for both industry operators and DOF officers.
  - » The DOF set up an appropriate framework to advise and assist landowners in natural forest management for long-term protection (parks and protected areas) or sustainable yield harvesting.
  - » The current (now completed) Natural Forest Inventory be succeeded by a permanent forest monitoring system with regular (3–5 years) satellite data analysis.
  - » A moratorium be placed on the establishment of hardwood plantations in natural forest, henceforth they be confined to areas of 'non-commercial' or degraded forest.
- Land degradation and soil conservation
  - » The issue of soil degradation in the marginal hill lands receive Government attention appropriate to its significance as a major threat to the agricultural resource base of the future and to the requirements of future generations of landowners.
  - » A nationwide educative initiative on soil conservation amongst landowners is urgently required.
  - » MPI significantly increase its research into agricultural practices suitable for the marginal hill lands and more importantly, the adoption of sustainable alternatives that are attractive to farmers.
  - » MPI revitalise its soil conservation management based on a strengthening of the Land Conservation Board.

- » The Fiji Sugar Corporation examine its contractual arrangements and administrative procedures with farmers to determine whether changes could reduce land degradation.
- » The NLTB and Government examine the various types of lease currently being used to determine whether changes to lease conditions could increase commitment to soil conservation and good husbandry.
- » Environmental issues pertaining to sustainable agricultural practices and the maintenance of the capacity of leased land to be productive in the long term, should be prominent in the review of the forthcoming ALTA leases, as well as in the development of Government's overall national environmental policies.

The NES discusses the issues behind these recommendations in more detail. It concludes with an implementation strategy for a series of prioritised projects of which 10 are of direct interest to land use. These are:

- *National Land Use Plan*
  Preparation of an authoritative land use plan based on land capability (Project 4).
- *Introduction of Soil Conservation Practices*
  Introduction of soil conservation practices by sugar cane farmers (Sub project 5.1).
  Promotion of soil conservation practices by ginger farmers (Sub project 5.2).
- *Examination of the Feasibility of a Comprehensive Resource Management Act for Fiji*
  Determine whether such legislation would be appropriate for Fiji (Project 6).
- *Natural Resource Assessment*
  Terrestrial resource survey to achieve understanding of Fiji's biological and ecological resources and develop a GIS database and identify ESAs to help generate ecologically sustainable options for resource exploitation (Sub project 8.1).
  National Environmental Database (NED) to integrate the results of both terrestrial and marine resource surveys into a single, spatially-referenced NED (Sub project 8.3).
  Develop a computerised Decision Support System to assist planning and management of Fiji's natural resources and to help mediate disputes on resource use options (Sub project 8.4).
- *Integrated Development Plan for Taveuni Island* (Project 10).
- *Upgrading Environmental Education*
  Improving environmental education by correcting curriculum deficiencies, providing in-service training to teachers and improving the resources in schools (Project 12).
- *Directed Public Awareness Programme*
  Raising general awareness in rural communities on benefits of sustainable resource use and awareness of specific, affected communities on the repercussions of non-sustainable land use (Project 13).

2.2.17 *Fiji: Soil Taxonomic Unit Descriptions Handbook*

(D.M. Leslie and V.B. Seru, 1998)

The Soil Taxonomic Unit Descriptions Handbook (STUDs), published in two volumes, describes in detail the soil series identified and mapped for Fiji and provides the supplement to the NZODA-funded national soil survey of Fiji mapped at a scale of 1:50,000. These soil maps are available from the Land Use Section's geographic information system (GIS) located at MAFF's Koronivia Research Station. The STUDs include comprehensive information about the physical, chemical, and mineralogical properties of soils with geographical information about their occurrence and distribution, plus climatological and topographical aspects of Fiji soils.

The Twyford and Wright (1965) classification for the soils of Fiji was unique to the nation but made it difficult to correlate Fijian soils with those of other countries. This factor denied the 'import' of land use experience from other countries, which could have partially circumvented the costs of research in Fiji. An NZODA project undertook to correlate Fiji's soils into a more universal system. Fiji adopted the US Soil Taxonomy soil classification system (1975) so as to facilitate technical interaction and dissemination of knowledge about crops, farming systems, and sustainable land use from other countries. The software models and skills to deliver these outputs are in place.

2.2.18 The Study on Watershed Management and Flood Control for the Four Major Viti Levu Rivers in the Republic of the Fiji Islands

(JICA Study Team, 1998)

At the request of the Government of Fiji, the Japanese International Cooperation Agency (JICA) developed this master plan for watershed management and flood control in the four major Viti Levu rivers (Ba, Nadi, Rewa and Sigatoka). The final report comprises a Summary Report, a Main Report, two volumes of Supporting Reports and a Data Book.

While this is an engineering/geohydrology study of the four catchments, the reports do consider the biophysical issues and causal factors affecting soil erosion, water quality, and more. There are some repeat but relevant suggested mitigations for erosion (similar to Nelson, 1987); measures for forest preservation, afforestation, sustainable agriculture, and the scenarios for future land use, although brief, are of interest. However, the reports do not address institutional, legal/regulatory or human resource issues (other than required positions for the proposed projects).

Table 8 provides quantitative soil loss data estimated for the Rewa, Ba, Sigatoka and Nadi watersheds. Figures for the relatively well-forested Rewa watershed in the wet zone contrast with the three dry zone watersheds with their smaller forested areas, extensive grasslands and cropping land. The total soil loss reflects the area of the respective catchments.

Table 8: Soil loss in Rewa, Ba, Sigatoka & Nadi watersheds

Watershed	Soil loss (ton/ha/year)	Soil loss (mm/year)	Total soil loss (million tonnes/year)
Rewa	32.2	2.2	9.3
Ba	69.0	4.6	6.4
Sigatoka	76.9	5.1	1.1
Nadi	81.4	5.4	4.2

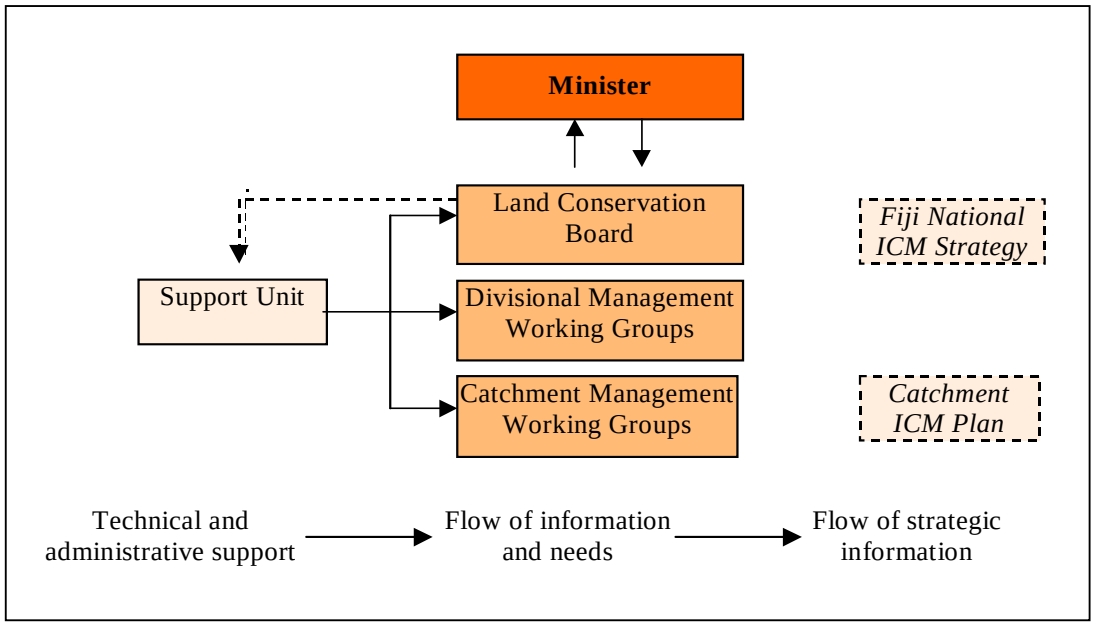
2.2.19 Integrated Catchment Management in Fiji

(L. Mudgway, 1999)

This paper highlights a number of watershed management issues and discusses current activities and responsibilities for watershed management studies viz those of Nelson (1987) and JICA Study Team (1998). The author notes that the former study made several important recommendations 'which appear to have been only partially implemented …and the JICA study unfortunately did not address either strategic planning aspects of watershed management …nor planning on a catchment scale'.

Recognising current national policies, the author makes recommendations for establishing a national Integrated Catchment Management (ICM) framework for Fiji. A suggested structure of the national ICM is given in Figure 11.

Figure 11: Proposed structure for a national integrated catchment management programme



The paper argues that a foundation for proper watershed management already exists – expertise in the various technical areas exists in the country, many of the basic questions have been answered, methods of mitigation are known and have been applied, and the elements for an institutional framework are in place. However, a number of further institutional and planning recommendations are that:

- The power of the current Land Conservation Board be increased;
- Legislation (including the Sustainable Development Bill in preparation) supporting the powers of the Land Conservation Board be reviewed and strengthened;
- Knowledge of watershed management issues be improved within the Land Conservation Board;
- Human resources and management of the MAFF Land and Water Resource Management Division be developed and strengthened to become the support unit to the Land Conservation Board;
- MAFF Land Use Section and PWD Hydrology Section be incorporated into the MAFF Land and Water Resource Management Division; and
- Aid funds and staffing assistance should be requested from developed countries that are at the forefront of community-based ICM programmes.

Mudgway recommended that the following programmes be implemented as a priority:

- A national integrated management strategy be prepared under the direction of the Land Conservation Board and Catchment Working Groups;
- The development of the national ICM strategy and catchment management plans be community driven;
- The cost of current lack of or poor land and water management practices be determined and presented to government;
- A national drought management plan be prepared; and
- A national flood management plan be prepared.

Summary

In summary, it is difficult to find a rationale, recommendation or judgement about the environment, land use and land conservation in Fiji that one of the foregoing reports has not made. The reports show that almost all the basic questions have been addressed and in most cases have been answered. The biophysical resource base has been well characterised (and mapped). The literature covers the 'what, how, why and where' of soil conservation and land use.

The lack of political resolve to confront the issues becomes more apparent in view of the volume and quality of the previous works (most performed at the request of government) that have been ignored. Consultants must share some of the responsibility because a number of the reports lack focus and/or ask for extensive institutional change (which can result in the report being put in the 'too-hard basket').

Several of the previous studies noted that all those governmental organisations involved with land use and land administration had conservation responsibilities and that the Land Conservation Board had the lead role based on current legislation. However, it was commonly acknowledged that the NLTB and the LCB were not discharging their responsibilities. A new approach to conservation based on a combination of statutory controls, extension and land use planning was recommended in a number of reports. This last element – planning – was based on the observation that the worst problems were related to land use that is unsuited to a particular land or soil type and not to bad management.

The resources devoted to soil conservation are inadequate for implementation of significant measures, either in terms of providing information or incentives. The limited resources that are made available to the Land Use Section have been mainly directed at planning land use with regard to its potential for production rather than to its potential for longer-term land degradation.

A major constraint has been NLTB's reluctance to exercise its legal rights regarding bad husbandry practices, although some reasons for this were recognised: lack of clear guidelines on what constitutes bad land husbandry practices, limited resources, the training and background of NLTB estate agents, the priority given to rent collection, and a lack of appreciation of the magnitude of the soil erosion problem. Whilst the Land Use Section recommended restrictions of sugar cane cultivation to slopes of 11° or less, FSC and NLTB allow cultivation on much steeper slopes. Erosion over the years has led to thinning of topsoils and to progressive siltation of rivers, resulting in deterioration of drainage on river flats, frequent flooding and the formation of shallow bars across the river mouths. Dredging of rivers has become necessary; the maintenance and construction of drains on flat land was an urgent matter and on adjacent sloping land, contour planting, the building of new terraces and bunds would have to be tackled. The land use overview by Twyford and Wright (1965) accurately describes the situation as we go into the new millennium.

There was consensus among the reports in the fact that after Fiji assumed ownership of the sugar industry (in 1973), concern that tenants carry out land husbandry practices diminished, partly because of the drive for production and partly because any punitive measures against damaging land practices took on political overtones, associated with the sensitive issue of land. Most expressed concern at the severity of soil erosion in the sugar cane belt that they claimed resulted from a lack of land husbandry.

In those reports that addressed the issue of a national land use policy, most pointed to the need for future land use planning and strategies for increasing rural production to be directed towards increased yields from land already in use and towards a closer match between land use and land capability. They also highlighted the need for closer attention to soil conservation both in future land development and on existing farmland. The LCB was proposed as the co-ordinating authority for discussion, land use planning, land and water conservation and management, and for ensuring that the spirit of the various pieces of legislation is implemented. Those previous studies that concentrated on examining land and water legislation and associated institutional arrangements tended to advocate revision of legislation, departmental re-organisation, and strengthening and extending the roles and responsibilities of the Land Conservation Board. Relevant

reports stressed the need to strengthen the Land Use Section as the primary support unit to the Land Conservation Board and the requirement for the NLTB and the Lands Department to build their image as 'guardians of the land' and to put in place the 'tools' to facilitate change.

Co-ordination and standardisation of land use planning practices was recommended. Conservation would become increasingly important as more of the 'poorer' classes of land are brought into use; Fiji would need to develop different land use (for the 1990s). Conservation of natural resources would only be effective if there is a strong executive authority, close integration between government departments and other 'players', and strong political will.

More recently, a small number of studies considered needs in the environmental sector and agreed that the general lack of inter-departmental co-ordination was a major obstacle to conservation as the Government was too focused on rapid development. The reports described a poor awareness in Fiji of the inter-dependence of conservation and development and stated that institutions concerned with conservation and environmental management are weak and insufficient for Fiji's needs.

The Land Conservation and Improvement Act gave government considerable power to meet conservation needs. However, there was no programme to deliver the blend of direct assistance; education and planning needed to respond to the soil conservation needs. The potentially effective conservation tools for legislation and lease agreements had not been used for a number of years. If Fiji was to control soil erosion, it needed a programme with strong leadership, a well-trained and versatile staff, co-ordination among several government agencies, NLTB and FSC, and the money and political support to make it all happen.

There was general agreement that Fijian land ownership and customary rights and their future management were central to sustainable development and sound environmental management. Difficulties of agricultural development were not seen as due to any serious deficiency in the natural resources, so much as to the adverse relationship between farmers and their land. In the pre-independence days, there were problems with the administration of land that led to problems of land use that existed at the time: several bodies with their own agendas pulling in different directions as far as land use development and conservation of resources were concerned. Four studies commented on the effect of land tenure in application of various land use practices. Despite improvements in the security of land tenure for land obtained from NLTB, there remains little incentive for lessees to invest in conservation measures.
The comprehensive FAO Forestry Sector Review expressed concern at the poor regard given in practice to the national and local importance of the environmental value provided by forest cover. The review advocated a strategy for the development of forestry (from 1990), specifically to maximise the sustainable contribution of the sector to the development and diversification of the economy, while at the same time protecting and enhancing the effectiveness of Fiji's forests in environmental conservation. The FAO forestry review concluded that soil erosion was an important national issue. Soil erosion resulting from improper land use and forestry harvesting practices that were at variance with forestry legislature guidelines (prescribed in legislation) had reached alarming proportions.

Legislation provided powers to address land conservation, preservation and environmental issues. The difficulty lay in the low priority given to, and the insufficient resources made available for the administration of such legislation. It was apparent that these problems had no political support. The Review stated also that a national land use policy was urgently required for both planning purposes and for developing an institutional mechanism for planning with landowners the appropriate use of their own land.

Ironically, the basic problems do not change. Uncertainty about land tenure as a disincentive to conservation is of equal concern today as it was in the 1950s. Steep slopes do not support row crops any better today than 30 years ago; soil depletion has only worsened. The majority of farmers still will not put in conservation improvements without financial help.

The early studies noted that most arable land was occupied and future development would be on hilly land; the buoyant agriculture sector of the 1970s was largely predicted because of the availability of unimproved

land that could be brought into permanent cultivation. However, by the end of the 1970s, this expansion had approached its limits. There was consensus that a number of rural sector trends in the 1970s were creating situations where fewer rather than more people were participating directly in primary production. These trends were seen to relate in part to land availability and land quality, land tenure, labour mobilisation and, in the Fijian village context, a changing balance between subsistence and commercial agriculture.
Land and water were identified as the main basis of the Fiji economy; the predominant importance of small-scale agriculture was reaffirmed; and the observation that virtually all economically unusable land was already in use or allocated was repeated in conclusions of most reports. Limitations in the amount of suitable land available for development led to an emphasis on increasing productivity from existing land resources. Fiji has most of the information, technology and legislation needed for land and water conservation planning and management.

A number of authors reviewed both general and specific land use practices needed to reduce erosion and identified land use and erosion research needs. One study (1984) concluded that the agricultural productive base is running down at a rate that is well above what would be regarded as economically acceptable. Major constraints to more stable land uses were identified as: the absence of effective government controls, the lack of resources devoted to soil conservation, the high preponderance of leaseholders, and the lack of information at the farm level on an appropriate package of land use and husbandry practices.

Studies with an economic focus noted that efforts to commercialise farming often bring private benefits but impose social costs. Two of these costs are loss of employment opportunities and soil erosion. A number of authors were not optimistic about short-term prospects of a national effort in land conservation because of concern generated by declining prices for export crops, balance of payment problems and rising unemployment.

Chapter 3

Analysis of Current Land Use Legislation Guidelines and Implementation Responsibilities

3.1 Introduction

This section discusses the legislation and the institutions responsible for law enforcement as a background to the land use policy recommendations that come out of this study. A number of earlier studies have been undertaken, each looking at one aspect of the rural sector, not always the whole. The most comprehensive recent study was the Review of Watershed Management Legislation by Clark (1986). It includes a thorough critique of legislation relating to subdivision of lands and the conservation and management of land and water resources; this study draws on the pertinent items outlined in Clark's findings and recommendations.

The following pieces of legislation are of primary relevance to the rural land use sector and are therefore the focus in this analysis; they are as follows:

- The Land Conservation and Improvement Act,
- The Rivers and Streams Act,
- The Drainage Act,
- The Irrigation Act,
- The Subdivision of Lands – Residential & Industrial Act,
- Agricultural Landlord and Tenant Act (ALTA),
- Forest Decree.

Clark (1986) considers there are five broad ways of influencing land occupiers in their use of land in order to promote conservation of land and water resources and sustainable land management practice. They are:

- Education and incentives;
- Conditions attached to tenancies and leases;
- Planning controls imposed on the use of land;
- Administrative directions, authorised by legislation, which allow intervention to stop or prohibit improper land use practices; and
- Prosecution and imposition of penalties.

In consideration of education and incentives, legislation can facilitate the education of extension and land conservation officers and of land users. However, it generally happens through administrative, educational programmes rather than legislation. The same is true of incentive programmes, although these have an important effect in inducing tenants to make necessary capital improvements.

Considering conditions attached to tenancies and leases, the land tenure system in Fiji (where there is a predominance of native leases (85%) and limited area of freehold and crown lands), means that the majority of non-urban lands in productive use (where land management problems are most likely to occur) are occupied under a tenancy or lease arrangement. In the majority of cases, the landlord is the NLTB or the Crown: 'Because of the public status of both, it is possible, without interfering unduly with contractual freedom, to require that particular conditions to ensure proper land use are included in any tenancies granted by these agencies.'

Such conditions were subject to the regulations mode under the Crown Lands and Native Lands legislation. However, the Agricultural Landlord and Tenant Act (ALTA), introduced in 1967, now protects the interests of all agricultural tenants, whether their landlord is the Crown, NLTB, or a party with an interest in freehold land. Specific statutory conditions concerning land use and land husbandry are also imposed on tenants.

With respect to planning controls and administrative directions and interventions, the provisions in the Town Planning Act and the Subdivision of Land Act do not specifically apply to most agricultural lands. In general, planning controls are applied when the nature of land use is about to change. They permit change of use given adherence to specified conditions. Control through leases is also imposed at the commencement of an interest and any default can generally only be called to account by the landlord.

In contrast, the Land Conservation and Improvement Act (1953) provides for interventions over the way in which land is being used, such as requiring particular land practices to cease and directing remedial works to be undertaken. While lease conditions and planning controls tend to be preventive, they can also be both preventive and remedial.

With respect to the prosecution and imposition of penalties, there are opportunities to use enforcement measures where either planning conditions are not observed or administrative directions are not obeyed. In general, prosecution is a means of last resort and includes retribution for damage caused. However, prosecution is not an effective means of preventing soil erosion or land degradation, although it may indirectly have a preventative effect. In general, prevention is better; but if an individual breaks the rules there must be mechanisms in place that make people realise they should have adhered to them.

While the Drainage Act, through the schemes implemented by Drainage Boards, has some impact on increasing productivity from poorly drained lands, it is an example of administrative intervention to control land use. This is also true of the Irrigation Act and the Rivers and Streams Act.

3.2 Tenancy arrangements

3.2.1 Availability of land

Bienefeld (1984) found that freehold (8%) and leased native lands (85%) were of far better quality than other classes of land based on the soil resource assessments of Twyford and Wright (1965). Only 50% of these lands were either marginal (Class III) or unsuitable (Class IV) for agriculture. On the other hand, 75% of Crown land and unleased native lands are found within these categories. The report concluded that the greater part of the land not already committed was marginal land, which would only be suitable for agricultural or pastoral use after major improvements were made, including major soil conservation measures on the steeper land, major drainage schemes on poorly drained areas or heavy regular fertiliser applications on infertile soils.

The implications that arise point to the following:

- NLTB is the most important landlord for the quality agricultural land (Class I & II);
- Most quality agricultural land is already occupied;
- The importance of new land conservation measures being directed towards occupied lands, and appropriate enforcement measures in place;
- Having regulatory measures that are capable of influencing existing lessees as well as new lessees; and
- The need for strong land conservation measures to be imposed (as a condition of planning approval or as special conditions in a tenancy agreement) on new agricultural or leased marginal land (Class III & IV).

The constraints caused by the scarcity of suitable utilised agricultural land cannot be stressed enough.

For existing agricultural lands the ability of the law to influence tenants depends on the ‘standard’ or special clauses included in current leases. Where clauses are inadequate, the regulatory powers under the Land Conservation and Improvement Act could be applied.
There is a high probability that new agricultural tenants are likely to be on marginal land and therefore require the application of special land conservation measures. Standard and special clauses in tenancy

agreements should be adequate to impose the land conservation measures, in conjunction with or independent of planning approval conditions.

3.2.2 Tenancy issues

ALTA is designed to give security to tenants by providing for relatively long-term leases and standard terms and conditions. Although interests may be terminated by the landlord for breach of conditions, the tenant can automatically resort to an agricultural tribunal for the district and may further appeal to a central tribunal in order to protect his interest. The security provided to tenants in guaranteeing that existing interests are renewable and new interests are for 30 years is a crucial factor in encouraging tenants to make farm improvements. Provisions that ensure tenants can recoup the cost of agreed capital improvements are complementary to security of tenure and could prove critical in the context of soil conservation and sustainable land management.

3.2.3 Native lands

Under ALTA the tenant is obliged to permit the landlord to enter and inspect the land for all 'reasonable purposes connected with the proper use and cultivation of the holding by the tenant.' In Section 9 there is an undertaking:

> To farm, cultivate, manure and manage the entire holding in a good and husband-like manner according to the practice of good husbandry and also to keep the holding in good heart and condition and not to allow any part to become impoverished, injured or deteriorated by neglect or improper cultivation, and to keep the same clean and free from weeds.

Section 13(2) defines the *practice of good husbandry* as:

> … having regard to the character and location of an agricultural holding –
> *(a) the maintenance in good order of such terraces, drains, barriers, bunds and hedges and the carrying out of such measures of contour cultivation and cropping as the Permanent Secretary for Agriculture or his nominee shall consider to be the minimum standard necessary for the protection and conservation of the soil,*
> (b) the cultivation of the land in a husband-like manner and the maintenance of the fertility of the agricultural holding to the minimum standard considered necessary by the Permanent Secretary for Agriculture or his nominee,
> (c) the avoidance of any practice commonly known to have an effect harmful to the soil or which may lead to a reduction in the fertility of the agricultural holding.

The definitions are very subjective and unlikely to be upheld if tested in a court of law. MAFFA and NLTB should develop more quantitative definitions.

If the tenant fails to practise good husbandry, Section 13(1) (a) deprives him of his entitlement to extend a 10-year tenancy by a further period of 20 years. Section 37(1) (c) further allows the landlord to terminate the tenancy and recover the land after giving three months' notice, if the tenant:

> (a) is not cultivating or operating the land according to the practice of good husbandry; and
> (b) the interests of the landlord are materially prejudiced thereby.

This provision is missing from logging concessions.

There is notice that the landlord's interests must also be 'materially prejudiced' by any lapse in husbandry and termination may not proceed if the matter is put right within three months of notice being given. Although these provisions apply to all interests granted under ALTA, they are 'spelled out' to tenants in the standard lease document.

The Native Land Trust (Leases and Licences) Regulations (1984) includes one implied condition of relevance to land conservation viz a regulation that requires the consent of both NLTB (and any other consent required by law) to any 'development' on land. Development is defined to include any change in use and is therefore comparable to definition in the Town Planning Act.

Under the NLT Regulations and applying to leases entered into prior to October 1984, a lease for agricultural purposes was subject to the following implied conditions in that the lessee:

a) Shall manure the portions of the land planted as aforesaid and shall keep the whole in good condition and shall not allow any part to become impoverished and shall use such artificial or other manure as may be required by the lessor or an officer authorised by the lessor in that behalf in writing,
b) Shall apply such measures to check soil erosion as may be required by the lessor in writing and shall maintain such measures to the satisfaction of the lessor or of an officer appointed by the lessor in writing. Such measures shall include one or more of the following: strip cropping, terracing, contour planting, cover cropping, rotation of cropping, construction of drains or dams, and construction of fences,
c) Shall not fell trees or clear or burn off bush or cultivate any land within a distance of twenty-four feet from the bank of a river or stream,
d) Shall not cultivate any crops within thirty-three feet of the centre of any public road or on a slope exceeding thirty-five degrees from the horizontal,
e) Shall not clear, burn off or cultivate or permit excessive grazing of the top twenty-five per cent of the hills (as measured vertically) which have a slope exceeding twenty-five degrees from the horizontal.

If the lease was for grazing purposes, it remains subject to the following implied conditions, that the lessee:

a) Shall not clear, burn off, cultivate or permit uncontrolled grazing of the top twenty-five per cent of hills (as measured vertically) having a slope exceeding twenty-five degrees from the horizontal,
b) Shall apply such measures to check soil erosion as may be required by the lessor in writing and shall maintain those measures to the satisfaction of the lessor or of an officer appointed by the lessor in that behalf in writing. Such measures may include the restriction of grazing, terracing, construction of drains or dams and the construction of fences,
c) Shall not, without the prior consent of the lessor in writing, take, use or otherwise injure any forest tree growing upon the demised land except for the purpose of clearing the land for the planting of grass or of erecting fences or buildings incidental to the use of the land for grazing purposes.

All regulations made under NLTA are subject to the provisions of ALTA and in the case of conflict, the provisions of ALTA prevail.

The current standard NLTB lease form contains the following covenants that have some relevance to land conservation and use:

a) To keep in good and tenable repair all buildings together with all fixtures and fittings and all drains, sewers, gullies, cess-pits, septic tanks, soak-aways, water supply piping, wells, tanks, reservoirs, ponds, pumps, fences, walls, hedges, gates, posts, bridges, culverts, water courses, ditches, roads and yards in and upon the land and to maintain in good order all boundary markers.
b) To:
   (i) farm and manage the land in such a way as to preserve its fertility and keep it in good condition,
   (ii) keep the land clear of all refuse weeds vermin and rubbish, and
   (iii) regularly manure the land, all in accordance with good husbandry practice.
c) To enclose with good and substantial fencing to the satisfaction of the lessor the whole or any portion of the land used for the grazing or pasturing of livestock. Not to:
   (i) fell trees or clear off, burn or cultivate any land within a distance of eight metres from the bank of any river or stream,

(ii) clear, burn off or cultivate any hillside having a slope of more than twenty five degrees from the horizontal or the top twenty five percentum (measured vertically) of any hills having such slopes,
(iii) plant any crops within ten metres of the centre of any public road, or
(iv) permit excessive grazing on the land.

d) Not to remove or dispose of by way of sale or otherwise,
   (i) any forest produce as defined in the *Native Land (Forest) Regulations*, or
   (ii) any sand, gravel, common stone, limestone, coral, clay, top soil or other similar substances lying in, under or upon the land save only those materials (not being found in a river or stream bed) as may be necessary to construct or repair a road or yard upon the land, without the written consent of the lessor etc.

e) Not to cut down fruit trees on the land without the written consent of the lessor.

f) Not to permit any act matter or thing whatsoever to be done in or upon the land or buildings or any part thereof which shall be or may be or grow to be to the nuisance of any occupier, lessee or owner of adjoining or neighbouring land and property.

It is noted that the current form of lease does not accurately or completely state or summarise all the conditions implied by statute. A tenant is thus not in a position to discover what precise obligations are binding upon him.

Box 3

When passed, the legislation will be a monument...of hopes for the future – hopes that the seeds of disruption will disappear and the Europeans, Indians and Fijians will settle down to labour, sacrificing if need be community interests for the benefit of the whole.

Ratu Sir Lala Sukuna, 1940,
speaking in the Legislative Council on the NLTA

3.2.4 Crown lands

All Crown leases are automatically subject to the same land conservation provisions of ALTA. In addition, the following standard clauses appear in lease forms, which may be selectively deleted, depending on whether the lease is for grazing or agricultural purposes:

(9) The lessee shall not remove or dispose of by sale or otherwise any forest produce growing upon the demised land without the written consent of the lessor first had and obtained and subject to such conditions as the payment of royalty or otherwise prescribed by the Forests Regulations as the lessor may direct.

(11) The lessee shall manure the portions of the demised land planted as aforesaid and shall keep the whole in good condition and shall not allow any part to become impoverished and shall use such artificial or other manure as may be required by the lessor or an officer authorised by the lessor in that behalf in writing.

(12) The lessee shall not fell trees or clear or burn off bush or cultivate any land within a distance of twenty-four feet from the bank of a river or stream or plant any crops within thirty-three feet of the centre of any public road or on a slope exceeding twenty-five degrees from the horizontal.

(15) The lessee shall not, without the prior consent of the lessor in writing, take, use or otherwise injure any forest tree growing upon the demised land except for the purpose of clearing the land for the planting of grass or of erecting fences or of buildings incidental to the use of the demised land for grazing purposes.

(16) The lessee shall keep the demised land clear of all refuse, rubbish, weeds and unsightly undergrowth to the satisfaction of the lessor.

(17) The lessee shall apply such measures to check soil erosion as may be required by the lessor in writing and shall maintain such measures to the satisfaction of the lessor or of an officer appointed by the lessor in writing.

(18) The lessee shall not clear, burn off or cultivate or permit excessive grazing of the top twenty-five percentum of the hills (as measured vertically) which have a slope exceeding twenty-five degrees from the horizontal.

(20) The lessee shall not subdivide the land without the written consent of the lessor first had and obtained and then only in accordance with a plan of subdivision approved by the lessor in writing.

(21) The lessee shall keep open and maintain in good condition all drains, ditches and water courses upon or intersecting the land the subject of the lease, to the satisfaction of the lessor or the Divisional Surveyor.

(25) The lessee shall apply such measures to check soil erosion as may be required by the lessor in writing and shall maintain such measures to the satisfaction of the lessor. Provided that any such measures qualifying as improvements under Part II of the Schedule to the ALTO (1966) shall have the recommendation of a nominee of the Director of Agriculture.

Where the foregoing clauses conflict with statutory conditions implied by ALTA, the latter have priority.

3.2.5 Forestry leases

When the Conservator of Forests requires lands for reafforestation, for example, the initial step is to obtain a lease. Where NLTB lands are involved, similar arrangements to those for agricultural lands apply. Formal instruments of tenancy exist, with land conservation clauses as follows:

a) The Lessee shall within 10 years of the commencement of the term of this Lease prepare and plant all land hereby leased except non-establishable areas and those areas to be utilised for research or recreation purposes with timber producing trees and grow and harvest such trees and may at any time construct buildings and structures and carry out roading and other works ancillary to and necessary for the management of the land hereby leased and for which the Lessor's consent is hereby granted without prejudice to the provisions of Clause 11 and 13 hereof.

b) Non-establishable areas shall include:
   (i) Lands where physical obstructions such as roads, creeks, rocky cliffs, thin soils or swamp prevent the establishment of trees.
   (ii) Land where excessive soil erosion is likely to be caused by forestry operations.
   (iii) Land under cables for which a wayleave has been granted.
   (iv) Sacred land, old village sites and burial grounds.

   The Lessee will manage the land hereby leased in accordance with sound forest management practices.

c) Where in the reasonable opinion of the Lessee excessive soil erosion has been or is likely to be caused by the activities undertaken on the land hereby leased, the Lessee shall notify the Lessor of such areas and shall thenceforth modify, curtail or cease forestry activities in such areas.

d) Subject to sound forest management practices where in the reasonable opinion of the Lessor excessive soil erosion or damage to water courses and resources, soil, flora, fauna or damage to the environment in general has been or is likely to be caused by the activities undertaken on the land hereby leased by the Lessee, the Lessor may by notice in writing served on the Lessee prohibit or modify forestry activities in those areas and may instruct the Lessee to prevent, repair or reinstate such damage at its own cost.

e) The Lessee shall use its best endeavours to replant all clearfelled areas as soon as possible and unless otherwise approved by the Lessor within two years of completion of such clearfelling.

f) The Lessee shall submit to the Lessor prior to the commencement of planting on the land hereby leased and thereafter annually its anticipated scheme of management which shall include:
   (i) Plans showing the subdivision of the land hereby leased into planting areas and any further subdivisions thereof and the approximate size of those subdivisions.
   (ii) Operation plans showing the areas to be utilised for planting, restocking, logging, research or recreation within the forthcoming year.
   (iii) Operation plans showing the alignment of all new roads to be built within the forthcoming year.

(iv) Special provisions for the prevention of fires, protection of the environment and any extraordinary operation within the forthcoming year.

At the end of each year the Lessee will provide operation reports of the actual progress accomplished during that year.

g) River or stream beds may not be used for roads or skidding trails except with the consent of the Lessor who shall be given not less than one month's notice in writing of the Lessee's intention to use such river or stream bed. Now the NCOLP is applied.

h) This lease does not permit the extracting of sand and gravel or common stone from the land hereby leased and in the event that sand and gravel or common stone is required to be extracted the Lessee shall apply for an extraction licence from the Lessor in the normal way which may be refused or granted at the Lessor's absolute discretion.

The lease is expressly made *subject to the conditions and covenants expressed or implied in ALTA.*

Where a commercial operator is permitted to carry out logging activities within a leased area, approval is required of both the NLTB and the Conservator of Forests. Specific requirements may be attached to permission, and forestry field officers assess forests for cutting, inspect operations and scale logs. These activities are primarily related to revenue, but officers could also exercise close supervision over the deleterious activities of loggers.

The National Code of Logging Practice is in place to provide standards for loggers and supervise their activities. While it guarantees an environmentally friendly operation, it in itself does not sustain the forest.

3.2.6 Forest Decree

The Forest Decree of 1992 made provision to establish a Forestry Board, for the purpose of advising the Minister on matters related to forestry policy. However, the Forestry Board was never formed. Its membership was to comprise:

- The Conservator of Forests (chairperson);
- Permanent Secretary, MAFF or his/her representative;
- Director of Town and Country Planning or his/her representative;
- Seven other persons appointed by the Minister, of whom one shall represent NLTB; one shall be a member of the LCB; and five others (not state servants) to represent landowners, forest owners, forest users, forestry industry and the public interest.

An important function of the proposed Board was to oversee preparation and revision of the national forestry plan. So, in the absence of a Forestry Board, considerable power is vested in the Conservator of Forests.

Part 3 of the legislation covers the declaration of forest reserves and native reserves. It gives power to the Minister to declare any of the following classes of land already reserved for another public purpose to be a forest reserve or native reserve:

- Unalienated state land,
- Land leased to the state,
- Unalienated native land, with the prior consent of the landowners and of the NLTB.

No licences for development on or extraction of forest products from nature reserves may be issued. But licences for such may be issued upon reserved or protected forests. The Minister of Forests may also declare that reserved forests, nature reserves, silvicultural areas and protected forests are no longer such.

There is a requirement that forest reserves be managed as permanent forest to provide 'the optimum combination of benefits of protection and production' and native reserves 'managed for the exclusive purpose of permanent preservation of their environment, including flora, fauna, soil and water'.

Part 4 of the Decree deals with utilisation of forest resources and details, in the first instance, the prohibited activities in all categories of land ownership. These are quite specific with respect to enforcement. The Conservator's powers to authorise timber utilisation through issuing of licences to applicants comprise the last part of Part 4. This includes the need for prior consents (from NLTB and from Lands Department alienated state land) for: the issue of licences; duration and content of licenses; the logging plan (including provision for reforestation); fees and royalties; powers to revoke or suspend licences; and damage caused through lack of compliance.

Part 7 covers fires. It defines those areas in which fires are prohibited, the conditions under which the Conservator may issue fire licences, the appointment and responsibilities of fire rangers (all Forestry Department staff and police officers are ex-officio fire rangers (the responsibilities are quite specific as to establishing blame and onus squarely on landowner or land occupier at site of fire to prove the rangers are not responsible)), and the duty of any person to extinguish fires.

The remaining parts of the Decree deal with offences and penalties, powers of officers (for inspection, arrest and seizure) and regulations. The 1992 Forest Decree repeals the Forest Act and the Prevention of Forest Act; the Land Conservation and Improvement (Fire Hazard Period) Order of 1969 is revoked.

3.2.7 National Code of Logging Practice

The MAFF Forestry Department had developed guidelines to minimise damage to the forest environment and had incorporated these into licence conditions and concession agreements in the past. The guidelines proved to be vague, lacking in definition and generally of limited value. To address these shortcomings it was decided to produce a National Code of Logging Practice, NCOLP (1990). Clearly the growth and expansion of the forest industry will involve continued harvesting of nature forests, much of which is located in difficult terrain.

The Code prescribes desirable practices aimed at protecting the forest environment, its assets and forest users, while allowing the execution of economically viable logging operations. It applies to all harvesting operations in conjunction with any wood-sales agreement between the owner(s) of timber resources, the buyer(s) and the Licensing Authority. The provisions are binding on all parties involved in marking, felling, extracting, loading and hauling timber from all forests in Fiji. One weakness of the Code is that it does not yet cover sustainable yield harvesting. Only the consideration of silvicultural mechanisms in combination with an environmentally friendly logging operation (NCOLP) will sustain the forest for the future.

In 1994 (work started in 1990), the Forestry Department completed a research model on silvicultural treatments – natural forests based on species-specific diameter limits. The model proved sustainable forest management is not more expensive than the current logging system and guarantees the structure because:

- the structure and species composition is maintained;
- natural vegetation is stimulated; and
- the ground (soil) is covered at all times.

The implication of this system will significantly improve indigenous forest management. Fiji will have a chance to maintain the forest at all times on a low-cost basis with the involvement of landowners in the field activities. It also offers many more options to landowners, such as employment opportunities.

3.2.8 Definition of good husbandry practice

Land conservation conditions are specified in tenancy agreements, whether freehold land, native land or Crown Land for agricultural, pastoral or forestry purposes. For forestry this does not apply to private sector logging concessions unless the government is involved. Note the mahogany plantations are leased and the indigenous forests are under concession. It is possible that a range of generic special conditions could be

prepared for attachment to leases; these are to supplement the general conditions which are quite brief under the NLTB approval notice to the more detailed forestry clauses described above.

The statutory conditions of ALTA apply to all agricultural tenancies and in most cases have overriding force. Section 13(2) establishes the tenant responsibility to farm 'according to the practice of good husbandry' (refer para. 158). There are some difficulties in determining the obligations embodied in section 13(2). For example, the standards of land maintenance and cultivation are defined as 'the minimum standard considered necessary by the Permanent Secretary of Agriculture or his nominee'. These are not objective, measurable standards that can be applied to particular land types or classes of land capability. Whether or not good husbandry is observed only becomes an issue when the Permanent Secretary is called upon to provide a certificate for the purposes of litigation.

Section 13(2) does not provide standards to which a tenant can refer to for guidance in land husbandry. It also puts in question, in view of the subjective nature of these standards, whether they would be totally defendable in the case of litigation. The question is whether such standards exist and how tenants can be made aware of them. While there is somewhat of a gap in technical information in that manuals about land husbandry specifically designed for farmers are not available in Fiji (FSC has a field manual containing some guidelines), local knowledge is available to promulgate the required land husbandry measures to the various land classes for agricultural, pastoral and forestry activities.

It is possible that section 13(2 a, b) of ALTA is adequate for promulgating standards that are generally applicable to particular classes of lands. However, in any proceedings for forfeiture based on non-observance of general standards, the tribunal or a court would be bound to construe the provision strictly and in favour of the tenant. It might therefore be successfully argued that the words 'or his nominee' in each paragraph implies that an individual exercise of discretion must occur in relation to each holding and unless a minimum standard has been determined in relation to each holding, no grounds exist for drawing conclusions as to whether land husbandry has been good or bad. As stated earlier, there is an urgent need to develop indicator criteria with associated new quantitative definitions relating to land husbandry practice.

Table 9: A summary of Fiji's land, water and environmental legislation

Legislation	Outline of Provisions	Authority Responsible	
Native Land Trust Act (NLTA), 1940 (Cap 134)	Established the NLTB as a non-Government corporate body to manage Native lands. Leases Native land (which is not Native Reserve land) with restrictions regarding land use.	• General Manager, Native Land Trust Board (NLTB) The NLT Board consists of: • The President of Fiji • The Prime Minister • Minister of Lands and Mineral Resources • Honourable Ratu Josefa Iloilo	• Honourable Ratu Sakiusa Makutu • Ratu W.T. Malani • Adi Kuini V. Speed • Ratu Inoke Kubuabola • Turaga Tui Bobuco, Ratu Sakiusa Navakaroko • Niko Nawaikula – Secretary
Town Planning Act, 1946 (Cap 139)	Minister has power to constitute a town planning area. Permission of local authority and Director DTCP required for development. Preservation of historic buildings and objects of historic and scientific interest.	Director, Town and Country Planning Department Ministry of Housing and Urban Development	
Forest Act, 1953 (Cap 150)	Made provision to establish a Forestry Board to advise the Minister on matters of forestry policy with provision to appoint Forestry Committees to advise the Board. Minister has power to constitute a Forest Reserve (Crown land and land leased to the Crown only); to constitute all or part of a Forest Reserve as a Nature Reserve; and to declare any Native land (with consent of NLTB) to be Protected Forest and Silvicultural areas therein. NLTB (without consent of Conservator of Forests) cannot alienate land in a Protected Forest. Strict powers and regulation apply to use and actions in declared Nature Reserves and Silvicultural areas.	Conservator of Forests, Department of Forests, MAFFA Forestry Board not established	

Legislation	Outline of Provisions	Authority Responsible	
Land Conservation and Improvement Act, 1953 (Cap 141)	Established the Land Conservation Board (LCB). The LCB has powers to exercise general supervision over land and water resources; stimulate public interest in the conservation and improvement of land and water resources; issue Conservation Orders controlling or regulating or prohibiting the use of land and activities on land; recommend legislation. The regulatory Conservation Orders under the Act include: bush clearance; cultivation of crops and methods of cultivation; grazing and watering of livestock; lighting of fires and burning of vegetation (including cane trash); and requirement for any landowners or tenant to carry out any necessary soil conservation measures on their land. The Minister may appoint Conservation Officers to assist LCB supervise land and water resources. Conservation Officers have significant powers under the Act to enter land at anytime.	• Chairperson (Perm. Secretary MAFFA) • Land Conservation Board • Land Use Section, Research Division MAFFA (Secretariat) The proposed LC Board consists of: • Perm. Sec., MAFF (Chairperson) • Perm. Sec., PWD • Director of Lands • Director, National Trust	• Director, Department of Environment • Conservator of Forests • CEO, NLTB • CEO, FSC • Director, TCPD • Perm. Sec., Fijian Affairs • Member from Fiji Council of Women • 3 farmer representatives
Land Development Act, 1961 (Cap 142)	Established the Land Development Authority (LDA) The LDA promotes and assists the investigation, formation and conduct of projects for the development, improvement and settlement of land.	Land Development (LD) Authority The LD Authority consists of: • Chair and a Vice Chair • General Manager, NLTB, • Permanent Secretary, Dept of Lands & Survey, • representative from the Fiji Development Bank (FDB) and • Permanent Secretary, MAFFA	
Drainage Act, 1961	Provides for the drainage of land, irrigation of flooding and or erosion. Established Divisional Drainage Boards.	Director, Land and Water Resource Management Division, MAFF Land Conservation Board Land Drainage Boards	
Mining Act, 1966 (Cap 146)	Provides for restoration of land after mining or extraction and compensation for damages by ‘Developer’.	Assistant Director of Mines, Mineral Resources Department	

Legislation	Outline of Provisions	Authority Responsible	
National Trust for Fiji Act, 1970 (Cap 265)	Provides authority to purchase land. Allows for voluntary agreements to protect land.	The National Trust Council consists of: • Chair – Adi Litia Cakobau • Asst Chair – Mr Robin Yarrow • Perm. Sec. For Women & Culture • Mr Sevanaia Tabua • Mrs Gilly Huggett • Mrs Jyoty Tappoo	
Agricultural Landlord and Tenants Act, 1976 (Cap 270)	An amendment of the 1966 Agricultural Landlord and Tenant Ordinance (ALTO), ALTA covers agricultural lease and outlines the rights and responsibilities of both Landlord and Tenants. Principal provisions include: Security of tenure; control on rents; payment of compensation by landlords for improvements made by tenants; application of certain statutory conditions to agricultural tenancies; statutory periods for reassessment of rent; a Tribunal to which a landlord and tenant may apply in the case of a dispute; strict limitations on and control of share cropping; and damages to the landlord in the case of deterioration or degradation to the land. The Act stipulates 'good husbandry practices' by tenants.	• General Manager, NLTB • Joint Parliamentary Select Committee. • Prime Minister (Chair) • Attorney General • Minister for Agriculture, Fisheries and Forests • Minister for Lands and Mineral Resources • Minister for Fijian Affairs	• Minister for Transport and Tourism • Minister for Health • Plus 16 Members of Parliament Representing Government and • Opposition Parties By invitation: • CEO, NLTB • Perm. Sec. – responsible for ALTA
Rivers and Streams Act, 1982 (Cap 136)	Rivers belong to the Crown.		

3.2.9 Awareness about statutory land use conditions

Previous discussions show that, while tenancy documents commonly include clauses related to land conservation, they do not accurately reflect all the conditions that are implied into the agreement by statute. For example, under ALTA section 13(2), all tenants are obliged to implement land conservation measures such as contour cropping and cultivation and to maintain soil fertility to the minimum standard set by the Permanent Secretary for Agriculture or his nominee. Although this clearly imposes an obligation to obey certain directions given by a Department of Agriculture officer, a tenant is nowhere advised of this obligation.

How can all the relevant (legal) conditions be brought to the attention of tenants? It is crucial that the GOF give urgent consideration as to how this can best be undertaken; importantly, to how 'ordinary people' can ever fully understand the legalese that pervades tenancy agreements. Apart from the law, there exists a major role for Land Conservation Officers to inform tenants about land husbandry practices.

3.2.10 Enforcement of land conservation conditions

It was suggested that an amendment to section 13(2) of ALTA should provide that any breach of a special expressed condition in an agreement be deemed to infringe the statutory requirement of good husbandry.

Under section 37(1 c), the landlord may give a tenant three months' notice of termination where the tenant is not following 'the practice of good husbandry' and the interests of the landlord are thereby materially prejudiced. While the provision contemplates an initiative by the landlord, neither NLTB nor Department of Lands will, in fact, take action until a certificate of the Permanent Secretary of Agriculture or his regional officer is provided, stating that good practice is not being followed.

Action by the landlord is thus suspended for two reasons. First, the definition of 'good husbandry' in section 13(2a, b and d) does not depend on overt, stated standards, but on a subjective judgement by the Permanent Secretary or his nominee. Until that judgement is made, the landlord does not know whether the tenant is in breach – which is highly unsatisfactory. Secondly, the practice is to await a certificate, because the special protections afforded to the tenant by the provisions concerning agricultural tribunals make it inevitable that every attempt to terminate a tenancy – even for the most flagrant violation of conditions – will be contested, possibly before both the district tribunal and the central tribunal. While the statutory function of the certificate is merely to provide prima facie evidence of its contents before any tribunal, it has effectively become a pre-condition of issuing a notice to quit.

With regard to enforcement of conditions, MAFF staff are logically not party to a dispute between landlord and tenant; but it is the certificate of the Permanent Secretary and the oral evidence in support of that certificate which seals the fate of the tenant. It is the Land Conservation Officer, not the landlord, who will thus attract unpleasant cross-examination and whose judgement will be rightly seen to be to blame, both by the tenant and his neighbours. There is therefore an understandable reluctance on the part of MAFF officers to provide the requisite certificate, which is fortified by the fact that this policing function is incompatible with their other roles of developing a friendly relationship for extension purposes and helping the farmer to increase productivity. This area of conflict is difficult to resolve but somebody has to make a final judgement. A public awareness programme would go a long way to develop a better understanding and so reduce potential conflict.

Clark (1986) noted that requests for a certificate had only been made in seven cases. That landlords have sought to terminate leases for breach of good husbandry practice on so few occasions is not consistent with the apparent magnitude of the problem. It raises a serious question whether relying on landlords to enforce land conservation clauses is an effective means of policing statutory requirements.

If land conservation standards were promulgated for different classes of land made available to tenants, if officers from various services trained and equipped to assist in overseeing land conservation practices as recommended and the amendment proposed to ALTA 13(2) adopted, the subjective assessment of a MAFF officer would no longer be necessary to determine if improper practices had occurred. It would then be possible for either an NLTB, Department of Lands, MAFF, FSC or a Land Conservation Officer to certify non-compliance with promulgated standards. It would also be appropriate to amend legislation to allow the certificate of any of these officers to be received as prima facie evidence of its contents by any tribunal.

Land conservation conditions in a lease are only enforceable by the lessor. In the case of Crown land, it is unlikely that the revenue generated would influence the Department of Lands not to enforce conditions in a Crown lease, but it is possible that political pressures might intervene. In the case of the NLTB, there is a more apparent conflict of interests. One of the primary concerns of the Board is to ensure that native lands are in productive use and are generating the maximum income for native landowners. Furthermore, the Board is a pervasive landlord and, within reason, wishes to protect its good reputation with neighbouring tenants. These factors both count against active enforcement of land conservation conditions. On the other hand the NLTB is a trustee and recourse to equitable principles is not really necessary to establish that allowing the subject matter of the trust to be degraded, when the trustee could take effective action to preserve the asset, is clearly in breach of the duties of any trustee.

Potentially MAFF faces political problems, not merely in compromising its officers by having to grant a certificate, but by political and commercial interests, which would be disadvantaged if marginal lands causing land degradation problems were put out of production. Bienefeld (1984) concluded that land conservation initiatives would only be effective ‘if there is a strong executive authority, close integration between government departments and other actors, and a strong political will’.

NLTB has relied heavily on MAFF and the Land Conservation Board (LCB) to monitor its agricultural estates and enforce good husbandry clauses in its leases. In view of the significant land degradation within the NLTB ‘Estate’, particularly within the sugar cane belt, it is clear that the NLTB–MAFF–LCB partnership arrangement is no longer working effectively. The LCB has had a small resurgence in activity over the last five years but well short of that required to effectively carry out their statutory obligations, particularly in support of the NLTB. The LCB and its technical support unit, the MAFF Land Use Section, have clearly been under-resourced in staff and funds.

Under the provisions of ALTA all tenants are required to adhere to the practice of good husbandry. Should the tenant not comply with this requirement the Act empowers the Permanent Secretary (or nominee) of MAFF to serve a Certificate of Failure on the non-compliant tenant. This certificate constitutes prima facie evidence before any Tribunal. NLTB has had little success in obtaining certificates (from MAFF) and has resorted to issuing warning letters that have no legal status. Clearly termination of a lease under ALTA for the disregard of soil conservation clauses (in leases) is impossible.

3.2.11 Collaboration between NLTB and MAFF

It has been noted (Section 3.2) how important MAFF and NLTB’s legal responsibilities are with respect to good husbandry practice clauses in legislation and the statutory obligations of the Land Conservation Board. To meet these responsibilities, a close working relationship between NLTB and MAFF at all levels is crucial. At the technical level both organisations are below strength and have been under-resourced for some years.

To reduce the incidence of improper land use practice on leased land, and to send a signal to tenants blatantly disregarding good husbandry clauses in their leases, it would be appropriate for NLTB/MAFF to undertake periodic joint field inspections (unannounced) to identify misused land and follow-up with the issue of ‘bad husbandry certificates’. Clearly there are political implications of lease enforcement; NLTB, a Fijian institution, trustee and guardian of indigenous lands, is open to criticism from both major ethnic communities about lease enforcement for conservation reasons.

In addition, there are other areas of potential co-operation between NLTB and MAFF, as follows:

- Production of multilingual pamphlets and posters covering: agricultural development and conservation; sustainable farming practice; arable farming and grazing on marginal lands; sugar cane and land conservation; ginger farming and land conservation; NLTB lease clauses covering good husbandry, etc.;
- Production of a multilingual technical handbook/guidelines on sustainable land use practice;
- Establishment of demonstration farms/agricultural plots at the Divisional, Provincial and local levels, together with the establishment of local committees to provide advice and assistance to the farming community;
- Training and professional development, to include NLTB staff attachments with MAFF, and workshops/seminars;
- Developing their agricultural plans/schemes on the principles of catchments and whole river basin planning;
- Conduct an audit and develop a register of seriously degraded lands to be used as a basis for identifying areas to be 'closed' and rehabilitated.

3.3 Subdivision of Land and Town Planning Acts

The Director of Town and Country Planning, in consultation with appropriate Government departments and local authorities, gives approval to subdivide under the Subdivision of Land Act. However, approval under the Town Planning Act, both where a Town Planning Scheme has been adopted and in declared areas where no scheme has yet been adopted, is given by the responsible rural local authority, or city or town council, after reference to the Director.

As these two Acts do not apply to proposals to use land for agricultural, pastoral or forestry purposes, there is no opportunity to prevent development or impose conditions even were the proposal deemed to have deleterious environmental impact. Planning approval would also complement general or particular conservation orders that might be issued under the Land Conservation and Improvement Act. However that Act will usually only be deployed after problems have arisen. Planning approval aims to stop the problem arising in the first place. There is a need to improve linkages and communication between departments and agencies involved in land development. Development plans should also be open to public scrutiny.

Where planning conditions are attached to lands to be occupied under a tenancy, there is also no actual requirement that the condition be made a condition of the tenancy agreement. In practice, the NLTB and Department of Lands often impose conditions that mirror the conditions attached to planning consent.

In any future legislation it should be made obligatory for landlords to make any land conservation conditions attached to planning approval express conditions of any tenancy agreement. This would allow leases under ALTA to be subject to forfeiture for failure to observe good husbandry practices in the event that they are not observed by the tenant.

In terms of co-ordinated national control of land use, it is important to note that the final approval to subdivide under the Subdivision of Land Act is given to the Director (TCPD), not the local authority.

The potential application of the Subdivision of Land Act to agricultural, pastoral or forestry land is further severely limited by Section 4. This only requires approval to be sought if the land concerned is both within three miles (5 km) of a town and if the result would create one or more holdings of less than five acres (2 ha).

Within the rural areas where agricultural, pastoral and forestry lands mainly occur, there are no town planning schemes in existence. If the Town Planning Act is capable of applying to those lands, it can only be by way of interim development controls by virtue of the Town Planning (General) Order 1971, which declared all lands not already declared, to be a town planning area.

3.4 Land Conservation and Improvement Act

The Land Conservation and Improvement Act (1953) establishes the Land Conservation Board (LCB) 'to exercise general supervision over land and water resources'; disseminate information; recommend appropriate legislation; and make general or particular conservation orders or closing orders, or require landowners to execute works, for 'the conservation of land or water resources'.

The primary concern of the LCB since the early 1970s has been land drainage. This comes about, not by virtue of the Land Conservation and Improvement Act, but because the LCB is nominated as the controlling authority of Drainage Boards established under the Drainage Act. Accordingly, it is the body that formally institutes boards and drainage areas; authorises drainage works; approves and helps to arrange loans to execute drainage works; and approves the levying of drainage rates by Drainage Boards.

The LCB has no staff of its own however, and in executing its functions under the Drainage Act, is advised by the MAFF Land and Water Resource Management Division, which also executes its decisions on these matters. Although the Drainage Act requires 'land conservation officers' to act as secretaries to Drainage Boards and implies that these officers are employees of the LCB, it is clear that those functions conferred on the Board by the Land Conservation and Improvement Act itself – in particular the making of conservation or closure orders and directing landowners to undertake particular works – are never enacted.

The provision for Conservation Committees has not been acted on by the LCB in recent years. However, one Conservation Committee was appointed in the Western Division in 1998, one is currently being established in the Northern Division and a third is proposed for the Central/Eastern Division. Under the Act, the function of each Conservation Committee is to advise the LCB on matters related to the conservation of land and water resources within its area. The ability of LCB to undertake the functions envisaged for it under the Land Conservation and Improvement Act is obviously hampered by the fact that it has no staff and meets infrequently. The lack of field staff to enforce general or particular conservation orders seems to be the primary reason for not pressing the Board to exercise its powers, although there may also be political reasons for not invoking the powers vigorously.

The formal powers conferred on the Board by the Act are sufficient to allow the Board to make a substantial contribution to land conservation, should the executive will exist to employ them.

Previous studies have examined the legislation and proposed particular amendments aimed at strengthening the Act and making the LCB's charter more explicit. In 1974, a Draft Bill was prepared, but not proceeded with. It would have incorporated the Board; given it power to acquire and dispose of property and greater financial independence, and allowed it to make loans to Drainage Boards. While that Draft Bill mainly enhanced the Board's functions under the Drainage Act, the report of Galletly and Swartz (1974) proposed substantial changes to strengthen the powers of the Board in relation to land conservation under its own Act.

The provisions of the 1974 Draft Bill and the suggestions of Galletly and Swartz (1974) were put to the working party of officers convened for the 1975–1976 review of water legislation undertaken by S.D. Clark. As both were agreed to, they were incorporated into draft legislation. Certain provisions in that draft would be particularly significant if a decision were made to invigorate the Land Conservation Board and use it as a mechanism to improve land conservation practices. The draft suggested that the Board be renamed the Land Conservation Council to eliminate potential confusion with Drainage Boards and existing cumbersome drafting in the Drainage Act. It included the following provisions:

Clause 10(2):
In carrying out its functions, the Council shall have regard to the need to make proper provision for:

(a) Classifying all land within Fiji in terms of its suitability for the various uses to which land may be put;

(b) Indicating those uses of land in any area which would be detrimental to the conservation or protection of land or of the environment;

(c) Specifying techniques of land management which may contribute to the better conservation, protection or improvement of any land;

(d) The conservation, protection and improvement of all lands, including:
  (i) lands devoted to the cultivation of sugar, of grain, or of gardens;
  (ii) natural grasslands and forest lands;
  (iii) pine plantations and planted forest lands;
  (iv) lands affected by the construction of roads or by other forms of development;

(e) The education of the public in the need for land conservation, protection and improvement and in appropriate techniques of land management and the provision of proper educational and extension services;

(f) The regulated change from existing uses of land which are detrimental to the conservation or protection of land to uses which are less detrimental thereto;

(g) Ensuring that the policies and programmes adopted pursuant to these Regulations are properly and efficiently implemented by public authorities.

Clause 12 also contemplated the declaration of Land Conservation Districts. Clause 12(3) provided:

> Any such declaration may establish a policy for the conservation, protection or improvement of any land within such District and, without in any way detracting from the generality of the foregoing, may:
>
> (a) classify any land within such District in terms of its suitability for use as forest, pastoral, agricultural, residential, urban, recreational or park land or for any other purpose or purposes;
>
> (b) declare those uses of land which, in any portion or portions of the District, are or would be detrimental to the proper conservation or protection of any land or related water resources;
>
> (c) establish conditions upon which or management practices by which any land within the District shall thenceforth be used for any purpose or purposes.

Clause 15 sought to recognise the need for better communication and information by the following provisions:

> (1) Where any Land Conservation District is declared or any general conservation order or any closing order is made pursuant to these Regulations, the Council may cause discussions to be held with any public authority, the Native Lands Trust Board or any other person or body to ensure that the provisions of such declaration or order are fully understood by, and thenceforward observed by, any such public authority, the Native Lands Trust Board or any such person or body.
>
> (2) Where any Crown land or any native land is affected by any such declaration or order, the Council may cause discussions to be held with the public authority responsible for such Crown lands or with the Native Lands Trust Board to ensure that appropriate covenants or conditions to ensure compliance with such declaration or order are incorporated into any lease or interest in such land which may thereafter be negotiated or renegotiated.
>
> (3) The Council may establish such information and extension services as it deems necessary to ensure that policies developed by the Council are brought to the attention of the public and that appropriate education in techniques of land management is available to owners and occupiers of land.

Finally, to enhance co-ordination, Clause 3(3) proposed that the Director of Town and Country Planning should be an ex-officio member of the Land Conservation Board. It also specified that the five additional members should represent the interests of the NLTB – FSC, Sugar Commission of Fiji (SCOF), the National Trust, Fijian owners and occupiers and Indo-Fijian owners and occupiers of land.

3.5 Rivers and Streams Act

The Rivers and Streams Act was first passed in 1880 to ensure the Crown's right to the water in watercourses. It also states certain public rights in water and establishes a licensing system to permit the taking of water for beneficial purposes. Minor amendments were made as recently as 1966. Political arguments are sometimes made that the Ordinance is not compatible with certain pre-existing native rights. The Ordinance represents the law and is to be interpreted according to normal judicial interpretation. The primary practical use of the Ordinance is to grant licences to private diverters for periods not exceeding 25 years.

The rights of the Crown are defined in Sections 2, 5 and 6. The joint effect of all these sections is to make the water at any time contained in most watercourses the property of the Crown and the subjacent soil and bed of all such watercourses the property of the Crown.

Section 2 provides for the preservation of public rights. It declares that all river waters and the subjacent soil, though vested in the Crown, are to 'be perpetually open to the public for the enjoyment of all rights incident to rivers'. Section 5 similarly states that all streams with the bed thereof are to 'be perpetually open to the public for all purposes for which streams may be enjoyed'. These phrases are ambiguous. They have led to arguments about whether the 'public' rights are merely water-related (i.e. to navigate, fish, swim, and consume) or also relate to use of the bed.

Added confusion stems from the practice of the Crown in making payments to local *mataqali* landowners in respect of gravel or other material taken from riverbeds for public purposes such as road-making. The term 'royalty' has often been applied to such payments, which has reinforced the lay view that river beds in fact 'belong' to the adjacent native landowners. As a matter of law, however, this is not the case. Any payments made to local owners are not based on native rights acknowledged by the Ordinance, nor on any other legal title to the material extracted. The ambiguities are undesirable both as a matter of law and social policy. In any proposed water resources legislation it would be preferable to redraft the provisions in a clear and unambiguous way.

Section 7 provides for the granting of licences to occupiers of land to take water for beneficial purposes. Such licences may be for up to 25 years but in drought seasons, Section 8 provides for temporary permits of up to one year. The relationship between Sections 7 and 8 is unclear. Section 7 does not specifically empower the Director of Lands to attach conditions of use to any licence granted to take water but such a power might well be implied. If so, it would be possible for the Director to attach conditions governing the way water is used or discharged which may have an impact on land conservation. Very few, if any, private diversion licences have yet been issued for irrigation. It is possible therefore that in technical terms, there is no present need to impose land conservation conditions on such licences.

However, should it be thought desirable to impose land use conditions through private diversion licences, the simplest technique would be to ensure that the standard land conservation conditions proposed above were drafted to include conditions relevant to irrigated agriculture and horticulture. These could then be incorporated by reference in any licence to use water. This would ensure that freehold irrigators were also subject to the standard conditions applicable to all lands held under tenancy agreements.

Dredging is part of the strategy presently employed to mitigate flooding problems. Other river training and bank protection measures may well be technically desirable in appropriate circumstances. Such supervening powers as the Crown has in relation to controlling the course of rivers and activities in the riverbed stem from the Rivers and Streams Ordinance. However Sections 2 and 5 of the Act leave open the potential for ongoing disputes between the Crown and *mataqali* landowners as to their respective rights.

A further strategy for river management may be to control the excavation of material from riverbeds. While it is desirable that clarifying legislation should acknowledge the traditional practice of native owners of taking stones and gravel for traditional purposes, it should also allow restrictions to be imposed on the particular places from which such material is taken so that unnecessary damage can be avoided. This is very important during logging operations. NLTB approves the right for gravel extraction but there are no controls over the industry as to how it happens and environmental consequences.

3.6 Irrigation Act

The purpose of the Irrigation Act (1974) is to facilitate the development of Government-controlled irrigation schemes in areas having a high suitability for and proven benefit from irrigation. It provides for the appointment of commissioners to develop, oversee and manage irrigation in areas that may be declared, and gives them wide powers to direct the way in which irrigation occurs in these areas.

Areas commanded by gravity are likely to be selected for development. Also, it is unlikely that Class III or IV lands would be chosen. Accordingly, the land conservation requirements of such areas are likely to be rather different from those in hilly and upland areas. However proper drainage measures, flood protection works and techniques to minimise soil damage from flooding or improper irrigation or drainage are likely to be important on the plains and valley floors.

As the Act envisages a high level of supervision, it is possible that no special legal measures are necessary to ensure that proper engineering and irrigation techniques apply. Section 14(1) presently empowers a Commissioner to 'specify engineering and agricultural programmes, practices and standards to be adopted by owners and occupiers of land within an irrigation area'. This broad power is backed up by sections 14(3) and 17 (b, i), both of which allow the Commissioner to withhold water from any occupier who has failed to comply with a notice directing him to comply with practices and standards laid down. Also, Section 29 empowers the making of regulations to provide for 'compliance with engineering and agricultural programmes, practices and standards'. Monitoring and evaluation should be conducted on a regular basis.

Section 8 presently provides for the laying-out of lands within an area in a way that is compatible with irrigation. Section 8(2) deals with relations between the Commissioner and the Director of Town and Country Planning. The Commissioner must submit any proposed adjustment plan to the Director. While the Commissioner must 'take into consideration the objections, if any, of the Director', he is not obliged, on the face of it, to decide in accordance with the decision of the Director. Even if the decision lies with the Commissioner, the best interests of land conservation might be served if the Commissioner were obliged not merely to take into consideration any objections of the Director, but to observe any conditions which the Director may propose in order to promote land conservation and environmental protection. Although the decision to proceed remains that of the Commissioner, an objective observer would be empowered to set appropriate conditions. An appropriate amendment to section 8(2) would be required.

The Act therefore contains sufficient powers for a Commissioner to ensure that proper land conservation measures are applied if there is a technical reason and a need to apply and enforce such measures. Unfortunately these powers are rarely used.

3.7 Drainage Act

The purpose of this Act is to provide the mechanism for implementing and rehabilitating public drainage works to serve lands of many occupiers within declared areas. Under the general supervision of the Land Conservation Board, which is appointed the controlling authority to administer the Act, Drainage Boards may be set up at the district level to implement the proposed works.

The Act envisages that the implementation costs of capital and rehabilitation works will be met from rates levied on lands benefiting from the improvements; but that maintenance of the works will in general be the responsibility of the landowners.

Remedial works implemented under the Act over the last 25 years mean that in certain areas, construction programmes are now complete and Boards have consequently been amalgamated and larger districts formed to reduce overheads as operations reduce.

Financial problems do exist. Suggestions have been previously made for amendments to allow the LCB to take a more active role in obtaining loan funds for Drainage Boards. There is also the 'classic' problem of determining which lands have benefited from remedial works and whether lands in watersheds that contribute to drainage problems should be rated to meet part of the costs of the downstream works.

The activities of Drainage Boards are generally subject to supervision by the Land Conservation Board. As an officer of the MAFF Land and Water Resource Management Division acts as Secretary to each Board, clearly opportunities exist to ensure that the activities of each Board are fully consistent with proper land conservation practice.

The public works implemented under the Act have had beneficial impact on the amelioration of flooding and have improved drainage in downstream areas. However, the Act does not provide an appropriate means for controlling land degradation or agricultural practices in upstream areas. Here, the rarely used provisions of the Land Conservation and Improvement Act that specify particular and general conservation orders would be more appropriate. Those measures in turn can be complemented by provisions in tenancy agreements and conditions imposed on subdivisions.

3.8 Land Development Act

The purpose of the Land Development Act (1961) is to establish the Land Development Authority, whose duty is to promote and assist the investigation, formation and implementation of projects for the development, improvement and settlement of land.

The main powers of the Authority include:

- Initiation and implementation of schemes for land development;
- Initiation of schemes for the processing and marketing of produce;
- Making loans;
- Establishing corporations; and
- Establishing local development boards.

The Land Development Authority is a corporate body and consists of a chairperson and deputy chairperson appointed by the Minister of Agriculture and three to six members (appointed by the Minister) who shall represent Fijian interests.

Section 23 of the Act establishes the Fiji Land Corporation for the purpose of purchasing freehold and leasehold agricultural estates or leasing parts or the whole of these, given that it is a project planned by the Land Development Authority.

The Fiji Land Corporation has a Board of Management comprising a chairperson appointed by the Minister of Agriculture and three to six members (appointed by the Minister). The Corporation must comply at all times with the provisions of the Land Development Act.

3.9 Administration of native land

The two public agencies concerned with native land administration are the Native Lands Commission and the Native Land Trust Board. The Commission is part of the government and is concerned with native land ownership and disputes, while the Board is an independent statutory body administering native land on behalf of the owners.

The law requires that native lands be held 'according to native custom as evidenced by usage and tradition', and that:

> …such lands may be cultivated, allotted and dealt with by native Fijians as amongst themselves according to their native customs and subject to any regulations made by the Fijian Affairs Board and approved by the Legislative Council, and in the event of any dispute arising for legal decision in which the question of the tenure of the land amongst native Fijians is relevant all courts of law shall decide such disputes according to such regulations or native customs and usage. (Section 3, Native Land Ordinance 1905, Cap. 114 of the Laws of Fiji.)

The Commission decides what these customs, usage and tradition are on the basis of knowledge acquired from all areas of Fiji over many years, as well as from the Council of Chiefs and other sources. The process of decision has now settled down to an administrative routine. Fijian land is registered in terms of patrilineally-organised social units that are conceived as lineages of the classical segmentary type. The unit of widest span is the *yavusa*, the members of which are supposed to trace patrilineal descent to a common male ancestor called *vu*. Genealogical segments of the *yavusa* are called *mataqali*, and similar segments of the *mataqali* are called *I tokatoka.* Most Fijian land is registered by *mataqali*, although some is registered in the name of *I tokatoka*, or of *yavusa,* or as belonging to the descendants of a particular man or woman. The blocks comprising the last category of lands are known as *kovukovu* or encumbrances on *mataqali* land, for example, those given as dowry and reserved for the use of the woman's descendants in which case the land reverts to the owning *mataqali* when they die. The names of the members of these owning units are recorded by the Commissioner in a register known as the *Vola ni Kawa.*

The Commission also keeps a Register of Native Lands, containing descriptions of the boundaries of all blocks of land, their area and the owning units, and a reference to maps upon which the boundaries are marked. All this information, which has been collated and recorded by the Commission over many years, now forms the basis of the legally recognised tenure of native lands in Fiji.

A close link exists between land administration and status within the landowning unit, for the making of decisions regarding land is one of the most important ways in which the Fijian status system is expressed. The legal provisions take some account of differential status – not in the distribution of decision-making powers, but in the form of a cash payment. All money received as rent or royalty on native land is distributed in the following proportion:

Native Land Trust Board	25%
Head of *Vanua*	5%
Head of *Yavusa*	10%
Head of *Mataqali*	15%
Members of *Mataqali*	45% shared equally

For Fijians there are many different kinds of right to land – to plant, to harvest, to gather wild products, to cut timber, to fish in streams or lagoons or reefs, to impose restrictions on the use of particular products or areas, to lend, to lease, to receive rental, to confer benefits upon others, and so on.

3.10 Proposed Sustainable Development Bill

The proposed Sustainable Development Bill (as at 9 September 1998) binds the Government, including Government departments and statutory authorities to an Act 'to establish a national sustainable development council, to require environmental impact assessments in respect of development proposals, to provide for codes of environmental practice and a national resource management plan, and to prohibit pollution of the environment'.

The legislation establishes a National Council for Sustainable Development. The Council's function is to 'provide effective and coordinated decision-making on sustainable development planning, policies and implementation programmes, and where necessary to provide for environmentally sound and sustainable resource use and allocation'.

Of relevance to this study, functions of the Council are to:

a) Direct the formulation and implementation of a national sustainable development policy;
b) Devise and periodically review the National Environment Strategy to implement policies;
c) Oversee the drafting of the National State of the Environment reports;
d) Resolve conflicts in the implementation of the National Environment Strategy and national environmental and resource management policies;
e) Coordinate the Government's environmental and resource management activities;
f) Advise on the establishment of environmental units in ministries, departments and statutory authorities and, if requested, in commercial and industrial facilities;
g) Provide a forum for discussion and resolution of problems arising from the implementation of the National Environment Strategy;
h) Monitor and review public and private sector efforts to promote sustainable development;
i) Review, approve or reject any activity or undertaking that is subject to a comprehensive study or mediation report under the environmental impact assessment process established by this Act; and
j) Recommend policies that encourage the environmentally sound and sustainable use of resources.

The National Council has the authority to appoint technical committees to advise it and is expected to formulate the following national policies on sustainable development:

- Policy on integrated resources management which must include:
  - Policy on Sustainable Coastal Management,
  - Policy on Sustainable Mineral Resource Development,
  - Sustainable Forestry Development Policy,
  - Sustainable Fisheries Development Policy,
  - National Biodiversity, Conservation and Protected Areas Policy,
  - Policy on Sustainable Agricultural Development,
  - Policy on Sustainable Resource Management on Native and State Lands;
- Policy on Poverty, Sustainable Human Settlements and Achieving a Sustainable Population;
- Policy on Integrated Waste Management;
- Policy on Sustainable Human and Environmental Health;
- Sustainable Tourism Policy; and
- National Policy on Energy Conservation.

There is a responsibility to establish within MAFF (no later than two years after the Act comes into force), a National Resource Management Unit (RMU). The functions of the RMU are to:

- Establish the Natural Resource Inventory;
- Maintain a natural resource information database;
- Formulate and periodically review the National Resource Management Plan;
- Coordinate the implementation of land and resource use and management programmes under the National Resource Management Plan;

- Coordinate natural resource management activities; and
- Issue permits and approvals for resource use activities within the National Resources Management Plan.

The Natural Resource Inventory must contain information concerning the natural resources of the State, including an inventory of:

- Geographic and topographic features;
- Soil types and geological formations including known mineral deposits;
- Ecological systems and classifications including:
  - locations of nationally significant flora and fauna,
  - locations of endangered species of flora and fauna, threatened ecological habitats and biodiversity reserves,
  - surface water catchment areas and sub-surface water reserves,
  - marine and coastal resources including coral formations, mangrove areas, sand deposits, tidal estuaries, fish breeding areas and aquaculture areas,
  - forestry resources, including forest types and densities, and such information contained in any forestry resource inventory established by the Government for any purpose,
  - mineral resources,
  - agriculture resources and activities, including where appropriate crop varieties, rotational routines, animal husbandry areas and land tenure systems;
- Cultural, archaeological and historic sites;
- Human resource activities including population centres, industrial and commercial centres, settlement patterns, communication corridors, educational and social support services and infrastructure, and civil works including electricity networks, waste management sites, sewage and potable water networks; and
- Economic development activities and infrastructure, including tourism developments, mines and quarries.

An outcome of the Natural Resource Inventory will be the formulation of the National Resource Management Plan. The Plan is expected to contain:

- A summary of the Natural Resource Inventory;
- A forestry resource management plan;
- An evaluation of historic, current or proposed activities that impact upon the carrying capacity of the natural resources of the State;
- An implementation programme outlining mechanisms, programmes, policies and strategies to ensure that development and resource use activities are carried out in such a manner as not to adversely impact upon the carrying capacity of the natural resources of the State;
- An outline of the principal reasons for adopting the objectives and policies of the Plan and implementation programme;
- Mechanisms to be employed to manage or mitigate any undesirable economic or resource management impact; and
- Mechanisms to be employed to monitor and manage the implementation of the Plan and to ensure its periodic review; for this purpose the mechanisms must balance environmental, economic and social development interests and provide the guiding principles for any subsequent legislation introduced for sustainable resource management and use.

Chapter 4
Land Use Practices, Issues and Impacts

4.1 Land use practice – good and bad

In order to understand better what it is that constitutes 'good' and 'bad' land use practices, examples of both are given in the two sub-sections that follow.

4.1.1 Good land use practices

Shifting cultivation
Shifting cultivation involves the clearing of forest and vegetation cover and sometimes burning the vegetative waste before the soil is cultivated by hand tools. The garden is cropped for a few years before it is abandoned (into fallow) for a new area, where the process is repeated. Abandoned land reverts naturally to bush land until it is ready to be cleared and cropped some 10 to 20 years later. Shifting cultivation is a system that maintains soil fertility through alternation of crops and long fallow periods. In recent times, fallow periods have reduced drastically because of an increase in population and consequent pressure on the land; this turns shifting cultivation into a bad practice.

Subsistence cultivation
This system involves growing different types of crops on a small parcel of land for household use or as a home garden. It is sustainable where traditional types of cultivation are practised; for example, planting of cassava or yams on mounds intercropped with banana, pawpaw, citrus and *dalo* under minimum tillage practice. This practice includes planting *Erythrina* (drala) nitrogen-fixing trees – to enhance soil fertility – and keeping the soil surface well mulched with garden waste such as leaves, grass and fruits. The recycling of plant nutrients is an important element in subsistence cultivation practice. On hill slopes, tree stumps are left intact and organic waste is placed along contours as soil erosion barriers, along with fruit trees and nitrogen-fixing trees that enhance soil fertility and create a diverse ecosystem. Subsistence steep-slope cultivation is acceptable where the traditional conservation practices are adhered to.

Intensive sloping land cultivation
Intensive cultivation on marginal and sloping land for crops such as sugar cane, ginger, *dalo*, maize and assorted vegetables is sustainable only if conservation and soil fertility enhancement techniques are used. For example, the cultivation of sugar cane with vetiver grass hedgerows and the retention of cane trash for mulching will reduce soil loss, conserve moisture during the dry season, increase organic matter content of the soil, enhance soil fertility, increase infiltration rate of the soil, enhance soil micro-organism activity and minimise weed competition. Using legumes such as peanuts, beans and other nitrogen-fixing vegetables as a cover crop and for fallow improvement, and leguminous trees like *glyricidia* and local fruit trees for live fence posts will also help. A similar system is the growing of *dalo* and ginger in alleys with vetiver grass and pineapple as contour hedgerows; fallow improvement and intercropping of agroforestry species such as *Erythrina* (drala) or *glyricidia* or other leguminous species like beans and *mukuna* with vetiver grass is carried out; crop waste is utilised as a mulch. All these practices will reduce soil loss, enhance soil fertility, conserve moisture, increase organic matter content of the soil, minimise weed competition and increase the infiltration rate of the soil. A pineapple hedgerow is an additional source of income for the farmer. The practice of crop rotation improves soil fertility, reduces pest and disease infestation and supports biodiversity. All cultivation on slopes greater than 8° require conservation measures and need to be monitored strictly.

Intensive flat land cultivation
This system involves large-scale intensive cultivation of crops such as sugar cane, *dalo*, vegetables and ginger on flat land. Crops are intercropped with suitable nitrogen-fixing species, widely spaced to reduce shading, or live fence posts of fruit trees such as *dawa*, *kavika*, citrus and mangoes; crop waste (leaves, stems and grasses) is used as mulch. These practices increase the soil organic matter content, stimulate soil micro- and macro-organism activity, and improve overall soil fertility. Crop rotation is also practised with different crops grown on the same piece of land but with a fallow period during which cover crops such as legumes are used to protect the soil from erosion and improve soil fertility. The fallow crop can also provide a cash return to farmers, for example, through the sale of peanuts or pods.

Commercial livestock farming
Commercial livestock farming is generally carried out in areas that have been deforested or logged. The use of live fence posts to support fencing wire also provides fodder for livestock, improves soil fertility and provides shade for the animals. Good land use practice requires that paddocks are subdivided, properly fenced and the number of livestock (stocking rate) is controlled to avoid overgrazing. Rotational grazing further reduces the risk of overgrazing and also allows grassland to recover faster.

A good practice is to establish fodder banks for animals comprising intensive planting of trees such as *Leucaena* (vaivai), *Glyricidia* (bainicagi) and *Calliandra*, all of which have leaves and pods that contain a high amount of crude protein and are ideal for animal feed. These areas are usually fenced and serve as a supplementary source of protein for livestock. This practice improves soil fertility, minimises land degradation and provides shade for the animals. The growing of shade trees (fruit trees and leguminous trees) in paddocks, widely spaced, can be used as supplementary feed and a source of fuelwood for the farmer.

Animal waste is recycled in the paddocks to increase the fertility of soil and enhance good pasture growth to provide good feed for the animals.

Sustainable logging
Sustainable logging involves controlled, selective cutting based on silvicultural considerations and the NCOLP. Logging roads and the time to log, how to log and how much to log are well planned. This practice preserves biodiversity in the forest, maintains species composition, is less disturbing to the ecosystem, maintains water quality, prevents soil erosion and provides socio-economic benefits to the landowners. Only such a system balances economic, environmental and social requirements of a society.

Afforestation and reafforestation
Fiji has embarked on a most successful pine plantation establishment programme. The *Pinus caribea* softwood plantations of over 43,000 ha were established in the dry zone of Fiji as an afforestation programme on degraded grasslands and reedlands. In the wet zone of the country, the re-afforestation programme of hardwood mahogany is well established within the existing native forest and now covers about 42,000 ha.

4.1.2 Bad land use practices

Deforestation
Deforestation has slowed but is continuing under a more controlled regime despite introduction of the Code of Logging Practice. Since 1967, up to 140,000 ha of Fiji's forest has been converted to non-forest land uses. Unsustainable logging practice is the clear felling of the forest trees and vegetation followed by burning, all in the guise of rural development. There are six principle causes of deforestation in Fiji:

- clearing of forest associated with a large-scale commercial (agriculture) rural development project;
- the continuing small but steady growth of smallholder agriculture involving mixed commercial and subsistence farming;
- the continuing spread of small villages and settlements;
- urban growth and infrastructure to service these areas (road, dams, bridges, reservoir);

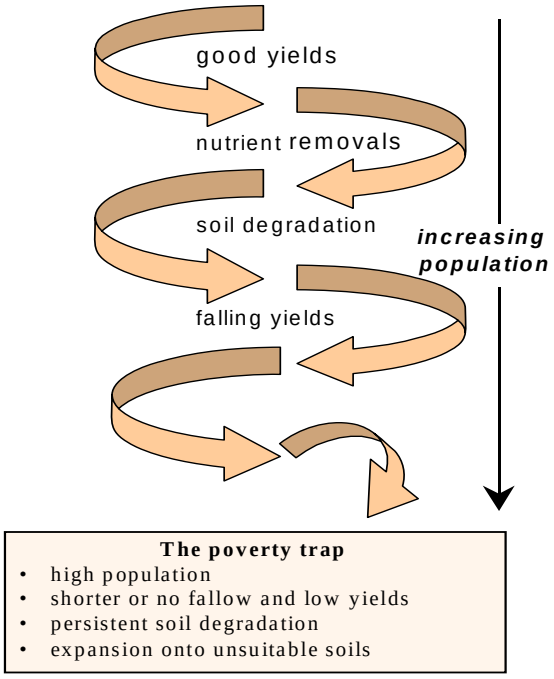
- fire; and
- bad logging practices followed by land clearance.

Logging
The exploitation of forest for timber is also a factor of deforestation. Logging itself does not necessarily permanently reduce forest cover. Poor logging practices however can and do affect the ability of forest to regenerate. Heavy disturbance of forests is still occurring and this type tends to encourage clearance for agricultural purposes. More dense forests are under less stress. The unplanned alignment of logging roads have on-site and off-site consequences to the environment such as erosion on road embankments, which causes siltation of creeks and depletion of biodiversity in the river ecosystems. These practices, both within and outside logging concession areas have significantly affected forest quality and biodiversity to the detriment of both forest cover (through erosion) and subsequently, forest-based industries.

Intensive sloping land cultivation
Increased population, low availability of fertile arable land and the encroachment onto fertile arable land for non-agricultural purposes such as urban expansion, has forced farmers to use sloping marginal steeplands.

Intensified use of marginal steepland areas leads to shorter fallow periods and ultimately to soil degradation and reduced crop yields from those crops such as sugar cane, ginger and *dalo* grown on sloping land with crops planted up and down slopes (rather than across the slope). This induces on-site land degradation, soil erosion, loss of plant nutrients, increased pest and disease infestation, reduction in soil depth, decreased soil water-holding capacity and rill and gully erosion. This gives rise to an unsustainable cropping system that ultimately leads to poverty (Figure 12). Off-site effects include increased siltation in the river systems, formation of mud banks, reduced navigability of rivers, destruction of fish spawning areas, reduced fish populations and flash floods during heavy rains. The latter cause damage to infrastructure costing millions of dollars in rehabilitation, sometimes loss of life and increasing destruction of coral reefs.

Figure 12: The downward spiral to the poverty trap



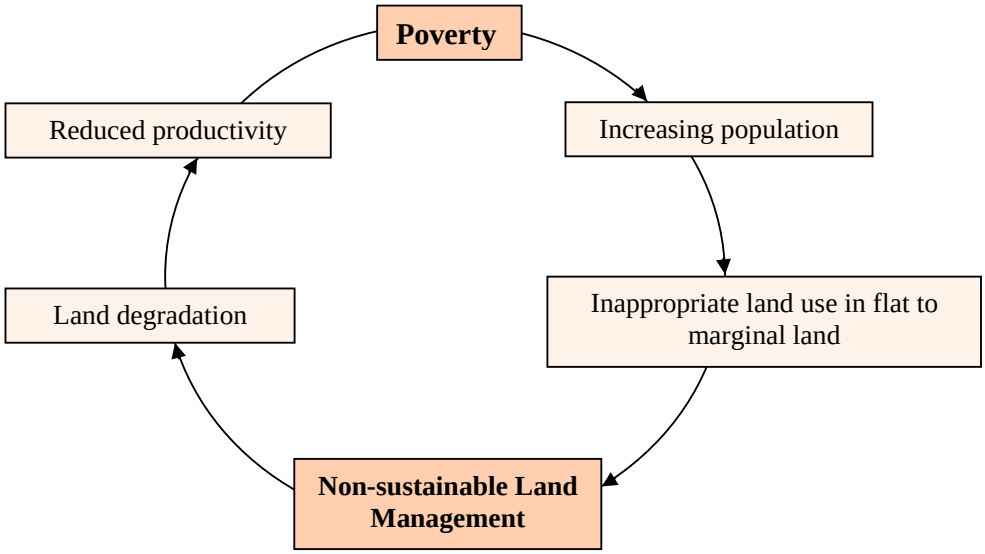
From: Cherish the Earth, FAO, 1994

Intensive flat land cultivation
Commercial and intensive farming on flat land often includes total clearing of forest and land for mono-cropping. It is the concentration of high-production output on a short-term basis, without consideration for the soil resources or 'best practice' farming, which results in unsustainable use.

The large-scale intensive and continuous cropping with crops like sugar cane, *dalo*, maize, ginger and others on flatland depletes the soil of plant nutrients and increases the dependence on expensive fertilisers. During heavy rainfall, the leaching and overland flow of the fertilisers and farm chemicals into rivers and ground water causes water pollution. As for sugar cane, the burning of trash after harvesting destroys micro-organisms and the organic matter on the soil surface. Tractors can cause compaction of the soil and an increase in bulk density that results in poor crop growth and low infiltration rates during heavy rain. Compaction is also an issue associated with logging operations.

The consequences of these practices result in a reduction in farm income that in turn can lead to the beginning of the cycle of poverty (Figure 13).

Figure 13: The vicious cycle of land degradation



From: The Conservation of Lands in Asia and the Pacific, FAO, 1992

Commercial livestock farming
The commercialisation of livestock farming without good pasture management, with unfenced paddocks and overstocking, leads to a situation where the land and animal feed is out of balance or the carrying capacity of the pasture is low. This results in soil erosion on steep marginal areas. Land degradation compounds when mature grass cover is burnt repeatedly to create young grass shoots that are palatable for livestock. Burning is usually done just before the onset of the wet season, therefore causing soil losses and mass movement. Another major problem is the accumulation of tonnes of animal waste that usually finds its way into streams and rivers causing pollution of waterways.

Reclamation of freshwater swamps
The reclamation and draining of freshwater swamps for rice and other agriculture development has proven to be unsustainable due to the high input costs of maintaining drains and other infrastructure. It also destroys habitats of endangered animals or birds.

Reclamation of mangrove swamps
The draining of large tracts of mangrove swamps for agriculture and housing development is expensive and unsuitable. Acid sulphate soils are prohibitively expensive to ameliorate for cropping. This practice has resulted in financial losses (in addition to the loss of mangrove so crucial for local subsistence villagers) plus the destruction of fish-spawning grounds and an overall loss of biodiversity.

Urban development
Increase in population and the continuous influx from rural to urban areas have resulted in significant urban development and encroachment onto first-class arable land.

The change of government policy from a strategy of import substitution, self sufficiency and heavy involvement of government to a strategy of export-led growth has changed agricultural land use. First-class land is now being used for private investment in developments such as housing, garment industries, tourism and others. For example, in the corridor between Nadi Town and Nadi Airport about 500 ha of first-class sugar cane land has been taken for non-agricultural purposes. The following are examples of the land use practices that occur within the urban and peri-urban areas.

Hotels
In the quest for more earnings from tourism, Fiji has to regulate the type of hotel development best suited for particular ecosystems.

Reclamation of entire mangrove islands also impacts adversely on nearby areas used as a source of landfill material. Also deserving of special consideration is the role of large hotels as pollution sources that harm water quality and upset the hydrological regime.

Housing
An increasing source of irritation nowadays relates both to the siting of housing schemes and the methods of landscaping observed. Earthmoving and levelling operations should be evaluated seriously, as they tend to overload waterways with all forms of debris. Eventually such debris finds its way to the coast and upsets the ecosystems. Sewerage also needs to be properly treated before being released into lagoons.

Ports
Development of port facilities in Fiji is being stepped up. Ports are developed on delicate coastal ecosystems. It is observed that large areas of mangrove swamps are currently being drained for this purpose. Consequent oil spills and changes to wave or current action trends may feature unfavourably in nearby areas in terms of coastal erosion and extermination of several species of baywater and coastal fisheries.

Airports
Most of the airports are developed on prime agriculture land. Besides encroaching on the nation's agricultural land, airport development displaces people as it creates noise pollution spreading to adjacent settlements. Though desirable for modern travel, impacts should be properly assessed and cost/benefit analyses carried out as such development displaces people and creates unpleasant side effects, such as sale of farmlands for non-rural real estate and rural-to-urban migration.

Highways and roads
Recent work on highways and roads demonstrates scant regard for measures to divert water safely into areas that are environmentally safe. Where a large part of the population relies on potable water, sources of regular, quality water are vital. Stabilisation of road embankments through 'greening' programmes is commonly ignored.

Towns
A continuing aspect of urban development is the way settlements continue to sprawl onto food-producing first-class land. Under current policies and legislation this trend will escalate, potentially to the point where it could impact on national efforts to develop agriculture with an export orientation on value-added, agro-based industries. As evidence, it is necessary only to look at the environment of Fiji's major cities and towns to see land previously used for sugar cane areas, rice fields, vegetable and root crop farms taken out of production; there seems to be no end to this. The guiding principles in such developments are nearly always the economy of sewerage, electricity, roading and water reticulation systems. Even the location of ecologically sensible garbage-dump sites causes a lot of discussion (not to say an outcry) from affected population groups.

Manufacturing industries
Current siting of manufacturing industries is, in many cases, visually unacceptable. Wastes emanate from industrial processing – these could be gaseous, solid or liquid. The way in which these wastes are produced and disposed of are crucial environmental planning issues. Waste-producing industries of significance are cement plants (dust), sugar mills (soot), agro- and timber-processing plants (chemically contaminated waste water) and oil spills from rusted discarded cars, machinery and equipment.

Energy
The creation of artificial lakes for the harvesting of electrical energy, even to meet current national requirements, is already creating problems for people who gave land away in good faith for such purposes. The problem stemmed from too much emphasis on economic rates of recovery and little to negligible attention on social impacts of the long-term welfare of landowners. The solution lies really in suitable engineering design specifications to prevent the unpredicted flood of upstream areas where people plant their crops, e.g. in Nadrau where the Monasavu Dam is situated.

Mining
The mining industry does not have guidelines like NCOLP for the timber industries and there is an urgent need to develop standards. The environmental impact survey of the Mount Kasi open gold mine indicated significant ramifications for the surrounding environment, Yanawai River and coral reef ecosystems. The long-term impact of the mining works – especially where mine tailings are deposited – and other environmental effects will have long-term consequences. The mining of coral for export has had devastating effects on coral reef ecosystems.

4.1.3 Issues related to sound land husbandry practice

As described elsewhere, ALTA applies to all agricultural areas except for:
- All lands in native reserve;
- Tenancies held by members of a registered Co-operative Society as landlord; and
- In general, land holdings less than 1ha.

Clearly, ALTA and associated legislation provides the legal mandate to enforce and improve appropriate land husbandry practices. To exemplify this fact an abbreviated listing of relevant provisions follows:

- *Maintenance of soil fertility*
  Crown Agricultural Leases (CAL) specify this in provisos (10).
  ALTA 13 (2 b and c) specifies cultivation to maintain fertility and avoidance of measures reducing fertility.
- *25º limit to usage*
  CAL provisos 11 and 17 ban cultivation, overgrazing, burning, and tree felling on areas steeper than 25º.
  ALTA schedule 3 proviso (8) states this limit.

- *Soil erosion control*
  ALTA Schedule 3 proviso 7 provides instructions to tenants on how to apply measures to check soil erosion CAL proviso (29) implements.
- *Burning in cane lands*
  ALTA is not specific on slopes below 25º. However, the provisions in *the maintenance of soil fertility* above can be applied to control burning.
- *Forbid planting with the slope*
  ALTA Schedule 3 proviso 7 can be applied to control erosion.
  Land Conservation and Improvement Act Order 21 (1959) instructs all sugar cane to be grown along the contour.
- *Vetiver grass hedgerows*
  Research results demonstrate the value of this technique.
- *Agroforestry, alley-cropping*
  This is a desirable practice to incorporate into the farming system for both erosion and soil fertility reasons.
- *Fencing of cattle*
  Uncontrolled cattle damage crops. There is a need for protection under the Land and Improvement Act and ALTA.
- *Stocking rates (livestock units)*
  There is a hint of responsibility with the Committee of Valuers under ALTA 1985 revision Section 21. The clause could be used to clarify definitions related to overgrazing.
- *Bans on steep slopes greater than 25º*
  Refer to the conditions under the *25º limit to usage* provisions above.
- *Plantation forestry*
  Refer to the *25º limit to usage* provisions above because the establishment and harvesting phases are very damaging.
- *Drainage and reclamation works*
  This satisfies the improvement provision of the LCI Act 1953 Cap 141 – a broad component little used.
- *Keeping waterways clean and flowing*
  Logging, housing, farming, pastoralism and manufacturing generally ignore the importance of waterway maintenance.
  Blocked waterways overload systems with pollutants and sediment.
- *Pollution of water environment*
  Land and water are complementary resources and have detrimental acting impact on each other.
- *Riparian strips, corridors and belts*
  These provide filter zones for land-sourced sediments and have a key role in keeping creeks clean and also minimising bank erosion.
- *Misuse of roadsides*
  CAL proviso (11) addresses this for steep areas but could be expanded to accommodate mass movement and improved soil cover purposes.
- *Litter, refuse and discarded machinery*
  Land improvement under Cap 144 of the LCI Act must always be viewed as enhancing land values. When rubbish dumps develop unabated (e.g. Western Wreckers Ltd sites), land values fall.
- *Mangrove environments*
  Values of mangrove area need to be assessed and fully recognised. Building roads through these and reclaiming them should never have been done without careful analysis of results.

- *Closed area*
  Should imply protection and rehabilitation together, for meaningful proclamations. The LCB is already empowered to do this.

4.2 Analysis of the results from stakeholder meetings

As part of the process of analysing the issues, a series of stakeholder meetings was organised by MAFF Land Use Section staff using questionnaires, semi-structured interview (SSI) techniques and Participatory Rural Appraisal (PRA) methods. A copy of the questionnaire used with communities is given in Appendix 5. Agencies with responsibilities related to rural sector and land use were also asked to complete questionnaires.

4.2.1 Quality and availability of expert advice

In general there is a lack of information about land use legislation amongst target groups surveyed. Where government departments or NGOs are working with the community on projects, people have become aware of some aspects of the law and they abide by their provisions; for example, in Nabukelevu village (National Forest Logging Code Practice) and at Tilivalevu village (soil conservation practices). Clearly there is a need for better mechanisms of information exchange. The fora are in place. Indian communities have their advisory councils that are represented by district councillors. Fijian villages have the *tikina* councils and the *Turaga ni Koro* meetings. However, these fora are not utilised by government departments other than the Fijian Affairs Board and the Ministry of Regional Development.

Given an integrated and multi-sectoral approach, linkages between departments and communication channels should become better utilised and co-ordinated. MAFF Extension Division staff need to be trained in methodologies and technologies for sound land husbandry practice so that they can more effectively encourage sustainable land development goals. Also, MAFF Land Use Section needs the resources to expand its areas of expertise so that more target groups are informed about land husbandry practices. As the church, Health and Education Departments feature prominently in villages and settlements, it would be opportune to develop a strategy whereby these organisations and government departments can play a more effective, active role in information dissemination.

With the benefit of hindsight, the survey exposes the true level of commitment and rapport that exists between MAFF officers and their clientele. Where there is good rapport between the officer and the farmers, the latter are willing to host meetings and gatherings at their own expense. Much depends on the skills and experience of MAFF extension officers and their attitude in forging an improved working relationship with MAFF's clientele, the people.

The survey demonstrated that a common complaint by farmers was that MAFF officers rarely visited. Some farmers, due to lack of knowledge, do not appreciate that they have a land use practice problem. MAFF Extension clearly needs to clarify its performance and methods of interaction with farmers and make these known to the people by way of various organised meetings. Generally, there needs to be a better exchange of information between government departments and clientele. Perhaps the lack of interaction explains, in part, the distance between MAFF Extension and the communities they serve.

4.2.2 Awareness of land use legislation

The surveys showed that the majority of the respondents polled (95%), has very little or no knowledge about land husbandry and soil conservation legislation (Table 10). Tilivalevu villagers have some knowledge of soil conservation practice, particularly in the use of vetiver and pineapple contour planting to minimise soil erosion and enhance moisture retention. Some farmers in Dawasamu are planting nitrogen-fixing trees (*Callindra calothyrsus*) to improve soil fertility. Nabukelevu and Abaca villagers have some knowledge of

the National Code of Logging Practice, in particular the distance from the waterway that should remain protected from logging. Keka villages are very aware of the forest and conservation issues. They are also familiar with the process they need to take to conserve and manage their forests. However, they are not willing to give permission for their forests to be logged under a proposed forest conservation programme (SIFM) due to the differences they have with the logging contractor concerned (Fiji Forest Industries).
The majority of respondents indicated that they had no idea of any existing legislation with respect to land use. The majority of community members surveyed indicated that that was the first time they had heard of such legislation.

Table 10: Level of awareness towards conservation legislation

Villages and Settlements Surveyed	*Land Conservation Act*				*ALTA*				*Rivers and Streams Act*				*Logging Code*			
	H	M	L	N	H	M	L	N	H	M	L	N	H	M	L	N
Waidalice				3				3				3				3
Dawasamu				3				3				3				3
Nabukelevu				3				3				3		3		
Tilivalevu			3			3						3				3
Vitogo				3				3				3				3
Abaca			3					3				3		3		
Johnson				3				3				3				3
Wavuwavu				3				3				3				3
Keka			3					3				3	3			

Key**:** H = High; M = Medium; L = Low; N = Not Aware

4.2.3 Institution and community interactions

From the figures presented (Figures 14 and 15), it is noted that only four institutions interact closely with village communities and settlements. These are the Health Department, Education Department, Fiji Sugar Corporation and the church. Broken lines in the diagrams suggest that the linkage is not very strong and the distance of the block to the settlement graphically shows the variance in linkages between institutions and target villages or settlements.

Figure 14: Institutions assisting communities and their interactions

1. FSC Field Officer
2. MAFF Extension, AH & P
3. Growers Councillor
4. Health
5. FEA
6. PWD Water and Roads
7. Lands
8. NLTB
9. Fiji Pine
10. Market Agents
11. Education Officers – Schools
12. Telecom Fiji
13. MAFF Fisheries
14. MAFF Forestry
15. Church
16. Police.

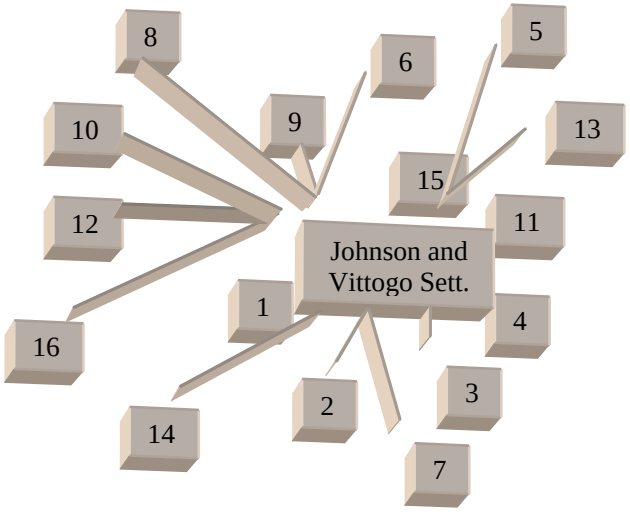
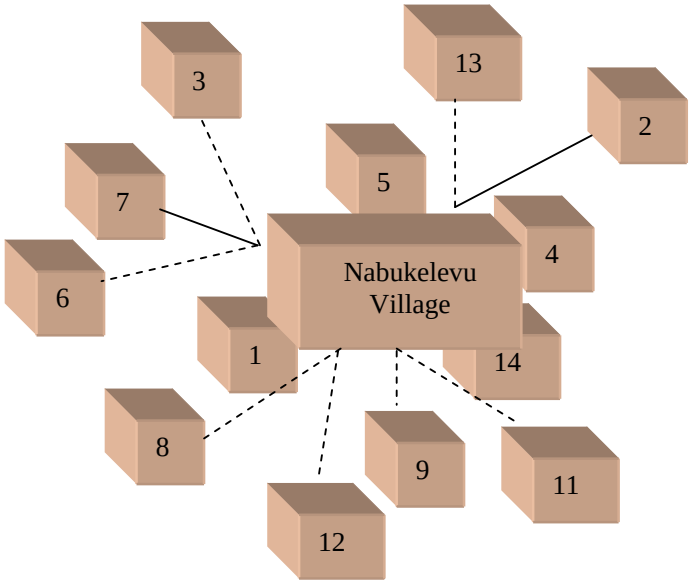


Figure 15: Institutions interacting with villages and their linkages

1. Health
2. MAFF Forestry
3. MAFF Agriculture
4. Education
5. NLTB
6. Police
7. Tourism
8. Telecom Fiji
9. MAFF AH & P
10. Carpenters (PWD)
11. Logging Companies
12. Lands
13. Provincial Office
14. Church.



4.2.4 Problems identified

Community members surveyed were asked to list and prioritise those problems of importance to them. The results are presented in Table 11. Of interest is the place on the list of erosion and poor information about sound land use practices.

Table 11: Summary of problems identified by community members from the 11 survey areas (not prioritised)

Topics	Frequency of Citation
Erosion	11
Lack of information and assistance on proper land use	11
Soil fertility decline	10
High cost of input	10
Lack of infrastructure	8
Lack of market and distribution centres	7
Yield/production decline	7
Sloping land	7
Weather patterns	6
Drainage	5
Flooding	5
Available agriculture land	5
Land tenure	4
Financial assistance for land development	3
Shortage of labour	3
Tools	3
Land rent	2
Logging	2
Firewood	2
Water quality	2
Pests and disease	1
Planting material	1
Planting season	1

4.3 Issues

4.3.1 Demographic changes

The increase in Fiji's population over recent decades has placed pressure on the land, particularly marginal land, and this has resulted in significant land degradation and soil erosion.

While the majority (54%) of the population still lives in rural areas, there has been an absolute decline in the rural population over the last decade due to the rural to urban migration; a trend that is driven by perceived prospects of employment, problems of access to rural land, limited income-generating opportunities and poorer services and infrastructure in the rural areas. The amount of unused land suitable for development is quite small and land use competition is becoming increasingly intense. The uneven distribution of arable land

has resulted in some localised demographic imbalances. The environmental impacts of uncontrolled urbanisation combined with land degradation are seriously impacting on the quality of living and the sustainable income-generating capacity of Fiji's natural resources.

Land availability and land quality, land tenure, labour mobilisation, depopulation in some outer islands and sugar cane areas and, in the Fijian village context, a changing balance between subsistence and commercial agriculture are all factors contributing to fewer people being supported directly in primary production.

It is becoming more difficult to absorb (at a satisfactory level of living) within the subsistence farming sector those who cannot find work in the urban or fully commercial rural sectors. The conversion from subsistence to commercial agriculture, and the inferior quality of each parcel of land brought into use have meant that the average new rural family requires more land than their predecessors did. The small size of farm holdings (60% are less than 3 ha) forces farmers into intensive cultivation (often mono-cropping) for high-output, short-term production without or with only minimal fallow periods.

4.3.2 Pressure on the production base

Apart from the commercial crops (sugar, ginger, *yaqona*, *dalo*) most farmers are locked into subsistence production or root crops, pulses and rice, not a diverse farming system involving a mix of crops (perennials, fruit and nut trees plus the subsistence crops) that would increase income and self-reliance. Market crops have higher value and perennials are more appropriate for soils prone to erosion.

Because of competition and pressure for land, subsistence gardens are increasingly being relocated onto steeper slopes because of the expansion of cash cropping and grazing on the flatter lands. Some gardens experience soil loss, especially when traditional mulching is not practised and fallow periods are too short.

Soil loss measurements clearly demonstrate that the agricultural productive base in many sugar cane areas, and with ginger on slopes, is declining at a rate that is well above what would be regarded as economically acceptable.

The new system of cash cropping is not sustainable. The method here is to move into a new area, clear a relatively large block (10–20 ha) by slash and burn methods, cultivate the land until depleted of nutrients and eroded and then, if more land can be leased, move to a new area and repeat the process.

Goat grazing areas are invariably overstocked and show bare eroded patches due to the typical farmer's need to recoup expenses as quickly as possible and an ignorance of controlled grazing techniques.

4.3.3 Over-dependence on the sugar industry

The country's high dependence on the sugar industry and its quota and incentive system encourage cane farmers to move onto slopes greater than 11º and, commonly, to not practise any soil conservation measures. Over a short period of time, many of these areas experience soil depletion, soil moisture deficits and decreasing productivity. Where land degradation has become extreme, farmers are forced into growing non-cane crops or foregoing leases.
Overall the sugar industry is experiencing declining productivity and industry efficiency. Sugar prices have declined, there is little new investment into the sector, there are growing uncertainties about land tenure and there is a high level of farmer indebtedness.

There is a prevalent attitude that a soil's only function is to physically support the cane crop – all nutrient inputs are artificial – and there is scant regard for the soil's role as a 'bank' for moisture and nutrients. FSC (apart from recent Taiwanese assistance) has long ceased research into soil conservation. This is in a situation

where estimates point to 15,000 ha of cane land on Viti Levu being in urgent need of soil conservation works and a further 6500 ha that should not be in cane at all.

The Taiwanese research evaluated the relationship between conservation practice, surface run-off, soil erosion and crop yield. The results of this research on selected soils are given in Appendix 6.

4.3.4 Use of appropriate technologies

Pressures on land indicate an urgency to increase sustainable production per unit area. However, there is poor understanding throughout the agriculture sector about a much closer matching between land use/crop type and land capability if productivity goals are to be met. There is very low farmer participation in technology generation.

The use of vetiver grass planted along the contour in the cane belt was a widely promoted practice until 30 years ago. The Fiji model for the use of vetiver grass is described widely in world soil conservation literature; unfortunately, this is no longer the case with only a fraction of vetiver grass areas remaining. It is a proven technique to control soil movement and loss on sloping land.

The burning of cane trash, while illegal, is a widespread practice and over repeated years, combined with long fallows every four to five years, results in serious depletion of fertility and soil loss. Trash is burnt, and then follows a period where the soil surface is bare and exposed to high-intensity rainfall. This period coincides with the wet season and on sloping land commonly results in severe sheet erosion.

Mission grass areas are burnt each season. The grass 'browns off' early and when fired at late growth stage, the entire cover is lost due to total combustion and extremely hot fires. This results in a high percentage of bare ground (mission grass dominates, with other species smothered) and exposure to rainfall impact. There is a widespread culture of burning and a growing incidence of wild fires in the indigenous forests and pine plantations.

In the 1960s, up to 140,000 ha of Fiji's forests were converted to non-forest land use with loss of forest cover leading to serious soil degradation. This was particularly so where logged areas had no subsequent management. Here the incidence of mass movement and soil erosion is high. In many cases, forest logging practices have caused avoidable environmental damage (the National Code of Logging Practice has been adopted – but its enforcement is often inadequate).

Because of the predominantly poor adoption and application of land husbandry practices and the resultant degradation of the land and water resources, the impact of natural disasters is becoming increasingly more acute, in particular, vulnerability to droughts and flooding.
The unplanned alignment of mining and logging roads has both on-site and off-site consequences on the environment with siltation of creeks and runoff surges during storm events.

4.3.5 Lack of physical infrastructure

Too many rural areas have poor roading, utilities, transport (to market) and social services – all disincentives to follow anything other than a subsistence lifestyle.

4.3.6 Weak institutional infrastructure

There is serious under-resourcing by Government for line Ministries having responsibility for agriculture, forestry and land use in general. The public sector commonly lacks effective funding, resources and trained technical staff to undertake environmental planning, management and enforcement. Expertise in the areas of

agricultural extension, soil conservation, land use planning and environmental planning, management and enforcement is below critical mass in the responsible line ministries. The resources devoted to soil conservation are inadequate for the implementation of significant measures, either in terms of providing information or incentives.

FSC has no staff designated as soil conservation officers and the institutional memory of land husbandry practices is poor due to the current age structure. Prior to Fiji's independence, CSR and MAFF had some 60 conservation officers between them, the majority by far with CSR.

NLTB receives poor technical support from MAFF Land Use Section and Department of Forestry by way of expertise about soils and land capability, advice and field inspections relating to the land husbandry clauses in NLTB leases. As a consequence, NLTB is reluctant to exercise its legal rights with respect to bad land husbandry practices.

The Land Conservation Board has no public profile and there is little understanding about its role and responsibilities; yet it is charged with an enormous national task. The LCB has been ineffective for a number of years and did not meet for six years in the 1970s. The Board is in urgent need of revitalisation concurrent with a national awareness programme. The primary responsibility of the LCB is the 'supervision over land and water resources' (as per the Land Conservation and Improvement Act, 1953) yet expenditure has been on coastal zone/floodplain drainage schemes, not toward solving the causal factors responsible for the downstream problems.

The Land Conservation Board is not acting on the powers vested in it and while the Board has 'ownership' of the problems and solutions there is minimal government support and intervention for the Board to fully implement its 'powers to exercise general supervision over land and water resources'. This is not a recent phenomenon, but rather a situation that has prevailed for 20 years or more. With regard to the scope of the Board's work, little attention has ever been given to the issues of water yield and quality.

Environmental issues are not well addressed in the planning process. There is no national level planning and environmental policy guidelines backed by legislation. It is therefore difficult for TCPD to consider or action environmental needs at the divisional and local planning level. Environmental analysis is currently not a requirement in the planning system nor is an environmental impact assessment (EIA) on land development proposals before decisions are made. MAFF Land Use Section activities, due in part to limited resources, are mainly directed at planning land use with regard to production potential rather than to longer-term land degradation issues.

There is a poor awareness of the interdependence of conservation and development. There are widely held views in some influential ministries that conservation and environmental management are obstacles to development or at best irrelevant to it.

Land conservation is generally ineffective because there is no strong executive authority in a co-ordinating role, nor is there close integration between Government departments and other stakeholders, and there is an absence of any strong political will.

4.3.7 Water resources

Land use planning for the future is not possible unless there is some co-ordination of the best use of Fiji's water and land resources, particularly with population growth that is causing competition for the use of the same limited resources. Part of this process should involve a review of the various ordinances that control the nation's water and land resources (refer Chapter 3).

Planners and decision-makers ought to ask searching questions about water resources and their development. Questions might include: What are the demands on water resources? Are the water resources sufficient to

meet these demands? Where are the resources, how extensive are they and how are they currently utilised? Are the present uses sustainable? If not, what are the constraints on more sustainable use? Answers to such questions are rarely simple. Some questions can only be answered by integrating environmental, social and economic information.

Water scarcity is about more than the decreasing availability of this resource. The increase of pollution and, to a lesser extent, salinity in water are other pressing issues. This contamination makes plentiful water supplies unfit for drinking, or for agricultural or environmental purposes.

In some lowland parts of Fiji, flood control and salinity mitigation are required for raising agricultural productivity. Drainage works are essential to allow cultivation of other low-lying areas subject to waterlogging.

There is a general lack of specialised knowledge about ground water and a limited awareness of the importance of water resources management as a technical and policy issue.

Primary Government objectives for the water resources sector should ideally encourage efficient use and integrated management of water resources at the catchment (river basin) level; improve flood warning and protection; reduce water pollution; undertake priority water resource development projects (e.g. irrigation schemes in the 'dry' zones); and promote financial self-sufficiency. Key steps to be taken for the achievement of these objectives are policy and institutional reforms to improve water resource management.

Policy on water resources management should emphasise the following principles:

(i) Water resources are managed and developed in a comprehensive integrated manner and cross-sectoral issues are considered with the goal of ensuring the sustainability of the water environment for multiple uses as an integral part of Fiji's economic development process;
(ii) Water resources planning and management are carried out recognising the interrelationships between water, land and human resources with the objective of enhancing economic growth and development in an environmentally sustainable manner;
(iii) Water is an economic resource and therefore should be managed in an economically efficient manner;
(iv) The catchment (river basin) should be the basic unit for planning and managing water resources;
(v) Water users should participate directly in water resources management and development; and
(vi) Water use should be efficient and environmentally sustainable.

Irrigation on appropriate soils for intensive cropping has potential to significantly increase productivity per unit of land given proven water resources are available to support irrigation. Integrated 'dryland' measures that farmers can adopt can result in soil moisture savings and increased agricultural yields. These include land-levelling, non-tillage in the dry season, deep ploughing in the wet season, mulching and overall improved management measures.

4.3.8 Inappropriate land use in watersheds

Erosion resulting from inappropriate land use and land management practices in watersheds has led to progressive siltation of rivers resulting in deterioration of drainage on floodplains, frequent inundation and the formation of shallow bars across the river mouths. Dredging of rivers has become a very costly necessity. Land degradation in watersheds causes peak flows in rivers during high-intensity storms. This results in downstream sedimentation and flooding with serious implications for settlements, domestic water supplies, infrastructure (roads, bridges) and crops. There is general lack of attention by loggers to erosion, streamflow and ecological considerations; similarly to legally established reserve forest areas.

The consequences of land degradation and inappropriate land use practices have the potential to impact negatively on the tourist industry. Sectors of the industry already express concern about dirty rivers,

frequency of flooding, water rationing and poor quality water, unsightly landscapes, pollution and visible waste. Environmentalists' point to the vulnerability of the coral reefs to excessive sediment brought into the lagoons by flooded rivers from eroding watersheds.

Ecologists have concerns over the forest hardwood programme. These relate to the vigour of mahogany that potentially could lead to a monoculture and elsewhere, invasion of native forests. Also, as mahogany plantings often follow logging, a high proportion of Fiji's native production forest is being lost. Planting of mahogany on steep slopes and riparian zones (which is illegal) poses a potential erosion risk at logging time.

4.3.9 Inappropriate land use in the coastal margins

Large-scale reclamation of mangroves for rice production in particular has proven to be economically unviable with significant net financial losses (refer P. Lal's Raviravi analysis). This national loss is in addition to the loss of benefits for subsistence villagers from mangrove removal.

4.3.10 Information

There is a very poor public understanding in the rural sector about various legislation that pertains to land, land use practice and soil conservation. This situation results in part from the fact that the majority of government and corporate (e.g. NLTB, FSC) field officers responsible are themselves not conversant with the various laws. Also, there have been no public awareness programmes to inform about the land husbandry provisions stated in these laws and written into rural leases. For 30 years, there has been in essence no enforcement or policing of these provisions; in effect, a whole generation has been kept in the dark since land conservation laws were regarded seriously and enforced.

The level and standards of technology transfer from officials to farmers is inadequate on matters of land use diversification and intensification, farming systems and their development needs, new systems, costs of inputs and gross margins, post-harvest support and marketing.

Soil conservation legislation is not being used due to poor understanding of the issues at both planning and implementation levels. Resources devoted to soil conservation are inadequate for applying significant measures either for information or incentives. The LCB does not have available information and publicity material for land users/farmers about soil and water conservation and land management.

There is a lack of clear guidelines on what constitutes 'bad' land husbandry practices, and poor institutional understanding about the magnitude of the soil erosion problem. There is also very little literature about land use farming practices available in Fiji Hindi or Fijian.

4.3.11 Land tenure

Over the period 1997 to 2026 approximately 11,800 leases issued under ALTA will expire. While many leases will be renewed there will still be a number of farmers to be resettled. Noting the shortage of good land in suitable locations, the questions arise as to where these displaced farmers will be settled and whether farmers will move to the areas identified.

A number of landowners are concerned at the provisions in ALTA for a minimum lease period of 30 years, which effectively removes for more than one generation any say in the use of their land. Most tenants consider that ALTA has served them well with the 30-year leases. A number of landowners are concerned that the lease rental is based on the unimproved capital value of the land and not its commercial value. A lease rent based on the market value of the land would be more remunerative to the landowners.

Tenants consider ALTA has provided additional protection for them; for example, the right of appeal vis-à-vis reassessment of lease rentals and the right to fair compensation in the event tenants are asked to vacate the land on expiry of the leases[2].

The Bose Levu Vakaturaga[3] (BLV) supports the recommendation in the NLTB Task Force Report on ALTA that future leases on native land are dealt with under the provisions of NLTA and its regulations. This would mean amending ALTA to exclude native land. It would also involve amending NLTA to incorporate those provisions of the ALTA legislation that are considered superior in their protection of rights and interests of both landowners and tenants. Clearly NLTB see this as the favoured solution as it addresses the needs and concerns of all parties. The BLV members were unanimous (in consideration of the NLTB Report on ALTA) that new leasing arrangements on native land must not only address the needs and wishes of the landowners but those of lessees, to ensure continued national economic progress. There is consensus that a solution can be agreed on by the Joint Parliamentary Select Committee (JPSC) on agricultural leases.

The TCPD is responsible for all subdivision of land under the Subdivision of Land Ordinance; this role is applicable in all non-urban designated areas. This Ordinance makes no provision for planning on a regional scale per se. Thus TCPD will make an assessment of a particular land development and will establish the standards required for the development, but there is no requirement in law for TCPD in this process to give consideration to land use alternatives (at the development site). There are non-existent environmental controls over land developers; the Director of Town and Country Planning is not empowered to require an environmental impact statement from a land developer.

For historical reasons the Town Planning Act treats land development as three actions – subdivision, planning, and building. This process causes delays in developing schemes and has little relevance to rural sector subdivision. Note all planning applications must be referred to the Director of Town and Country Planning. The Act has little relevance to the rural sector. Recurring problems related to the Subdivision of Land Ordinance include: maintenance of roads and legal access in rural areas; peri-urban subdivision to the detriment of infilling of established urban areas; and the low standards prevalent in towns that in part allow squatting in peri-urban and rural areas.

While the close relationship between Fijians and their land is continually emphasised, there appears to be scant regard by the Fijian landowners to ensure the soil resources are well-managed and fertility retained by tenants who have leased *mataqali* land.

4.3.12 Poverty

Poverty can be seen in all communities. Although the impact of poverty is offset by the relatively high level of subsistence and food security, 25 per cent of the population are living below the poverty line. This proportion has probably increased as a result of the impact on land use from the recent droughts and subsequent floods. Clearly rural incomes have been reduced (both for farmers and those on wages) and greater rural unemployment exists as a result of these climatic events. Rural poverty is greatest among those farming degraded and/or marginal land for agriculture and among those without access to the land. The significant increase in rural-to-urban migration has reduced the food security buffer and traditional (rural) family support mechanisms.

Rural youth constitute a major part of the less educated school leavers (without FSLC) and are a significant element in the rural-to-urban migration due in part to the lack of employment in the rural sector. No significant Government schemes are available to create rural employment and stimulate income-generating opportunities.

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[2] According to the NLTB, the compensatory provision of NLTA and its regulations are more generous than those under ALTA, for both tenants and landowners.

[3] Also known as the Great Council of Chiefs (GCC).4

Box 4

Strategic Checklist for Rural Development

- Macro-economic and sectoral policies are stable. The foreign exchange, trade and taxation regimes do not discriminate against agriculture, but are similar for rural and urban sectors.
- The growth of private agriculture is encouraged by minimising distortions among input and output markets and by market development for agricultural and agro-industrial products, both at home and abroad.
- Public investment and expenditure programmes for economic and social infrastructure, health, nutrition, education and family planning services do not discriminate against rural populations or the rural poor.
- Large farms and large agro-industrial companies do not receive special privileges and are not able to reduce competition in output, input, land or credit markets.
- The agrarian structure is dominated by efficient and technologically sophisticated family operators who rely primarily on their own family's labour.
- The rights and needs of women farmers and wage-labourers are explicitly recognised.
- Access to and security of land and water rights are actively promoted.
- Private and public sectors complement each other in generating and disseminating knowledge and technologies. Public sector financing is particularly important for areas of limited interest to the private sector, such as strategic research, smallholder extension and diffusion of sustainable production systems and techniques.
- Rural development programmes mobilise the skills, talents and labour of the rural population through administrative, fiscal and management systems that are decentralised and participatory, and through private sector involvement.
- Rural development programmes are designed so that the rural poor and other vulnerable groups are fully involved in the identification, design and implementation of the programmes.

World Bank. 1997. Rural Development: from Vision to Action

4.3.13 Poor local control, responsibility and incentive because of central government control

Currently there is an over-centralisation in planning and current legislation does not allow for segregation of national, divisional and local issues. Desirable outcomes from national, divisional and local land use and rural sector development objectives cannot be realised without the following mechanisms:

- 'Bottom–up' planning;
- A change in the current national centralisation of control;
- Introduction of legislation that segregates natural, divisional and local issues;
- Integration of land capability and community needs; and
- The absence of law and processes for co-ordination of watershed management, land zoning, land use planning and sustainable natural resource management.

A major limitation to sustainable rural development in Fiji is the lack of a National Land Use Plan and an institutional responsibility for the land use planning to facilitate the national plan. Land resources are limited and finite. If the demographic trends continue, there is an increasingly urgent need to match land systems, soil types and land uses in the most national way possible, to maximise sustainable production and meet the needs of society. Land use planning is fundamental to this process.

As it relates to rural land use, the present legal and administrative system comprises a number of old laws that have not been significantly amended (although largely still relevant). However in general these are not enforced or policed and compliance is voluntary or coerced. There is no overriding planning provision that enables integration of land capability assessment and community needs for sound land use and planning.

Deficiencies in physical planning are being compounded by significant rural-to-urban drift that has resulted in widespread development in the peri-urban areas. It is a weakness in the physical planning sense that TCPD has not been given the mandate to develop regional and district schemes in collaboration with appropriate bodies and agencies of government. Combined with zoning, these plans would go a long way towards controlling indiscriminate and inappropriate land use, particularly in the peri-urban areas. Without such schemes, urban areas do not have a framework in which to indicate their growth and development directions. Significant tracts of first-class soils for food production are being lost to urban use, e.g. Nadi to Lautoka corridor (only 16% of land area available). No mechanism exists to resolve land use conflicts.

The National Development Plans (DP6 – DP9) provide adequate environmental policy but have been weak in the implementation of strategies and programmes. This can be attributed to: a lack of integration of development and environmental policies; environment provisions which are spread among a number of Acts; and the predominance of national economic and social development objectives that are invariably isolated from any environmental framework.

There is in general an inability by the Government of Fiji to manage natural resources on a sustainable basis due to inadequate policies, legislation, forward planning and administration. No one government department is responsible for the planning and co-ordination of watershed management.

Chapter 5
Land Resource Information

5.1 Basic information required in rural land use planning

Reliable information on land resources – including soils, climate, vegetation and topography – is needed if sound land use and conservation policies are to be developed. Some of these data are more widely available in Fiji than is generally realised. However, the data is of different scales and reliability, and are stored in different ministries. When planning for sustainable land use, the first major task is to find out what data are available and where they are located. The second is to gather existing data together, arrange them in a usable form, assess their utility and decide what additional data still need to be gathered.

GIS is the efficient way for the assembly, storage and processing of natural resources data. There are a number of systems now available and operational amongst GOF ministries, SOEs and regional organisations based in Suva (for example SOPAC). With GIS, all relevant information for land use planning can be stored in one place, added to as more and better data become available, and effectively processed into usable formats.

Fiji is fortunate to have the Fiji Land Information Council (FLIC) and its technical support unit – the Fiji Land Information System Support Centre (FLISSC), both of which function under the auspices of the Lands and Survey Department. The Fiji Land Information System (FLIS) – *Tukutuku ni Vanua kei Viti*, the system managed and implemented by the Support Centre (FLISSC) – is an integrated land information infrastructure that embraces the majority of agencies dealing with land-related information in Fiji. The FLIC/FLIS model is one of the most effective approaches to national management of land-related information and is the envy of many countries. The organisational structure and membership of FLIC and an outline of FLIC policies, in particular the protocols for data ownership, sharing and charging are given in Appendix 7.

Detail about native, Crown and freehold lands is provided elsewhere in this report. However, for the purpose of land use planning, the administration of land is the responsibility of four authorities:

- Native Land and Fisheries Commission (Native Land ownership);
- Native Land Trust Board (administration of Native Land);
- Department of Lands and Surveys (for Crown Land); and
- Register of Titles (for Freehold land).

Thus, administrative land-related data (both graphic and non-graphic) reside in different agencies but are still in varying standards of accuracy, consistency and completeness. A number of government and non-government organisations have established ‘stand-alone’ computerised systems to improve in-house operations. In the main, all relevant systems within those ministries responsible for land administration are linked to FLIS. The current operational systems are given in Table 12 (21). The range of information and amount of detail required varies according to the level of planning. The minimum data set that should be included is listed below.

Table 12: Fiji Land Information System – operational systems (as at November 1998)

No.	System	Description	Database System	Location
1.	Central Index	The hub that links most of the systems, holds the key data from each, and provides for their maintenance	Advanced Revelation	FLIS Support Centre
2.	Computerised Cadastral Mapping Systems (CCMS)	The GIS database that holds the spatial representation of all cadastral boundaries.	Oracle	Department of Lands & Surveys
3.	Titles Journal	A system that captures the details and movement of documents through the Registrar's Office.	Advanced Revelation	Registrar of Titles
4.	Titles Index	Contains key information for all Certificates of Titles, Crown Leases, Native Leases, Crown Grants, Native Grants, and Sub-leases.	Advanced Revelation	Registrar of Titles
5.	Survey Plan Journal	Holds details of every parcel and every survey plan, and tracks those plans through the approval process.	Advanced Revelation	Department of Lands & Surveys
6.	Survey Plan Index	Contains key information for all approved survey plans.	Advanced Revelation	Department of Lands & Surveys
7.	Valuation Records	Holds all valuation assessments made by the Dept of Lands & Surveys, as well as details of property sales.	Advanced Revelation	Department of Lands & Surveys
8.	Road Index	Textual details of all legal roads in Fiji.	Advanced Revelation	Department of Lands & Surveys
9.	State Lease Administration	Contains details of registered and un-registered State leases and related actions and file movements.	Advanced Revelation	Department of Lands & Surveys
10.	State Rental System	Contains rental details of all State Leases and Native Leases to State.	Oracle	Information Technology & Computers (ITC)
11.	State Land Register	An inventory of all State Land – Sched. A, B, State land with Title and without Title.	Advanced Revelation	Department of Lands & Surveys
12.	Native Land Register	An inventory of all Native Land, and links to the associated land owning units.	Advanced Revelation	Native Lands & Fisheries Commission
13.	Vola ni Kawa Bula	A record of all indigenous Fijians referenced to the land owning unit – *Tokatoka,* etc.	Advanced Revelation	Native Lands & Fisheries Commission
14.	Town & Country Planning Applications	Holds details of all planning applications, including processing and conditions.	Microsoft Access	Department of Town & Country Planning
15.	Census Mapping	Holds records of National Census Boundaries – 1976, 1986 and 1996.	Oracle	FLIS Support Centre
16.	Fiji Topo Database	GIS of fully structured topographic data derived from 1:25,000 scale national mapping and aerial photos.	Oracle	Department of Lands & Survey
17	Native Land Mapping System	The GIS database that contains spatial representation of all land recorded on the Native Land Commission (NLC) maps.	Oracle	Department of Lands and Survey.
18	Geodetic Database	Holds records of all survey controls in Fiji – first, second and third order.	Advanced Revelation	Department of Lands and Survey
19	Government Rented Buildings	An inventory of all buildings rented by State for office space and staff quarters.	Advanced Revelation	Department of Lands and Survey
20	Native Leases to State	An inventory of all registered and un-registered Native Leases to State.	Advanced Revelation	Department of Lands and Survey
21	Vanuaview (v 1.0)	A viewing package based on CCMS and Fiji Topo.	Uses data from Oracle and Advanced Revelation; uses C++ programming language	Department of Lands and Survey

5.1.1 Land resources

Geology, climate, hydrology, landforms, soils and vegetation. Sources include topographical base maps, aerial photographs, satellite imagery, existing surveys and departmental records.

Aerial photographs (Department of Lands and Survey)
These comprise photos taken remotely on board an aircraft with details such as flight altitude, date of photography, scale, and flight run number. Data on these photos can be viewed stereoscopically. National coverage starts from 1952 with regular updates; the latest conducted was in 1992. The modern topographical data are generated from the 1992 aerial photographs.

Orthophoto maps (Department of Lands and Surveys)
These are large-scale maps with details of rectified photo images combined with contours, spot heights, and grid lines with co-ordinate values. Fiji has had national coverage since 1970.

Geological maps (Mineral Resources Department)
These give national coverage at 1:50,000 scale in hard copy format only. A non-spatial database includes rock sample analysis and seismic data.

Soil maps (MAFF Land Use Section)
National coverage maps at 1:126,720 scale are available in hard copy format. More recent digital soil maps with eight slope classes are available for Viti Levu, Vanua Levu and Taveuni. Field mapping was conducted for the latter at 1:25,000 scale. Other spatial layers include vegetation, digital terrain model, climate (rainfall and temperature) and vegetation. Supporting non-spatial database includes climate, soil properties (laboratory and field), and a crop growth model.

Land classification maps (MAFF Land Use Section)
National coverage maps at 1:126,720 scale are available in hard copy format.

Spatial geo-science database (Mineral Resources Department)
This database provides a record of aeromagnetic surveys, bathometry, reefs, digital elevation model, coastlines, and rivers. Coverage is national but at variable scales. Data is available in both digital and hard copy forms.

Fiji Topo database (Department of Lands and Surveys)
The Fiji Topo database is a record of topographical data with details such as contours, manmade and natural features, river systems, administrative boundaries, coastline, urban areas and villages, transportation and other infrastructure. Hard copy and digital format maps are available at 1:25,000 and 1:50,000 scales; coverage is national.

Forest Management Information System (Forestry Department)
The FMIS provides national forest cover data divided into forest types plus hardwood and software plantations and mangrove areas. It also holds further spatial information such as digital terrain model, soils, slope, rainfall, declared reserved areas, forest functions and logged out areas. Non-spatial information about woody plants, biomass, species, regeneration potential, and medicinal plants is also stored in the system. Much of the mapping was from satellite imagery and is available in digital and hard copy (1:50,000 scale) formats.

5.1.2 Present land use

Surveys and departmental records of land use, farming systems, forestry, production levels and trends.

Land use maps (MAFF Land Use Section)
National coverage land use maps are available in hard copy for 1958, 1968 and 1978 at a scale of 1:50,000.
Agricultural Census (MAFF Economic Planning and Statistics Section)
Reports provide statistics about farmers, farms, crops, farming systems, etc. Censuses were conducted in 1968, 1978 and 1991.

5.1.3 Present infrastructure

Roading, other transport systems, settlements and services to rural sector.

Road Index (Department of Lands and Survey)
The Road Index provides a national record of all roads and their status, with details such as road name, length, width, class, legalities, locality, surface make, and maintenance authority. Information is available both as hard copy reports and digital maps. Note that roading, settlements and other infrastructure are provided by Fiji Topo database (Section 5.1.1).

5.1.4 Population

Numbers, demographic trends, location of settlements, ethnic groups.

Census mapping system (Bureau of Statistics)
Based on the Fiji Map Grid, the system provides records of national census-enumeration area boundaries for 1976, 1986 and 1996 with their enumeration numbers. Digital and hard copy (1:50,000 scale) data are available on approval of the Government Statistician. An extensive, non-spatial record of housing and population data supports the mapping system.

Provincial Profile Database (Ministry of Fijian Affairs)
The Provincial Profile System is a record of summary findings of rural Fijian villages within provinces and *tikinas* with population, their religious affiliation, housing and toilets, transportation means and communication, economy, power supply, village access, primary waste disposal, primary water supply, and new businesses. The coverage is national and recording started in 1992. Information outputs are hard copy reports and digital data.

Vola ni Kawa Bula (VKB) System (Native Lands and Fisheries Commission)
This System provides a listing of all native Fijians according to *tokatoka*. The VKB is a record of native ownership of all Native Land with such details as *tokatoka*, *koro*, *yavusa*, *vanua*, *tikina*, *mataqali* and provincial names. Hard copy reports are available subject to the approval of NLFC.

5.1.5 Land tenure

Legal and traditional ownership and user rights for land, forest reserves, etc.

Cadastral maps (Department of Lands and Surveys)
Hard copy cadastral maps provide a record of all surveyed land parcels with their appellations. Areas are compiled at various scales. Data are also available digitally (CCMS below).

Computerised Cadastral Mapping System (Department of Lands and Surveys)
The CCMS is the GIS database that holds data about land parcels in Fiji with respect to their geographic location, shape area and legal description. Other details also shown are administration unit, map label, native reserve, native land owning unit, parcel, reserves, roads, shoreline, crown land, *tiri* land, title, villages and water courses. Digital copy on computer tape/disk, hard copy maps and dyeline prints are available.

Final Reports System (Native Lands and Fisheries Commission)
The final reports contain details such as head of *yavusa*, *yavusa* name, NLC sheet and lot reference, area, and same for *matanitu*, *mataqali*, *tikina*, *tokatoka* and *vanua* plus village, date and place of sitting, and commissioner. Hard copy and digital copies are available subject to the approval of the NLFC.
Land tenure maps (Department of Lands and Survey)
The land tenure maps contain graphical representation of land ownership with details such as title references and general notes on new lease applications and new subdivisions. They are available in hard copy only.

Native Land Management System (Native Land Trust Board)
This system will be an interface of the existing graphic (LIS/GIS system) and the non-graphical (LADS system) records of native land leases (both surveyed and unsurveyed), with landowning unit information now available, and data from other agencies such as Forestry, Land Use Section, Fiji Pine Ltd. Hard copy and digital reports are available subject to the approval of NLTB and a licensing agreement.

Native Land Commission Maps (Department of Lands and Surveys)
These maps are records of native land showing surveyed *mataqali* land boundaries with lot numbers, areas and sheet numbers. The same information is now in a GIS database, known as the Native Land Mapping System. Digital and hard copies are available.

Parcel Plan Index (Department of Lands and Surveys)
This contains survey plan and land parcel details such as plan number, description, *tikina*, land type, and surveyor's name, plus a complete inventory of all survey plans and all parcels created by the survey. It is available in hard copy or digital format.

State Land Register (Department of Lands and Surveys)
This is a comprehensive register of all land held by the State. It contains details of State-owned land such as type, NLC lot number, NLC sheet reference, area, title reference, name of land, *tikina*, province and purchase information. It is available in hard copy, but is subject to licensing agreement.

Titles Index (Register of Titles)
This records details of all registered titles that are available in digital or hard copy format.

Vanuaview System (Department of Lands and Surveys)
This is a computerised map viewing system for speedy delivery and easy access to land information. The package is based on the CCMS and Fiji Topo on a single continuous map comprised of more than 90,000 land parcels. Information is available either in hard copy or on compact disc.

5.1.6 Economic

Town and Country Planning Scheme Plans (Department of Town and Country Planning)
The scheme's paper maps are records of all city and town boundaries with various zoning and their designated use and land use within each zone. The hard copy maps are subject to Crown copyright laws and the approval of Director, DTCP.

Valuation Maps (Department of Lands and Surveys)
These maps are records of properties and their dimensions, with valuation assessment numbers based on cadastral maps. Hard copy maps are available on the approval of the Chief Valuer. The Valuation Records

System is a database in support of the map system. The database is a record of valuation data such as local authority, assessment year, unimproved value, title reference, lease reference, parcel description, street, zone, owner, lessee, area and ward.

5.1.7 Legislation

Laws and regulations that affect land use, traditional law and custom and law enforcement.

(i) Legislation

The key legislation for Fiji that is of relevance to rural land use is discussed in detail in Chapter 3 and is as follows:

- Land Conservation and Improvement Act,
- Drainage Act,
- Rivers and Streams Act,
- Subdivision of Lands Act,
- Agricultural Landlord and Tenant Act,
- Forest Decree,
- Town Planning Act,
- Land Development Act, and
- Mining Act.

(ii) Taxation

There are a number of taxes that impact on rural land use and rural sector investment (in particular by non-residents) and development. These are listed below.

Income tax
Individuals are liable to normal tax which is payable on 'chargeable income', i.e. total income less personal allowances. The rate of income tax on the chargeable income of a resident company is 35% and for non-resident companies carrying on business in Fiji, 45%.

Dividend
A 15% non-resident dividend withholding tax is payable where there is a dividend paid or credited by a company incorporated in Fiji to a non-resident shareholder of a non-treaty country. For countries with which Fiji has a double tax treaty, rates are between 15 and 20%. In the case of a resident individual shareholder, 5% dividend tax is deducted at source.

Interest
Interest payable to a non-resident is subject to a 10% interest withholding tax. However, there are certain exemptions from this tax, including interest on any Bill of Exchange or promissory note payable to the supplier of goods in respect of goods imported into Fiji. The rate of withholding tax with a tax treaty country is restricted to a maximum of 15%.

Royalties
Royalties paid to non-residents are subject to 15% royalty with holding tax deducted at source. The rate of withholding tax with a double tax treaty country is restricted to a maximum of 15%.

Land sales tax
This is a tax that affects both residents and non-residents. Generally, profits arising from dealings in undeveloped land are subjected to this tax progressively, maximising at the rate of 30% on profits in excess of $9500.

Value added tax (VAT)
VAT is levied on all goods and services at the rate of 10% and is effectively borne by the consumer. All businesses with a turnover of $30,000 or more are required to register with the VAT Unit, and must charge 10% VAT on the price of all goods and services supplied. Exemptions for VAT related to land use/rural sector are:

- All farm income;
- Businesses with turnover of less than $30,000; and
- Non-processed foods.

Capital gains tax
There is no capital gains tax, but non-residents would be liable to income tax on profits arising from the sale of land in Fiji, or the profit derived from the carrying on, or carrying out, of any scheme or undertaking connected with the disposition of land.

5.1.8 Government

Administrative structure and key authorities and services provided.

Fiji is divided into four divisions for administrative purposes: Central Division, based in Nausori; Eastern Division, based in Suva; Northern Division, based in Labasa; and Western Division, based in Lautoka. Each of these has administrative jurisdiction over the various provinces that come within each division. There are 14 provinces in total, each governed by a council which has an executive head appointed by the Fijian Affairs Board. City and town councils generally administer urban affairs. Government ministries and entities are listed below.

Ministry of Agriculture, Fisheries and Forests
Agriculture Department; Land Development and Resettlement Unit; Land and Water Resources Management Division; Land Use Section, Research Division; and Forestry Department.

Ministry of Justice
Attorney General's Chambers; Office of the Solicitor General; Fiji Law Reform Commission.

Ministry of National Planning
National Planning Office; Bureau of Statistics.

Ministry of Housing and Environment
Department of Environment; Town and Country Planning Department.

Ministry of Lands and Mineral Resources
Mineral Resources Department; Department of Lands and Surveys (includes FLIC and FLISSC).

Ministry of Fijian Affairs
Fijian Affairs Board, Native Lands and Fisheries Commission.

Statutory Boards
- Forestry Board (Forest Decree) – never established;
- Land Conservation Board (Land Conservation and Improvement Act);
- Land Development Authority (Land Development Act);
- National Trust.

State Owned Enterprises, Corporations

- Native Land Trust Board;
- Fiji Sugar Corporation;
- Fiji Pine Ltd;
- Fiji Hardwood Corporation Ltd.

5.1.9 Other information

As part of the data compilation phase in the land use planning process, information would also be collected on:

- Any commercial organisations whose interests may be affected (e.g. mining companies such as Emperor Gold Mining Co. Ltd);
- Social structure and traditional practices; and
- Non-governmental organisations (NGOs) operating in the planning area, e.g. the South Pacific Action Committee for Human Ecology and Environment (SPACHEE), World Wide Fund for Nature (WWF), Pacific Islands Association of NGOs (PIANGO), and Foundation for the Peoples of the South Pacific (FSP).

Chapter 6
Processes to Facilitate Change

6.1 Introduction to land use and sustainability concepts

The integrated approach to the planning and management of land resources has been identified as a programme area of Agenda 21, agreed at the United Nations Conference on Environment and Development (UNCED) to which the Republic of Fiji is a signatory (FAO 1995).

Fiji participates in and benefits from globalisation of the world economy. Trade and investment linkages with developed countries are growing rapidly. As this trend evolves, Fiji will become less reliant on external donor development assistance.

Since there are a number of terms related to land and natural resources used in this chapter, it is important to define them so that the reader fully understands the context in which they are used. The two most important terms are 'development' and 'sustainable development'.

- ***Development*** means change. It is about how Fiji and its people organise themselves, use resources available to them and improve their well-being.
- ***Sustainable development*** is about processes that lead to lasting improvements in the standard of living of present and future generations. It encompasses environmental, economic, social, cultural and political concerns. It is people-centred.

Box 5

Development and conservation have so seldom been combined that they often appear – and are sometimes represented as being – incompatible. Development aims to meet human needs and wants, and conservation aims to ensure that the material basis of development is sustained and the quality of life is protected so that we may enjoy the fruits of development. Conflicts often occur because of timing – development causes immediate change, while conservation seeks to secure the future. However, unless development is guided by ecological, as well as by economic, social, cultural and ethical consideration, much development will have undesirable effects, with reduced overall benefits or even total failure.

There can be no effective action without an understanding of the common ground between development and conservation; of the part conservation can play in ensuring future development; and of the fact that development may create the conditions which make conservation possible. This understanding cannot be forced on the community, it can only grow through the efforts of concerned people.

IUCN/UNEP/WWF 1980

6.1.1 Land use planning and physical planning

For the purposes of this discussion *physical planning* is the designing of the optimal physical infrastructure of an administrative land unit in anticipation of population increase and socio-economic development, and taking into account the outcome of land use zoning and planning. Infrastructure includes transport facilities (roads, railways, airports, harbours); industrial plants and storage of produce; mining and power generation; and facilities for towns and other human settlements. It has both rural and urban development aspects, though the latter usually predominate.
Physical planning is carried out by government organisations for the general good of the community. The purpose is to take a more comprehensive view of the development of an area than can, or would be taken by individuals. Physical planning has two main functions – to develop a rational infrastructure, and to restrain the excesses of individuals in the interests of the community as a whole. This latter function usually leads to physical planning being associated with a system of laws and regulations.

Land use planning should be a decision-making process that 'facilitates the allocation of land to the uses that provide the greatest sustainable benefits' (Agenda 21). It is based on the socio-economic conditions and expected developments of the population in and around a natural land unit. These are matched through a multiple goal analysis and assessment of the intrinsic value of the various environmental and natural resources of the land unit. The result is an indication of a preferred future land use, or combination of uses. Through a negotiation process with all stakeholders, the outcome is decisions on the concrete allocation of land for specific uses (or non-uses) through legal and administrative measures, which will lead eventually to implementation of the plan.

Land use planning is mainly related to rural areas, concentrating on the use of the land in the broadest agricultural context (crop production, animal husbandry, and forest management/silviculture, safeguarding of protective vegetation and biodiversity values). However, peri-urban areas are also included where they directly impinge on rural areas, through the expansion of building construction onto valuable agricultural land and the consequent modification of land uses in the adjoining rural areas.

6.1.2 Planning and management

As stated above, land resources *planning* is the process of evaluation of options and subsequent decision-making that precedes implementation of a decision or plan.

Land resources *management* is the actual practice of using the land by the local human population, which should be sustainable and provide benefit for future generations.

In a broader sense, land resources management is the implementation of land use planning, as agreed between the stakeholders with their direct participation. It is achieved through political decisions; legal, administrative and institutional execution; demarcation on the ground; inspection and control of adherence to the decisions; solving of land tenure issues; settling of water rights; issuing of concessions for plant and animal extraction (timber, fuelwood, non-wood products, hunting); promotion of the role of women and other disadvantaged groups in agriculture and rural development in the area; and the safeguarding of traditional rights of the indigenous peoples.

6.1.3 Land and land resources

A definition of *land* used to be 'a physical entity in terms of its topography and spatial nature'. This has economic connotations, expressed in price per hectare, etc. The broader view takes into account the biophysical and socio-economic resources of the physical entity as well. A complete definition adopted by the United Nations is as follows:

> *Land is a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow surface lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, road, buildings, etc.).*

This definition conforms to *land system units* or landscape-ecological units as building blocks of a watershed (catchment area). The repeated reference to 'land and land resources' may be taken to mean land as well as its individual land components.

The definition of a *natural* land unit as defined above is distinctive from an *administrative* unit of land which can be of any size (individual holding, municipality, province, etc.) and which normally encompasses a number of natural units.

The components of the natural land unit can be termed land resources – including physical, biotic, environmental, infrastructural, social and economic components – in as much as they are fixed to the land unit.

Included in the land resources are surface and near-surface freshwater resources. Part of these freshwater resources moves through successive land units. The linkages between water and land are so intimate at the management level that the water element cannot be excluded.

In this integrative approach, a natural unit of land has both a vertical aspect – from atmospheric climate down to groundwater resources; and a horizontal aspect – and an identifiable repetitive sequence of soil, terrain, hydrological, and vegetative or land use elements.

For the purposes of this study, the term *land degradation* is taken to mean any change in the land resource that reduces its usefulness to humans, recognising that usefulness comprises socio-economic, scientific and ethical elements.

6.1.4 Environmental resources and natural resources

Natural resources, in the context of 'land' as defined above, are taken to be those components of land units that are of direct economic use for humans living in the area. These include near-surface climatic conditions; soil and terrain conditions; freshwater conditions; and vegetational and animal conditions in so far as they provide produce. To a large degree, these resources can be quantified in economic terms.

Environmental resources are taken to be those components of the land that have an intrinsic value of their own, or are of value for the longer-term sustainability of the use of the land by human populations. They include:

- biodiversity of plant and animal populations;
- scenic, educational or research value of landscapes;
- protective value of vegetation in relation to soil and water resources;

- the functions of the vegetation as a regulator of the local and regional climate and the composition of the atmosphere;
- water and soil conditions as regulator of nutrient cycles (C, N, P, K, S), as influencing human health and as a long-term buffer against extreme weather events; and
- occurrence of vectors of human or animal diseases (mosquitoes).

Environmental resources are to a large degree 'non-tangible' in strictly economic terms.

In the framework of an integrated, holistic approach to land use planning, the distinction is somewhat artificial as environmental resources are part of the set of natural resources. However, it still serves to group the tangible from the non-tangible components, and the directly beneficial components at local level from the indirectly beneficial components of human life support systems.

Accepting the broad definition of land as including 'human settlement patterns', a third important set of resources has to be taken into account. The set of *social or human resources* should be defined in terms of density of population groups, their occupational activities, their land rights, their sources of income, the standard of living of households, gender aspects, etc.

Further definitions related to land and land uses are given in Appendix 8.

6.2 Sustainable soil and land management

6.2.1 Criteria, indicators and methodology for sustainable land use

A sustainable soil and land management strategy would help define the problem(s), present the priorities for implementation and define the outcome(s) sought by the Government. It would describe what Government could do to help land users directly to improve land use practices and what the strategy itself could do by improving the systems that support land management practice in Fiji. The focus of such a strategy would be the land user.

In the following discussion, 'land' refers not only to soil but also to the combined resources of soil, water, vegetation and terrain that provide the basis for land use. Land quality is the condition of the land relative to its capacity for sustainable land use and environmental management. The terms 'agriculture' or 'agricultural', unless qualified, refer to the whole sector that includes forestry.

The importance that the term *sustainability* is receiving internationally can be attributed to its use in the Brundtland Commission Report, 'Our Common Future' (World Commission on Environment and Development 1987), which linked the term to *development*. This report emphasised the economic aspects of sustainability by defining sustainable development as 'economic development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs'.

Sustainable agriculture and rural development has been defined by FAO (1991) as:

> *The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable, and socially acceptable.*

In a broader context, the Asian Development Bank defined sustainable agriculture as 'a food-fibre system for human utilisation that can evolve indefinitely toward greater productivity and increased protection and conservation of the natural resource base while ensuring a favourable balance with the environment' (1992).

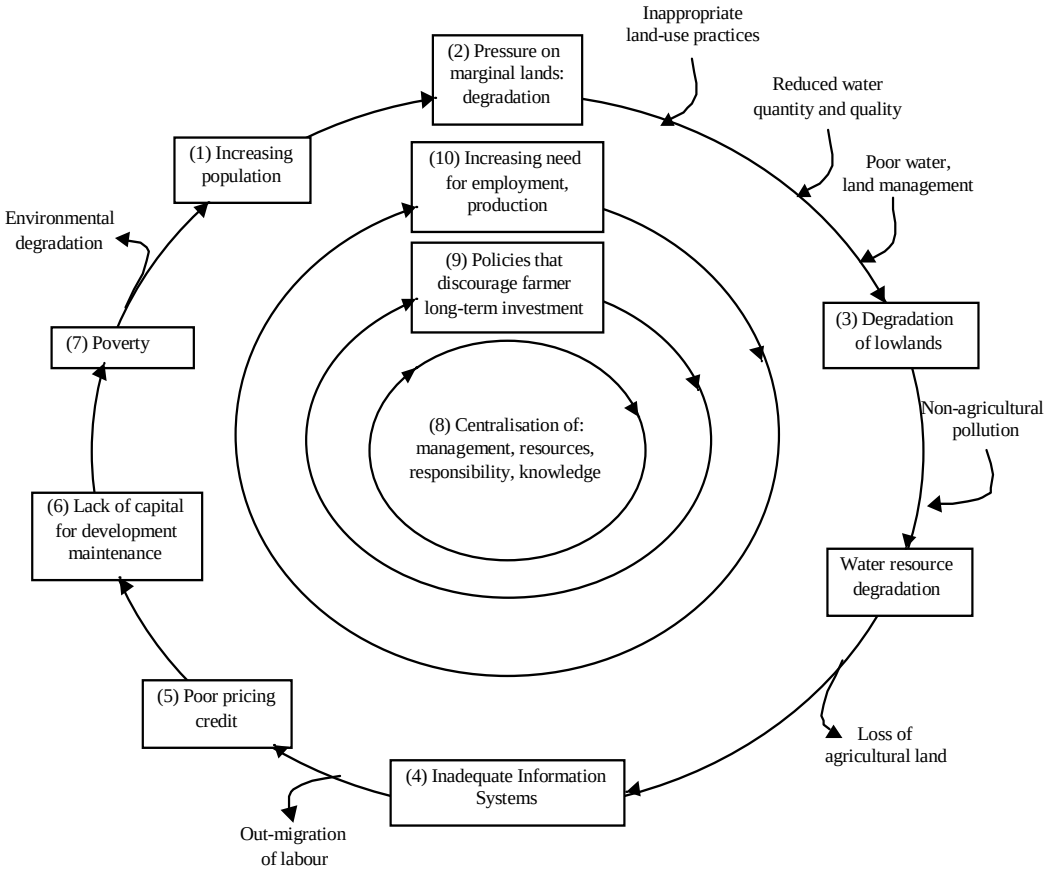
It should maintain and even enhance the productive capacity of the agriculture and forestry of future generations while meeting the pressing, immediate food needs of the present population.

Despite the many definitions, there are some common elements that typify views of sustainable development. These characteristics are:

- increased and stabilised productivity;
- rational use of natural resources to conserve and enhance the quality of the environment;
- enhanced quality of life;
- equity across generations (both intra-generational and inter-generational); and
- balancing social, economic and environmental needs and interests.

Clearly sustainable land use in Fiji should evolve with a number of parallel types of production systems to meet local, national, and international needs. Each system, by itself, must meet the criteria for sustainability. Each has different social, economic and sometimes political requirements, and each serves a different set of clients. It is essential that deficiencies in the production systems be fully understood before solutions can be devised. While each type of production system has problems – in particular agricultural systems – an overall pattern of land degradation is evident. Solutions must be found to the pattern of degradation as a whole, as well as to its components. This pattern of unsustainability is outlined in Figure 16.

Figure 16: The cycle of unsustainability



After Rhoades and Harwood, 1992

Nine main elements in this 'cycle of unsustainability' are identified and described in more detail under Issues (Section 4.3). They are:

- An increasing population, especially during the last 30 years has placed pressure on all environments, especially hilly marginal land, dry-zone grasslands and indigenous forest.
- Pressure on the production base and the environment has been exacerbated by farmers' and the Government's needs to meet short-term revenue goals (particularly in the sugar industry); the use of inappropriate technologies and practices; ineffectual institutional support structure; and lack of enforcement of lease provisions and legislation relating to 'best practice' and land husbandry.
- Increasing pressure has been placed on arable lowland areas because of prime agricultural land being lost to urbanisation; an increase in land and water pollution from non-agricultural sources; water-logging and raised water tables degrading the soil resource; and inappropriate land use in watersheds causing uneven water flow, soil and other containment loading in rivers and regular flooding of lowlands and coastal margins.
- Information systems are inadequate to meet the Government's and farmers' needs. This relates to knowledge about farming systems and their development requirements, crop diversification and intensification, agroforestry systems, etc. There is little information about the integration of social, economic and biophysical data, soil-crop matching, crop options (and gross margins for these), and requirements in the significant areas of post-harvest handling/processing and marketing.
- Pricing policies may change unpredictably and might not always reflect production needs. International pricing may inhibit (for example, future sugar prices) the achievement of national development goals. Past land use 'policies' have resulted in unsustainable land use.
- Capital is generally unavailable for rural investment and lending institutions perceive the sector to be unattractive and risky. Credit at realistic rates is a prerequisite for sustainable development by farmers.
- Biological capital is an investment in long-term production, for example, through planting trees. It can only be supported where there is security of land tenure, social stability and access to the resources.
- Land degradation coupled with inappropriate use of natural resources reduces production potential and thus the ability to correct for factors that lead to poverty. As the poverty cycle deepens, social instability increases, there is reduced investment in and productivity from the land, and land and water degradation worsens.
- Centralised management and control of resources and information discourages local (farmer level) responsibility and initiative. The absence of 'grass roots' stakeholders' participation and bottom–up planning for sustainable land development results in poor land use practice because of ignorance about 'best practices', technical support services and opportunities to tap other available resources. The knowledge gap is very large throughout Fiji's non-subsistence rural sector.

Unresolved land tenure issues related to ALTA create an environment of insecurity amongst farmers and are a disincentive for long-term investment and introduction of land husbandry practices particularly on cane farms. The ever-present social and economic pressures on the agricultural sector to produce more and to create more employment will increase significantly over the next 20 years.

6.2.2 Application of sustainable development measures by MAFF

MAFF Department of Forests has adopted the sustainable forest management concept to address the following issues:

- maintenance of biodiversity, forest composition, forest structure and water quality;
- prevention of soil erosion;
- provision of socio-economic benefits and continuous supply of timber products and non-timber products; and
- ensuring forest functions are maintained.

In implementing this sustainable forest management plan and the very important National Code of Logging Practice (refer Section 3.2.7), stakeholders plan that Fiji's forests will continue to provide for future generations. The current forest logging practice in Fiji involves the following procedural and approval process:

- *Landowners' consent*: NLTB can sign on behalf of the landowners without consulting with them, but in general it is common practice to get at least 50% consensus of the landowners for providing a concession. More than 75% of *mataqali* entered on the NLC register (*Vola ni Kawa Bula*) are required to agree to the logging proposal for *mataqali* reserves only.
- *Native Land Trust Board (NLTB):* Landowners, together with the logging contractor, make a joint application to the NLTB (administrators of and on behalf of *mataqali*) seeking approval to log. Following NLTB approval, the application then passes to the Forestry Department.
- *Forestry Department*: With these approvals, the logging contractor prepares a logging plan, which is submitted to Forestry Department for their consideration and approval. This plan must conform to the NCOLP and cannot proceed without Forestry Department consent.
- *National Code of Logging Practice (NCOLP):* The NCOLP, first implemented in 1990, was developed to ensure logging contractors and sawmilling operations were safe and complemented environmental priorities for Fiji's forests. The NLTB licence allows commercial timber species greater than 35 cm diameter to be cut by the logging contractor. This practice could potentially remove up to 90% of the trees with a diameter >35 cm and is not sustainable.

The Government of Fiji, with a priority to implement a sustainable forest management regime, implemented a pilot study in Nakavu, Namosi. The study was designed to look at improved management tools plus operational and procedural elements of a sustainable forest management programme. The Nakavu study had demonstrated viable technical and economic aspects of sustainable logging operations, in particular prioritising those silvicultural aspects of indigenous forest management. The Nakavu model is based on a pre-harvest inventory followed by a tree selection management process. This allows landowners to know in advance the timber volume and financial return they might expect from each cut. In addition, it shortens the felling cycle and maintains a permanent forest cover.

While the Government has not defined sustainable development, the term is used in its national policies. However, the Ministry of Environment defines sustainable development in its 1993 National Environment Strategy as: 'improving the quality of human life while living within the carrying capacity of supporting ecosystems'.

MAFF Research Division has adopted the definition of sustainable land management described in the Framework for Evaluating Sustainable Land Management (FESLM), a discussion paper compiled by Smythe and Dumanski (1993). In this document, 'sustainable land management' (SLM) is defined as follows:

> Sustainable land management combines technologies, policies and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously:
> - maintain or enhance production/services (*productivity*);
> - reduce the level of production risk (*stability*);
> - protect the potential of natural resources and prevent degradation of soil and water quality (*protection*);
> - be economically viable (*viability*); and
> - be socially acceptable (*acceptability*).

These factors are described as the five pillars of sustainable land management. Performance indicators for each pillar are used for assessing its contribution to the general objectives of sustainable land management. Indicators are also necessary to monitor progress toward the goal of sustainability. These indicators are used by farmers, foresters, scientists, planners and decision-makers to monitor the condition and trends in use of land and water resources, and in the performance of development projects. The following indicators are emerging as possible standards for evaluating and monitoring sustainable land management (Pieri et al. 1995):

- crop yield (trend and variability);
- sustainable crop yields;
- nutrient balance;
- forest regeneration capacity;
- maintenance of soil cover;
- soil quality/quantity;
- water quality/quantity;
- net farm profitability; and
- participation (of farmers, landowners and society) in conservation practices.

6.2.3 Key issues for sustainable development and land management in Fiji

Nagatalevu and Ratukalou (1995) identified a number of national concerns affecting sustainable land management in Fiji:

- *Land use planning*: Significant housing, airports, industries, etc. have been developed on good arable land, as is evidenced by non-agricultural growth in the Nadi to Lautoka corridor. Arable land is only of limited extent and its allocation to uses other than agriculture must be monitored and preferably controlled through zoning and a national land use plan.
- *Land tenure*: The present land tenure system (85% native land) often inhibits sustainable rural development.
- *Population increase*: It is estimated that Fiji's population will reach 1 million by 2020. The question is where farming will take place, as more land will be needed for urbanisation. More people will turn to farming on marginal lands and hill slopes and such practices do not lead to sustainable farming.
- *Over-dependence on the sugar industry*: Sugarcane is grown intensively in the dry zones of Viti Levu and Vanua Levu. Farming on steep hill slopes in these dry zones causes soil erosion, as farmers do not practise proper soil conservation measures. Educating farmers on the effects of soil erosion and developing soil conservation methods that are farmer-oriented can overcome this. Another option is to encourage crop diversification.
- *Small size of farm holdings*: Farmers use their land intensively for economic and social survival. About 60 % of farms are less than three ha and intensive use leads to depletion of soil nutrients and organic matter. This is a grave issue because it leads to soil infertility and low crop production.
- *Logging*: In the mid-1960s, about 14,000 ha of the nation's forests were converted to non-forest use. This loss of forest cover has led to soil erosion and land degradation. This is particularly important where logged areas are left unattended, thus encouraging landslides and soil erosion.
- *Short- and long-term benefits*: Soil conservation methods should consider short- and long-term benefits for farmers. Farmers are always in need of cash and recommended interrows should ensure quick cash return to be complemented by long-term ones. Pineapple interrows, for example, generate income and protect the soil whereas vetiver grass ensures long-term soil conservation.
- *Target: holistic approach*: What or who is targeted for enhancing soil and land management? Is it the commodity that is the issue, or is it the farmer? Many agricultural projects have failed because the needs of farmers were never considered. As a result, farmers have often failed to adopt recommended technologies. There has to be integration of biophysical and socio-economic factors to ensure success. Two important questions need to be asked: Was the farmer involved from the beginning? Did the farmer contribute towards finding solutions to unsustainable use of soil and land?
- *National policy*: Fiji needs to emphasise policy in addressing sustainable soil and land management at the Ministry of Agriculture, Fisheries and Forests. To quote from the Ministry's Policies and Strategies Section (Ministry of National Planning 1993), the aim is 'to enforce soil conservation and sound land use

practices for the long-term sustainability of agricultural development'. In addition, the Ministry's mission statement is as follows:

> *The Ministry of Agriculture, Fisheries and Forests is responsible for and committed to sustainable development of land and marine resources through applied research, training and dissemination of information with an aim to increase production of food, wood and fisheries products to satisfy both domestic and export requirements of the country in ways most friendly to the environment for the ultimate purpose of improving the quality of life of the people.*

While the definition of and criteria for sustainability will continue to be the subject of debate amongst professionals, the concept can still be usefully implemented for rural development and land use change. However, it requires the long-term sustained support and commitment by Government to ensure the principles of sustainability are put into practice; that there is wise management and conservation of natural resources to achieve the combined goals of increased production and environmental maintenance.

Demands on land resources are increasing. If the ongoing expansion of commercial cropping onto marginal lands, cropping on fragile soils without land conservation practices in place, deforestation and burning of grasslands continue, then Fiji will experience further land degradation, lower yields and an increase in poverty. It is not too late to reverse current trends but it requires a far-sighted government with determination to implement land use policy for sustainable development. In order to provide support for this, technical teams are required, who provide sound information and operate in an integrated way, with a commitment accorded to farmers and other rural stakeholders who have an ownership in sustainable land management.

6.3 The World Soil Charter

For several centuries, land degradation has emerged as one of the major constraints to agricultural expansion as well as the attainment of higher yields per unit/area. In Fiji, soil loss is taking place at an alarming rate. If poor land husbandry practices and unsustainable land uses are not addressed, the productive capacity of the land may be entirely lost. In recognition that these trends in land degradation are occurring in many countries, FAO adopted the World Soil Charter at its 21st session in 1981. The World Soil Charter calls for a commitment on the part of governments, international organisations and land users in general to manage the land for long-term advantage rather than for short-term expediency. Special attention is called to the need for land use policies that create incentives for people to participate in soil conservation work, taking into account the technical, ecological and socio-economic elements of effective land use.

In compliance with the Charter, FAO has been pursuing an active programme on soil management and conservation. Activities include those that are basic for the promotion of optimum land use: land resources inventories, assessment of degradation hazards, evaluation of productive capacity, improvement of soil fertility, combating desertification, land reclamation, integrated land use planning, training and institution building.

The World Soil Charter provides Fiji's decision-makers and users of the land with a framework for ensuring good stewardship of the nation's land resources. In view of their defined roles and legal responsibilities, the Charter is of particular relevance to MAFF (Land Use Section, Land and Water Resources Division), the Land Conservation Board, NLTB, TCPD and FSC. The Principles and Guidelines for the World Soil Charter are set out in Appendix 9.

6.4 Soil resource assessment

6.4.1 Soil surveys

In general the purpose of soil surveys is to examine, classify**,** describe and crop soils so that predictions can be made about their behaviour for different land uses and their response to various management practices. A soil survey is conducted for a defined area. This may be a nation, an island, a province, a research station, or a farmer's field. The types of soil in the survey area and their distribution (extent) are shown on maps and commonly accompanied with a report. The soil survey report contains information about the soil-forming factors; a description of methods used to conduct the soil survey; a detailed description of soil morphological, chemical, physical and mineralogical properties; descriptions of where each soil occurs in the landscape; descriptions of other relevant environmental features of profiles (e.g., landform position, drainage class, vegetation); and analytical data. Information on land use is often included. Thus, the soil survey report provides a comprehensive description of soils shown on the soil map.

Soil surveys may be general purpose (multipurpose) or special purpose. The modern national soil survey of Fiji (Leslie and Seru 1998) is a general purpose soil survey that maps natural soil units in the landscape at a scale of 1:50,000. Soil mapping units were digitised and entered into a geographic information system (GIS) from which soil maps could be printed. The GIS also includes non-spatial databases on soils, climate and crops that enable quantitative interpretations for crop suitabilities and various land uses to be made.

Special-purpose soil surveys have specific targets and therefore a limited number of morphological properties are collected. Examples of special-purpose surveys include: drainage of soil with high water tables (Navua floodplain) or suitability for irrigation for growing export crops (adjacent to Nadi airport) or evaluating soil type with tree growth performance (Lololo, Nadi, Nabou forests).

Soil survey involves the following steps:

- deciding which properties of the soil are important for the particular purpose;
- selecting categories for each soil morphological property relevant to the purpose of the survey;
- classifying soils into map units so that soil variation within map units is less than between units;
- locating and plotting the boundaries of these units on maps; and
- preparing maps and reports for publication.

Whatever the type of survey undertaken, the aim is to make the classification and mapping units relevant to the purpose of the soil survey. A vast amount of information is gathered in a soil survey, but to be useful the survey should be able to predict at least some of the properties of soil at a site without having to visit it. The most useful classification systems are those with the ability to predict.

6.4.2 Soil versatility

Arable land – Fiji's most important soil resource

Traditional shifting cultivation commonly occurs on sloping land, often on steep slopes. Continuous, more intensive cultivation is discouraged by the Fiji government on slopes greater than 11°, and the land area below this limit – that is, potential arable land – represents 305,600 ha (or 16.5% of the total land area). However, these potentially arable soils are not all of equal value for food production. Some are stony and difficult to plough, subject to repeated and damaging floods (e.g. low terraces), droughty (e.g. sandy coastal flats, shallow soils in the ustic soil moisture regimes), and poorly drained (soils that experience severe wetness or are difficult to drain, such as peats and mangrove areas). Because of these limitations, only 137,300 ha (or 7.5%) of Fiji's land area is regarded as having high value for food production.

Soil versatility

A priority of sound land use planning is to protect versatile soils for agricultural purposes. A highly versatile soil is one that has the capacity to sustainably grow a wide range of crops suited to its particular climate. The soil survey of Fiji has put emphasis on determining the versatility and crop-specific sustainability of the soils.

In terms of its physical characteristics, a highly versatile soil is one which:

- occurs on flat land or on slopes less than 5°;
- has a potential rooting depth of at least 0.75 m;
- offers little resistance to root penetration;
- experiences few days of soil–water deficit;
- has good internal drainage and soil aeration;
- has a low content of stones;
- can be cultivated by machines at most times;
- has high structural stability; and
- is unlikely to suffer from erosion, flooding or salt contamination.

Soil and climate factors in land use

Within this broad category of high-value soils there are very different potentials for the growth of a range of crops. Some crops need specific soil conditions, and the influence of climate is very important. In general, equitable temperature (crop-specific), well-distributed rainfall, plus a soil that is capable of storing this rainfall (or irrigation water), are the key factors. It is the storage property that makes soil such a valuable medium for plant growth for it can act as a 'heat sink', a 'water sponge' and a 'nutrient bank'. It is the combination of these three factors that makes soil an extraordinary natural product.

As a heat sink, soils store up the heat from the sun. While air temperatures can fluctuate between day and night, and between fine and bad weather, soil temperatures are much more stable. Fiji is subdivided into two soil temperature regimes (STR) – isothermic >600 m altitude and isohyperthermic <600 m. The significance of the isothermic zone lies in the opportunity to grow temperate zone fruits and vegetables. There are 1782 ha of potential arable land with an isothermic STR, mainly in the uplands of Viti Levu.

Soil also acts as a water sponge, retaining much of the moisture received from rainfall or irrigation. This capacity depends on a number of factors – soil depth, chemical and physical properties, the amount of water that has percolated into the soil, and the amount of water taken up by plants or evaporated from the soil surface. The weather essentially controls how much moisture will be in the soil; however, in low rainfall areas the moisture-retaining properties of the soil assume greater importance.

Soil is a nutrient bank, holding nutrients until they are required by plants. Generally, the greater the depth of soil capable of penetration by roots, the greater the availability of moisture and nutrients to the plant. The roots of sugar cane will exploit the entire upper 2 m of friable, well-drained soils. This accounts for much of their drought tolerance; however, cane needs adequate soil depth to survive serious droughts. Tree roots from *Pinus caribaea* can be seen at depths >4 m. However, impediments (for example, pans, water table,

Box 6

Soils and Plant Growth

Soil is a remarkable natural product because it is able to integrate many of the environmental elements which have a bearing on plant growth:

- soil acts as a *heat sink*, gradually storing up the heat that the sun gives to the atmosphere. Whereas air temperatures can fluctuate sharply between day and night, or between fine and bad weather, soil temperatures are much more stable;
- soil can also act as a *water sponge*, storing up much of the moisture it receives from rainfall or irrigation. Some of this water is only loosely held and is freely available to the plant, while some is more tightly held and the plant has to make greater efforts to absorb it from the soil;
- soil is a *nutrient bank*, holding nutrients until they are required by plants.

compacted layers, stony subsoils, gleyed layers) can restrict root penetration and so limit the plant's access to both nutrients and water.

6.5 Land zoning

6.5.1 Introduction

For many years, 'zoning' has been used for ensuring land use control in urban and peri-urban areas. More recently it has also become associated with delineation of rural ecological units for example, FAO's Agro-Ecological Zones (AEZ).

In the urban planning sphere the word is commonly used in a prescriptive sense; for example, the allocation of peri-urban land for specific uses such as housing, light industry, recreation, horticulture or animal bio-industry, in each case with the appropriate legal restrictions.
In the agro-ecological zoning concept, the word (zoning) denotes an earlier stage of rural planning. It is a subdivision of rural lands on the basis of biophysical characteristics (climate, soils, terrain forms, land cover etc.), and is used as a tool for agricultural land use planning. The above zoning does not include legal or administrative decisions on future land use, which is the subject of land use allocation. It consists of a series of processes that take place after the zoning phase. Important procedures will involve political decisions connected with choosing between alternative options presented in a plan after negotiation with all stakeholders; identification and resolution of land tenure issues; legal, administrative and institutional implementation; demarcation on the ground; and effective control and enforcement of the decisions taken.

6.5.2 Land zoning concepts and purpose

Land zoning is a process that is used to identify parcels of land (land zones) that have similar properties with respect to land use. The process determines the way in which those lands should be managed and used in a sustainable manner. It formulates procedures to ensure that the use of such lands is controlled in accordance with the principles of sound land management. In general terms, a 'land zone' can be defined as an area of land where the predominant and proposed/permitted land uses are compatible with the capability of the land to support those land uses in a sustainable manner, in accordance with land use policy and regarding the need for development and for conservation.

The process of land zoning involves the identification, definition and mapping of land zones and the preparation of those procedures and guidelines necessary to facilitate some control over land development and the land uses that will be planned, applied for and implemented. The purpose of land zoning is to group together lands of similar capability and therefore similar management requirements in order to lay down specific guidelines as to use of that land (whether it be industrial, residential, agricultural etc.) in order to maintain the quality and character of the land.

For land zoning to be effective, a number of actions need to undertaken. These include:
- the range of uses to which the land may be put are listed and agreed to by key stakeholders;
- an evaluation of the land capability or suitability for each of these agreed land use types is made;
- a national land use policy is formulated; and
- procedures are put in place for facilitating conformity between land zone categories and land use policy.

Land zoning does not produce a land use plan, rather it identifies those areas which are best used for a single purpose or a range of compatible uses, on the basis of the suitability of the land for those uses, the management practices to be adopted, and national policy on land use.

The primary outputs from the land zoning process include:
- national maps (at a scale of 1:50,000) showing the recommended distribution of land zones;

- peri-urban maps (at a scale of 1:10,000 or 1:5000) showing the recommended distribution of land zones;
- land tenure map (at a scale of 1:50,000) showing the distribution of Native, Freehold and Crown lands including location of special protected areas (for example Native reserve, or protected forest);
- maps showing current proposed/future land development/expansion areas that may require intervention (based on zoning criteria) to resolve a land use conflict; and
- a manual of guidelines that details the purpose for which each land zone has been created, the land use options/activities that are recommended (permissible) for each land zone and the administrative enforcement mechanisms.

The information on which the land zoning maps can be made is available. Land zones would be mainly derived from spatial land use and soil information integrated with topographical and cadastral maps. The map outputs would be GIS-generated. The key collaborating Government agencies in Fiji would be MAFF Land Use Section (co-ordinator), Lands Department (FLIS), Town and Country Planning and NLTB. Clearly this core group will interface more widely with appropriate agencies both to inform and generate information and response.

The land use activities to be considered in land zoning will require careful consideration. The process would most likely adopt a three-level hierarchical structure such as:

- the major sector level – for example, mining, forestry, agriculture, urban, industry, tourism, service (public utilities, e.g. airports);
- the second level (land use system) where for example forestry sector might be subdivided further between forest protection, indigenous production forest, softwood plantations, designated re-afforestation areas, etc.; and
- the tertiary, dryland agricultural level, which might include land use activities such as class one arable land, tree crops, commercial cropping, subsistence agriculture, and pastoralism.

Data sources for evaluating the suitability of land use activity can be identified, e.g. Mineral Resources Department would be the source for all information about activities under the mining sector.

6.6 Land use capability

Land use capability (LUC) classification can be described as the systematic arrangement of different kinds of land according to those properties that determine its capacity for sustained production, where capability is used in the sense of suitability for productive use. The MAFF Land Use Section assesses land use capability based on its *LUC Land Inventory System*. This was developed in 1977 and is based on the USDA Land Use Capability; it has been adapted to the Fiji environment. Soil is a key element in determining land capability as most forms of land utilisation ultimately depend on soil as the medium for plant growth.

The capacity for sustained production depends largely on the physical qualities of the soil and related environmental factors. These factors are regarded as limitations when they are not ideal in some way. The limitations affect the productivity, the types of corrective measures required, and the intensity and type of land use. The degree of the limitation is assessed and the following factors are evaluated:

- susceptibility to erosion;
- steepness of slope;
- susceptibility to flooding;
- liability to wetness or drought;
- salinity;
- depth of soil;
- soil characteristics (texture, structure, fertility, etc.); and
- climate.

As a basis for this assessment an inventory is undertaken in the field. This 'land inventory phase' maps rock type, soil type, slope, erosion, vegetation and current land use. Land inventory units describing these factors are delineated on the final land inventory map. Based on the land inventory, the land use capability is classified. The land inventory units are classified into one of eight land use capability classes. A description of the eight Fiji LUC classes is given in Appendix 10.

There are dangers in modifying or adopting an unchanged system like the American LUC that was developed for a temperate zone farming system (viz extensive mechanised arable production of cereals) to, for example, the Fijian humid tropical system in which subsistence agriculture, involving complex multiple cropping, is an important component. The results can be irrelevant to the type of agricultural development taking place in the country adopting or modifying the system.

Over the last 20 years, FAO has endeavoured to find a solution to this problem by developing a framework for land evaluation whose principles, if followed, produce outcomes that are appropriate in all farming systems and all soil environments. The underlying philosophy is matching land utilisation types with soil and climate characteristics to determine soil suitability classes on a specific crop basis.

6.7 Land evaluation

As more demands are made on the use of the land for specified purposes, land use planning becomes, more than ever, an important function. One of the processes in determining the suitability of land use planning is land evaluation. FAO defines 'land evaluation' as:

> the process of assessment of land performance when used for specified purposes, involving the execution and interpretation of surveys and studies of land forms, soils, vegetation, climate, and other aspects of land in order to identify and make a comparison of promising kinds of land use in terms applicable to the objectives of the valuation.

Some of the objectives in land evaluation are to determine: how the land is currently used and how its management can be improved; what the alternative land use options are; what the socio-economic benefits related to sustained production from each land use option are; and what inputs are necessary for each land use option and what outputs will result.

Certain principles are recognised in land evaluation. These are:

- *Land suitability is assessed and classified with respect to specified kinds of uses.* This recognises that a given land use has specific requirements and that land suitability is related to the characteristics or qualities of the land. For example, parts of the Navua alluvial floodplain with impeded drainage are correctly cited as being highly suitable for rice cultivation but unsuitable for many other kinds of agriculture.
- *Evaluation requires a comparison of the benefits obtained and the inputs needed on different types of land.* Suitability for a specific use requires comparison between the inputs and the outputs in terms of yield and benefits. For example, in comparing the different types of land, the highest crop yield may not necessarily represent the best suitability because high input costs may be responsible for the high yield.
- *A multidisciplinary approach is required.* Land evaluation must include consideration of socio-economic factors. Therefore, a land use evaluation team should not only include the soil scientist or agronomist, but also a resource economist and a rural sociologist.
- *Evaluation is made in terms relevant to the physical, economic, and social context of the area concerned.* In addition to biophysical information, other factors such as financial resources, availability and cost of labour, standard of living, proximity and access to markets must be considered. Experience shows that extensive non-mechanised rice cultivation requiring much low-cost labour is unrealistic in a country with high labour costs.

- *Suitability refers to use on a sustained basis.* This relates to land use and its impact on the environment. Immediate benefits of land use should be assessed carefully against long-term land degradation such as that caused by soil erosion.
- *Evaluation involves comparison of more than a single kind of use.* A comparison of the alternative uses of land, farming systems or crops is undertaken to determine suitability. Such a comparison is necessary to identify the land's most suitable sustainable use.

Thus, the basic concept in land evaluation is to match the requirements of land use with land qualities. Land evaluation is a study of the land use system that, in turn, is a study of two components – the kinds of land use in relation to the land mapping unit.

Land use can be described in either a major or a detailed way. Major kinds of land use descriptions are associated with reconnaissance land evaluation studies (for example, 'rainfed agriculture'), while the detailed kinds, called land utilisation types (for example, 'irrigation field maize'), are those associated with quantitative studies. In the latter example, there would be moderate financial resources, with moderate-to-high labour intensity, using small mechanical machinery, applying 'best' technology and maintaining near optimum management of fertilisation, irrigation, and control of weeds, pests, and disease. The major kind of land use is only a generalised description, while the land utilisation type is a precise definition with specific requirements of land use (capital, labour, technology used, scale of operation, and so on).

The second component of the land use system is the land mapping unit, and associated with this unit are land characteristics and land qualities. Here, the basic unit under evaluation is the land and its soils, climate, vegetation, topography, and other land-related factors.

Land characteristics include the soil properties and other features such as slope angle and biomass vegetation, while land qualities are the result of the interactions of two or more land characteristics. Some examples of land qualities that relate to crop productivity include moisture availability, nutrient availability (e.g. phosphorus), oxygen availability in the rooting zone, and workability of the land. For phosphorus availability, examples of interacting characteristics are soil pH, amount and type of soil minerals, levels of primary phosphorus, etc.

Thus, the land evaluation method relates the specified types of land use, or the land utilisation type, to the land mapping units. The use requirements of the land utilisation types are matched with the land characteristics and qualities of the land mapping units. The land suitability classification is then derived to show the assessment of a given parcel of land for a defined use based on current condition or after improvements. The structure of the FAO Land Suitability Classification is given in Appendix 11.

6.8 Land use planning

Procedures for land use planning and decision-making are complex and little understood. Everybody has at one time or another been directly or indirectly affected by land use decisions. In view of the complexity of factors involved it is perhaps not surprising that, to date, no national rural land use policy has been possible.

Land use decisions are made at many levels. Major decisions are generally made in line ministries of government, SOEs or quasi-government agencies. However land use decisions are also made by land users, i.e. individuals owning or leasing small or large parcels of land. Few land owners/users have access to the necessary information, or know where to go for the advice to make proper land use planning decisions.

Land use decisions are controlled or affected by many pieces of legislation (see Chapter 3). The effect that the proposed Sustainable Development Act may have on land use planning procedures is unknown.

Box 7

Fiji is mainly a country of small farmers who require considerable guidance and technical assistance on farming matters; accordingly we feel that as a pre-requisite it is essential to have an overall or broad long-term land use plan or policy. Not only would such a plan be of use to farmers concerning the major type of crops which they might grow or the kind of livestock they should have, but it would also assist in the preparation of any plants for crop processing and marketing. Furthermore it would indicate the lines along which major technical investigations should proceed for the further assistance of farmers.

The preparation of such a plan would be governed to a considerable degree by the ecological regions of the Colony, indeed it would be based mainly on them; it would be an outline blue-print with an objective known to all and it would also reduce to a minimum uncoordinated development on ad hoc lines.

Report of the 1960 Burns Commission[4]

Statutory responsibility for land use decisions is spread among a number of ministers and their departments. Advising bodies (LCB, Forestry Board, LDA, etc.) also have responsibility for or advise government on various land-related matters.

The part played by national, provincial (divisions) and local land owners/tenants in land regulation, research and other roles is shown in Figure 17, which, although schematic, indicates that participation in the six roles varies greatly and in some cases is mutually exclusive. For example, research is conducted by national organisations and land use *per se* is largely the prerogative of the land owner/tenant.

Land is the most basic natural resource available for social and economic development. Combined with water, land produces other valuable resources including topsoil, forests, pasture, etc. In turn, these resources allow for specific uses to be made of land, including crop production, grazing, logging, mining, residential or commercial development, waste disposal and recreation.

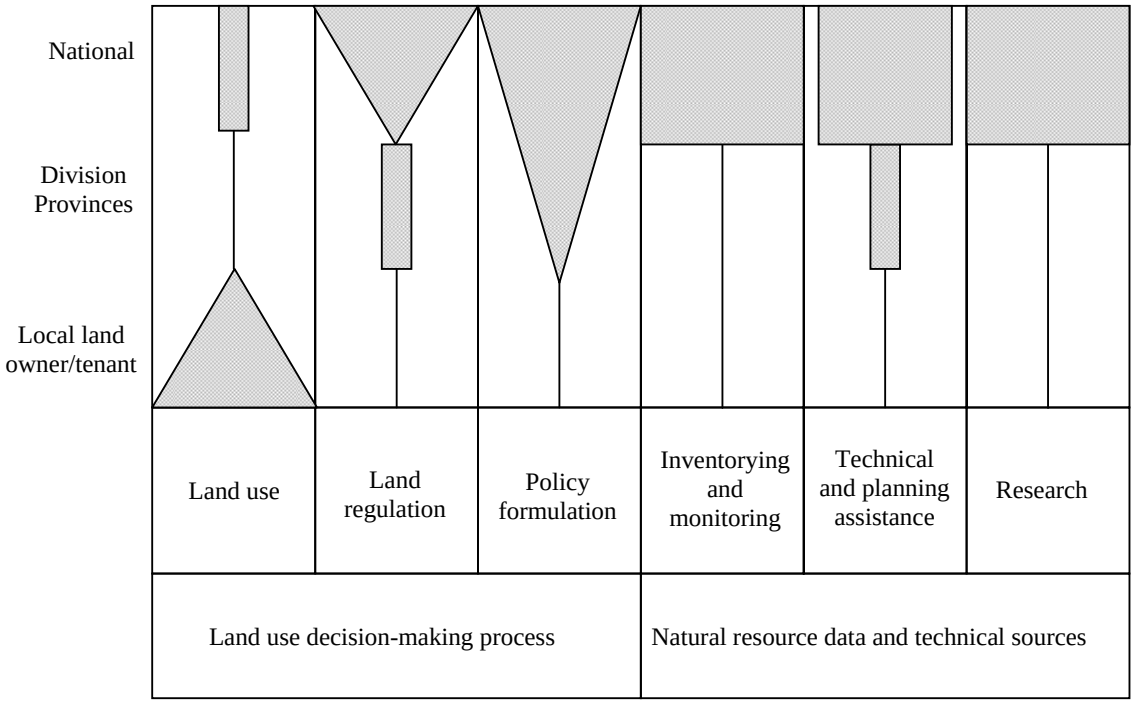
Potential (or current) land uses can be looked at in terms of their compatibility or non-compatibility with other uses. For example, increasing the amount of land under sugar cane may decrease forestry or pasture resources if forests are cleared or pasture converted in order that cane farming can expand.

While land use patterns are ever changing, it is important to note that, although some land use decisions can be compatible with other current or proposed land uses, other land use decisions are not. Rational land use decision-making should be encouraged, and *ad hoc*, ill-considered decision-making avoided. The FAO World Soil Charter (refer Section 6.3) presents in its 'Guidelines for Action' the need to incorporate the principles of rational land use and management into appropriate resource legislation.

Rational and informed land use will produce sound use of limited resources with improved socio-economic outcomes. However, the challenge is how to generate rational and informed land use decisions and if these are accomplished, how to convince other land users/stakeholders to adopt them. Land use planning may be at national, regional or village level. The process has to involve the participation of the land users; in fact, throughout all the steps described below (Section 6.9) participatory rural appraisal methodology must be applied wherever it is appropriate. It entails bringing together a wide array of data – physical, technological, economic and institutional – and integrating them systematically for the purpose of developing a workable plan and programme of action.

[4] Appointed to enquire into problems connected with the natural resources and population trends of Fiji.

Figure 17: Generalised land use planning roles



> The plan may be subject to institutional or other constraints, such as land tenure systems and customs. However, in the long run, these institutions are subject to changes to facilitate better land use. Nevertheless it should be recognised that the plan must, at best, be regarded as an ideal and that in an economy undergoing structural changes, the desired optimum patterns of land use may not be obtainable in a practical sense. The plan will change according to the wants and preferences of consumers, changes in the land, advances in technology, and variations in the level and distribution of income. The essential task is to indicate those patterns of use which are superior to the present or alternative land uses, in terms both of spatial allocation of land among different uses and the intensity of land use, which together determine the patterns of land use.

It can be seen that land use planning is the mechanism by which judgement can be injected into a previously non-judgemental situation. Stated differently, it is the means by which the term 'land use' can be made more 'rational'. The definition of land use planning comprises the following distinct elements:

- specified objectives;
- appraisal of land and alternative patterns of land use;
- assessment of other physical, social and economic conditions;
- a process of calculation and selection; and
- a process of adoption.

6.9 Proposed land use planning process

The land use planning process advocated for Fiji should be based on 'Guidelines for Land Use Planning' by FAO (1993); a system which is now adopted as a national planning tool in many countries. While national objectives and local situations vary, the sequence of 10 steps in the FAO system are generic and can be adapted to meet such variations. An outline of the planning steps follows (see also Figure 18).

Box 8

The Land Use Planning Process can be expressed in the following questions:

- **What is the present situation?**
- **Is change desirable? If so:**
  - *what needs to be changed?*
    Land use problems and opportunities are identified by discussions with the people involved and by the study of their needs and the resources of the area.
  - *how can the changes be made?*
    Planners seek a range of ways to make use of the opportunities and solve the problems.
  - *which is the best option?*
    Decision-makers choose the best option, based on forecasts of the results of implementing each alternative.
  - *how far is the plan succeeding?*
  - Once a land use plan is put into effect, planners monitor progress made towards its goals and change the plan if necessary.

6.9.1 Step 1: Establishment of goals and terms of reference

The planning effort starts by discussions between the land users, government and the planners. This vital first step should be a mutual exchange of ideas and information. The planner(s) must be briefed about the problems and learn from the people what they want to achieve; and the planner has to demonstrate to them how the land use plan can help.

A number of tasks may be included in this first step of planning. Some are repeated in more detail in Steps 3 and 4. The tasks are as follows:

- Define the planning area (size, boundaries etc.);
- Acquire the basic information (see Chapter 5);
- Establish the goals (from problem identification, national policy and development priorities);
- Identify problems and opportunities (follows baseline appraisal);
- Identify constraints to implementation (these may be legal, economic, institutional, social or environmental);
- Establish the criteria by which land use decisions will be made (if many, prioritise);
- Set the scope of the plan (how much is the plan supposed to cover, e.g. include basic services);
- Set the planning period (duration for which the plan will operate before a revision);
- Agree on the content and format of the plan; and
- Decide operational questions (e.g. funding, facilities, inter-agency co-operation, production schedule);

Step 1 is the foundation of the land use plan. It is crucial to develop close working relationships between the land users, the decision-makers, the planning team and other participants of the planning process. The output from this step will be a project document giving the terms of reference of the planning exercise, including its goals, specific objectives, time required and budget.

Box 9

Starting at the local level: bottom–up planning

'Bottom–up' planning is initiated at the local level and involves active participation by the local community. The experience and local knowledge of the land users and local technical staff are mobilised to identify development priorities and to draw up and implement plans.

The advantages are:

- Targets, management and benefits are all local. People will be more enthusiastic about a plan seen as their own, and they will be more willing to participate in its implementation and monitoring;
- There is more popular awareness of land use problems and opportunities;
- Plans can pay close attention to local constraints, whether these are related to natural resources or socio-economic problems; and
- Better information is fed upwards for higher levels of planning.

The disadvantages are:

- Local interests are not always the same as regional or national interests;
- Difficulties occur in integrating local plans within a wider framework;
- Limited technical knowledge at the local level means technical agencies need to make a big investment in time and labour in widely scattered places;
- Local efforts may collapse because of a lack of higher-level support or even obstruction.

6.9.2 Step 2: Organisation of the work

Step 2 transforms the general planning procedure from Step 1 into a specific programme of work. It says what needs to be done, decides on the methods, identifies who will do it, specifies the responsibilities of each team member, schedules personnel and activities and allocates resources for the ensuing steps in the process. The tasks are as follows:

- List the planning tasks and activities. For each:
  – identify the people and organisations responsible for it;
  – set out the resources needed; and
  – estimate the time needed;
- Prioritise tasks (critical path analysis);
- Develop a work plan for the project as a whole;
- Develop individual work plans;
- Allocate money and equipment;
- Arrange administrative matters and logistics (e.g. transport, equipment, technical support-field, laboratory, and GIS).

6.9.3 Step 3: Analysis of problems

After the previous focus on discussion, terms of reference and preparation, Step 3 is the first to involve the detailed technical aspects of land use planning. It is an important step. First, the existing land use situation is analysed and compared with the development goals; this requires identification of land units and land use systems. Then problems with the present land use are identified, including their nature and severity. Finally, the causal factors of these problems are analysed.

The tasks are as follows:

- Collect data on the current situation; where possible, compile maps (giving information about population, land resources, employment and income, present land use, production and trends, and infrastructure);
- Check in the field the reliability of data sources and update (maps, satellite imagery, aerial photos, censuses, records etc);
- Identify and map land units (at national level, agroclimatic regions; at district level, land systems; and at local level, soil series, and land facets);
- Identify and map land use systems (areas with similar land use and economy – may be farming systems or systems based on forestry, etc);
- Identify problems of land use (their nature and severity, land units and land use systems affected) and analyse causes;
- Conduct rapid rural appraisals and meetings with stakeholders (associated with identifying land use problems);
- Prepare problem statements (based on analysis of causes, and assessing short-term and long-term effects; describe causes as physical, economic and social).

6.9.4 Step 4: Identification of opportunities for change

Now that the problems needing attention are known, the next step is to consider what can be done to solve or ameliorate them. This requires interaction between: planners, who present options for change; the land users who comment on these and offer their own solutions; and the decision-makers, who decide as to which options might be analysed further. Based on the goals from Step 1 and problem statements from Step 3, problems for which solutions other than land use planning must be sought are separated out. The tasks are as follows:

- Develop options for solving each problem in terms of opportunities (the people, land resources, improved technology, economic measures, and government action);
- Develop options for solving each problem in terms of land use strategies (no change, maximum production, minimum investment, maximum conservation, and maximum equity);
- Develop options for solving each problem in terms of types of production, the role of conservation, and self-reliance versus external investment;
- Develop realistic options that best meet the needs of production, conservation and sustainability and that minimise conflicts of land use;
- Prepare outline budgets and time frames for each option;
- Present the problem statement (from Step 3) and the alternatives for change in terms suitable for public and executive discussion.

The decision-makers have the responsibility of deciding whether the goals are attainable; selecting the priority problems; choosing the most promising alternatives for a feasibility study (specifying targets); and outlining the actions needed at other levels of planning.

6.9.5 Step 5: Land suitability evaluation

This step forms the central part of land evaluation, a procedure that answers the following questions:

- For a specific kind of land use, which areas of land are best suited?
- For any given area of land, for which kind of use is it best suited?

The approach and methodology is set out in ‘A Framework for Land Evaluation’ (FAO 1976) and an overview of what the procedure entails is given in Section 6.7. In simplified form, the procedure is:

(a) Describe promising land use types;
(b) For each land use type, determine the requirements, e.g. for water, nutrients, avoidance of erosion;

(c) Conduct the surveys necessary to map land units and to describe their physical properties, e.g. climate, slope, soils;
(d) Compare the requirements of the land use types with the properties of the land units to arrive at a land suitability classification.

Land cannot be graded from 'best' to 'worst' irrespective of the kind of use and management practised, because each kind of use has special requirements; for example, needs of sugar cane, or rice, or ginger, or *P. caribaea* are all different. The tasks are as follows:

(a) Describe land use types in detail (Refer Appendix 8);
(b) Select land qualities and land characteristics to be used in comparisons of land use requirements with land;
(c) Map the land units and determine their relevant land characteristics and qualities;
(d) Set limiting values to land use requirements (these are the values of land characteristics that determine the class limits of land suitability for a certain use – standard FAO land suitability classification is shown in Appendix 11);
(e) Match land use with land (this process compares land use requirements with land characteristics to determine land suitability classes; considers modifications to land use types, to make them better suited to the land; and considers land improvements that could make the land better suited to the land use).
(f) Conduct land suitability classification (map land suitability for each land use type; enter into GIS).
(g) Conduct planning for research (additional surveys, research by outside agencies or within the land use plan).

6.9.6 Step 6: Appraisal of alternatives: environmental, economic and social analysis

The evaluation carried out so far has been essentially in terms of physical suitability. An assessment has been made of whether different kinds of land use can be undertaken on a sustained basis. In Step 6, planners appraise the effects of each alternative use in environmental, economic and social terms. The following studies refer first to individual combinations of land use with land units that have been classed as suitable in physical terms and, second, to alternative combinations of land use that are being considered in the plan. The studies are as follows:

(a) Environmental impact assessment (soil and water resources, pasture and forest resources, nature conservation, resources for tourism and recreation, and off-site effects);
(b) Financial analysis (assesses whether the proposed land use types are profitable for the farmer or other land users);
(c) Economic analysis (measures the value of the proposed changes to the community; also, determines whether there are areas of land of critical importance for certain uses, e.g. for production or conservation);
(d) Social impact analysis (analyses the effects the proposed changes will have on different sections of the community, especially women, other ethnic groups and the poor);
(e) Strategic planning (assesses how the proposed changes in land use will affect wider aspects of rural development planning, including national goals).

6.9.7 Step 7: Choice of the best option

At the point of decision, the roles of the planner and the decision-maker must interact. The planners have assembled and summarised the facts needed to make an informed decision, i.e. results from the previous steps. The decision-maker has to choose the land use option that best meets the goals.

The responsibilities of the planner are as follows:

(a) Set out a series of options for the allocation/recommendation of land use types to land units. In addition, state their evaluation in terms of land suitability and environmental, economic and social analysis;
(b) Set out the consequences of these options in terms of the goals and planning objectives;
(c) Present the options and their consequences in a way that is appropriate for review.

The responsibilities of the planners and decision-makers together are as follows:
(a) Make arrangements for consultations with the communities affected, as well as with the implementing agencies; obtain views about feasibility and acceptability;
(b) Assemble and review the comments received. In light of these, make any necessary changes to the options.

The responsibilities of the decision-makers are as follows:
(a) Decide if the response to comments is adequate;
(b) Consider the options in terms of goals and policy criteria;
(c) Choose the best option;
(d) Authorise preparation of the plan.

6.9.8 Step 8: Preparation of the land use plan

At this point a report is written which has two main functions:
- To present the plan that is now recommended, with reasons for the decisions taken, i.e. to summarise the results from Steps 1 to 7;
- To prepare for implementation.

Three elements in the land use plan that is now prepared are: What should be done? – the selected changes to land use and where they should be applied; How should it be done? – logistics, costs and timing; and reasons for the decisions taken. The key tasks for the planners are as follows:
(a) Prepare maps (the master land use plan and supporting maps);
(b) Set out land use allocations/recommendations (based on the preferred option in Step 7; give descriptions of land use types, including management recommendations on each kind of land);
(c) Set targets for achievement (these by land use type, area and agency; specify how they will be reached);
(d) Draw up logistical requirements (specify capital works, recurrent inputs and responsibilities for implementation);
(e) Establish mechanisms for monitoring progress and revising the plan (Step 10);
(f) Arrange the research needed to support the plan;
(g) Determine the finance required for each operation and the funding source;
(h) Write the report (executive summary, main report, maps and appendices);
(i) Establish communication mechanisms (with all agencies and institutions);
(j) Prepare public relations material.

6.9.9 Step 9: Implementation of the plan

The objective of the land use planning process so far has been to identify and put into practice beneficial land use changes; implementation is a key ‘step’ in the planning process. Nationally, implementation is likely to be through policy guidelines that may also provide a framework for selection of potential projects at the divisional or district levels. Thus, the planners remain throughout a part of implementation, supplying information to government as a basis for decisions. Implementation involves a wide range of practical activities and the following are those roles that the planners may undertake:
(a) Ensure that recommended changes in the plan are correctly applied (e.g. through technical consultations; discussions with implementing agencies);
(b) Maintain communication between those affected by the plan (i.e. land users, sectoral agencies, government, NGOs, commercial organisations);
(c) Assist in institution building;
(d) Focus on the participation of the land users;
(e) Organise research in association with the plan;
(f) Arrange for education and training of planning staff and land users.

6.9.10 Step 10: Monitoring and revision of the plan

Now the planning process comes full circle. Information is needed on how well the plan is being implemented and whether it is succeeding, so that the implementing agencies can improve the way in which the plan is being applied and so that the planners may learn from experience and respond to changing conditions. It is necessary to know the answers to the following questions:

(a) Are the land use activities being carried out as planned?
(b) Are the effects as predicted?
(c) Have the assumptions on which the plan was based proved to be correct?
(d) Are the goals still valid?
(e) How far are the goals being achieved?

For monitoring and revision, the responsibilities of the planners are as follows:

(a) List the goals and criteria achievement agreed in Step 1; add any that have emerged later in the planning period;
(b) Gather data relevant to each criterion of attainment – physical, economic and social;
(c) Compare what has been achieved with what was planned; identify elements of success and failure; and identify the causes of any failures;
(d) Review the goals – are they still valid? Initiate modification or revision of the plan.

6.10 Preferred institutional framework for land and water management and land use planning

In general, individual land users are not always well aware of the consequences of their actions with the land. This is in part due to lack of information about 'best practice', legislation and sources for technical support. In the absence of long-term planning for and government intervention in rural land use options and issues, a 'market forces' environment takes hold This is a situation where a large number of land use/practice decisions are being taken by many land users for their own private ends. The current climatic, economic and social pressures are forcing many land users into actions that satisfy their short-term needs; actions that can have adverse long-term consequences.

Irrespective of the level and degree of government intervention in planning, a suitably qualified team is required to facilitate informed opinion on the management of land and advise decision-makers on the available options and the ramifications of alternative decisions. This team needs both the support of the rural people on the ground and the authority and resources of government.

Government structures and financial allocations in Fiji are mainly sectoral (e.g. Lands, Environment, Agriculture, Forestry). Land use planning by its function straddles these administrative hierarchies, but does so without disruption to budgets and influences of the existing government structures.

The introduction of integrated land use planning at the national level can be frustrated by inexperienced planning staff and ill-defined career paths; poorly defined responsibilities for co-ordination of sectoral activities; and poor co-operation between national administrative authorities and the more technical agencies of government. This leads to inefficient use of available data and expertise. The question then is, what is the most appropriate institutional model for land use planning in Fiji?

FAO (1993) believes that there is only one proven strategy for small nations like Fiji: establish an independent land use planning unit. Such a unit should be staffed with a range of expertise, and have access to authority and the ability to make quick decisions. If it was established as another sectoral body it would in all probability fail, for the body would be competing with other agencies for resources and would not be in a strong position to either influence their programmes or to implement plans of its own.

The current land use planning responsibilities in Fiji are divided among a number of different units of government with some overlapping tasks. There is a need for stronger institutional linkages (e.g. NLTB, MAFF, Environment, TCPD, Rural Development, Fijian Affairs) and co-ordination with a clearer definition of responsibilities.

To facilitate improved linkages and co-ordination with well defined responsibilities (supported by policy and regulations) the following institutional elements are recommended for the national level of land use planning proposed.

- **National Land Use Council**
  A permanent inter-ministerial, inter-departmental technical committee should be established, chaired by a minister or senior civil servant. Its functions are to identify priorities and requirements, allocate resources, approve plans and monitor implementation. Decisions of the committee should be in the form of recommendations to the Cabinet (or Cabinet subcommittee). In this way it should possess the three necessary qualities: technical knowledge, access to resources, and authority.
- **Land and Water Conservation Board** (A reconstituted Land Conservation Board)
  A legally independent body charged with enforcement of laws and policies designed to conserve and manage Fiji's natural resources, to propose new laws and policies where needed, and to monitor land and water resources, implementation of the national land use plan, and environmental conditions, particularly on NLTB-leased lands.

  The following goal is recommended as a possible goal for the management of water and land resources by the Land and Water Conservation Board:

  Delivery of effective, integrated and collaborative research, development, information and extension services to achieve economical and ecologically sustainable development of natural resources.

- **Ministries and Departments**
  Their basic functions are to provide information, to recommend, and to implement. Co-ordination and collaboration between different Government agencies are essential in order to avoid duplication and the ill-defined roles and responsibilities that can result in inefficiency, and poor use and management of scarce resources.

  Water and land resources issues cross the boundaries of institutional structures and programmes and demand solutions that are holistic and integrated. Therefore, applied research and extension require strong co-ordination across structures; they must focus on priority issues, and must be outcome driven and responsive to land users, stakeholders and collaborators.

At the provincial or divisional level it is recommended to establish:

- **Provincial or divisional land use planning groups**
  The basic functions of these groups are to identify priorities, allocate resources, approve sub-national plans, and monitor implementation. They should also be responsible for the establishment of long-term development plans and zoning schemes for their areas, and provide support and liaison to the Land Husbandry Committees. Membership would be drawn partly from the community and partly from Government. Support expertise would be provided through specialists who are members of Government departments located in the Divisions, delegated to assist the local land use planning group.
- **Land Husbandry Committees**
  The present planning approach in Fiji is essentially top–down. National planners and decision makers see their functions as the identification of problems and issues and the development of solutions which are applied through economic and legal instruments with the assistance of line Ministries. The top–down approach is inefficient and slow when it comes to responding to 'grassroots' needs; inefficient in the use of resources; and inefficient in harmonising opposing objectives.

The village and district communities know best the local conditions and problems, and with a supportive institutional framework established, and necessary advice and information available to them, these communities are able to work together. When empowered and involved in the planning process, local communities show initiative and enthusiasm.

Formation of Land Husbandry Committees at the local level would bring stakeholders together to co-ordinate their resource uses and provides the bottom–up input to interactive land use planning.

It has been mentioned elsewhere in the report that there is an urgent need to implement an ongoing, national awareness programme to explain to landowners and tenants the current legislation related to land use (including provisions in leases about land husbandry requirements), sustainable land management and the practices and techniques available to achieve sustainability. As a complement to a national awareness programme and to assist the development of communication and interaction at the 'grassroots' level, Land Husbandry Committees (LHCs) should be established in rural communities with an overall goal of working toward sound land management and improved productivity from the land.

The primary functions of each LHC would be to develop co-operation between all land users, government agencies (including Boards) and Corporations (e.g. FSC). They would also promote practices that will enhance productivity (per unit area) within a sustainable farming system and promote approved soil and land conservation practices within the rural community served by the LHC. Land Husbandry Committees would provide an ideal way for rural people to become actively involved in land utilisation and conservation programmes. It would be appropriate that the LCB take the initiative in helping establish LHCs and provide the support for technical information and other guidance. Also, for the land planning system advocated (Section 6.9), LHCs would perform an important role in the participatory activities (e.g. PRAs) required in that process.

Land Husbandry Groups would encourage farmers to work together with government and rural communities to solve a wide range of rural environmental and social problems. In other countries, such groups have emerged to deal with many different local problems that affect the whole community. Groups deal with such issues as weed and pest problems, tree decline, dune regeneration, conservation farming, wildlife conservation, farm profitability and agribusiness management.

6.11 Resource management legislation for Fiji

Fiji's natural resource management legislation is very sectoralised. Some sectors have no workable legislation and there are some omissions. In view of the comprehensive resource management legislation introduced in some countries, most notably New Zealand and the United Kingdom, it would be appropriate for the Government of Fiji to examine these.

The sustainable development legislation is being introduced to Parliament in 'parcels' rather than the total package as originally mooted. While the final outcomes of these parcels is into the future, it is worth discussing planning of the type provided for under the New Zealand Resource Management Act (RMA) and considering whether similar legislation modified to suit the Fiji situation is appropriate and applicable.

The New Zealand RMA (1991) is the core of legislation intended to help achieve sustainability by bringing together laws governing land, air and water resources and concentrating on the environmental effects of human activities. The Act initiated a new approach to environmental management; its purpose is to promote the sustainable management of natural and physical resources.

The New Zealand RMA is the principal statute for the management of land, subdivision, water, soil resources, coastal resources, and air and pollution control. It sets out the rights and responsibilities of individuals, territorial and regional councils, and central government. The Act provides a common set of principles to be applied to the management of all resources with an overall purpose to 'promote the

sustainable management of natural and physical resources'. This purpose applies to every part and all those exercising functions and powers under the provisions of the Act are required to ensure that this purpose is realised.

With regard to sustainable management, the New Zealand RMA says:

> Managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety, while:
> - sustaining the potential of natural and physical resources for future generations;
> - protecting the life-supporting capacity of air, water and soil; and
> - avoiding, remedying and reducing any adverse effects.

All territorial councils in New Zealand are required to prepare a district plan that will assist them to carry out their functions under the Act. District plans and regional policy statement comprise objectives, policies and rules 'to control or direct development and change so the effects are not environmentally destructive or in a form that reduce the sustainability of resources…it gives a description and framework for the use of resources, in particular the types of activities that can be undertaken'.

Resource consents are specific approvals for the undertaking of activities within the general framework of the district plan. A consent is required when a development proposal is not allowed as of right in the district or regional plan. Under the RMA, an application for a resource consent must include:

- An assessment of any actual or potential environmental impact of the proposed activity; and
- An appraisal of how any adverse effects can be overcome or lessened.

Figure 18: Steps in land use planning – inputs, activities and outputs

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10
Inputs and Activities	Land use policy		Rapid rural appraisal, expand baseline data	First formal public consultation	Specific land resource surveys	Farming systems analysis	Public and executive discussion	Planning for change	Action by land users and implementing agencies	
	Baseline situation appraisal				Physical land evaluation	Analysis of environmental, economic and social impact	Consider implementation of projects	Project formulation		Field progress reports from land users and developme nt agencies
	Local experience	Select methods	Consider legal, social, economic constraints	Study of relevant land use option and their land requirements	Land use modelling				Co-ordinate sectoral activities	
	Institutional constraints	Organise work			Land Information System					
Land Use Planning	ESTABLISH GOALS AND TERMS OF REFERENCE	ORGANISE THE WORK	ANALYSE THE PROBLEMS	IDENTIFY OPPORTUNITIES FOR CHANGE	EVALUATE LAND SUITABILITY	APPRAISE ALTERNATIVE S	CHOOSE THE BEST OPTION	PREPARE THE LAND USE PLAN	IMPLEMENT THE PLAN	MONITOR AND REVISE THE PLAN
Outputs	Terms of reference	Plan of work times, resources, people	Problem statement and options for change	Specifications of promising land use types	Land suitability maps	Viable land use options	Land use proposals	Land use	Changes of land use	Revised land use plan
							Feedback to higher-level plans	Projects for implementa tion		Feedback to higher-level plans

Source: Dent and Ridgeway (1986)

6.12 Implementation

Table 13 outlines a possible timetable for supplementing much of that proposed in the report, particularly recommendations from Chapter 6.

The Government will require external assistance in implementing some of the recommendations plus the methodological and institutional changes discussed in Chapter 6. Eight projects have been identified with their stated objectives presented in Appendix 12.

Project 1	Development of an Institutional Capability for Integrated Land Use Planning
Project 2	National Land Use Planning
Project 3	National Land Zoning
Project 4	National Contemporary Land Use Mapping
Project 5	Integrated Rural Resource Database Development and Applications
Project 6	Adaptive Research and Extension in Land Husbandry Technologies
Project 7	National Sustainable Land Management Education and Awareness Programme
Project 8	Improve the Capacity and Quality of Human Resources within Government for Land Management and Land Use Planning

Figure 19 attempts to show the role of land use planning and policy in developing sustainable land use.

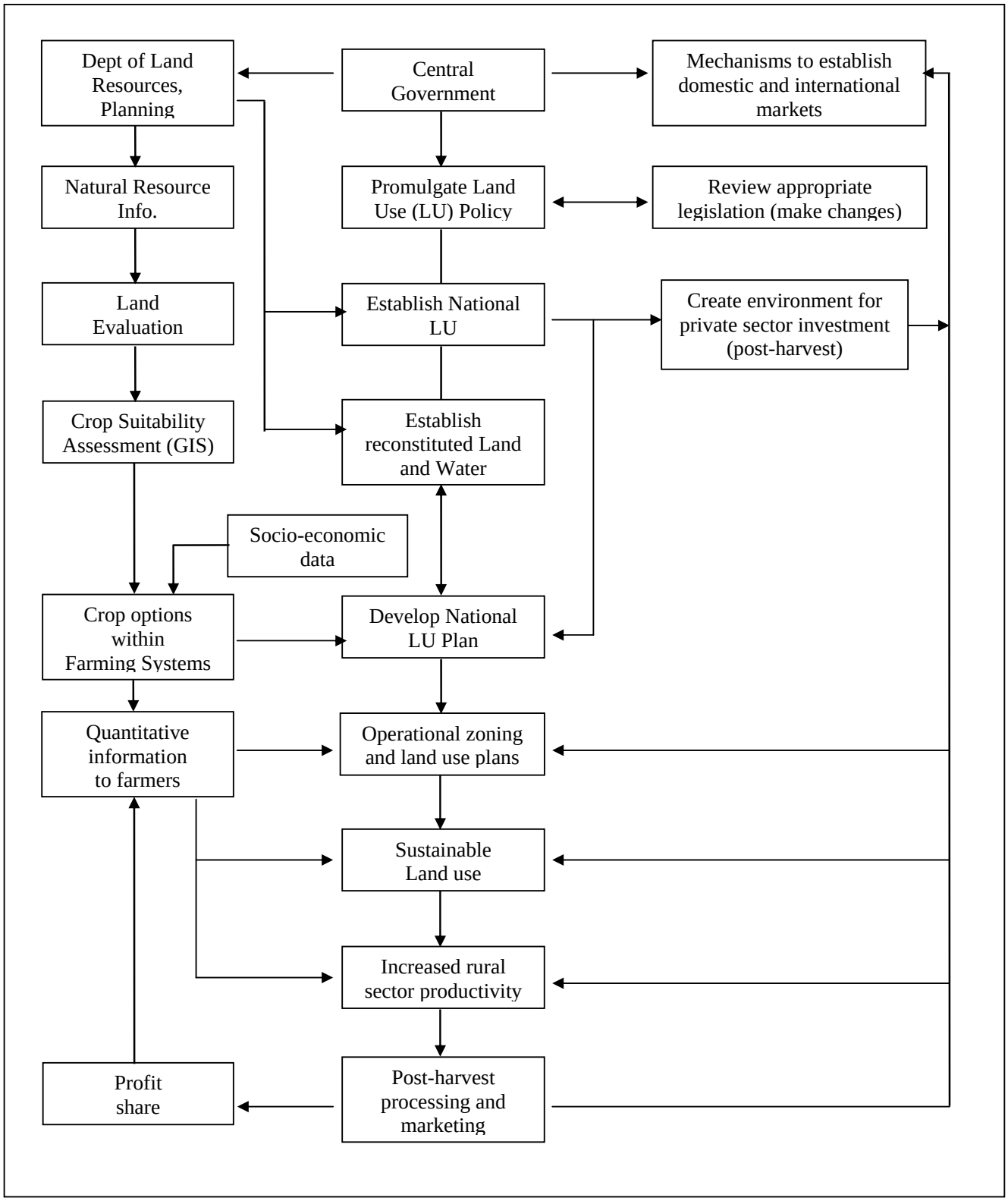
Table 13: Implementation Schedule

Project	Activities	2001	2002	2003	2004	2005	2006	2007
1	Establishment of Land Use Authority							
2	National Land Use Planning Project							
3	National Land Zoning Project						revision	
4	National Land Use Mapping Project							
5	Integrated Rural Resource Database Project							review
6	Research and Extension in Land Husbandry Technologies						review	
7	National Sustainable Land Management Awareness Programme							review
8	Improve the Capacity and Quality of Human Resources within Government for Land Management and Land-use Planning							

Key:

- Design consultancy
- Established (on-going)
- Implementation

Figure 19: The role of land use planning and policy in developing sustainable land use



APPENDICES

1. Terms of reference
2. The consultation process
3. Land utilisation classes
4. Total land under farms and non-farms, number of farms and land use change
5. Rural land use policy questionnaire
6. Soil erosion and conservation practice
7. Fiji Land Information Council (FLIC): organisational structure and policies
8. Land and land use-related definitions
9. World Soil Charter: principles and guidelines
10. Fiji Land Capability Classes
11. Structure of the FAO Land Suitability Classification
12. Projects required to facilitate change

Appendix 1: Terms of Reference

Country: ***Fiji***
Title: Review of Rural Land Use and Implications on Land Use Policy

Agency: SPC/GTZ Pacific German Regional Forestry Project, Suva, Fiji.

Under the overall supervision of the Director Research and Principal Research Officer (Land Use) with support from SPC/GTZ-Pacific German Regional Forestry Project, Suva, Fiji, in joint collaboration with the Agriculture Working Group, the Consultant will be responsible for the timely completion of the following:

1. Review current Government policies and legislation relevant to the agriculture land use and related sectors and identify aspects which are not adequately covered and to set out proposed additions and/or alternatives.

2. Review the state of the agriculture land resources based on latest maps, documentation and information.

3. Review the reports of past missions on agriculture land resources and related sectors, the status of their recommendations, and their implications on the agriculture sector and policy.

4. In close consultation with interested and affected stakeholders, analyse the past and present levels and trends in agriculture land use. Analyse the demand for agriculture products, the functions and services, and develop scenarios for future situations.

5. In close consultation with interested and affected stakeholders, assess current land and forest clearing, burning of agriculture debris and sugarcane and other land use practices, their impacts on soil, water, ecosystems and communities, and recommend appropriate measures where necessary.

6. In close consultation with representatives of local communities, assess current customary land conservation practices that should be considered in the future.

7. Liaise with other Government Departments and donor agencies in relation to the efforts on the above issues.

8. In close consultation with representatives of local communities, assess customary landowners concerns related to the use and management of rural agriculture resources that should be considered in setting agriculture policies.

9. Review the current and planned responsibilities and capacities of the relevant Government departments, non-Government and private institutions, and make appropriate recommendations.

Duty Station: Suva, Fiji with internal travel
Duration: 8 weeks

Appendix 2: The Consultation Process

2A: List of persons consulted

Geoff Adlide	First Secretary, Australian High Commission
Vilimone Baledrokadroka	Senior Economic Planning Officer, National Planning Office, MFED.
Osea Bolawaqatabu	SRO (Land Use), MAFFA
Timothy Brown	Secretary, Sugar Commission of Fiji
Nemani Buresova	Permanent Secretary, Min. Women's Affairs and Culture
Sefanaia Dakaica	Principal Town Planner, DTCP
Joreti Dakuwaqa	Valuer, NLTB (Western)
Amrit Dass	Research and Planning Officer, SCOF
Tony Dowling	Co-ordinator, PACIFICLAND Project, IBSRAM
Jai Gawander	Acting Director Research, Fiji Sugar Corporation
Nicky Hill	Second Secretary, N.Z High Commission
Mohammed Jaffar	Acting Permanent Secretary, Dept of Lands & Survey.
Lindsay Jones	Economic Adviser, EU
Peniasi Kata	Land Use Section, MAFFA
Gris Maharaj	Chief Executive, Sugar Cane Grower's Council
Hemraj Mangal	Chief Extension Officer, FSC
Jiten Mangal	Principal Planning Officer, NPO, MFED
Jim Manley	Business/Change Management Adviser, NLTB
Kemueli Masikerei	Manager, FLIS
Samisoni Matasere	Strategic Land Use Planner, NLTB
Warwick Mathieson	CEO, Tailevu Development Co. Ltd
Epeli Nasome	Director, Dept of Environment
Ilaitia Navunisaravi	Secretary, Fiji Land Information Council
Misieli Naivalu	Director, Extension Services, MAFFA
Barma Nand	Acting Director, Dept of Lands and Survey
Albert Queet	Director, Land Development, MAFFA
Aisea Quminakelo	Divisional Secretary, Commissioner's Office (Western)
Esiteri Radrodro	Senior Economic Planning Officer, National Planning Office, MFED.
Luke Ratuvuki	Permanent Secretary, MAFFA
Evelyn Reigber	Team Leader, Pacific German Regional Forestry Project.
Hiroyuki Sawada	Assistant Resident Representative, JICA
Vilitati Seru	Director, Land Development, MAFFA
Timoci Sova	Senior Engineer (Mechanisation)
Niumaia Tabunakawai	Permanent Secretary, MAFFA
Seva Tabua	Senior Land Use Planner, NLTB
Rupeni Tamanikaiyaroi	Senior Scientific Officer, Sugar Cane Research Centre, FSC
Paula Taukei	Chief Economist, MAFFA
Kasaqa Tora	GIS Specialist, Land Use Section, MAFFA
Sakiusa Tubuna	Principal Economist, LDRU, MAFFA
Tomasi Tui	Divisional Planning Officer, Commissioner's Office (Western).
Pita Tuiloma	Assistant Director, Dept of Lands and Surveys
Osea Tuinivanua	OIC, Management Services Division
Susana Tuisese	Senior Forester, Dept of Forestry
Aliki Turagakula	PRO (Agronomy)

Samisoni Ulitu	Deputy Permanent Secretary, MAFFA
Joeli Vakabua	Director Research, MAFFA
Sakapo Vodivodi	Acting Commissioner, Central Division
George Vuki	Forest Manager (South West), Fiji Pine Ltd
Josua Wainiqolo	PRO (Chemistry) Research Division, MAFFA

2B: Workshop participants

Rural Land Use Policy Workshop
28 July 1999

Names	Designation	Organisation
Mr Vilitati Seru	Director of Land Development & Resettlement	MAFFA
Mr Nand M. Sugrim	Director of Animal Health & Production	MAFFA
Mr Alifereti Filipe	Senior Agriculture Officer (Beef & Dairy)	MAFFA
Mr Aliki Turagakula	Principal Research Officer (Agronomy)	MAFFA
Mr Josua Wainiqolo	Principal Research Officer (Chemistry)	MAFFA
Ms Maria Elder	Senior Technical Assistant, Soils Research	MAFFA
Mr Inoke Ratukalou	Principal Research Officer (Land Use)	MAFFA
Mr Taito Nakalevu	Senior Research Officer (Central/Eastern)	MAFFA
Mr Hiagi Foraete	Principal Agriculture Officer (Extension)	MAFFA
Mr Kuldeep Singh	Principal Silviculturist	Forestry
Mr S Lagataki	Acting/Principal Management Officer	Forestry
Mrs Susana Tuisese	Principal Environment Officer	Forestry
Mr Elaisa Tulele	Divisional Forestry Officer (Southern)	Forestry
Mr Apisai Ucuboi	Principal Research Officer (Horticulture)	MAFFA
Mr Isoa Korovulavula	Environment Awareness Officer	SPC/GTZ/PGRFP
Mr Sekope Bula	Chief Executive Officer (Hardwood Corp.)	Forestry
Mr Sakiusa Tubuna	Principal Economic Planning Officer	LDRU, Lands Department
Mr Moti Lal Autar	Principal Research Officer (Plant Protection)	MAFFA
Mr Amar Singh	Training Officer	MAFFA
Mr Ropate Ligairi	Deputy Principal - FCA	MAFFA

Rural Land Use Policy Workshop
29 July 1999

Mr Waisale Ravono	Client Service Officer (CSO)	NLTB
Mr Nimilote Naivalumaira	CSO	NLTB
Mr Waisake Koroisamanunu	CSO	NLTB
Mr M Niudamu	CSO	NLTB
Mr S Baro	CSO	NLTB
Mr J Dakuwaqa	CSO	NLTB
Mr N Bakaniceva	CSO	NLTB
Mr N Nawaikula	Director Legal	NLTB
Mr Semi Tabakanalagi	Regional Director (West)	NLTB
Mr Jim Manley	Change Advisor	NLTB
Mr Samisoni Matasere	Acting Director Land Use	NLTB
Mr Etika Tawaketini	CSO	NLTB

Mr Kitione Tuibua	Client Service Manager	NLTB
Mr Mojito Mua	Regional Director (C/E)	NLTB
Mr Solomone Nata	CSO	NLTB
Mr Isoa Korovulavula	Environment Awareness Officer	SPC/GTZ/PGRFP
Mr Inoke Ratukalou	Principal Research Officer, Land Use	MAFFA

Rural Land Use Policy Workshop
5 August 1999

Names	Designation	Organisation
Mr Ram Sewak	Senior Agriculture Officer	MAFFA
Mr Taito Nakalevu	Senior Research Officer	MAFFA
Mr Isoa Korovulavula	Environment Awareness Officer	SPC/GTZ/PGRFP
Mr Eparama Ravaga	Client Service Officer	NLTB
Ms Laisiana Maivalenisau	Support Service Assistant	NLTB
Ms Cema Bolatagane	CSO	NLTB
Mr Netani Kisi	A/CSO	NLTB
Mr Vuki Tokailagi	CSO	NLTB
Mr Josevata Namatasere	CSO	NLTB
Mr Lui Busere	SSA	NLTB
Mr Mataiasi Bolatagane	A/CSO	NLTB
Mr Tomasi Mucunabitu	District Officer, Ba	Regional Development
Mr Lui Naisara	SSA	NLTB
Mr Tomasi Tui	DPO	
Mr Rajesh Prasad	Senior Agriculture Officer	MAFFA
Mr Janka Prasad	Divisional Surveyor Western	Lands Department
Mr Kalisito V Biaukula	Senior Agriculture Officer (LWRM)	MAFFA
Mr Aisake Vucago	Forest Ranger, Timber Production	Forestry
Mr Osea Bolawaqatabu	Senior Research Officer, Land Use	MAFFA
Mr Eroni Qama	Senior Agriculture Officer Quarantine	MAFFA
Mr Semi Matalau	District Officer, Ra	Regional Development
Mr Inoke Ratukalou	Principal Research Officer, Land Use	MAFFA
Ms Maria Elder	Senior Technical Assistant Soils Research	MAFFA
Mr Peni Kata	Senior Technical Assistant Cartography	MAFFA
Mr Shiri Chand	Commissioner Western, Lautoka	Regional Development
Mr Aisake Saro	Research Officer	Fiji Pine

Rural Land Use Policy Workshop
16–17 November 1999

Seru Sila	Principal Communication Officer	MAAF
Ilaitia Navunisaravi	Senior Technical Officer	Lands Department
Ashok Kumar	Hydrologist	Public Works Department
Hemraj Mangal	Chief Extension Officer	Fiji Sugar Corporation
Josua Wakolo	Forester	Dept. of Forestry, MAFFA
Ilaisa Tulele	Divisional Forestry Officer	Dept. of Forestry, MAFFA
Anare Bogitini	Environment Officer	Local Govt. & Environment
Ifereimi Dau	Principal Environment Officer	Mineral Resources Dept.
Vilisoni Nataniela	Forester	Dept. of Forestry, MAFFA
Esiteri Radrodro	Economic Principal Officer	National Planning Office

Samisoni Ulitu	Deputy Permanent Secretary (Services)	MAFFA
Bijendra Singh	Director for National Trust	National Trust of Fiji
Alivereti Bogiva	Acting Senior Assistant Secretary	Fijian Affairs
Samisoni Matasere	Acting Director Land Use	Native Land Trust Board

Rural Land Use Policy Workshop

30 July 1999

Names	Designation	Organisation
Mr Isoa D Tikoca	Commissioner Central Div	Regional Development
Mr Manasa Sovaki	Principal Environment Officer	Environment Department
Mr Robin Yarrow	Consultant	Environment Department
Mr Viane Amato Ali	Senior Town Planner	Town & Country Planning
Mr Kemueli Masikerei	Director Mapping	Lands Department
Mr Viliame Tagivetaua	Chairman	Native Land Commission
Mr Rishi Raj	Hydrologist	Public Works & Utilities
Mr Isoa Korovulavula	Environment Awareness Officer	SPC/GTZ/PGRFP

Appendix 3: Land Utilisation Classes

Appendix 3A: Classification

Appendix 3B shows the areas in the primary divisions of Fiji of the major land utilisation categories as determined by Twyford and Wright (1965). The basis for this classification is whether land in its natural state is suitable for agriculture or not and, if the latter, how much modification to the land is necessary to render it suitable. The following categories were proposed:

Class I — Soils suited to permanent agriculture without improvement (other than by occasional addition of fertilisers):

(a) Suited to a wide range of crops.
(b) Suited to a narrow range of crops.
(c) Suited mainly to pastoral farming; alternatively, to reforestation or forest preservation for catchment protection.

Class II — Soils suited to permanent agriculture after minor improvements:

(a) Suited to a wide range of crops if regularly supplied with fertilisers.
(b) Suited to a good range of crops if at least some drainage improvement is provided and, in some cases, if fertiliser is given regularly as well.
(c) Suited largely to pastoral farming, if regular additions of fertilisers are provided; to certain orchard crops after minor soil conservation measures and with some fertiliser; alternatively, to reforestation or forest preservation for catchment protection.

Class III — Soils suited to permanent agriculture after major improvements:

(a) Suited to a wide range of crops if regularly supplied with heavy doses of fertilisers.
(b) Suited to a narrow range of crops, with regular heavy additions of fertilisers and considerable improvements in drainage; alternatively to reserves for the preservation of wild life.
(c) Suited to pastoral farming, with heavy additions of fertilisers; to certain orchard crops after major soil conservation measures and with fertilisers; alternatively to forest reserve for catchment protection.
(d) Suited to a narrow range of crops with major reclamation projects to control water table, and in some cases, with heavy additions of fertilisers.

Class IV — Soils largely unsuited to permanent agriculture:

(a) Suited to reforestation for catchment protection.
(b) Suited mainly to forestry for continuous timber production and in a few places, to shifting agriculture as well.
(c) Suited to forest preservation for catchment protection.

Appendix 3B: Major land utilisation categories (in hectares)

Major Class	Viti Levu	Vanua Levu including Kioa/Rabi	Taveuni and Islands	Kadavu and Islands	Lomaiviti	Lau	Yasawa	Other Islands	Total
Ia	77,437.25	28,450.20	1,067.61	1,736.03	3,658.70	7,848.58	826.72	2,793.11	1,23,818
Ib	30,142.91	11,486.23	131.98	823.99	1,280.16	20,54.669	1,972.53	614.17	48,462
Ic	120,941.70	45,206.88	-	538.87	6,876.52	6,083.81	3,363.16	611.34	1,83,622
Total I	228,521.86	85,143.31	1,199.259	3,098.89	11,815.38	15,987.05	6,117.41	4,018.62	3,55,902
% of Grand Total	21.46	14.66	2.48	7.41	27.84	42.87	38.17	57.85	19.36
IIa	12,035.63	8,625.51	6,640.89	41.30	2,256.68	611.34	663.16	57.09	30932
IIb	9,638.87	111.74	72.47	-	-	10.12	-	-	10833
IIc	59,957.89	63,518.22	14,012.55	5,607.29	6,780.97	536.44	375.71	722.67	1,51512
Total II	81,632.39	73,255.47	20,725.91	5,648.58	9,037.65	1,157.89	1,038.87	779.76	1,93277
% of Grand Total	7.67	12.61	42.79	13.51	21.29	3.10	6.48	11.23	10.51
IIIa	42,786.64	65,077.73	3,953.85	787.85	1,453.44	2,819.03	451.01	152.63	1,17482
IIIb	34,847.77	17,580.57	103.64	144.94	1,383.81	194.33	-	-	54255
IIIc	205,401.21	137,276.11	10,499.19	7,576.52	1,495.14	2,067.61	595.95	88.26	3,65000
IIId	25,859.11	22,187.45	129.55	559.51	925.10	209.72	310.93	83.00	5,02636
Total III	308,894.74	242,121.86	14,686.23	9,068.83	5,257.49	5,290.69	1,357.89	323.89	5,87000
% of Grand Total	2901	41.67	30.23	21.69	12.39	14.19	8.47	4.66	31.93
IVa	29,336.03	58,320.24	-	3,858.30	1,344.94	4,259.92	438.06	23.48	1,27580
IVb	358,137.65	114,018.62	8,206.07	19,744.13	11,540.49	3,391.90	3,114.57	1,140.08	5,19294
IVc	28,128.74	8,110.12	3,614.57	393.93	3,443.72	7,203.24	3,961.54	660.73	55517
Total IV	995,602.43	180,448.99	11,820.65	23,996.36	16,329.15	14,855.06	7,514.17	1,824.29	7,02392
% of Grand Total	41.86	31.06	24.41	57.39	38.48	39.84	46.88	26.26	38.20
Grand Total	1,064,651.4	580,969.64	48,432.39	41,812.55	42,439.68	37,290.69	16,028.34	6,946.56	18,38570
%	2	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	100.00								

Appendix 4: Total Land Under Farms and Non-Farms,

Number of Farms and Land Use Change by Census Year

Table A1: Area (hectares) of land use type by division and province (1991)

Division and Province	Agriculture	Planted Forest	Natural Forest	Other Land Uses	Total Land Area
Central	76,719	3,492	130,536	17,376	228,150
Naitasiri	30,502	1,117	47,730	5,766	85,115
Namosi	3,510	1,107	22,351	1,532	28,500
Rewa	5,588	471	10,653	2,511	19,223
Serua	7,567	38	17,604	4,112	29,321
Tailevu	29,552	759	32225	3,455	65,991
Western	269,743	41,773	120,332	131,566	563,414
Ba	121,679	30,448	52,630	62,251	267,026
Nadroga/Navosa	101,817	9,349	25,702	49,815	186,683
Ra	46,229	1,976	42,000	19,500	109,705
Northern	190,039	15,207	165,284	28,207	398,737
Bua	34,170	12,707	52,789	9,818	109,484
Cakaudrove	69,467	1,379	74,862	6,597	152,305
Eastern	54,906	4,152	37,451	19,818	116,327
Kadavu	6,125	1,627	13,036	13,503	34,291
Lau	29,492	1,710	8,671	2,095	41,968
Lomaiviti	15,209	815	15,124	4,200	35,348
Rotuma	4,080	-	620	20	4,720
TOTAL	**591,407**	**64,624**	**453,603**	**196,967**	**1,830,000**

Source: National Agricultural Census, MAFFA (1991)

Table A2: Number of farms and total land area farmed by census year

Census Year	Number of Farms	Total Land Area Farmed (ha)	Average Farm Size (ha)
1968	33,500	242,500	7.2
1978	66,600	319,800	4.8
1991	95,400	591,407	6.2

Source: National Agricultural Census, MAFFA (1991)

Table A3: Agriculture land use change by census year

Census Year	Cultivation (Ha)	Pasture (Ha)	Other (Ha)	Total (Ha)
1968	145,000 (59.9%)	37,000 (15.3%)	60,000 (24.8%)	242,000 (100%)
1978	117,000 (36.6%)	-	203,000 (63.4%)	320,000 (100%)
1991	231,000 (39.0%)	173,000 (29.4%)	187,000 (31.6%)	591,000 (100%)

Source: National Agricultural Census, MAFFA (1991)

Appendix 5: Rural Land Use Policy Questionnaire

Policy

Objective: to assess stakeholders' views on rural agricultural land use policy

1. Outline policies that you think could be developed that will result in the best use and sustainable management of land.
2. Do you consider land use policy and the environmental and legal framework has positive effects on the incentive to conserve the land resource base? Explain.
3. Considering agencies responsible for rural land use policy and practice, outline how effective (or ineffective) they are in considering the experiences, priorities and aspirations of *mataqali*.
4. Outline the extent to which the majority of land users are aware of the laws related to land use and environmental protection. How much are these laws supported?
5. What are your views about Fiji developing a national land use plan with zoning provisions and zone guidelines?
6. What mechanisms are available to resolve conflicting rural land use objectives between stakeholders?

Institutional/stakeholders' role

Objective: to identify institutions responsible for providing land use services to land users.

7. Given that the majority of decisions about how land is used and managed are made by the immediate users of the land (farmers, commercial enterprises, etc.), what other parties do you think should be involved and to what extent
8. State what you consider the level of support there is for sustainable land use, change, options, etc. at every echelon of government and within the local community.
9. Explain how you would recommend institutions and coordinating mechanisms be strengthened to achieve conservation of land resources and to facilitate sustainable land use.
10. What role do/can local institutions (e.g. village communities) have in the land use planning process?
11. What external services (e.g. government, private sector, NGO) are needed by local people to assist in the local-level planning process e.g. technical assistance, financial, etc?
12. Explain what you think the impacts would be of intervention by government agencies in local level rural planning.
13. Do you believe that local rural people want assistance, bearing in mind that the particular groups within the rural community may hold different views? If so, how do you think they can be helped to improve sustainability on what they are already doing?
14. What level of understanding do you think land users have about the benefits of conservation?
15. Comment on the knowledge and availability of techniques that combine conservation with enhanced productivity.

Linkages/communications/land use section

Objective: to identify and assess linkages between land users and institutions

16. Explain how you think communication between stakeholders (e.g. landowners, tenants, technical advisers-foresters, extensionists, and processors of land-based products) could be improved?

17. How would you assess the level of resources available for you to undertake responsibilities in soil conservation, land use planning and extension to the standard needed to implement any recommendations?

18. Do you feel you have ready access to accurate and up-to-date information about natural resources as well as rural economic/marketing projections? If no, how could this access be improved?

19. Natural resource surveys (i.e. national soil survey 1:50,000 scale and LUC mapping):
    a) What is the information going to be useful for?
    b) Who will use it?
    c) When/how will the data be used?
    d) Do relevant data already exist?
    e) Who is best placed and best qualified to provide the data needed?
    f)What useful information is held with the community? Elaborate.

20. Outline the extent to which local people are interested in sharing their knowledge with other rural communities? Do you believe other rural communities are interested in learning from them? How can the appropriate external agencies assist them in this process?

21. Comment on the effectiveness of decision-makers to use and interpret land resource information.

22. Outline the importance of a current land use map for your operations?

23. Outline the extent to which senior officials (policy-makers, planners, project manager) appear to know what information is required for land use planning.

24. Are you aware of the existence of useful data that is not known, or not available to the decision- makers?

25. How strong, in your opinion, is the support of senior officials for funding, political will and technical needs?

26. How active are land users in community and national conservation schemes? What is the level of participation?

27. Explain how you could benefit from further technical training in natural resources survey, participatory enquiry and land use planning? What are your needs in these areas?

Resource use

Objective: to evaluate the extent of resource use over time

28. How have land and resource use patterns and practices changed over time within your geographical area of interest? What factors have influenced present circumstances? How do you think local people view the situation for the future both with and without changes to current practices?

29. Please identify in detail all the major rural land use problems as you see them. Examples are: deforestation, cultivation on steep slopes, land tenure, inadequate technical information, etc.

30. In your opinion, how significant are the benefits to the local community from the exploitation or management of common resources such as indigenous forests?

31. Outline the importance of a current land use map for your operations.

Gender analysis

Objective: to conduct gender analysis of resource users

32(a) List the different groups within the rural community, e.g. women/men, better/worse off, younger/older.

32(b) Make a list of the resources you feel are important in rural Fiji, e.g. water, forest, subsistence farming, cash cropping, grazing, etc. Alongside each of these resources, state which of the above groups have access to, and control of them.

E.g. Subsistence farming – women, worse off, older
Cash cropping- men, better off, all ages

32(c) What does this imply for planning and sustainable use and management of these resources?

Technologies/practices

Objective: to evaluate land management technologies and traditional practices used by resource users

33. Regarding the development of better systems of land use practice and policy, what are the indigenous knowledge and management practices that are relevant? Consider:
    (a) Land tenure issues,
    (b) Institutions (their effectiveness, technical support and adequate financial and managerial support).

34 (a) What ways have local people developed to assess and manage their resources?
    (b) What local indicators or categories are used to assess the condition of their resources (e.g. presence of particular plant species to indicate soil types or condition)?

35. Comment on land use options available for areas that, in your opinion, practice unsustainable land use?

Information

Objective: to determine the resource management information available to resource users

36. Outline the importance of a current land use map for your operations.

37. Is information about land resources, forestry, farming systems adequate for you as advisers/managers/decision-makers? Is the map scale adequate? Are any key data lacking, incomplete, out of date or unreliable? Please comment.

Appendix 6: Soil Erosion and Conservation Practice

The Sugar Technical Advisory Mission from Taiwan is based at FSC Sugar Cane Research Centre, Lautoka and is engaged in agronomic research and extension activities with the objectives of increasing sugar productivity and covering the cost of production.

A trial established by the mission at Drasa Estate in 1992 on an oxisol with an average slope of 7% was continued on the third ratoon crop. Its purpose is to evaluate the relationship between conservation practice, surface run-off, soil erosion and crop yield. A total of 1359mm rainfall and 92 rain days were recorded between 1 July 1994 and 29 June 1995. Compared with the 1993/94 season, there was less rainfall but it was more concentrated and of higher intensity in the four months between January and April 1995 resulting in higher runoff and erosion.

Surface runoff was greatest on the bare soil plot that runs uphill/downhill, being 2979 m^3/ha, and accounted for 22% of the total rainfall. Least runoff was observed under contour planting with trash conservation, where the volume of runoff was only 310m^3/ha (Table A4). Soil erosion was closely related to surface runoff that was the function of rainfall, soil surface condition and conservation practice. Erosion was greatest on the two bare plots without cane while contour planting with plant cover effectively reduced the amount of soil eroded. When trash blanketing was practised, soil erosion was reduced to a minimum. The annual rate of soil loss ranged from 1.2 t/ha/year on the contoured trash conserved plot to 14.4 t/ha/year on the uphill/downhill bare soil plot (Table A4).

Table A4: Effect of conservation practice on surface runoff and soil erosion on an oxisol with 7% slope at Drasa Estate

Conservation practice	Runoff (m^3/ha)					Erosion (kg/ha)				
	Plant	1R	2R	3R	Sum	Plant	1R	2R	3R	Sum
Contour without trash	33	182	205	552	972	182	779	776	2,896	4,633
Contour with trash conservation	46	72	66	310	494	294	232	162	1,214	1,902
Contoured bare soil	96	575	908	1,263	2,842	592	3,831	3,624	9,555	17,602
Up/down hill without trash	299	969	556	888	2,712	601	2,326	899	2,835	6,661
Up/down hill bare soil	583	2,269	2,765	2,979	8,596	1,565	11,417	6,297	14,376	33,655
Annual rainfall (mm)	1,185	1,718	1,555	1,359	5,817	1,185	1,718	1,555	1,359	5,817

As with previous crops, cane growth and final yield were influenced in direct proportion to the difference in water runoff and soil erosion induced by the various conservation practices. The contoured plot with trash conservation, which had least amount of runoff and erosion, produced the highest cane yield at 77 t/ha, followed by contouring without trash at 51 t/ha. The uphill/downhill plot without trash produced only 47 t/ha or 39% less than the trash conserved contour plot (Table A5).

The total cane yield from four successive crops was 342 t/ha on the trash conserved contoured plot, compared with 285 and 258 t/ha respectively on the contour without trash and uphill/downhill plots. Obviously the most cost-effective water and soil conservation practice for cane farms located on hilly land is contouring combined with trash conservation.

Table A5: Cane and sugar yield of four successive plots affected by conservation practice on an oxisol at Drasa Estate

Conservation practice	Cane yield (t/ha)					Sugar yield (t/ha)				
	Plant	1R	2R	3R	Sum	Plant	1R	2R	3R	Sum
Contour without trash	99	71	64	51	285	11.0	7.7	9.1	5.6	33.4
Contour with trash	96	86	83	77	342	11.7	9.8	12.2	8.5	42.2
Up/down hill without trash	98	58	55	47	258	10.9	6.4	8.1	5.0	30.4
C.V%	11	9	12	18	-	12	12	14	18	-
Significance	NS	1%	1%	1%	-	NS	1%	1%	1%	-

To evaluate erosion of a nigrescent soil on a steep slope, a new trial was established at Naikabula. The slope at this site was approximately 20% and there was only 15 cm of topsoil. Three conservation practices were tested, namely contour planting with conventional land preparation, contour planting with land prepared by minimum tillage, and uphill/downhill planting.

Although the crop was planted in late March, runoff and erosion measurements only commenced in August 1994 and 1319 mm of rainfall were recorded. Due to the steeper slope runoff and erosion, losses were much greater than those at Drasa. The highest runoff of 2081 m^3/ha occurred following uphill/downhill planting compared with 891 m^3/ha on the conventional contour-planted plot. When the minimum tillage planting method was used, runoff was further reduced to 761 m^3/ha. Compared with the oxisol at Drasa, soil erosion losses from the nigrescent soil were also much greater (Table A6). Owing to extensive cattle damage, no yield data were available from this site but the results clearly indicated that planting by minimum tillage on the contour is required to conserve soil and water on hilly land.

Table A6: Effect of conservation practice on surface runoff and soil erosion on a nigrescent soil with 20% slope at Naikabula

Conservation practice	Runoff (m3/ha)	Erosion (t/ha)
Conventional contour planting	918	5.29
Contour planting by minimum tillage	761	3.13
Uphill/downhill planting	2,081	17.20
Rainfall (mm)	1,319	-

Appendix 7: Fiji Land Information Council (FLIC): organisational structure and policies

Organisational structure

The FLIS Programme is a co-operative venture of all Government and non-government land related agencies. Its administrative structure was formulated as such that it would maintain co-ordination amongst all those involved which is the key ingredient for the success of the whole programme. This includes the Fiji Land Information Council (FLIC), which is the executive arm of the programme. The Council's main roles include formulation of policies and also administering and managing FLIS projects. Membership of the Council consists of Permanent Secretaries of all government land related organisations, including the General Manager of the Native Lands Trust Board (NLTB) and the Managing Director of Telecom Fiji Ltd. This wide representation helps ensure that all agencies are given the opportunity to contribute, and that no single organisation dominates FLIS development. Present FLIC memberships are as follows:

1. Permanent Secretary for Lands and Mineral Resources (Chairperson)
2. Permanent Secretary for Finance
3. Secretary Public Service
4. Permanent Secretary for Fijian Affairs
5. Permanent Secretary for Regional Development & Multi-ethnic Affairs
6. Managing Director of Telecom Fiji Ltd
7. General Manager of Native Lands Trust Board
8. Permanent Secretary for Communication, Works & Energy
9. Permanent Secretary for National Planning
10. Permanent Secretary for Local Government Housing & Environment
11. Permanent Secretary for Information, Women & Culture
12. Permanent Secretary for Agriculture, Fisheries & Forests

Associate Members are:

1. Manager ITC Services
2. Management Officer Forestry Department
3. Government Statistician
4. Chairman Native Lands and Fisheries Commission

FLIC policies

Some of the common policies now in place are:

- **Charging for land information**
  This policy paper sets the basic framework for charging of FLIS data. The CCMS and Fiji Topo charges that are currently being used were developed from this policy.
- **Licensing agreement**
  This agreement between the data custodian and the private sector to control the passing of data to third parties, sets appropriate conditions (such as fees, and term of licence), and limits the liability of the parties.
- **Policy on sharing of land information**
  This agreement applies within government agencies to the supply of data. This is to control the passing of data to third parties, set appropriate conditions (such as fees, and term of licence), and limit the liability of the parties.

- **Data custodianship**
  This policy explains the concept of data custodianship, their responsibilities, rights, and criteria for selecting agencies as custodians of each respective dataset with a list of all designated data custodians.
- **FLIS standard**
  This is a suite of standards published and used by member organisations in regard to data, hardware and software. Other agencies, where necessary, are encouraged to use these standards.
- **FLIS directory**
  This document with summary information of data sets is kept in various agencies. It is designed to maximise community access to land and geographic information.

Appendix 8: Land and land use related definitions

Farming system
A class consisting of all farms with similar land use, environment and economy; comprising the farm household, its land and the systems of cropping or livestock production for consumption or sale. A farming system is a decision-making unit and a land use system based on agriculture.

Geographic information system (GIS)
A computer system for storage, analysis and retrieval of information, in which all data are spatially referenced by their geographic coordinates (north, east). In addition to primary data, such as climatic and soil characteristics, a GIS can be used to calculate derived values, such as erosion hazard, forest yield class, or land suitability for specified land uses types. Data are usually derived from maps and derived values can be printed out as maps.

Land facet
A subdivision of a land system, consisting of an area of land that is fairly uniform with respect to properties that affect land use, e.g. has a narrow range of slope angle or soil type.

Land information system
A collection of information relevant to suitability for land use, particularly land characteristics. Land information systems are generally, but not necessarily, stored in geographic information systems**.**

Land quality
A complex attribute of land, which affects its suitability for specific uses in a distinct way. For example, the land quality "availability of water" directly affects crop yields and, therefore, land suitability for different crops. Most land qualities can only be assessed by modelling the interaction of a number of land characteristics. For example, availability of water is modelled from data on rainfall, available water capacity of the soil, and potential evapotranspiration.

Land suitability
The fitness of land for a specified kind of use.

Land suitability class
One of a set of classes for evaluating land suitability. The FAO system consists of three levels of classification: suitable or not suitable (S or N); degrees of suitability, e.g. highly, moderately or marginally suitable (S1, S2 or S3); and a letter indicating the major land limitation that has led to the class allocation (e.g. S2w = water limitation, S2e = erosion hazard limitation (see Appendix 11).

Land system
An area of land with a recurring pattern of landforms, soils and vegetation and having a relatively uniform climate. Alternatively defined as an area of land with a recurring pattern of land facets.

Land systems survey
A survey of land resources based on mapping of land systems; usually land facets are also either identified or mapped. Otherwise called integrated survey.

Land unit
An area of land that possesses specific land characteristics and land qualities, and which can be mapped.

Land use
The management of land to meet human needs, including rural land use and also urban and industrial use.

Land use plan
A coherent set of decisions about the use of land and ways to achieve the desired use. A land use plan includes: a definition of goals; an ordering of land and human and material resources; an explicit statement of the methods, organisation, responsibilities and schedule to be used; and agreed targets.

Land use planning
The systematic assessment of land and water potential, alternative patterns of land use and other physical, social and economic conditions, for the purpose of selecting and adopting land use options which are most beneficial to land users without degrading the resources or the environment, together with the selection of measures most likely to encourage such land uses. Land use planning may be at international, national, district (project, catchment), or local (village) levels. (See district-, local- and national-level land use planning.) It includes participation by land users, planners and decision-makers and covers educational, legal, fiscal and financial measures.

Land use requirement
Land conditions necessary or desirable for the successful and sustained practice of a given land use type. Includes crop requirements or plant growth requirements, management requirements and conservation requirements.

Land use system
A specific land use type applied to a particular area of land.

Land use type
A kind of land use described in enough detail to assess its land use requirements and to plan the necessary inputs. The amount of detail varies with the level, scale and purposes of the survey, from generalised land use types, such as “dairy farming” or “irrigated agriculture” in reconnaissance surveys, to detailed descriptions of plants, management, inputs, etc. in more intensive surveys.

Limiting value
The value of a land quality, or land characteristics, identified as marking the boundary between land suitability classes.

Limitation
A land quality, or land characteristic, which adversely affects the potential of land for a specified kind of use, e.g. salinity, storm damage hazard.

Matching
This term is used in two ways. In its narrower sense, the process of comparing land use requirements with land qualities or land characteristics, to arrive at a land suitability classification. In its broader sense, the process of adaptation of land use types, and consideration of land improvements, so as to arrive at land use types which are better suited to the land.

Appendix 9: World Soil Charter: Principles and guidelines

Principles

1. Among the major resources available to man is land, comprising soil, water and associated plants and animals: the use of these resources should not cause their degradation or destruction because man's existence depends on their continued productivity.
2. Recognising the paramount importance of land resources for the survival and welfare of people and economic independence of countries, and also the rapidly increasing need for more food production, it is imperative to give high priority to promoting optimum land use, to maintaining and improving soil productivity and to conserving soil resources.
3. Soil degradation means partial or total loss of productivity from the soil, either quantitatively, qualitatively, or both, as a result of such processes as soil erosion by water or wind, salinisation, waterlogging, depletion of plant nutrients, deterioration of soil structure, desertification and pollution. In addition, significant areas of soil are lost daily to non-agricultural uses. These developments are alarming in the light of the urgent need for increasing production of food, fibres and wood.
4. Soil degradation directly affects agriculture and forestry by diminishing yields and upsetting water regimes, but other sectors of the economy and the environment as a whole, including industry and commerce, are often seriously affected as well through, for example, floods or the silting up of rivers, dams and ports.
5. It is a major responsibility of governments that land use programmes include measures toward the best possible use of the land, ensuring long-term maintenance and improvement of its productivity, and avoiding losses of productive soil. The land users themselves should be involved, thereby ensuring that all resources available are utilised in the most rational way.
6. The provision of proper incentives at farm level and a sound technical, institutional and legal framework are basic conditions to achieve good land use.
7. Assistance given to farmers and other land users should be of a practical, service-orientated nature and should encourage the adoption of measures of good land husbandry.
8. Certain land-tenure structures may constitute an obstacle to the adoption of sound soil management and conservation measures on farms. Ways and means should be pursued to overcome such obstacles with respect to the rights, duties and responsibilities of land owners, tenants and land users alike, in accordance with the recommendations of the World Conference on Agrarian Reform and Rural Development (Rome, 1979).
9. Land users and the broad public should be well informed of the need and the means of improving soil productivity and conservation. Particular emphasis should be placed on education and extension programmes and training of agricultural staff at all levels.
10. In order to ensure optimum land use, it is important that a country's land resources be assessed in terms of their suitability at different levels of inputs for different types of land use, including agriculture, grazing and forestry.
11. Land having the potential for a wide range of uses should be kept in flexible forms of use so that future options for other potential uses are not denied for a long period of time or forever. The use of land for non-agricultural purposes should be organised in such a way as to avoid, as much as possible, the occupation or permanent degradation of good-quality soils.
12. Decisions about the use and management of land and its resources should favour the long-term advantage rather that the short-term expedience that may lead to exploitation, degradation and possible destruction of soil resources.
13. Land conservation measures should be included in land development at the planning stage and the costs included in development planning budgets.

Guidelines for action

Acceptance of these Principles would require the following action:

By Governments

1. Develop a policy for wise land use according to land suitability for different types of utilisation and the needs of the country.
2. Incorporate principles of rational land use and management and conservation of soil resources into appropriate resource legislation.
3. Develop an institutional framework for monitoring and supervising soil management and soil conservation, and for co-ordination between organisations involved in the use of the countries' land resources in order to ensure the most rational choice among possible alternatives.
4. Assess both new lands and the lands already being used for their suitability for different uses and the likely hazards of degradation. Provide decision-makers with alternative land uses that both satisfy communities' aspiration and use the land according to its capabilities.
5. Implement education, training and extension programmes at all levels in soil management and conservation.
6. Disseminate as widely as possible information and knowledge about soil erosion and methods of controlling it both at the farm level and at the scale of entire watersheds, stressing the importance of soil resources for the benefit of people and development.
7. Establish links between local government administrations and land users for the implementation of the soils policy and emphasise the need to put proven soil conservation techniques into practice, and to integrate appropriate measures in forestry and agriculture for the protection of the environment.
8. Strive to create socio-economic and institutional conditions favourable to rational land resource management and conservation. These conditions will include providing security of land tenure and adequate financial incentives (e.g. subsidies, taxation relief, credit) to the land user. Give encouragement particularly to groups willing to work in co-operation with each other and with their government to achieve appropriate land use, soil conservation and improvement.
9. Conduct research programmes that will provide sound scientific backing to practical soil improvements and soil conservation work in the field, and which give due consideration to prevailing socio-economic conditions.

By International Organisations

1. Continue and intensify efforts to create awareness and encourage co-operation among all sectors of the international community, by assisting where required to mount publicity campaigns, conduct seminars and conferences and to provide suitable technical publications.
2. Assist governments, especially of developing countries, on request, to establish appropriate legislation, institutions and procedures to enable them to mount, implement and monitor appropriate land use and soil-conservation programmes.
3. Promote co-operation between governments in adopting sound land use practices, particularly in the large international watersheds.
4. Pay particular attention to the needs of agricultural development projects that include the conservation and improvement of soil resources, the provision of inputs and incentives at the level of the farm and of the watershed, and the establishment of the necessary institutional structures as the major components.
5. Support research programmes relevant to soil conservation, not only of a technical nature but also research into social and economic issues, which are linked to the whole question of soil conservation and land resource management.

6. Ensure the storage, compilation and dissemination of experience and information related to soil conservation programmes and of the results obtained in different agro-ecological regions of the world.

Possibilities for follow-up

The guidelines for action contained in the World Soil Charter call for a follow-up in different fields of land development and conservation. These include:

Assessment of land resources and land use planning

1. Soil survey and land evaluation,
2. Assessment of soil degradation and desertification,
3. Assessment of land use potential according to an agro-ecological approach,
4. Evaluation of population supporting capacities,
5. Planning of optimal land use,
6. Training in the above fields of work.

Soil management and fertilisers

1. Maintain and improve soil fertility,
2. Promote the efficient use of fertilisers,
3. Promote the use of organic manures, biogas and nitrogen fixing practices,
4. Assessment and elimination of micro-nutrient deficiencies,
5. Soil and plant testing,
6. Promotion of integrated plant nutrition systems,
7. Improvement of tillage practices,
8. Improvement of production in shifting cultivation areas,
9. Training in the above fields of work.

Conservation and reclamation of land resources

1. Soil conservation and watershed management
2. Soil conservation legislation and soil conservation policies
3. Reclamation of saline and alkaline lands
4. Combating desertification
5. Developing soil conservation services
6. Training in the above fields of work

Appendix 10: Fiji Land Capability Classes

Class I Versatile multiple-use land. It is flat (0–3°); has deep, easily worked, fertile soils; no erosion risk; well drained but not seriously affected by drought, and the climate is favourable for the growth of a wide range of crops. No special soil conservation measures required.

Class II Good arable land with slight limitations that make it more difficult to manage than Class I. The land may be flat to gently undulating (0–7°); well drained to moderately drained, deep to slightly shallow, and fertile to moderately fertile soils. Simple management and conservation practices to overcome soil limitations are easy to apply.

Class III Fair arable land with moderate limitations that restrict the choice of plants and/or require intensive soil conservation measures. The land may be flat or gently sloping (0–11°); slightly unstable; of moderate to severe wetness; subject to frequent damaging floods; and have shallow, moderately stony and/or infertile soils.

Class IV Marginal arable land with severe limitations that restrict the choice of crops grown, or require intensive soil conservation measures and very careful management. Limitations may affect land use in both of these ways. Class IV land may be flat to rolling (0–15°) and may comprise one or more of the following- poorly to very poorly drained; stony or bouldery soils; very shallow soils; infertility; coarse-textured soils with very low moisture retention capacity; or mangrove or peats that can be drained and reclaimed for cropping.

Class V Land is unsuitable for arable cropping but suitable for pastoral or forestry use. Steepness (slopes 16–20°) or stoniness are the main limitations. Only slight erosion risk under pasture or forest trees.

Class VI Marginal pastoral land with moderate to severe limitations. Land is too steep (21–25°) for pastoral use; or has a high susceptibility to erosion, or there is evidence of severe past erosion. Soil limitations include shallowness, low moisture retention and low fertility. Production or commercial forestry is the preferred land use.

Class VII Unsuitable land for pastoral use and marginal for commercial forestry. Land is either very steep (26–35°); highly susceptible to erosion; there is evidence of severe past or present erosion; or soils are either very shallow, very bouldery, or with very low fertility.

Class VIII Land is generally unsuitable for productive use in both agriculture and forestry. This is primarily very steep mountain land mostly above an altitude of 800m. It also includes lowland areas in unfavourable situations, such as extreme erosion or high susceptibility to erosion (particularly mass movement), or extreme stoniness, shallowness or infertility. Class VIII land is best protected and/or reserved for watershed and environmental purposes.

To reflect limitations or hazards, subclasses can be recognised for some of the above major and use capability classes. The four general kinds of limitations recognised are erodibility (E); wetness (W); soil limitation within the rooting zone (S); and climate (C).

Appendix 11: Structure of the FAO Land Suitability Classification

S	Suitable	The land can support the land use indefinitely and benefits justify inputs.
S1	Highly suitable	Land without significant limitations. Include the best 20–30% of suitable land as S1. This land is not perfect but is the best that can be hoped for.
S2	Moderately suitable	Land that is clearly suitable but which has limitations that either reduce productivity or increase the inputs needed to sustain productivity compared with those needed on S1 land.
S3	Marginally suitable	Land with limitations so severe that benefits are reduced and/or the inputs needed to sustain production are increased so that this cost is only marginally justified.
N	Not Suitable	Land that cannot support the land use on a sustained basis, or land on which benefits do not justify necessary inputs.
N1	Currently not suitable	Land with limitations to sustained use that cannot be overcome at a currently acceptable cost.
N2	Permanently not suitable	Land with limitation to sustained use that cannot be overcome.
	Examples of classes in the third category	
S2e	Land assessed as S2 on account of limitation of erosion hazard	
S2w	Land assessed as S2 on account of inadequate availability of water	
N2e	Land assessed as N2 on account of limitation of erosion hazard	

Note: There is no standard system for letter designations of limitations; first-letter reminders should be used where possible

Source: FAO (1976)

Appendix 12: Projects required to facilitate change

Project 1	**Development of an Institutional Capability for Integrated Land Use Planning**
Objective:	To establish an independent Land Use Authority, staffed with a range of appropriate expertise, having access to authority and direct support to the executive; the Authority having both the support of the rural people and authority and resources of government.
Rationale:	In general, individual land users are not always well aware of the consequences of their actions with the land. This is in part due to lack of information about 'best practice', legislation and sources for technical support. Without long-term planning and government intervention about rural land use options and issues we have a 'market forces' environment i.e. where a large number of land use/practice decisions are being taken by many land users for their own private ends. Current climatic, economic and social pressures are forcing many land users into actions to satisfy their short-term needs – actions that can have adverse long-term consequences.
Activities:	1. Assess institutional constraints, land use and legislation policy, 2. Conduct extensive consultation with land users, government officials and the public at large, 3. Recommend preferred institutional model for facilitating land use planning, 4. Recommend human, financial and other resources required to support a Land Use Authority, 5. Develop strategic and business plans for the Authority, 6. Define job descriptions, roles and responsibilities and, based on a needs assessment, a training programme, and 7. Establish the Land Use Authority and implement recommendations.
Personnel:	k) Initial consultancy – Land Use Planner (1 month) and Institutional Specialist (1 month), l) Implementation of independent Land Use Authority – as recommended by above consultancy.
Government Contribution:	Facilities and personnel for Authority and support land use planning team.
Targets:	1. Recommendations for establishment of Land Use Authority (LUA) should be prepared by end of 2001, 2. LUA established by April 2002.
Duration:	3 months

Project 2	**National Land Use Planning**
Objective:	To prepare an authoritative national land use plan based on physical land resource evaluation and extensive formal public consultation.
Rationale:	A national land use plan would assist in appropriate land use and resource allocation – basic prerequisites of sustainable development. There is an urgent need for information and modern 'tools' by authorities to provide effective and efficient approaches to the generation, collation and interpretation of land resources data for land use planning purposes.
Activities:	1. Assess land use policy and legislation, 2. Select methodologies and develop approach, 3. Conduct formal public consultations, 4. Collate biophysical data from land resource surveys, 5. Evaluate land suitability and generate maps via GIS, 6. Evaluate and apply land use models from land information system, 7. Analyse environmental, economic and social impacts, 8. Develop and present viable land use options at public fora, and 9. Prepare the land use plan.
Personnel:	a) Initial consultancy – Land Use Planner (1.5 months), b) Preparation of Land Use Plan – as recommended by above consultancy.
Government Contribution:	• Facilities for Land Use Plan consultant team, • Counterparts to the Specialists, • Physical and natural resource data.
Targets:	1. Terms of reference for National Land Use Plan should be prepared by March 2002, 2. Preparation of the National Land Use Plan should have commenced by mid 2002.
Duration:	3 years.

Project 3	**National Land Zoning**
Objective:	To prepare a 1:25,000 scale national land zoning map (plus 1:5,000 scale zoning maps in the peri-urban areas) with definitions and guidelines for each zones as to rationalise location and direction of future non-rural land uses and to protect that class of land for food production.
Rationale:	Land use zoning in the agricultural sector is long overdue; as a result there are clashes in land requirements for various uses. Industrial, commercial, residential and other developments are occupying large tracts of valuable agricultural land due to the absence of sound planning and until recently, unavailability of accurate crop-specific and land use suitability classifications.
Activities:	1. List the range of potential land uses, 2. Collate natural resource information in GIS, 3. Generate specific use-suitability and general land use maps from GIS, 4. Map recommended land zones and boundaries of protected areas, 5. Define land zones and guidelines for use within each zone, 6. Conduct extensive consultation with land users/owners, officials and the public at large, and 7. Publish various scale land zoning maps (national and peri-urban).
Personnel:	a) Initial consultancy – Land Use Planner (2 months), b) Preparation of national land zoning maps and guidelines – as recommended by above consultancy.
Government Contribution:	• Facilities for Land Zoning Planning team, • Physical Planner, GIS Specialist and counterparts to all Specialists, • Physical and natural resource data.
Targets:	1. Terms of reference for National Land Zoning Project should be prepared by April 2002, 2. Preparation of national land zoning map with guidelines should have commenced by September 2002.
Duration:	6 months.

Project 4	**National Contemporary Land Use Mapping**
Objective:	To produce a 1:50,000 scale contemporary land use map of the Republic using remotely sensed data and field survey techniques.
Rationale:	The provision of basic data on contemporary land use changes in area under cultivation or changes of crop types is fundamental and a prerequisite to all rural, particularly agricultural development planning.
Activities:	1. Map contemporary land use using remote sensing techniques or image processing of satellite imagery, 2. Ground truthing and field mapping using GPS, 3. Upgrade GIS to handle raster data, 4. Training in image processing and image enhancement applications, 5. Digitise land use maps from 1968 and 1978 surveys, 6. Process, collate and interpret field and remotely sensed data, 7. Generate national contemporary land use map (1:50,000 scale), and 8. From GIS derive interpretative single-factor land use maps, statistical data and trends in land use.
Personnel:	m) Initial consultancy – Land Use Planner (1 month), n) Implementation of Land Use Mapping Project – as recommended by above consultancy.
Government Contribution:	• Contemporary national aerial photography coverage, • Facilities for Land Use Mapping team including GIS facilities, • GIS Specialist and the full support of Land Use Section, MAFFA.
Targets:	1. Design and scope for national land use map prepared by September 2002, 2. National land use map available April 2004.
Duration:	15 months.

Project 5	**Integrated Rural Resource Database Development and Applications**
Objective:	To develop a computerised Land Resources Information System (LRIS), comprising thematic databases covering agroclimatic factors, soils, topography, vegetation and present land use, linked to a GIS to display combination of these, and other data in support of rational land use policy, planning and utilisation.
Rationale:	National resource information is currently available only with difficulty – held amongst different agencies and in various formats and not based on uniform standards of data or procedures. The definition and mapping of the possible extent of kinds of sustainable land use, land productive capacity, a system for land use zoning that protects the natural resources etc., require accurate and integrated information on land resources, the potential for alternative kinds of land use, costs and benefits of land use and operations.
Activities:	1. Provide explanation of concepts, discussion and agreement in details of the design, 2. Identify data sources, and agreement on responsibilities for data acquisition, verification and digitisation (where appropriate), 3. Collect, collate, install databases and input data into GIS, 4. Integrate physical, socio-economic and cadastral information, 5. Install crop environmental requirements and production systems' databases and provision of suitable interface with the GIS, 6. Collect and input data, 7. Develop database of socio-economic information, 8. Adopt and apply systems of land evaluation, and 9. Estimate potential yields from combinations of products (crops), production systems, and land/climate units.
Personnel:	a) Initial consultancy – Land Resource Evaluation Specialist (1 month) and GIS Specialist (1 month), b) Develop LRIS as designed and recommended by above consultancy.
Government Contribution:	• Facilities for LRIS development team (hardware/software provided by donor), • Physical, natural resource, land use data sets, • Selected Database and GIS Specialists and counterparts to the consultants.
Targets:	1. Terms of reference and design for LRIS prepared by March 2002, 2. Implementation of LRIS should have commenced by mid 2002.
Duration:	2 years

Project 6	**Adaptive Research and Extension in Land Husbandry Technologies**
Objective:	To develop a well-resourced and integrated research and extension programme comprising suitably qualified MAF staff conducting adaptive sustainable land management (SLM) and 'best practice' research and effectively disseminating ecologically sound and socially acceptable land husbandry technologies to land users through targeted and innovative techniques.
Rationale:	The almost complete utilisation of first class arable land means that the current expansion of agriculture into marginal hill areas and steeplands will continue. Some agricultural practices, i.e. sugar cane and ginger production on slopes >11º are not sustainable; they increase natural erosion rates, which are already high and are responsible for significant areas of land going out of production annually. Unsustainable land use on such lands has seen unacceptable soil losses and sedimentation of key waterways, for example, in the Ba valley, some 12,000 ha of sugar cane land and 35,000 ha of grasslands are badly eroded.
Activities:	1. Conduct extensive rural participatory meetings with farmers/land users to understand needs, problems and constraints, 2. Evaluate and recommend appropriate institutional model for SLM research and extension within MAF, 3. Assess training needs and development of training plan, 4. Design targeted research and extension programme with implementation schedule and forward budgets, 5. Further the consultative process with farmers and land users, and 6. Implement programme in concert with a media awareness programme (project 7).
Personnel:	Crop Research Specialist (3 months), Institutional Training Specialist (1 month), Rural Sociologist (1 month) and Land Husbandry/Extension Specialist (2 months).
Government Contribution:	• Facilities for consultants' team, • Counterparts to the Specialists, • Provision of previous reports, reviews, financial and HRD information, etc.
Targets:	1. Terms of reference for consultancy prepared by May 2002. 2. Programme with recommendations designed and available June 2002.
Duration:	4 months.

Project 7	**National Sustainable Land Management, Education and Awareness Programme**
Objective:	To create a high level of public understanding about land use policy and legislation, in particular specified land-husbandry and 'best practice' clauses in land leases with the purpose of reducing land degradation and increasing productivity from the land through sustainable land management (SLM).
Rationale:	Future economic activity will lead to increasing competition for the use of land resources and increases in population can be expected to dramatically accelerate land degradation. There is a very poor understanding about legislation, policy and 'best practice' pertaining to land use and management. NLTB and MAF research and extension advice to land users, landowners and farmers is seriously wanting.
Activities:	1. Consult with the 'market' as to needs, then design a programme to meet these, 2. Prepare printed materials, brochures, information sheets, manuals, guidelines, handbooks and education programmes, 3. Develop radio and video material to promote SLM practices, 4. Implement structured education courses for farmers, women, NGOs, student of community groups, 5. Provide support for organisations with interests in SLM, 6. Prepare and distribute information packs as teaching aids for use in schools, and 7. Conduct evaluation.
Personnel:	c) Initial consultancy – Land Husbandry/Farming Systems Specialist (2 months), Rural Sociologist (1.5 months) and Education/Media Specialist, d) Implementation of programme – as recommended by above consultancy.
Government Contribution:	• Facilities for consultants' team, • Counterparts to the consultants, • Provision of graphic artists, scriptwriters and journalists.
Targets:	1. Terms of reference for consultancy prepared by September 2002, 2. Awareness Programme designed and available December 2002.
Duration:	3 months.

Project 8	**Improve the capacity and quality of human resources within Government for land management and land use planning**
Objectives	Strengthen the Government capacity for policy making, administrating and facilitating the delivery of quality natural resource information, land management advice and land use planning services. Improve the quality of basic land information for land use planning through improved skills in the collection, mapping and interpretation of natural resource information. Promote understanding about the importance of zoning and land use planning for the conservation of land resources and sustainable growth.
Rationale:	Establishing a Land Use Authority and a Technical Unit to develop and implement a national land use plan requires skilled staff in responsible parts of Government to be fully conversant about how the information for the plan is derived, the land use planning process, how plans are to be used and responsibilities. Also, to be competent in managing their Department's responsibilities for all steps in the land use planning process. For land use planning to be effective and have positive impacts, end-users and other stakeholders are appreciative about the purpose and all that is involved in the land use planning process; so relevant Departmental staff need to also be skilled in creating awareness.
Activities:	1. Assess training needs, 2. Identify needs and numbers for long-term and short-term specialist training, 3. In consultation with CEOs (or nominees) prepare referral manual as to Ministries' legal responsibilities, 4. Develop capacity-building training plan, 5. Prepare training manual designed to also function as an ongoing referral document by trainees, 6. Conduct relevant training in legislative responsibilities, 7. Conduct one-day training in land use planning for Managers, 8. Conduct intensive training in land use planning (including field trips) for practitioners.
Personnel:	• Land Use Planner/Trainer (2 months) • Land Use Planner counterpart (2 months) • Counterpart GIS Specialist (1 month)
Government Contribution:	• Training facilities (including visual aids equipment) • Key Departmental staff available when required • Reproduction of manuals and other training materials.
Targets:	• Training needs assessment and plan, Terms of Reference for training, and preparation of training manual by June 2002. • Conduct legislative and manager's training, and conduct intensive land use planning by December 2002.
Duration:	6 months.

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