

Challenges in adopting an integrated approach to managing forest and rangelands in the Near East Region



Food and Agriculture Organization of the United Nations
Regional Office for the Near East and North Africa

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Front cover photo:

Controlled grazing of sheep on a fenced parcel of land some 50 km west of Gabes, Tunisia, an Integrated Research and Development of the Pre-Sahara Region, supported jointly by the Tunisian government and UNDP with FAO as executing agency (©FAO/G. Tortoli)

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Installation of an irrigation network in a tree nursery in Yemen, forestry component of project supported by FAO (UTF/YEM/023) (©FAO/Rosetta Messori)

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FOREWORD

Forests and rangelands occur as a land use continuum and play vital roles in the livelihood of rural communities in the Near East countries. In many countries forests, other wooded lands and rangelands occur together and their ecological and economic linkages are fully taken into account by local communities in fulfilling their basic needs. Rangelands and forests also suffer from the same set of problems of degradation. The demand for ecosystem goods and services far exceed their productive capacities. With the increasing frequency and intensity of extreme climatic events like droughts the ability of the ecosystems to support human and livestock populations will be severely affected.

One of the major challenges in sustainably managing forests and rangelands is strengthening the institutional framework, in particular developing synergies of the activities of institutions and stakeholders concerned with managing forests and rangelands. Traditional community organizations have developed such integrated approaches. However for various internal and external factors, such land use systems have given way to fragmented sector focused systems undermining the synergy between forests and rangelands. Degradation and desertification have become major problems paving the way for social and economic problems.

There is hence an urgent need to streamline the institutional arrangements for managing forests and rangelands. It is in this context that FAO broadened the mandate of the Near East Forestry Commission to include range management as a thrust area of its work and renamed it as the Near East Forestry and Range Commission.

This study on improving collaboration and integrating the management of forests and rangelands was undertaken in pursuance of the recommendation of the Near East Forestry and Range Commission. The four country studies, although may not capture the rich experience in the region in its entirety, provides an indication of the challenges in fostering collaboration between key players and integrating forest and range management. The synthesis report along with the country studies underscore the challenges in the pursuit of an integrated approach and give an indication of what needs to be done for enhancing sustainability.

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ABBREVIATIONS AND ACRONYMS

AAID	Arab Authority for Agricultural Investment & Development
ACF	Assistant Conservator of Forests
ADLR	Agency for Development of Livestock and Range
AEFCS	Directorate of Water, Forests and Soil Conservation (Administration des Eaux et Forêts et de la Conservation des Sols, Maroc)
AFD	French Development Agency
AGAT	Associations of management and development of land territory
AMCEN	Arab Ministerial Conference on the Environment
AOAD	Arab Organization for Agricultural Development
ARC	Agricultural Research Corporation
BCO	Basic Community Organization
CBD	Convention on Biological Diversity
CCDFR	Center for Conservation and Development of Forest Resources
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CFA	Central Forest Administration
CFRS	College of Forestry & Range Sciences
CITES	Convention on International Trade in Endangered Species
CLMVA	Local Commission for the Development
CPA	Comprehensive Peace Agreement
DALP	Development Agency of Livestock and Pastures
DDG	Deputy Director General
DF	Director of Forests
DFD	Director Forests Department
DG	Director General
DGACTA	General Direction of facilities and agricultural land conservation
DGE	General Directorate of Environment
DGF	General Directorate of Forests
DT	Tunisia Dinar
EDTA	Association of Talassemthane for Environment and Development
EU	European Union
EWS	early warning system
FAO	Food and Agriculture Organization of the United Nations
FD	Forest Department
FFGE	French Fund for Global Environment
FNC	Forests National Corporation of Sudan
FNC	Forests National Corporation
FO	Forest Officers
FPGR	Forage Plant Genetic Resources
FR	Forest Rangers
FRA	Global Forest Resource Assessment
FRA	FAO Global Forest Resources Assessment
FRC	Forest Research Centre

FRS	Forest Rangers School
FRWO	Forests, Range and Watershed Management Organization, Islamic Republic of Iran
FSR	Forestry Sector Review
GA	Gum Arabic
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEFIC	Community of Common Interests
GHGs	Green House Gasses
HCEFLCD	High Commissionership for Water, Forests and Combating desertification (Moroccan Forest Department)
IBRD	International Bank for Reconstruction and Development
IFAD	International Fund for Agricultural Development
IUCN	International Union for Conservation of Nature
KP	Khartoum Polytechnic
KSA	Kingdom of Saudi Arabia
MAAR	Ministry of Agriculture and Agrarian Reform
MAFNR	Ministry of Agriculture, Food & Natural Resources
MAMF	Ministry of Agriculture and Maritime Fishing
MAMWA	Ministry of Agriculture & Agricultural Development
MANR	Ministry of Agriculture & Natural Resources
MDG	Millenium Development Goal
MOA	Ministry of Agriculture
MPR	Master Plan for Reforestation
NCSD	National Committee on Sustainable Development
NDP	National Development Plan
NEFRC	Near East Forestry and Range Commission
NFP	National Forest Programme
NGO	Non Governmental Organization
NMC	National Monitoring Committee
NSE	National Strategy for Environment and Sustainable Development
NWFP	Non-Wood Forest Product
ODESYANO	North West Office of Silvo-Pastoral Development
ODS	South Office for Development
OEP	Office of Livestock and Pasture
OSP	Oued Srou Project
OWL	Other Wood Lands
PD	Presidential Decree
PDA	Provincial Directorate of Agriculture
PDPEO	Development Project for Pasture and Livestock in the Oriental
PMU	Project management unit
PMVB	Perimeters of Bour Enhancement
RD	Royal Decree
RFD	Range and Forest Department
RFLDL	Rehabilitation of Forest Landscapes and Degraded Land

RNE	FAO Near East Region
RoS	Republic of the Sudan
RPA	Range and Pasture Administration
RSS	Republic of South Sudan
SAR	Syrian Arab Republic
SDG	Sudanese Pound
SFLM	Saline Soils and Areas Prone to Wind Erosion
SFM	Sustainable Forest Management
SMLWR	Sustainable Management of Land & Water Recourses
SPLA	Sudan Peoples' Liberation Army
SPLM	Sudan Peoples' Liberation Movement
STC	Steering Technical Committee
SUST	Sudan Unit of Science and Technology
TFAP	Tropical Forest Action Plan
UF	Unit Forage
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
VDG	Village Development Group
WB	The World Bank

EXECUTIVE SUMMARY

Rangelands and forests together account for a major chunk of land in the Near East region. Characterized by semi-arid and arid conditions use of these land faces very severe constraints, which have been accentuated on account of climate change related extreme weather events. Larger changes, especially population growth, changing aspirations of the people, development of markets, globalization, etc. have directly and indirectly affected forests and rangelands. In most countries they are on a path of deterioration affecting the provision of goods and services provided to society, especially undermining the livelihood of local communities.

Integration initiatives

This has led to several initiatives to sustainably manage forests and rangelands. Considering the similarity in the goods and services provided by rangelands and the main stakeholders in managing forests and rangelands, there have been a clear recognition of the need for better coordination and integration of these two important land uses. It is in this context that the FAO Near East Forestry Commission broadened its mandate including rangelands within the purview of the statutory body, renaming it as Near East Forestry and Range Commission. Increasingly development assistance provided by bilateral and multilateral organizations are also giving thrust to integrated approaches. Most donor projects, including those dealing with watershed management, desertification control, biodiversity conservation, climate change mitigation and adaptation, etc. are pursuing an integrated approach to land use transcending the sectoral barriers that existed for a long time.

It is in this context that this study was undertaken to assess the experience of inter-sectoral collaboration and integration in Near East region. Responding to the needs of stakeholders almost all countries have made some effort to strengthen inter-sectoral coordination and to integrate management of forests and rangelands. While there are successes in this regard, many countries continue to struggle with inconsistent policies, conflicting demands, ineffective legislation and poor coordination between the different ministries and departments. This diverse experience provides valuable lessons as to why and how integration has worked and what options are available to countries to pursue an integrated approach.

Stakeholders and their changing interaction

A multitude of stakeholders place varying demands on forests and rangelands and interact with each other in multiple ways.

- The most important among them are the local communities who use forests and rangelands in an integral manner to fulfill the need for an array of products and services. These local communities have developed community organizations to regulate the use of forests and rangelands giving due attention to sustainability issues. However larger societal changes along with the emergence of other institutions have undermined the effectiveness of such community organizations and the approach they followed as regards forest and range management.

- Governments form the next most important stakeholder in the management of forests and rangelands. In fact the predominance of public ownership and the mandate of the government to meet the needs of the diverse stakeholders make the government the most important actor as regards management of forest and rangelands. To fulfill this, most governments have formulated policies, enacted rules and regulations, established public institutions and allocates resources to manage the resources. Certainly policies, legislation, institutions and resource allocation decisions are influenced by other stakeholders depending on their relative importance.
- Individuals, private sector and corporate players form another important group of stakeholders. Most of this group responds to market opportunities and often give a low priority to the production of public goods and services. Increasing dominance of this group tends to undermine the more conservative community oriented land management practiced by local communities.
- Education and research institutions – local, provincial, national and international – tend to affect collaboration and integration, largely through the inputs they provide for land management and imparting the skills required by staff involved in the management of the resources. For historical reasons knowledge generation and skill development remains compartmentalized in most countries.
- Civil society organizations form another important stakeholder in land management. In particular they have been extremely effective in highlighting social and environmental issues relating to land management. Most often they function as effective interlocutors between governments and local communities. Several civil society initiatives have contributed significantly to develop sustainable resource management practices.
- International organizations, including bilateral and multilateral agencies play an important role in influencing land management through the technical and financial support they provide to governments, local communities, private sector, etc. For a long time international assistance was sector focused, largely to enhance technical capability in narrowly defined areas. However, this has changed considerably in the last two decades and increasingly most international agencies are supporting cross sectoral integrated approaches to resource management. In fact this had a tremendous impact on the thinking of governments, paving the way for more integrated approaches within government institutions as also between government and other institutions.

High level of integration under traditional community arrangements

Throughout the Near East region community organizations played a key role in land management. Local communities made no distinction between forests and rangelands and used them integrally to produce a wide array of goods and services drawing upon their traditional knowledge built over many years of experience. The “Hima” and “Agdal” systems helped in the sustainable use of resources and the community institutions were able to ensure compliance of the rules and regulations. In a relatively closed and self-reliant system where needs of society was largely subsistence driven, traditional community organizations remained effective.

Changing political, economic and social conditions led to the emergence of new institutions like private sector investors and governments and this has affected traditional land

management systems in two ways. On the one hand market oriented profit driven production undermined subsistence oriented land management practised by local communities. On the other hand the broader interests of governments (often depicted as “national interests”) led to increasing pressures on community focused land management. In both cases resources that many communities have managed integrally were either privatized or brought under government control. Along with this the integrated approach that many communities had adopted also faded out.

The challenge for institutional integration in governments

Governments in the Near East region face two broad types of institutional challenges as regards management of forests and rangelands:

- The first challenge is to improve coordination and integration between institutions within the government, both horizontally and vertically. Historically land uses have been fragmented in distinct sectors – agriculture, horticulture, animal husbandry, forestry, etc. – each being managed by ministries/ departments with narrowly defined mandates. However, the natural contiguity and ecological, social and economic linkages between different land uses makes it extremely difficult to adopt a narrow sectoral approach. The same type of resources falling under the control of different departments in the government are treated differently (A typical example of this is the pastures within forests and the pastures outside forests in Morocco). Here again the situation varies between countries. For example the Islamic Republic of Iran, Tunisia and the Kingdom of Saudi Arabia have been able to develop an integrated institutional framework under which range management and forestry are under the same department. In several other countries (for example Sudan), there are distinct entities dealing with forests and rangelands, adding to the problem of cooperation and coherence. The problem of collaboration and integration become more difficult when other land uses – for example agriculture and horticulture – are also considered. In addition to the problem of horizontal coordination and integration, governments also face the daunting task of vertical coordination/ integration, especially in a decentralized system of governance. Vertically structured departments and decentralized local governments tend to have divergent views on natural resource management, and the existing mechanisms to resolve the conflicts are far from satisfactory.
- The second challenge as regards public sector management of resources is coordination outside the government with stakeholders like local communities, private sector, civil society organizations and international organizations. Here again the experience in the region is diverse. Largely coordination depends on the perceptions of public sector organizations. In many cases public sector forestry departments give emphasis to their policing functions significantly reducing the space for collaborative efforts involving local communities and other stakeholders. There are of course changes taking place to this especially in the context of increased role of civil society organizations and international agencies. Often the attitudinal changes required improving collaboration and integration takes considerable time requiring long term facilitation by civil society organizations and international agencies.

Private sector players

In most countries in the Near East region forests and rangelands are largely under public ownership and the role of private sector in managing them remains very limited. In most situations, private sector is driven by profit motive, often with a short time horizon, giving inadequate attention to the integration of different land uses, especially to produce environmental services. There are of course examples of integration of crop production and tree growing (especially as wind breaks and shelter belts) by private sector. Such options are pursued in the context of profitability/ increased crop yields and no examples have been reported as regards private sector initiatives to integrate the extensive type of forest and range management in the region.

Research institutions

Development of an integrated knowledge base is extremely critical to develop an integrated approach to managing range and forest lands as also agriculture land. Although many countries have made significant investments in research, their impact has been limited on account of:

- Fragmentation of research within the different sectors such that many of the research findings are unable to contribute significantly even to the narrowly defined sectoral objectives;
- Inter-disciplinary collaboration (for example between forestry and range management) continues to be challenging even in an integrated institutional framework. Where there are separate institutions to deal with research in the different sectors, collaborative efforts remain extremely challenging.
- The linkage between research institutions and end users are very weak in most countries. This is particularly so when the research institutions are under the administrative control of another ministry/ department. Although institutional mechanisms like research advisory committees have been established to improve stakeholder interaction and to promote client-driven research, these mechanisms are often ineffective.

Human resource development institutions

A key to institutional collaboration and integration is well qualified professionals who are able to think and act holistically understanding the strong linkages between different sectors. Recent efforts to provide a broad knowledge base by integrating forest and range disciplines in universities are important in this direction. A number of forestry faculties have broadened their curriculum to include range management as an integral component. There is also a few which offers under-graduate programmes in natural resources management. Similarly the Arab Range and Forestry Institute is training middle level managers in forestry and range management adopting an integrated approach.

International organizations

International organizations have been playing a key role in the development of national level forestry and range institutions, as a source of ideas and knowledge based on wider

experience and as a source of technical and financial support. There has been a significant change in the approach of international organizations to development and many of the efforts to pursue an integrated approach are based on support of bilateral and multi-lateral organizations. Issues like poverty alleviation, enhancement of livelihood of local communities, assessment of environmental and social implications of different land uses, community involvement in resource management, adoption of integrated resource management, mainstreaming gender issues in development, etc. are brought to the forefront by international agencies. Most project assistance is focused on integrated land use and most countries in the region have several such projects helping to develop and test alternative developmental models. International organizations have also been supporting other stakeholders – local community groups, civil society organizations, research and training agencies, all contributing to shifts in thinking encouraging integrated approaches to resource management.

Civil society organizations

Civil society organizations have also been playing an important role in improving coordination and integration between different sectors. Most civil society organizations focus on social and environmental issues which require an integrated approach. Many are known for their work with the local communities addressing livelihood aspects and their involvement compels the forest and range management institutions to adopt a broader perspective.

The way forward

The assessment of the current management of forests and rangelands in the Near East region clearly underscores the need for closer cooperation between the different institutions and the urgency of adopting an integrated approach. In almost all the countries, there are clear indications that the fragmented approach is resulting in continued degradation, undermining the livelihood of millions of people. Both rangelands and forests in the region provide more or less the same set of goods and services. Largely these cater to the livelihood of rural communities. Hence, there is strong rationale for strengthening coordination and to adopt an integrated approach to resource management covering all land uses. Some of the key measures to be taken to improve coordination and integration are:

- Development of a ***comprehensive and forward looking land use policy clearly outlining how the different components*** (agriculture, horticulture, animal husbandry, forestry, water resources) are to be managed integrally.
- In many countries existing forestry laws (often inherited from colonial governments) are the major hindrance to collaboration and integration. In most cases such laws have curtailed the space for collaboration. These need to be reviewed and revised, making cooperation and integration legally feasible and unavoidable.
- Considering the strong environmental linkages between different land uses, emphasis should be given to adopt a ***landscape approach to resource management***. In fact most of the traditional community management systems have adopted such an approach, considering the totality of goods and services from a spatially and temporally integrated approach.

- ***Decentralization, democratization and strengthening local level institutions are critical*** in developing an integrated approach to land use. Often coordination/ integration at the national level may not percolate to the lower levels, especially if the organization has a strong vertical structure.
- A key to the success of integrated resources management will be to develop the human resources with the necessary skills required to adapt land management to the changing needs of an evolving society. In several countries in the region efforts have been made to integrate range management and forestry. Such ***efforts need to be strengthened further and eventually all land uses including agriculture should be brought under one umbrella*** at the level of the under-graduate programme.
- Effective integration of land uses, especially forests and rangelands will be extremely demanding as regards integrated knowledge. The R&D system in the land use sectors will require ***an in-depth review and reorientation giving emphasis to the generation of more integrated knowledge***. In this regard particular attention needs to be given to strengthen social science research and to integrate it with other knowledge streams.
- Countries should ***invest to build up an effective communication system within and between different departments and stakeholders so that many of the land use problems can be identified and resolved in the early stages***. Improved communication is also the key to enhance transparency and better governance of natural resources. Especially developments in remote sensing could help to monitor

A road map for integration of land uses

The economic, social and ecological conditions are such that an integrated approach to land use will be unavoidable and sooner this is pursued the better it is. The urgency of this is underscored by the social, economic and political turbulence being experienced by many countries in the region. Climate change related events will accentuate the problems, especially as increasing frequency and severity of droughts and desertification severely undermine productivity of farming, forestry and animal husbandry. Hence there is urgency to move away from the traditional sectoral approach to land use. Incremental changes will not also suffice considering the severity of the problems. It is important that ***countries prepare a road map for transition to an integrated approach to land use*** giving due consideration to the various components indicated above. The various initiatives by bilateral and multilateral agencies in this regard should be fully taken advantage of to develop and implement the road map for transition.

1. INTRODUCTION

Background

Forests and rangelands (See Box 1 for definition) form a major land use globally and they occur as a continuum with strong economic and ecological linkages. Local communities have been using forests and rangelands in an integrated manner meeting the need for timber, firewood, fodder, medicines, etc. Both forests and rangelands also fulfill a number of ecological functions, especially conservation of water, arresting land degradation and desertification, conservation of biological diversity, carbon sequestration. They also provide important amenity values, especially outdoor recreation. Especially in the context of rapid urbanization, the amenity values of range and forest lands have increased and ecotourism has become an important source of income in a number of Near East countries.

Box 1 Definition of forest and rangelands

“A forest is defined as land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent or trees able to reach those thresholds in situ. It does not include land that is predominantly under agricultural or urban land use”.

“Rangelands are lands on which the native vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and the land is managed as a natural ecosystem. This includes lands re-vegetated naturally or artificially when routine management of the vegetation is accomplished mainly through manipulation of grazing”.

FAO Regional Office for the Near East
NEFRC Member States Map



Rangelands form an important land use in the Near East region. The total extent of rangelands in the Near East countries is estimated at about 461 million ha, or about 31 percent of the land area. Adding the area under forests and other wooded lands, which also fulfill several of the functions of rangelands makes the total area as 620 million ha. The extent of forests and rangelands in the Near East countries is given in Annex1 table 1.

The extent of range and forest land varies across the countries, largely depending on the overall size of the country and the ecological conditions. Largely the Near East region is desertic, arid or semi-arid and obviously rangeland forms the predominant ecosystem. Until the discovery of oil and the development of the industrial and services sectors, agriculture and animal husbandry have been the main livelihood of most people in the Near East countries with forests and rangelands making significant contribution to the national and household economy. Although the share of agriculture and animal husbandry in national income has declined (largely due to the growth of manufacturing and services sectors), still these account for most of the employment in the rural areas.

Integration: What is happening?

Considering the land use continuum, the nature of products and services, the similarity in the threats to their existence, there is considerable scope for integrating management of both forests and rangelands. However, this is not the case and divergent paths of the evolution of policies and institutions have led to fragmentation of management. Countries have however made efforts to bring about convergence of forest and range management efforts in different ways. Many donors have attempted this through supporting integrated resource management projects. The impact of these efforts has been varied depending on various factors. The need for institutional integration is well recognised by FAO which renamed the Near East Forestry Commission as the Near East Forestry and Range Commission during the 19th Session of the Commission held in Tunisia in 2009 (see Box 2).

Box 2 Rationale of integration of range and forest management

In recommending the renaming of the Near East Forestry Commission as Near East Forestry and Range Commission, FAO has outlined the following rationale.

1. "In most Near East countries, the land which is regarded as forest land also includes extensive surfaces that are of considerable interest to the forester even if trees are sparse or nonexistent. These areas are generally used for extensive and frequently indiscriminate and unregulated grazing by cattle.
2. In arid and semi-arid lands, where extensive grazing is practised, forests contribute a great deal to fodder production, and during severe weather conditions they play a critical role in reducing cattle loss by supplying fodder from tree foliage, flowers and fruits by direct browsing or branch pruning. However, under severe conditions, animal grazing can reach levels that jeopardize normal vegetation development. In addition, situations of conflict can arise between foresters and breeders or even between the breeders themselves. Conversely, grazing in forest land can be beneficial if it is rationally practised. In the Mediterranean countries, it is well established that grazing in forests helps to reduce the risk of forest fires.
3. The harsh ecological conditions, limited vegetation cover and the economic value of the resources require the implementation of a policy which aims at the best balance possible between crop-lands, forests and grazing lands. The integration of these land uses within a common management programme is needed to promote the protection and improvement of the productive capacity of both timber and forage resources".

Source: FAO, 2010

Understanding the challenges and experience of ongoing integration efforts will be of considerable value to design more knowledge based interventions, in particular to develop more holistic approaches in managing forests and rangelands. It is in this context that the present study was initiated in response to the recommendations of the Near East Forestry and Range Commission.

Objectives

The overall objective of the study is to provide a better understanding of how forest and rangeland resources in the Near East countries could be managed integrally, ensuring that the stakeholders get better services in terms of the production of goods and services. Keeping the above broad objective this study aims to:

- To review and analyze the barriers to coordination between forest and rangeland stakeholders (public, private, NGOs, communities, etc.) in the Near East countries from institutional, knowledge, financial, policy, legal and cultural perspectives and contribute to effectively address the challenges in the region.
- Assess the efforts to bring about integration of institutions dealing with forest and rangeland management and their effectiveness; and
- Outline what needs to be done to improve the situation and to have better coherence

Specifically the study aims to address the following questions:

1. What is the extent of integration of institutions dealing with forest and range management in the Near East countries?

2. What are the factors that have contributed to the present state of integration between institutions in these two sectors?
3. What needs to be done to strengthen such integration?

Methodology

While an exhaustive literature review was undertaken on range and forest management in the Near East Countries specifically focusing on policy, legal and institutional aspects, four country case studies in Islamic Republic of Iran, Morocco, Sudan and Tunisia provided in-depth information on the country situation, focusing on challenges and opportunities in pursuing an integrated approach to forest and range management. These country studies provided an indication of the experience on forest and range management especially focusing on the major challenges in managing forest and range resources, the policy context and the institutional framework. These along with information on experience in other Near East countries was synthesized to provide the larger picture of (i) key issues as regards forest and range management and how they have evolved (ii) factors that influence range and forest management that affect the pursuit of an integrated approach specifically focusing on the policy, legal and institutional framework and (iii) opportunities and challenges in developing an integrated approach to managing forest and rangeland resources.

Report structure

The Report is divided into two parts. Part I provides a synthesis of the regional situation as regards integration of range and forest management based on the four case studies as also information gathered from other sources. Specifically it summarises and synthesizes the experience as regards integration of forest and range institutions and the larger context of the divergent experience from the region. Based on this the synthesis report outlines what needs to be done to ensure better integration

Part II presents the four case studies – Islamic Republic of Iran, Morocco, Sudan and Tunisia. Each of the country study outlines the key institutional challenges in sustainably managing forest and range resources and past and ongoing efforts to enhance integration between the two sectors.

PART I

2. A SYNTHESIS OF THE SITUATION IN THE REGION

Dr C.T.S. Nair

Introduction



The Near East Region consisting of 19 countries has a total geographical area of 147 million Km² and supports a population of 409 million people. The region is predominantly semi-arid, arid and desertic and in view of the extremely low precipitation, biomass productivity is very low. Forests, woodlands and rangelands together account for almost half of the land area of the Near East Region (see Annex1 table 1). In fact forests, other woodlands and rangelands occur as a continuum along with agriculture and share a number of common features as regards the production of goods and services.

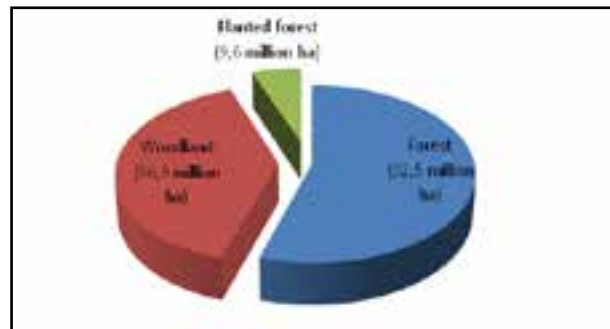
In most cases both forests and rangelands serve the needs of the same segment of population – largely rural population. Obviously considering the nature of goods and services provided and the stakeholders served by forests and rangelands, ideally management of forests and rangelands need to pursue an integrated approach. In the context of climate change related events, the boundaries between forests and rangelands are becoming irrelevant and the need for integrated approaches have all the more becoming very critical.

The population in these areas is poor and vulnerable to the effects and risks of seasonal changes in the harsh climatic conditions. Frequent droughts coupled with mismanagement of resources, such as overgrazing, contribute to rapid land degradation in these fragile ecosystems. This leads to loss of biodiversity of rangeland species and declining productivity, reducing the already low incomes of local communities and encouraging migration to urban areas.

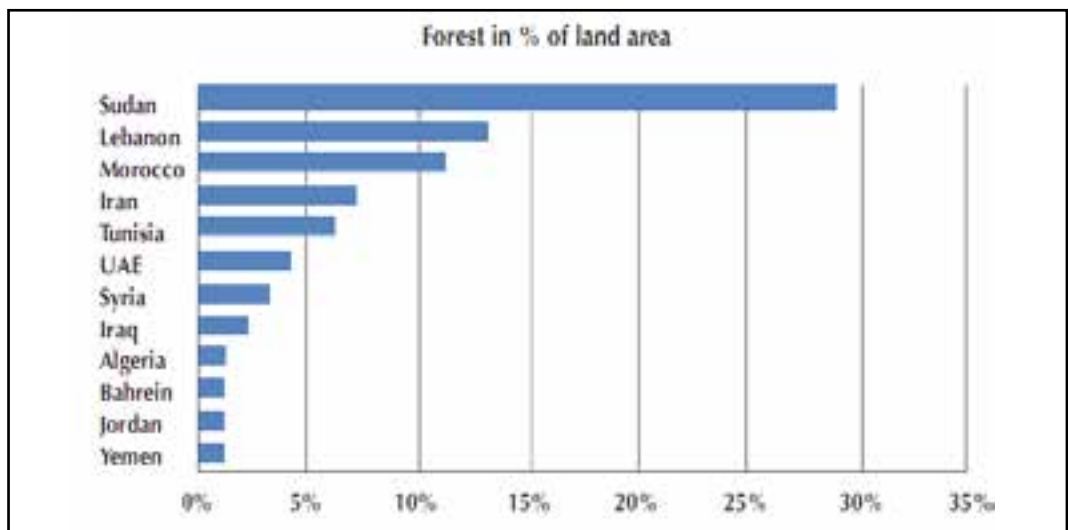
Considering the divergent evolution of policies, legislation and institutions, the degree of integration of institutions differ considerably across the different countries and dealing

components varies over time and space depending on a wide array of social, economic and environmental conditions confronting the community/ household.

Extent of forest and range resources in the Near East region



The Near East region is predominantly semi-arid to desertic and is characterized by low forest cover; in view of very adverse environmental conditions, especially low precipitation, the productivity is extremely low. According to the FAO 2010 Forest Resource Assessment (FRA) the extent of forests is estimated as 92.46 million hectares - of which 76 percent is in Sudan (69.9 million hectares). Other woodland areas cover an additional surface of about 66.87 million hectare and planted forests, 9.63 million hectares. With the exception of Sudan, Lebanon and Morocco all other countries are low forest cover countries with the extent of forest area being less than 10 percent of the land area. There are several countries with less than 1 percent of their land under forests (For example Egypt, Libya, Saudi Arabia).



Contiguous to the forests are “other wooded lands” which consist of “land not classified as “forest” spanning more than 0.5 hectares with trees higher than 5 metres and a canopy

cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. The Near East region has a total of about 67 million ha of other wooded land. As in the case of forest distribution, Sudan with 50 million ha accounts for about 75% of the other wooded land in the Near East region.

Rangelands form one of the most important ecosystems in the Near East region covering an area of about 504 million ha (excluding Pakistan and Turkey). However, reliable statistics on the precise extent of rangelands in each country and the changes in their extent over time are not available. As per FAO Statistics the extent of pasture lands in the Region is about 461 million ha. With the recent formation of the Republic of Sudan (which is not at present a part of the Near East region) the extent of rangelands (and forests and other wooded lands) will be quite different. Almost all countries face an immense challenge in providing reliable statistics on the extent of forest and rangelands. This makes it particularly difficult to monitor changes over a period of time and examine the implications on such changes on the provision of goods and services.

Both forests and rangelands have been subjected to increasing stress on account of several factors. Increase in human and animal populations, far exceeding the carrying capacity, has led to severe degradation; and most often the policy and institutional responses have been far from adequate to deal with the challenges. A key characteristic of the range and forest lands is the high variability in climate, in particular year to year fluctuation in rainfall and the number of rainy days. Climate change related increase in the frequency and severity of drought years is a major concern for most countries in the Near East.

Economic significance of forest and rangelands

Forests, rangelands and societies in the region have co-evolved over thousands of years. Until the spread of urbanization and the availability of alternative sources of income (especially from extraction of fossil fuels, their refinement, manufacturing, commerce and trade and more recently tourism), arable land, forests, other wooded lands and rangelands formed the primary source of income and goods and services. In fact almost everything from food, fodder, fuel, medicines, wood for housing and a host of cultural products continue to be sourced from forest and rangelands (see Box 3).

Box 3 Benefits from forests and rangelands in Sudan

Forests and rangelands in Sudan fulfil a number of protective and productive functions and as such offer many opportunities to contribute to the economic, environmental and social development of the country. As such, they can contribute to **poverty** alleviation and the enhancement of the well-being of people living in the vicinity of forest and of the country at large.

- Protective functions of forests, trees and rangelands in Sudan encompass their safeguard of watersheds; protection & fixation of soil; shielding of agricultural systems; habitat for livestock & wildlife and shelter to human settlements. Productive functions of forests, trees, shrubs and rangelands in the country include provision of wood and non-wood products (NWFPs).
- Wood products include lumber, sawn timber, industrial wood, building poles, firewood and charcoal.
- NWFPs on the other hand include a wide range of products such as browse & range material; ivory; bush meat; bee-honey & wax; gums & resins; bark derivatives such as tanning material; fruits, nuts & seeds.

Range products include browse and grazing material from thorny trees & shrubs together with thatching material and food covers made from Banu (*Arigrostis spp.*). The most valuable non-wood forest product in Sudan is gum Arabic (G.A.). Exports in 2010 totaled around 55,000 tons with a value of around US\$78 million.

Source: Abdel Nour 2012: Sudan Country Study **Source:** FAO, 2010

However, there are no reliable estimates on the multifarious contribution of forests and rangelands to societal well-being. There are two main challenges in this regard. Firstly a significant share of the products from forests and rangelands are transacted in the informal sector and they seldom get accounted in the national income statistics. Products collected and used locally seldom goes through any market transaction and value addition if any goes unaccounted. Secondly, inability to quantify and value the various environmental services remains a major problem both methodologically and operationally. Collectively this has led to a situation of underinvestment in management of forest and range resources and their conversion to other uses that are apparently more remunerative.

Coordination /Integration of forests and rangelands management

Forests and rangelands produce more or less the same set of products and services (See Table 1) and they occur as a land use continuum. Historically there were no sectoral distinction and local communities used forests and rangelands for the various goods and services required by them. Intensification of land use (for production of agricultural crops, forest products and livestock) led to a shift away from low intensity multiple use management and all the associated changes in policies, institutions, technology and markets and this has been the primary cause of the emergence of sectors, sectoral barriers and the associated conflicts especially when there is a clear distinction as regards the stakeholders.

Table 1: Forests and rangelands – A comparison of characteristics and services

Characteristics	Forests	Rangelands
Ecological characteristics	<ul style="list-style-type: none"> • Predominantly trees • More favourable growing conditions, especially as regards moisture availability. • High biomass productivity in the form of wood. 	<ul style="list-style-type: none"> • Largely seasonal herbs and shrubs • Mostly arid and semi-arid conditions with very unfavourable conditions. • Low biomass productivity and this entails the need to cover large areas, including through transhumance.
Goods and services	<ul style="list-style-type: none"> • Timber and poles. • Wood fuel (including charcoal to meet local and national demand) • Non-wood forest products (Cork, gum Arabic, honey, medicinal plants) • Fodder • Ecological services (watershed protection, biodiversity conservation, combating land degradation and desertification, carbon sequestration and amenity values). 	<ul style="list-style-type: none"> • Fodder for livestock (eventually for production of milk, meat and cash income). • Wood fuel (especially for local consumption). • Non-wood forest products • Ecological services (watershed protection, biodiversity conservation, combating land degradation and desertification, carbon sequestration and amenity values)

Excepting for a higher proportion of woody biomass in comparison with fodder biomass, most other products and services rangelands and forests tend to produce more or less the same set of goods and services. Certainly this would suggest the scope for better integration and coordination. However, this will largely depend on the actors and the stakeholders.

Key players and stakeholders

There are several key players and stakeholders as regards forests and rangelands (see Table 2) and their views and perceptions determine what products and services are to be produced and how the resources are to be managed. These in turn determines the potentials and constraints in pursuing an integrated approach. The key stakeholders are:

1. Governments at various levels – national, provincial and local – represented by the different departments responsible for managing land, especially agriculture, forests and rangelands. Within the governments itself there are divergent groups;
2. Traditional customary institutions - Local communities with differing interests – this includes communities dependent on agriculture, livestock and forests. Their

interrelationship could be co-operative or conflicting, especially if there is a clear segregation of social groups on the basis of their main source of livelihood. This is especially so in the context of expansion of settled agriculture which benefits agriculture dependent societies but detrimental to nomadic pastoral communities who see a reduction in the extent of rangelands. Similarly conflicts tend to be severe between forest management focused on industrial wood production and pastoral communities.

3. Private sector – including farmers, investors, local enterprises, etc. and various entities like cooperatives;
4. Civil society organizations;
5. Academic institutions dealing with studies and research;
6. International development agencies.

Table 2 Forests and Rangelands – Key players and beneficiary

Players/ stakeholders/ institutions	Forests	Rangelands
Players and institutions	<ul style="list-style-type: none"> • Government (National, Provincial, Local government institutions and different departments) • Local community organizations • Private sector including farmers, investors • Forestry research and development institutions • Institutions dealing with human resources development (Universities, training institutions) • Forestry extension agencies • Civil society organizations • International development agencies 	<ul style="list-style-type: none"> • Government (National, Provincial, Local government institutions) • Local community organizations • Livestock farmers • Animal husbandry and pasture research and development institutions • Institutions dealing with human resources development (Universities, training institutions) • Animal husbandry and pasture development extension agencies • Civil society organizations • International development agencies
Beneficiaries	<ul style="list-style-type: none"> • Local communities using wood and non-wood products. • Users of wood and other products – local, national and global. • Local, national and global beneficiaries of forest derived ecological services 	<ul style="list-style-type: none"> • Local communities who derive livelihood from herding • Consumers of livestock products linked through local, national and international markets. • Local, national and global beneficiaries of forest derived ecological services

Although at a general level the list of players and beneficiaries may appear to be more or less the same, excepting in traditional subsistence systems there is considerable differences in the players involved in the management of forests and rangelands. As each sector evolves and resource use intensification takes place considerable divergence sets in. It is this inevitable divergence of the interests of different players that undermines coordination and integration, Excepting in a few forest and range administrations that have evolved in a parallel manner in most countries (Box 4). Irrespective of the situation, modern forestry has largely focused on the commercial production of wood and non-wood products for the national or global markets. The stakeholders in different land uses and how their perceptions have moulded land use and the emergence of conflicts between different uses are discussed below:

Box 4 Interlinked but evolved in differently

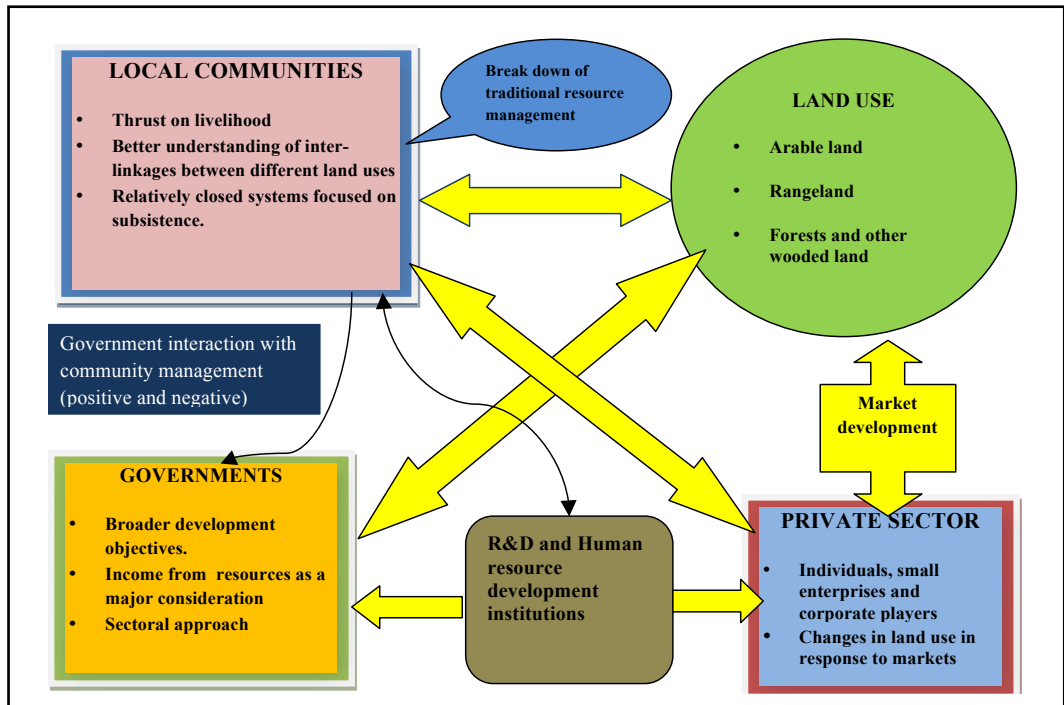
In all the four selected countries as indeed in other countries of RNE, forests and rangelands are intrinsically interrelated land uses. When foresters refer to forest or forest reserves and range officers refer to rangelands both parties are probably referring to the same domain. Yet the two forms of land use seemed to have evolved differently and on parallel lines and so did their relative legislations and policies”.

Source: Abdel Nour, 2012

Linkages between key stakeholders

Figure 2 gives a simplified picture of the larger framework of land use, the stakeholders involved and the nature of use by different stakeholders. Whether there will be integration of different land uses or not will be determined by the objectives of the different stakeholders and how they strive to accomplish these objectives under the changing social and economic conditions. As the situation changes the players may also change, altering the pattern of use and associated changes in the interaction between different stakeholders. Although the focus of this study is on integration of different public institutions managing forests and rangelands, it is pertinent to consider how the issue has been addressed by different stakeholders.

Figure 2 Main stakeholders of land use



Local communities and integration of different land uses

The factors that have contributed to the development of an integrated approach to resource management by local communities are as follows:

- Very limited opportunities for trade (excepting some limited barter of products within and between communities) necessitating that the community is self-reliant in most of the products like food, energy, fodder, building materials, medicines, etc. Generally it is a closed subsistence system requiring optimal use of natural resources like arable land, rangeland and forests.
- Most of the resource use was dependent on natural processes – inherent fertility of soil, rainfall, natural biomass productivity, etc. The scope for any external inputs to enhance productivity was very limited.

This situation led to the development of a more or less self-reliant economy and the communities made very little distinction between the different land use components. In fact in such relatively closed economic systems resource users made no distinction between the different sectors or components. Community management at the local level is particularly appropriate in a situation of uncertainty in production on account of year to year fluctuations in rainfall and consequent changes in fodder and water availability.

However a number of internal and external factors have collectively led to the decline of the traditional community institutions. Foremost of these is the efforts of central governments

to undermine the authority of traditional local institutions (Box 5). In most cases the authority of traditional institutions was removed; although national governments assumed the management responsibility, they were unable to exercise effective control and this led to over exploitation and degradation.

Box 5 Impact of nationalization of rangelands

“By nationalizing rangelands, undermining tribal authority, and enforced settlement of nomadic people, without substituting alternative effective systems of management and establishing clear property rights, some governments have opened the door to the abusive uses of the resource described above. The land belongs to everyone and to no one!. The local communities still claim their rights over parts of the rangelands which are also claimed by individuals who have developed them. Such conflicting rangeland rights negatively affect the efficiency of the use of resources”.

Source: Emad K. Al-Karableigh, 2010

Governments: The most critical player

Governments have stepped into management of natural resources for a number of reasons and largely this depends on the nature of governments. The interaction of governments with local communities has been varied - negative, indifferent or positive - which is reflected in the objectives and approaches of the different institutions as indicated below:

Colonial governments:

Most colonial governments have pursued a policy of appropriating community resources, especially if they are considered as a source of valuable products or as a source of income. In fact the entire process of reservation of forests, establishment of forest departments and managing them for production of wood or other products is part of this resource appropriation strategy. In almost all countries in the Near East and elsewhere, colonial governments have been instrumental in establishing forestry departments specifically focusing on wood production. Obviously giving thrust to wood production implies the following:

- Exclusion of traditional right holders from the area;
- Development of management plans to accomplish the primary objective namely production of wood and other products;
- Protection of valuable species, including their regeneration and management which will require exclusion of local communities.
- Prohibition of grazing from ecologically important areas for example catchments of important water sources intended to meet demand from urban population or agriculture.

Obviously this single minded approach brought institutions like the Forest Departments established by colonial governments into clash with local community institutions focused on multiple use management. Traditional pastoral systems are not narrowly oriented production systems, but rather complex socio-economic and cultural systems. Colonial governments seldom understood the multi-dimensional aspects, and were much more

concerned about imposing their perspective on local communities (See Box 6). It was largely a conflict between low intensity multiple use management practised by local communities and single use management excluding other uses adopted by colonial forest administrations largely aimed to exploit and appropriate resources. Existence of a wide array of tenure arrangements adds to the challenge of coordination and the pursuit of integrated management of rangelands and forests (Box 7).

Box 6 Complexity of pastoral systems

“The agropastoralist system has evolved over time and is run by a complex cultural and social organisation whose strategies and needs are little understood by those outside the system. The starting point, therefore, is to understand the variability and diversity that exists in the agropastoralist areas in order to find sustainable solutions for management of the system. In this regard, it is well to stress community participation in the planning and implementation of common-property programmes and in ensuring adequate preparedness and response in the face of calamities such as drought or flooding”.

Source: Abate, 2006

National governments

In many cases the institutions established in the colonial period along with the policies and legislations continue in the post-colonial period and many independent governments did not make adequate efforts to redefine policies, legislation and institutions. Wood production (for exports or to meet the domestic demand) remained a major objective (and so is revenue generation especially to meet the increasing government expenditure). The entire set of technological packages were designed to give thrust to single use management, intentionally or incidentally discouraging multiple use management that could accommodate the needs of diverse products and stakeholders. Almost all land uses – agriculture, forestry and animal husbandry – became specialised sectors and as they evolved separately, diminishing the chances of integrating them.

Box 7 Wide array of tenure arrangements in rangelands

Rangelands have been subject not just to the open access situation but also to a wide range of tenure arrangements, with different structures for regulating access, use, and management of rangelands. These include customary and tribal institutional arrangements that have functioned for long periods in rural communities. There are three main categories defined of land ownership: (1) state ownership; (2) individual ownership; and (3) common property. Furthermore, a number of different institutional arrangements have been introduced to manage state-owned rangelands including granting use rights to local communities or cooperatives grazing licenses, and leasing arrangements.

Source: Ngaido and McCarthy, 2004

Several governments have however attempted to bring related land uses – especially forestry and range management under the same policy and institutional framework. Iran, Saudi Arabia and Tunisia are some of the important examples. Effective integration requires intervention at all levels – policy, legislation, institutions and at various levels – national,

provincial and local. But integration across different levels (national, provincial and local levels) and in all the relevant spheres – in policies, rules and regulations and institutions – remains challenging. Often national level integration (when departments dealing with range and forestry are brought under one ministry or department) may not percolate to the lower levels (provincial and local levels). This will be particularly difficult in large countries with considerable differences between regions and provincial governments have well defined mandates as regards resource management. Similarly integrating policies may not have much impact unless synergy is established between rules and regulations. The challenges in building an integrated framework are discussed later.

Research, education and training institutions: Integration of knowledge

One of the major challenges in promoting integration between agriculture, range management and forestry is the compartmentalised approach to knowledge generation and application. Historically almost all knowledge was largely locally acquired based on accumulated experience passed on to successive generations and traditional communities did not make any sectoral distinction. However as distinct agencies/ departments were established to deal with the specific problems in each sectors, most of the growth in new knowledge has become fragmented. Each discipline developed its own repertoire of methodologies making the task of integrating different streams of knowledge extremely challenging. Research organizations, educational and training institutions and extension agencies pursued a narrow approach that deepened the chasm between the different land using sectors.

Countries like Iran and Sudan have made efforts to bring forestry and range/ livestock research under one umbrella (see Box 8). Yet there is concern on to what extent this has actually promoted the development of integrated knowledge considering the challenges of encouraging inter-disciplinary research even when the different disciplines are brought under one institutional umbrella.

Box 8 Integrating research on rangelands and forests in selected countries

In the case of Islamic Republic of Iran, range and forest research is under one institution, namely the Research Institute of Forests and Rangelands (RIFR). Established in 1968 to carry out research on various disciplines of renewable natural resources, RIFR has six research divisions (Forest, Range, Botany, Desert, Medicinal Plants and wood Science and Products) and four research departments (Forest and Range Protection, Poplar and Fast Growing Species, Biotechnology and Mechanization). Although rangeland research is included as an important component, there are no indications as to how forest and rangeland research is actually integrated and how much of the actual research really is interdisciplinary.

In the case of Sudan, agriculture and forestry research is under one organization, namely Agriculture Research Corporation under the Minister of Science and Technology. Research is organized under 22 research programmes and taken up by six research centres and in 22 field stations. Forest Research programme and Range and Pasture Research Programme are two of the 22 research programmes. Most of the remaining research programmes are focused on specific crops or areas. Again the major challenge is how interdisciplinary programmes encompassing key.

The two most important institutions dealing with research in Tunisia are the Institute of Arid Zone, under the Forestry Administration, established in 1976. It specifically deals with research on rangelands management and desertification control. Forestry research is undertaken by the National Institute of Research on Rural Engineering, Water and Forestry (NIRREWP), established through the merger of the National Institute of Forestry Research (NIFR) and the Research Centre of Water and Rural Engineering. Most of the research addresses technical problems and the extent of research on economic and sociological aspects is limited. This in a way limits the scope for interdisciplinary research.

In the case of Morocco, forestry research is undertaken by the National Centre for Forestry Research (CNRF), whose establishment dates back to 1934. Much of the focus of research is on traditional forestry issues. Livestock and related issues are addressed by the National Agricultural Research Institute. On the whole the efforts to address issues in an integrated manner are very limited notwithstanding that both the institutions are under the Ministry of Agriculture and Marine Fishery.

Source: Country Reports on Iran, Morocco, Sudan and Tunisia

Some recent efforts, as in the case of Sudan broadening the university curriculum to address all the natural resources sectors seems to be in the right direction. For example the Forestry College of Sudan University of Science and Technology has been transformed into the Forestry & Range College since 1996. Further there is already a recommendation made to the National Council for Higher Education that all existing or future faculties/ colleges of forestry should have a Department of Range and that the faculties/ colleges renamed adding the word range.

In addition to the national level efforts to provide an integrated framework for research, education and training there are also regional initiatives like the Arab Technical Institute for Agriculture and Fisheries (ATIAF), known previously as the Arab Forest and Range Institute, established in Lattakia in 1959. In 1969 the League of Arab States assumed the responsibility of its management, which again changed hands in 1976 when the Arab Organization for Agricultural Development (AOAD) assumed its management responsibility. Presently ATIAF is the only key regional institution offering middle level education and training in forestry, range sciences, ecology, biodiversity, agriculture and fisheries. Certainly ATIAF has key role in building up the capacity for integrated management of resources; but whether this is effective or not depends on the conditions specific to the countries.

Yet the challenges for developing integrated knowledge on rangelands and forests remain severe. Even when the two disciplines are brought under one institution for research, education and training, there is a strong tendency to pursue a fragmented approach. In many cases range and forest management research remains focused on their narrow domains and seldom consider the interlinkages treating the different disciplines are part of the whole. On the whole the linkages of R&D institutions with the users of research remain weak (See Table 3).

Table 3 Linkages of R&D institutions with range and forest management institutions

Clients/ stakeholders	Linkage	Remarks
Government departments/ agencies	<ul style="list-style-type: none"> Weak to satisfactory 	<ul style="list-style-type: none"> Very little demand driven research R&D institution seldom make any inputs to policy making Fragmented research seldom contribute to policy making R&D/ Government Departments consultative mechanism remains weak Governments do have leverage by way of funding, but this is not fully taken advantage on account of the poor appreciation of science inputs.
Local communities	<ul style="list-style-type: none"> Extremely weak 	<ul style="list-style-type: none"> Institutional mechanisms for interaction between local community organizations and R&D institutions are weak. Until very recently R&D institutions seldom took note of local knowledge. Most research in R&D institutions are not geared to address the problems of local communities
Private sector	Weak	<ul style="list-style-type: none"> Most research is undertaken by public sector institutions and the experience of private sector – public research institution collaboration is very limited. Fragmented studies seldom encourage private sector to seek inputs from R&D institutions. Most private sector institutions rely on tested and proven technologies from elsewhere and seldom rely on R&D institutions. Alternatively some of the large corporations rely on in-house research (whose access to others is restricted)

Clients/ stakeholders	Linkage	Remarks
Civil society organizations	Weak	<ul style="list-style-type: none"> Limited interaction: the extent of research on social and environmental issues (generally the thrust areas of civil society intervention) remains weak in most R&D institutions
International agencies	Weak	<ul style="list-style-type: none"> Reliance of international organizations on national public sector R&D system is limited, excepting through drawing upon limited expertise.

Role of international agencies in facilitating coordination/ integration

International development assistance plays a major role as regards the management of natural resources and many of the ongoing efforts to integrate the different land use components draw support from bilateral and multilateral agencies. Essentially two phases can be identified as regards international development assistance, largely reflecting the learning process involved. In the first phase, donors and international agencies largely adhered to a sectoral approach. Much of the thrust was on improving the technical capacity of existing institutions. Inevitably a lot of support went to improve human resources (especially through education and training), developing new technologies (especially building up research capacity) and delivering extension services. Social dimensions of development were seldom an area that received any attention.

This narrow focus changed considerably in the post 1980 period and more so during the last two decades. Largely such change stems from a better understanding of the inseparability of development from environment and the shift in emphasis on poverty alleviation and the need to involve people in decision making. With the Millennium Development Goals becoming the guiding principles for development there has been a major shift as regards in the objectives and process of implementation of development programmes and projects, resulting in departure from the narrow sectoral approach pursued earlier. Focus on sustainability, poverty alleviation, involvement of local people and tapping traditional knowledge all led to a cross-sectoral approach compelling collaboration between and integration of traditional sector focused institutions.

However, the experience of such a shift in the approach to development assistance is at best mixed as regards building lasting collaboration/ integration of institutions. Different pathways on the impact of such efforts of collaboration between rangeland and forest management can be visualised:

- In several cases the strong sectoral focus evolved over a long period of time has made collaboration between forest and rangeland management institutions extremely challenging. The complex institutional mechanisms (in the form of steering/ coordination committees, councils) established to facilitate collaboration often slowed down the process of project implementation. In many cases even if some consensus was arrived by the coordinating mechanisms, this did not percolate into all the key functionaries

in the line departments. Most often the coordination arrangements provided a broad framework at the project level, while the departments concerned continued a sectoral approach in implementing projects.

- Sustainability of donor assistance in institutional change, especially to foster collaboration between range and forest management institutions, has been a major issue. Institutional change is not something that can be accomplished during the short time horizons characteristic of most development projects. In many cases changing priorities of donor assistance results in project/ programme discontinuities and most of the mechanisms established to facilitate institutional collaboration breaks down at the conclusion of the project.
- Donor assisted integrated development projects will be able to trigger institutional changes enabling improved collaboration/ integration only if such projects leads to perceptible improvements in the delivery of goods and services to the stakeholders and there is a strong demand for the pursuit of an integrated approach. This has to come from higher levels in the government or from the communities benefitting from the project.

Private sector/ local enterprises/ corporate players

In almost all Near East countries the traditional community based resource management systems have declined on account of the collective impact of various drivers. Exposure to markets, interaction with outside world and the changes in value systems have led to the emergence of individualistic approach to resource management undermining the effectiveness of traditional community institutions. In a market driven system, much of the thrust goes to production of marketable goods and services to the exclusion of those that have no markets. This again has led to intensification of land uses – irrigated agriculture largely using purchased inputs, tree plantations to produce wood or other products and livestock farms dependent on purchased feed – reducing the scope for integration of different land uses unless markets drive such integration.

Intensification of any land use often necessitates the intensification of other land uses, changing the supply and demand for products and services. For example intensification of agriculture in certain areas reduces the availability of certain goods and services from such areas and would, *ceteris paribus*, necessitate intensification land uses intended to produce other goods and services.

Civil society organizations

The involvement of civil society organizations or NGOs in range and forest management is relatively recent. There are several international and a limited number of national NGOs involved in issues relating to rangeland and forest management in the Near East region. Some of them are in the forefront of action research and facilitating local community empowerment. Considerable thrust is given by NGOs to address social and environmental issues and many of their efforts are instrumental in building cooperation between different players and facilitating integration.

Analysis of country studies

Coordination between different institutions depends on (a) the main objectives of the institutions, (b) the structure of the institution and (c) internal and external mechanisms that enable concerted/ coordinated action. In the case of traditional community organizations in the Near East (and elsewhere), securing livelihood was the main objective and they used resources, forests, rangelands, arable lands, etc. to produce locally an appropriate mix of goods and services essential for their livelihood. This changed completely with the establishment of sector focused departments, which as in the case of most forestry departments focused on the production of a small number of products. In fact coordination/ integration emerged as an issue in the context of the creation of narrowly focused departments.

Coordination or integration needs to be considered at different levels and dimensions. As indicated earlier, integration of range and forest management has to be considered from various aspects and Table 4 provides an indication of the divergent situation as reported in the four country case studies.

Table 4 Assessing the extent of integration of forest and range management in selected countries¹

Criteria	Level of integration			
	Iran	Morocco	Sudan	Tunisia
Integration at the policy level	High	Moderate	Moderate	Low
Integration of laws/ rules and regulations	High	Moderate	Low	Low
Institutional integration				
• National level	High	Moderate	Moderate	High
• Provincial level	High	Moderate	Moderate	Low
• Local level	High	Moderate	Moderate	Low
• Community level	High	High	High	High
Integration at planning level	High	Low	Moderate	Low
Integration at implementation level	High	Low	Low	Low
Degree of integration	High	Moderate	Low	Very low

¹ Level of integration: High (High), Moderate (Moderate), Low (Low), Very low (Very low)

Although there is some subjectivity as regards the assessment of the degree of integration, still Table 4 gives a general picture of the state of affairs in the four country studies. On the whole Iran is a situation where range and forest management are well integrated while Sudan is at the other end – with the least integration. The situation in the different countries is outlined below:

Islamic Republic of Iran

In the case of Iran forests, range and watershed management are all in one organization, namely the Forests, Range and Watershed Management Organization (FRWO). However, its origin and functioning until 1972 was entirely as a forestry organization, when its status improved from a forestry division in 1940, to that of a Department, service and Organization in 1942, 1949 and 1960 respectively. Watershed management was also rightly brought under the Forest and Range Organization in 2002, renaming it as the Forests, Range and Watershed Management Organization. FRWO currently comprises of 5 Bureaus and 5 Departments and the High Council of Forest, range and Watershed Management an apex policy making body. Since forest and range are within a given institutional framework, which also has parallel provincial and local institutional frameworks, in theory the potential for pursuing an integrated approach is quite robust.

Integration of forest and range management at the policy, legal and institutional level was accomplished primarily through the Forest and Range Nationalization Law of 1962, which in addition to vesting all forests and rangelands with the government also brought them under the management of one single institution, namely Forests and Rangelands Organization. This to some extent helped to overcome the multiplicity of ownership of the forests and rangelands, thus providing a solid foundation for pursuing an integrated approach to managing the resources.

Whether this really helps in operational level integration of the two land uses is however a moot question. Certainly at the provincial and local level, the integrated structure of FRWO is more or less replicated and this again helps to overcome the potential conflicts that could arise if the two land uses are under separate agencies. Yet, there are indications that FRWO tends to give more thrust to forestry, especially in the areas traditionally devoted to forestry production. The most valuable forest from the point of view of wood production is the Caspian forests and here undoubtedly the focus has been on wood production. Considering the environmental significance of these forests there has been efforts to reduce wood production. In any case whether it is for production of wood or environmental services, range management and livestock production is regarded as less important and much of the thrust has been to reduce grazing pressure, including through relocation of villages in the Caspian forests (See Box 9). Most of the rangelands are in other regions and consist largely of forests and woodlands of low productivity. It is here that most of the efforts to integrate forest and range management are attempted especially by way of involving pastoral people.

Box 9 Conservation of Caspian forests

Caspian forests have been the most productive forests in Iran and continue to retain their primacy for wood production considering the highly favourable conditions for tree growth. Efforts to conserve these forests are pursued under three major programmes namely (a) National Plan for Development and Conservation of Caspian Forests (b) Regional Plan for Removal of Livestock from the Caspian Forests and (c) Regional Plan for Silviculture in the Caspian Forests and (d) Regional Plan for Supervision on Exploitation in the Caspian Forests. Certainly the increasing number of livestock especially in the villages within the forests is considered as a major problem in conservation of the forests and there is considerable emphasis on removal of livestock from forests and centralization of sporadic villages to improve forest protection.

Source: Jafari M., 2012

In the case of Iran a number of factors outside the forest and range sectors are reducing the pressure on the resources. This in a way reduces the conflicts in resource use including the conflicts between traditional uses and new uses, especially use of forests and rangelands for the provision of ecological services. Demographic and economic changes, including urbanization, reduced dependence on land as a source of income especially as the more educated become less dependent on land. Further the Iranian government has provided strong support to agriculture through procurement prices and input subsidies. However, if oil income declines affecting employment in the manufacturing and services sectors, there is a likelihood of land use conflicts resurfacing.

Forestry and range management institutions in Sudan

Sudan also has a long history as regards forestry, starting from 1901 when the Woods and Forests Ordinance were promulgated and the Department of Forests and Woodlands was established. Although at the local level there were strong positive and negative linkages between forests and rangelands, there were no attempts to build integration at the policy, legal and institutional levels, especially at the national level. Focused on meeting the demand for timber and woodfuel, the forest department evolved as strong professional organization, drawing on expertise and support from bilateral and multilateral agencies. In 1989 the Central Forest Administration was re-organized as semi-autonomous parastatal organization, namely Forests National Corporation (FNC). From the objectives and responsibilities and more so from its functioning as an autonomous body, evidently its thrust was on improving the forest resource base with commercial viability as an important consideration (see Box 10). Integration with other land uses was mentioned in passing, mainly focusing on coordination to combat desertification.

Box 10 Functions of the Forests National Corporation

As per the 1989 Forests National Corporation (FNC) Act, stipulates the functions of the Forest National Corporation as follows:

- Lay down the general forest policies;
- Assess, develop and provide good exploitation of the forests of the country;
- Accomplish full protection of the environment;
- Make the rules and methods which secure the good utilization and development of forests;
- Propose laws which achieve the implementation of the approved policies.
- Provide technical supervision to the Sudan's forests;
- Disseminate awareness about forests among Sudanese and investors;
- Increase the reserved forest area up to 20 percent of the total area of the country through planting trees and encourage the establishment of community, private and other types of forests;
- Develop gum Arabic and other types of natural gums;
- In close coordination with the concerned institutions, coordinate land use in the country and combat desertification;
- Encourage applied research and
- Enforce revenues and royalties on all forest products

Source: Abdel Nour, 2012

In contrast to the long history of continuous development of the Forest Department, the Range and Pasture Administration had a chequered history and the financial and human resources at its disposal to fulfill its functions were very limited. Key factors that contribute to its ineffectiveness are the:

1. absence of a policy relating to the use of rangelands; and
2. absence of law relating to the management of rangelands.

Further there have been no systematic assessment of the rangelands in the country and there is no clarity on the boundaries.

As the extent of rangelands shrunk in the context of rapid expansion of mechanised farming (which was given a very high priority by the government) RPA's influence on government further declined. So also was its influence on the rangeland stakeholders, especially the pastoral communities. With the adoption of Federal System in 1994, the RPA was decentralised and state level RPAs were established affiliated to the State Ministries of Agriculture. With just about 40 professionals in the RPA, it remains very weak and in a situation of severe resource constraints, other pressing demands like education, health care, transportation, etc. gets precedence over range management. The major challenge that sustainable management of forests and rangelands face in Sudan stems from the unprecedented expansion of rainfed mechanised farming. This has drastically curtailed the extent of rangelands and other wooded lands, putting enormous pressure on the remaining range and forest lands, possibly undermining the scope for any integration and coordination of efforts at the operational level. Considering that both forestry and animal husbandry are dependent on natural productivity, any curtailment of their area increases conflicts. It is for this reason that some of the initiatives to develop integrated approaches to manage forest and range resources did not succeed and the experience not widely adopted (see

Box 11). This clearly shows that integration between a sub-set of land uses (in this case forest management and rangeland management) are unlikely to succeed in the absence of a coherent land use policy at the national level encompassing all land uses.

Box 11 Lessons from integrated management plan in Rawashda- Wad Kabo forests

The Rawashda-Wad Kabo forests in the Gedaref State of Sudan form an intersection point for three livestock corridors, originating from the Butana and ending at the Ethiopian border. Rawashda forest was gazetted in 1960 as a national forest reserve and the primary objective of gazetting was to safeguard charcoal supplies to Khartoum. Although it was constituted as a reserve forest, no active measures were taken for its management in the 1960s and 1970s and much of the emphasis was on protection. It was in 1983 that a systematic effort was initiated to manage Rawashda forests, largely with the technical support of FAO under the Fuelwood Development for Energy in Sudan project. Successive years of drought led to increased dependence of pastoral nomads on the forests accentuating the degradation process necessitating an integrated approach. Rawashda thus became the starting point of Sudan's first effort at developing and implementing an integrated land use plan. The integrated management plan launched in 1987 set the following objectives:

1. To protect and maintain environmental stability; and
2. To provide forest products mainly fuel-wood, poles and fodder to meet national, regional and local demand.

To accommodate the different needs five working circles were formed as indicated below:

- a. National Fuelwood Working Circle comprising 68 percent of the area, in which management is geared towards fuelwood/ charcoal production for regional/ national use;
- b. Village Working Circle (13 percent of the area) to meet the demand of adjacent villages.
- c. Hasahab (Acacia) Working Circle (5 percent) devoted to gum production;
- d. Fodder Working Circle (2 percent) to be managed for grazing and fodder production; and
- e. Protection Working Circle (12 percent of the area consisting of all areas liable for gully erosion which should be protected.

Certainly this was an important effort to bring about integration of needs of very different stakeholders and should have helped to improve the situation. However, in the context of land use changes outside Rawashda Wad Kabo forests, in particular the rapid expansion of mechanized farming, local level integration efforts failed to make any impact. Largely this was due to the increased pressure of grazing, especially as rangelands outside the Rawashda forests shrunk and the livestock corridors were blocked by the indiscriminate expansion of mechanized farming. Although all mechanized farms were to supposed to afforest 10 percent of the area, this was not adequate to address the needs of the pastoralists.

The Rawashda – Wad Kabo initiative to integrate the divergent needs of different stakeholders at the local (forest) level clearly indicates the challenges of integration in the absence of a national land use policy. Obviously integration at local level is unlikely to succeed if there is no integration of land use at the macro-level. Further this also indicates that an agency mandated with a limited task (in this case Forests National Corporation) faces a number of limitations in transcending the sectoral barriers.

Source: Salah El Shazali Ibrahim, 1994 , Abdel Nour (personal communication)

Integration of forest and range management in Morocco

The situation as regards collaboration/ integration of forest and rangelands institutions is more complex in the case of Morocco considering the number of Ministries/ Departments involved. Pastures within forests are under the Forest Department (High Commissionership for Water, Forests and Combating Desertification) while customary lands outside forests

are under the Ministry of Interior, responsible for internal security and local administration. Technical support for livestock management comes from the Ministry of Agriculture. All these agencies have their provincial and local offices responsible for implementing the various programmes. In addition traditional community institutions continue to play an important role in managing public rangelands, although their authority and importance have declined considerably.

Box 12 Multiplicity of rules and regulations inhibit collaboration: The situation in Morocco

The pastoral and forest management is governed by a multiplicity of diverse laws and regulations that remain partial, fragmentary and difficult to apply, particularly with regard to collective pasture lands. Rules and regulations that govern pastoral land include:

- Dahir of 27 April 1919 stipulating the administrative supervision of community controlled collective pastures;
- Agriculture Investment Code of 25 July 1969 and the provisions therein for the protection and restoration of soil and water conservation on communal lands in semi-arid areas.
- Forest legislation, especially provisions relating to the use of forest pastures and silvo-pastoral planning.
- Communal charter of 1976 and the provisions for participation of rural communities in managing forests
- Act 33-94 of 1994 especially its provisions for areas of pastoral improvement.

The application of these laws has led to many problems and the outcomes of these are not conclusive. Traditional practices encouraged by the Dahir of 1919 are facing a number of difficulties. The traditional collective seasonal fencing against grazing (Agdal) is less and less respected.

Source: Sabir et al., 2012

This multiplicity of institutions has led to fragmentation of authority, making integration of activities and collaboration between different departments extremely difficult. This is made complex by the different legislations. For example pastoral areas are treated differently depending whether they are within or outside the forests (see Box 12). Further the rapid socio-economic changes have led to the considerable weakening of traditional institutions, as individual interests and motives starts undermining social cohesion. In general the overall trend in agriculture, forestry and livestock management is towards intensive single use – for production of wood, meat, food crops and the provision of environmental services. There have been several initiatives to improve collaboration between the different institutions, for example setting up of National Forest Council (see Box 13). This includes the setting up of committees to facilitate cooperation, especially as regards donor supported integrated projects. Yet many of these initiatives have themselves been caught up in procedural complexities.

Box 13 National Council of Forests in Morocco

Intersectoral coordination and collaboration remains challenging in Morocco considering the multiplicity of institutions focused on their narrow domains. The National Council of Forests, Provincial Forest Councils and Communal Forest Councils were established in 1976 to coordinate and strengthen the action of the State and other stakeholders in the development, conservation and extension of forest heritage. One of the important responsibilities of the Council is the coordination of programmes and budgets related to economic development activities in forest areas and pastures, development of mechanisms to resolve disputes between users and government departments and the formulation of approaches and principles of resource management.

Notwithstanding such mechanisms, coordination and collaboration remains challenging. Decision making has become extremely complex.

Source: Sabir et al., 2012

Morocco has however done very well in developing an alternative institutional model that provides the strength of traditional institutions but also adapted to the modern world, in the form of pastoral co-operatives (see Box 14).

Box 14 Pastoral cooperative in Morocco

The Livestock and Pasture Development Project in Eastern Morocco has been an innovative project which organized its activities around the formation of pastoralist cooperatives built on traditional ethnic lineages, promoting an array of range management practices to increase the long-term productivity of rangelands. The project's overall objective was to raise the incomes and living conditions of some 9 000 pastoral families, while improving and sustaining the productivity of some 750 000 ha of grazing land. A supporting sub-objective is the formation of pastoralist cooperatives based on traditional group lineages. Specifically, the project intervened in six areas: (i) pasture improvement, (ii) livestock development (animal health, genetic improvement), (iii) extension, training, research, (iv) credit for small herders, (v) women's activities, and (vi) institutional strengthening. 34 cooperatives have been formed, with total membership estimated at 8 250 as of year-end 1997; they include virtually all the sedentary, semi-nomadic and nomadic herders in a vast region covering over three million hectares. The cooperatives rather quickly assumed an active role, notably in the management of the "land resting" exercise. With guidance from the project team, they have created reserves — over various two-year periods — covering a total area of 450 000 hectares. Plant cover has been re-established. This measure produced important physical results with ecological and economic ramifications: as a result of a major recuperation of the vegetative cover, fodder production increased fivefold, from 150 kg/ha to 800 kg/ha of dry mass, the value of the latter exceeding the financial costs associated with the two year land resting by over 50%. The success of the project has been attributed to:

- A high level of consistency between the project concept and its policy and institutional context.
- Ability on the part of politicians and project planners to recognise the opportunities for innovation offered by traditional institutions, to understand their limitations and to have the vision of turning both limitations and opportunities into advantage in support of positive change.
- In complex situations marked by entrenched social and cultural custom and structures as in the Moroccan case, the human-resource factor in project design and management — in terms of dynamic and motivated people with a sense of vision — is of paramount importance.

Integration of forest and rangeland management in Tunisia

Although Tunisia shares a very similar colonial history with Morocco, management of its forests and rangelands are better integrated than Morocco. The Tunisian Forest service was established in 1883 and since then a number of legislations have been promulgated

addressing issues like forest management, logging, charcoal production, hunting, sand dune fixation, soil conservation, establishment of national parks, etc. Until independence the main thrust was on protection of forests, especially through defining the limits of forest domain and protection of forests. Almost up to 1990, forestry adopted a conventional approach of protection and production and the linkage with range management was rather limited (Box 15). Since the early 1990s forestry chalked out a new path of development, influenced to some extent by the developments in the international arena, in particular the UN Conference on Environment and Development and the multitude of international initiatives. Integration of land use and people's participation became two important tenets of all forestry projects.

Box 15 Key events in the development of Tunisian Forestry Service

1883: Creation of the Forest Service under the control of the General Directorate of Public Works.

1947: Reorganization of the Ministry of Agriculture and the creation of sub-Directorate of Agriculture to which the Forest Service was attached.

1970: Forest sub-Directorate was upgraded to a Directorate with three divisions (or sub-Directorates dealing with Studies and Forest Engineering, Forest Production and Forest Police.

1977: Organization of the Directorate of Forests into five sub-Directorates: Production, Studies, Control, Forest Police and Soil, Water Conservation & Reforestation.

1987: Restructuring of the Forests Directorate. Soil and Water Conservation moves out to become an independent Directorate. The remaining Forest Directorate was restructured to have six sub-divisions: Inventory, Rehabilitation Studies, Reforestation, Rangelands, Hunting and National Parks, and Control & Forest Regulation.

1990: Establishment of the General Directorate of Forests (DGF) with three directorates namely Forest Conservation, Forest Control and Silvo-Pasture Development.

2001: Re-organization of the Ministry of Agriculture, Hydraulic Resources & Fisheries including the DGF. The DGF was structured into four Central Directorates: Forest Conservation, Law Enforcement & Control, Silvo-Pastoral Development and Socio-economic Development of Local Populations.

Bringing rangeland management within the fold of forestry administration thus dates back to 1987 and with the 2001 reorganization and the emphasis on socio-economic development of local populations; the livelihood dimension of rangeland management was brought to the forefront.

Source: FAO, 2011

Forest and rangeland management in Tunisia is under one institution, namely the General Directorate of Forests (DGF) under the Ministry of Agriculture and Environment. It has four directorates namely:

- Directorate of socio-economic development of the population in forest areas;
- Directorate of forest conservation;
- Directorate of Silvo-pastoral development; and
- Directorate of law enforcement and monitoring.

With the directorate of socio-economic development of population in forest areas and the directorate of silvo-pastoral development, adequate space has been created to address needs of the pastoral communities, ensuring better integration of forestry and range management within the same institutional framework.

Integration of range and forest management in other countries

Apart from the four case study countries, other countries have also made significant efforts to integrate forest management and range management. It is however to be noted that in most of these countries rangeland and its use is much more significant, especially considering that very low extent of forests and more particularly the low commercial significance of forests as regards wood production. Some of the efforts to adopt an integrated approach as regards forest and range management are outlined below:

Kingdom of Saudi Arabia

Unlike most other countries it was the range administration that was established first in 1966. It was then affiliated to the Animal Resources General Administration of the Ministry of Agriculture. A Forests Administration was established in 1971 and it was then affiliated to the Land General Administration of the Ministry of Agriculture. It was in 1978 the Range and Forest Administrations were amalgamated into the Range and Forests Department under the Ministry of Agriculture. In 2006 the Range and Forest Department was brought under the Natural Resources Administration (which also includes Environment, Biodiversity and National Parks) of the Ministry of Agriculture.

On the whole within the RFD, range management gets greater attention considering the expansive rangelands and their significance for the economy. This is also evident from the higher proportion of those with specialisation in range management. Whether this integrated institutional framework is actually resulting in ground level integration is unclear.

Syria

Syria also has a long history as regards forestry considering the establishment of a forest service as early as 1869. For a long time much of the thrust of the service was traditional forestry which included the exploitation of wood, charcoal making and tax collection from products removed. Attached to the Agriculture Directorate, it was made up of forest inspectors, forest guards and commanders and local committees.

Over a period it has evolved as the Forests Directorate which currently consists of five divisions namely Afforestation Division, Protection Division, Forest Management, Organization & Investment Division, Biodiversity & Reserves Management Division and Forest Studies Division. Largely it has remained as a traditional forestry organization with a strong focus on afforestation and forest protection. At the provincial level the Syrian Forestry Directorate has Forest Departments affiliated to the Regional Directorates of Agriculture and Agrarian Reform.

Range management is under the Range Department of the Ministry of Agriculture and Agrarian Reform and is responsible for fodder and shrub production and plantations in steppe areas. The Department promotes sustainable use of natural resources, especially by preventing overgrazing and creation of protected areas. Despite the curtailment of powers of traditional community organizations, they have not completely faded out and remain an important player in the use of rangelands (Box 16).

Apart from the fact that the Forestry Directorate and the Range Department are in the same Ministry improving the scope for policy coherence, there seems to be very limited integration of activities especially at the field level, especially considering the strong vertical structures of the departments.

Box 16 continuing relevance of traditional institutions – Syrian experience

“Contrary to popular belief that they have broken down and disappeared, many customary institutions in Syria remain strong and continue to be influential in the property rights domain. Their inherent flexibility means they are usually better suited to the prevailing non-equilibrium environment of the Syrian rangelands when compared to the rigid statutory laws and inappropriate technologies imposed by the state. Imposition of technologies will not succeed unless tribal land tenure and institutions are taken into account. Customary institutions represent a superior foundation for an integrated and inclusionary resource management system. The continuing existence of these institutions contradicts Hardin’s assumption of the inability of resource users to coordinate their actions to avert overexploitation. It is not possible to prove that these customary methods are environmentally sustainable since ecological studies based on the new paradigms in the field have yet to be conducted. But what these institutions do represent are the foundations of a sustainable system by reducing transaction costs and affording local legitimacy.

Past policies centralizing rangeland management were founded on misplaced assumptions about the physical dynamics of the steppe environment as well as the capacity of herders to cooperate together and regulate their use of pastoral resources. Shrub technologies like *Atriplex* have proven ill-suited to livestock as well as incompatible with herders’ socioeconomic realities. Plantations likewise conflict with mobility objectives and customary land tenure, fueling the incidence of tribal conflict. In contrast to this failed top-down approaches are the enduring customary institutions whose sensitivity to the physical and social environment and inherent legitimacy have enabled them to overcome statutory abolition, even to the extent of obliging the authorities to recognize customary agreements.

With a fresh understanding of arid environments and the customary system, there are new opportunities for rangeland management in Syria. Tribes no longer represent a political threat as they once did, but they do represent irreplaceable social capital. With doubts raised about imported shrub technologies, plantations, and steppe policy more broadly, existing tribal systems offer a solid foundation on which to build an effective and efficient administration of steppe management and conservation. The task that now faces the authorities in Syria and elsewhere in the region is to respond to this latent opportunity and enter into a genuine partnership with the steppe users for the management and conservation of steppe resources”.

Source: Rae et al., 2001

Coordination of forest and range management: some issues

The diverse experience relating to coordination of range and forest sector institutions in the Near East region gives an indication of what works and what may not as summarised below:

Historical factors an important cause of weak cooperation/ integration

In many cases the absence of integration between the different sectors is often rooted in the colonial histories of the countries. Until the beginning of colonisation, most resource management was guided by traditional community arrangements. Excepting in the river valleys where irrigation was possible, animal husbandry, especially transhumance was

the most widespread mode of livelihood. Well established rules and regulations helped to manage resources minimising conflicts between the different segments in society. Management of forests and rangelands were well integrated at the local level.

However colonisation and the efforts to appropriate resources brought about major changes. Agriculture focused on export crops and so was forestry, which focused on production of timber and woodfuel. Animal husbandry, especially by nomadic pastoral communities largely remained outside the control of colonial governments; forest and agricultural departments increasingly moved away from multiple use management focused on the needs of local communities to single use management largely aimed at meeting urban demand within or outside the country. This led to direct confrontation with pastoral communities, who continued to rely on large swaths of land under different uses.

Obviously what we see is the divergent objectives of traditional community institutions and modern public sector institutions that are focused on narrow objectives.

Governance and institutional integration

Ultimately institutional collaboration or integration is only one of the means for providing efficient services to the public and integration should not be seen as an end in itself. What is important is to provide the goods and services to the different stakeholders in an economically efficient and environmentally sustainable manner. If efforts to integrate the different sectors undermine efficiency and increase the social and environmental costs, then the pursuit of integration will be counterproductive. This will be particularly so if the process of merger or collaboration creates a much larger bureaucracy with more levels in the hierarchy and complex and time consuming coordinating mechanisms.

Thrust on local level integration

Collaboration and integration of forest and rangelands institutions need to be considered at various levels. In many countries forest and range management may be housed in the same ministry and same department. Certainly this is advantageous to avoid policy conflicts and to ensure that there is broad based integration. What is however more critical is to ensure operational level integration, especially at the local level so that stakeholders, especially those who are dependent on these institutions for the various goods and services (production of timber, firewood, fodder, environmental services, technical advice, marketing support, input supplies, etc.) are able to get them efficiently incurring the minimum transaction costs. .

Failure to recognise the role of traditional institutions

This divergence of objectives of traditional community institutions and state institutions has been a major cause of the absence of integration between forestry and range management. Much of the challenge of integrating forest and range management institutions stem from the failure to take cognizance of traditional community institutions that played a

dominant role in the past and are still relevant despite their weakened situation. In most cases centralised government system has viewed traditional systems with considerable antagonism and through rules and regulations curtailed their power and influence. As part of appropriation of natural resources like forests colonial administration has formulated policies and legislation that excluded the exercise of traditional use by local communities through forest reservation. This has undermined and weakened the authority of traditional community organizations.

In fact undermining the traditional local institutions has been an important focus of colonial administration and efforts to declare forests as reserved and imposing rules and regulations that curtailed local use and thus the authority of traditional institutions has been a strategy. While this had some impact, in the absence of effective government institutional arrangements to address the needs of people, traditional customary institutions continue to have an important role.

Another approach that has been adopted to discredit customary organizations is to highlight their ineffectiveness in arresting rangeland degradation invoking the “tragedy of the commons” and the need for governmental intervention. However, this is based on the incorrect understanding of system of range management under traditional arrangements and the fact that much of the rangeland degradation is triggered by expansion of agriculture into rangelands, reducing fodder and water availability and curtailing the corridors for livestock movement.

Incorrect approach to range management by centralised bureaucracies

Most interventions in managing rangelands by governments have failed to produce the desired results. In extreme cases interventions were mainly focused on undermining traditional institutions that could possibly be a challenge to central authority. This was done through nationalisation of rangelands; but in most cases there were no systematic efforts to develop effective institutions to manage the rangelands. Thus while traditional community institutions were disempowered, centralised institutions were not able to function as effective alternate systems. This break down in traditional control systems has been an important cause of rangeland degradation.

International development assistance supporting integration

Increasingly international development assistance is encouraging integration of different components in the process of project implementation. Issues like poverty alleviation and environmental degradation necessarily requires transcending the sectoral barriers. Integrated natural resource management has become a key area for donor assistance and this has led to more area based approaches in a way building bridges between different agencies.

Integration through division of responsibilities and jurisdiction

Often governments have recognised the potential conflicts between different objectives at different levels. This has led to defining the responsibilities at different levels. Thus Forestry Departments at the national level have focused on production of timber and other products important from the national needs, while needs at the provincial and local levels (for example woodfuel, grazing, etc.) are delegated to provincial and local governments. In some cases this has led to the establishment of separate reserves (Central reserves and Provincial Reserves) as has been the case of Sudan (See Box 17)

Box 17 Sudan – Central and State Forest Reserves

Right on the onset of Anglo-Egyptian condominium rule of Sudan (1898-1956) dichotomy of interest and hence conflict over the management of and benefits from forest & range resources emerged between the central government and provincial authorities. The central authorities were anxious about wood supply for domestic and services sectors of people in towns, construction and running of national infrastructure. Fuel-wood (firewood & charcoal), telegraph & telephone transmission poles, building poles are the sought commodities together with sawn timber in the form of railway sleepers and construction timber. Provincial authorities on the other hand were more concerned about supplies of fuel-wood, Non-wood Forest Products (NWFP) and browse material for sedentary rural and nomadic populations and their herds of livestock.

The situation necessitated the division of functions and authority between the central and local entities. That was clearly elaborated by an announced forest policy statement for 1932 augmented by two acts; the Central and the Provincial Forest Ordinances 1932. Accordingly, the Central Directorate of Forests and the Governors of the Provinces were respectively entrusted to satisfy the country's and the provinces' needs for forest products from central and provincial forest reserves. The status of the forest reserves can only be repealed (de-reserved) by the Governor General for over-riding national interests.

Source: Abdel Nour, 2012

Different degrees of integration and multiple use management

This largely depends on the characteristics of forests and rangelands. There are certainly areas more suitable for production of wood on account of the more favourable ecological conditions, while there are areas which are only appropriate for forage production. Invariably in the arid and semi-arid rangelands, the potential for wood production is very limited. Ideally an ecosystem approach on a landscape basis would be more appropriate so that each part of the landscape is put to the most appropriate use under which it produces most and causes no deterioration or lead to environmental externalities like erosion, desertification or loss of biodiversity.

Within each broad land use category, there is scope for multi-purpose management. For example in the case predominantly rangelands, in addition to the principal use of forage production, it should be possible to provide a number of environmental services- like watershed protection, arresting land degradation and desertification, carbon sequestration and biodiversity conservation. However, these are not the priority concerns of users of rangelands operating in an environment of considerable uncertainty.

The way forward

Recommendations to facilitate better integration for sustainable resource management

The assessment of the current management of forests and rangelands in the Near East region clearly underscores the need for closer cooperation between the different institutions and the urgency of adopting an integrated approach. In almost all the countries, there are clear indications that the fragmented approach is resulting in continued degradation, undermining the livelihood of millions of people. Both rangelands and forests in the region provide more or less the same set of goods and services. Largely these cater to the livelihood of rural communities. Hence, there is strong rationale for strengthening coordination and to adopt an integrated approach to resource management covering all land uses.

Most of the countries have a long history of such integrated management practised by local communities and the traditional systems like “Hima” and “Agdal” ensured long term sustainability. Traditional resource management system seldom made any sectoral differentiation. Livelihood of people depended on the mix of products and services from different parts and uses of the land. In fact traditional communities pursued a “landscape approach” in the use of land.

Sectoral differentiation of land uses originated mostly with colonisation and the appropriation of resources to take advantage of opportunities for use/ trade of selected products. Gazetting forests as reserved and excluding local communities from exercising their traditional rights have been done to facilitate resource appropriation. The authority and power of customary organizations were undermined, adversely affecting the integrated use of land that traditional communities have practised for centuries. Although reservation of forests was ostensibly done to protect the environment, this was not effective for various reasons. While traditional organizations and the integrated land use they promoted declined, the sectoral approach promoted by most governments was also failed to provide a viable alternative. In fact it could be argued that under the new institutional regime deterioration of forests and rangelands accelerated.

Of course, the socio-economic conditions have changed enormously during the last one hundred years making it impossible to reverse the situation and revive the traditional community arrangements. What is really required is to develop an integrated land use appropriate to the changed situation of increased population, developed markets, high level of globalization and, more important, the developments in science and technology. This should take advantage of the strengths of different institutional arrangements, avoiding their deficiencies. Important steps in this direction are indicated below:

Formulation of a comprehensive land use policy

As already evident, coordination between different sectors and the eventual integration of programmes, plans and projects dealing with different land uses are constrained by the absence of an overall land use policy clearly indicating what needs to be done in agriculture,

forestry, animal husbandry, water management, etc. taking due account of the economic and ecological linkages between different land use components. From the experience hitherto in most countries in the region, as also elsewhere, it is evident that local level integration efforts are unlikely to succeed in the absence of an over-arching land use policy. In developing such a land use policy the following aspects need to be taken into account:

- The long term social and economic development scenarios of the country considering the larger changes in demography, economy, environment and science and technology.
- The changes in the relative importance of different land uses and how tradeoffs between competing uses could be established.
- The economic, social and ecological linkages between different land uses.

Review of land use legislations

While policies provide the larger framework, legislations outline what should be done and what should not, providing the basis for interaction between different stakeholders. In most countries efforts have been made to review and adapt land use laws; but as in the case of policies, they remain fragmented and suffer from the traditional “protection through policing” framework. With multiple government agencies involved in land management, there are several and often contradictory rules and regulations. This need to be reviewed, inconsistencies resolved and simplified. In many cases complex legislations increase the transactions costs of compliance, thus encouraging people to violate them. Sustainable management of resources involving the diverse stakeholders requires a very different legal framework to redefine the relationship between the state and other key players.

Adoption of landscape approach to resource management

The top-down approach adopted as regards land use (especially by drawing up sector specific policies, legislation and institutions) has undermined local level collaboration and integration. A landscape approach (which could use watershed or other geographical characteristics as the basis) within the overall land use policy could provide a better framework for local level integration. This will be particularly important in the context of the poverty alleviation objective.

Decentralization, democratization and strengthening local level institutions

A number of countries have made efforts to decentralize authority to the provincial and local levels. However many of the technical agencies, including the forestry departments, continue to operate as highly centralized hierarchical organizations, leading to conflicts with provincial and local level administrations. Governments should explore how decentralization and democratization should be made more effective avoiding some of the potential problems of decentralization.

In this regard a lot of lessons can be learnt from the experience of traditional community organizations. Certainly it may not be feasible to revive the traditional institutions especially

considering the larger societal changes that have taken place undermining the effectiveness of such organizations. Yet there is potential to re-invent local level institutions appropriate to the changed context.

Development of provincial and local land use plans

Within the larger framework of a national land use policy, the states and local governments should prepare land use plans through a consultative process involving the different stakeholders. Such plans should clearly indicate how the different land use components could be integrated considering the economic, social and environmental dimensions. With developments in GIS and remote sensing technologies, development of provincial and local land use plans will not be a major problem. In fact at successive levels, the land use plans should provide a clearer picture of how the different land use components could be integrated keeping in mind the long term vision for socio-economic development.

Provincial and local level integration of agencies dealing with different land uses

The next critical step in building an integrated approach to land use at the provincial and local level is to merge the different line departments and to form land use teams which will be responsible for implementing all the field activities in an integrated manner. To some extent this is already done as in a number of countries provincial units of forest and range management departments function within the provincial directorates of agriculture. Experience from the large number of integrated land use projects also suggests the potential of a team approach to land use management.

Effective use of information and communication technologies

Effective communication between the different sectors and stakeholders is the life-line of collaboration and integration. Unfortunately the flow of information – both vertically (between the different levels in a department/ ministry) and horizontally (between the different stakeholders and other departments) – remains extremely weak notwithstanding the rapid advancements in information and communication technologies. In many cases there is a reluctance to share information and this undermines effective decision making and action.

Countries should invest to build up an effective communication system within and between different departments and stakeholders so that many of the land use problems can be identified and resolved in the early stages. Improved communication is also the key to enhance transparency and better governance of natural resources. Especially developments in remote sensing could help to monitor land use changes on a continuous basis (and there are indications that soon technological advancements will enable real-time assessment of changes).

Building an integrated knowledge base

One of the major challenges facing integrated land use is the fragmentation of knowledge. Historically research has been compartmentalised in line with the sectoral approach to land use. Notwithstanding some of the ongoing efforts to adopt an integrated approach, in practice most research remains sector focused and sometimes even more narrowly focused on areas within a given sector. Further, a large proportion of research is not client driven making research findings of little practical value. Effective integration of land uses, especially forests and rangelands will be extremely demanding as regards integrated knowledge. The R&D system in the land use sectors will require an in-depth review and reorientation giving emphasis to the generation of more integrated knowledge. In this regard particular attention needs to be given to strengthen social science research and to integrate it with other knowledge streams.

In this regard particular attention needs to be paid to fully tap into the traditional knowledge of local communities. Also local communities possess in-depth understanding of local variations as regards land productivity and its seasonal changes. Most of their land use practices have been based on such understanding of local conditions and for a long time they have sustained these societies (Box 18). Notwithstanding the fact that such land use systems have declined in the context of internal and external factors, lessons there-from are of immense value. Integrating traditional knowledge with

Human resource development for integrated land use

A key to the success of integrated resources management will be to develop the human resources with the necessary skills required to adapt land management to the changing needs of an evolving society. Already many of the universities and other educational institutions have revamped their programmes and are offering more integrated courses in natural resources management. In many countries degree programmes have been integrated covering both range management and forestry. This trend need to be strengthened further and eventually all land uses including agriculture should be brought under one umbrella at the level of the under-graduate programme.

Box 18 Relevance of traditional knowledge

“With over six thousand years of bio-cultural diversity in the region, it is only to be expected that there is a wealth of indigenous knowledge on how to use natural resources sustainably. Local traditions for use of resources provide a basis that can be elaborated into programmes for linking the conservation of renewable natural resources with sustainable national development. Functioning local “Himas”, agricultural terraces, rainwater harvesting methods and wildlife populations that are protected by local people are all initiatives of tremendous value for achieving the objectives of conservation of biodiversity”

Source: Abu Zinada et al. 2003 – Quoted in L.Gari, 2006

A similar approach needs to be adopted in the training of land use managers and other professionals. Many of the existing sector focused training institutions can be remodelled and integrated to train land use managers. Such an approach to training of professionals will help to overcome the barriers that have been built over time on account of the sectoral focus of the education and training institutions.

International assistance

International assistance plays a significant role in effecting a transition to a more integrated approach to resource management. Certainly during the early years of development assistance there was a sectoral focus with particular emphasis on improving technical capacity. However, this has changed considerably and most externally assisted programmes adopt a broader perspective giving particular attention to intersectoral linkages. Most of the area based projects adopt an integrated approach which is essential to address problems like poverty alleviation and sustainable management of resources.

However, donor agencies and other international organizations also face certain challenges. Most often donor agencies are under pressure to produce quick results resulting in short time horizons for development assistance which could at best be ineffective and at worse counterproductive (Box 19). Integrated resource management approaches require sustained efforts over a long period to bring about fundamental changes in attitudes and perceptions.

Box 19 International assistance for projects

In conclusion, the first generation of rangelands development projects contributed in the development of technologies but failed in building sustainable institutional organisation of beneficiaries and adequate management models. Rangelands tenure regime was even rendered more complicated, and some buried old conflicts were dug out.

Source: Telahique and Abdouli 2001

A road map for transition

The economic, social and ecological conditions are such that an integrated approach to land use will be unavoidable and sooner this is pursued the better it is. The urgency of this is underscored by the social, economic and political turbulence being experienced by many countries in the region. Climate change related events will accentuate the problems, especially as increasing frequency and severity of droughts and desertification severely undermine productivity of farming, forestry and animal husbandry. Hence there is urgency to move away from the traditional sectoral approach to land use. Incremental changes will not also suffice considering the severity of the problems. It is important that countries prepare a road map for transition to an integrated approach to land use giving due consideration to the various components indicated above. The various initiatives by bilateral and multilateral agencies in this regard should be fully taken advantage of to develop and implement the road map for transition.

Part II. Country studies

- **Iran (Islamic Republic of)**

by Mostafa Jafari

- **Morocco**

by Sabir M., Qarro M. and Benjelloun H.

- **Sudan**

by Hassan Abdel Nour

- **Tunisia**

by Mohamed Nejib Rejeb

3. INTEGRATION OF FORESTRY AND RANGELAND MANAGEMENT INSTITUTIONS IN THE ISLAMIC REPUBLIC OF IRAN²

Introduction



Background

Forests and rangelands are important natural resources in Iran, playing key roles in Iran's economy and environment. A number of factors have affected their sustainable management especially in the context of changes in economic, social and environmental conditions. Institutional adaptation is unavoidable in sustainably managing forest and rangeland resources and it is important to assess the challenges in adopting integrated approaches. It is in this context that this study was initiated with the following objectives:

1. Analyse cooperation between the forests and ranges sectors with regard to promoting better delivery of services provided by forests and rangelands in Iran;
2. Identify the obstacles to improved coordination between the forest and rangelands stakeholders (public, private, NGOs, communities, etc.) enabling sustainable management of the resources and enhanced flow of goods and services. Specifically examine the policy, legal, institutional, financial and technical aspects, including

the flow of information between the different stakeholders/ players as regards improved management of forest and range management.

3. Analyze the measures taken in Iran to improve coordination of efforts in the management of forest and rangeland resources and to what extent these measures have benefited the resources and responded to the expectations of the society;
4. Assess the needs and opportunities for better coordination among stakeholders (public, private, NGOs and communities) and the way forward to sustainable resources management and improved livelihood.

General characteristics

Iran is a land of diverse topography, ranging from high, snow-capped mountains to fertile valleys to barren deserts. The centre of the country is a high plateau (about 1 200 m above sea level), ringed by mountain chains. Much of the plateau consists of desert, the Dasht-e Kavir, covered mainly with salt, and the Dasht-e Lut, covered largely with sand and rocks. In the north, to the south of the Caspian Sea, are the Elburz Mountains, forming a barrier between the low Caspian coast and the interior. Prevailing winds from the north-west bring plentiful moisture to the Caspian coast and the northern slopes of the mountains. The Zagros Mountains extend to the south-east from Turkey and Azerbaijan along the country's western border to the Persian Gulf. Smaller mountain ranges lie along the Gulf of Oman and the borders with Afghanistan and Pakistan. The Khuzistan Plain lies at the north end of the Persian Gulf, between the border of Iraq and the Zagros Mountains. The varied topography has also led considerable variation in climatic conditions.

Demographic and economic conditions

The population in Iran is estimated at about 75.1 million and the annual growth rate is about 1.2 percent. The overall population density is about 45 persons/ km². However, population is unevenly distributed with the Caspian coast and Teheran with relatively very high density, while the central and south eastern areas with sparse population (See Figure 3).

Figure 3 Population density in Iran



In comparison with other large countries in the Near East, Iran is a highly urbanized society and as of 2011 the share of urban population is about 71 percent. Teheran city alone has a population of over 8 million and if the small adjoining towns which are getting integrated with Teheran are also included, the population is about 12.7 million or almost one-sixth of the country's population.

Iran is an upper middle income country and the per capita income has seen a significant increase from about US\$ 2 974 (in PPP) to an estimated US\$ 11 396 in 2011. The average net salary per person is about US\$ 500 per month. Agriculture accounts for about 10 percent of the GDP, while oil, industry and services sectors account for 25 percent, 20 percent and 45 percent respectively. The country has made a systematic effort to develop self-reliance in agriculture as also in manufacturing. To a large extent this has been accomplished through subsidies, especially on energy, food, etc. In almost all sectors there have been efforts to modernize production, moving away from traditional low capital/ low input approaches. However, in the aftermath of the sanctions (especially affecting oil exports) and the need to cut down subsidies, there is considerable uncertainty on the long term performance of the economy. Growing unemployment is a major concern, especially considering the large proportion of people in the younger age group.

Land use and farming systems

Of the land area of 163 million ha rangelands account nearly 54.6 percent of the total land area while forests occupy 11.07 million ha or about 6.8 percent of the land area. The extent of arable land is 17.03 million ha or about 10.5 percent of the land area. Rangelands form the largest terrestrial ecosystem in the country, thus playing an important role in the economy of the country by providing a wide array of products as also ecological services.

Roughly one-third of Iran's total surface area is suited for cultivation, but because of poor soil and lack of adequate water distribution in many areas, most are not under cultivation. Only 12% of the total land area is under cultivation (arable land, orchards and vineyards) and less than one-third of the cultivated area is irrigated; the rest is devoted to dry farming. Some 92 percent of agro products depend on water. The western and northwestern portions of the country have the most fertile soils. Iran's food security index stands at around 96 percent.

One third of the total land area (35%) is used for grazing and small fodder production. Most of the grazing is done on mostly semi-dry rangeland in mountain areas and on areas surrounding the large deserts ("Dasht's") of Central Iran. The non-agricultural surface represents 53% of the total area of Iran, as follows:

- 35% of the country is covered by deserts, salt flats ("kavirs") and bare-rock mountains, not suited for agricultural purposes.
- An additional 11% of Iran's total surface is covered by woodlands.
- Cities, towns, villages, industrial areas and roads cover another 7 percent of the land area.

At the end of the 20th century, agricultural activities accounted for about one-fifth of Iran's gross domestic product (GDP) and employed a comparable proportion of the workforce. Most farms are small, less than 25 acres (10 hectares). Poor economic viability coupled with increasing job opportunities have led to large scale migration to cities. Water availability remains a major constraint as regards agriculture. Agriculture is highly subsidized, especially through a government procurement programme that guarantees a minimum procurement price. Also there are subsidies and incentives for various inputs. Being one of the leading producers of oil and gas, Iran is able to subsidize agriculture and industrial sectors directly and indirectly.

Management of forests and rangelands should be seen in this larger socio-economic context, especially the structural changes in the economy and how the country has attempted to address the different challenges (sanctions, increasing uncertainty in oil prices, unemployment, climate change, etc.).

Forests and forestry in Iran

Owing to extremes of climate, the Islamic Republic of Iran is sparsely forested. Most of Iran's forests are found in the north bordering the Caspian coastal plain and on the northern slopes of the Alborz mountain range. The Zagros range in the west of the country

also has significant areas of forest, though much of it has been converted to grazing land. Most of the forests are closed broadleaved deciduous forest, with the dominant species including *Quercus castaneifolia* and *Carpinus* spp. At high elevations *Juniperus* spp. is common. Some of the forests have been destroyed or severely degraded on account of overgrazing, exploitation for woodfuel, clear-cutting and conversion into rangelands. Industrial harvesting occurs only in the Caspian forests. Because of the severe climatic conditions and forest degradation, forests in other regions are not exploited for industrial wood production. Commercial production in these forests is limited to non-wood forest products, which include natural colorants and dyes, henna, aromatic plants and essential oils, honey, pistachios, walnuts, gum and medicinal plants. Around 60 percent of Iran is arid desert or semi-desert, where vegetation is primarily sparse *Acacia* and *Prosopis* scrub.

Extent and distribution of forests

In 2010 Iran's forest area totaled about 11 million hectares, approximately 6.8 percent of the country's land area. Iran is hence a low forest cover country. On a per capita basis the extent of forests is only about 0.15 ha, which is substantially much higher than for most countries (barring Turkey in the Near East region).

Table 5 Extent of forest and other wooded land

Extent of forest and other wooded land			
FRA 2010 categories	Area (1000 hectares)		
	1990	2000	2010
Forest	11 075	11 075	11 075
Other wooded land	5 340	5 340	5 340
Total	16 415	16 415	16 415

Source: FAO 2010

Although the forest area appears to remain stable during the last two decades (see Table 5) there are concerns about the reliability of area statistics. The figures in the table are based on vegetation cover 1/25000 in year 2000. The method used for preparing this map is satellite data (1998) interpretation and the views of experts. There is no information available for estimating changes over time, but any deforestation is unlikely to exceed the annual planting rate, so the original data have been used for all reporting year (FAO, 2010).

Adequate rainfall and other favorable climatic conditions have contributed to the existence of 1.5 million hectares of dense forests in the Caspian region and the northern slopes of the Elburz Mountain., where many of the forests are commercially exploitable and include both hardwoods and softwoods. The remainder is distributed among western forests (3.6 million hectares), southern forests (434 000 hectares), desert forests (620 000 hectares), and forests scattered in other locations.

Supervised by the Department of Natural Resources, the Caspian forests produced 820 000 cubic metres of timber products in 2004, more than 90 percent of which was for

industrial use. Although forests and pastures are nationalized in 1962 bringing them under direct government control, forest destruction remains a major problem. Forest fire, which affects 20 000 ha annually, is another major factor contributing to forest destruction and degradation. Between 1954 and 2004, an estimated 41 percent of Iran's forest land has been lost. In response to this government has imposed rigid controls of cutting of trees and has invested in reforestation.

Forest types

Broadly Iran's forests can be grouped as temperate semi-humid; semi-arid and arid forests. Over 90 percent of them are hardwood forests. Certain types of trees predominate in various geographical regions due to differences in temperature, moisture supply, soil conditions and elevation. Some of the forests have been destroyed or severely degraded. Within these three broad vegetation types five different regional forest types are distinguished as follows:

- **The Caspian broadleaved deciduous temperate forests:** These forests, extending over an area of about 1.9 million ha, are also called the Hyrcanian forests. They are found on the south coast of the Caspian Sea and the northern slopes of the Alborz mountain range from sea level to an altitude of 2 800 m. They extend for 800 km in length and about 25 km in width. Approximately 60 percent of these forests are used for commercial purposes and the rest of them are more or less degraded. The average annual precipitation ranges from 600 to 2 000 mm with a maximum in the west and a minimum in the east. These are the most valuable forests in Iran.
- **Arasbaran sub-higrophic forest:** These forests, located in north-western Iran, look like the Hyrcanian forest but some of species such as *Fagus orientalis* and *Quercus castaneifolia* do not grow in the Arasbaran region.
- **Irano-Toranean evergreen and broadleaved forests:** These cover an area of about 3.5 million ha in the central plateau and mountainous part of the country. The region is arid to semi-arid and the annual precipitation varies between 100 and 400 mm.
- **Zagrosian broadleaved deciduous forests:** The main constituent of these forests is oak, *Quercus* spp. They stretch from north to south along the Zagros Mountains, extending as far as Shiraz. They grow under annual precipitation between 450 and 1 050 mm. They are subject to over-exploitation and degradation due to intensive human activities including overgrazing.
- **The Khalijo-Ommanian forests:** This region comprises the entire southern part of Iran between the southern watersheds of the Zagros, the coast of the Persian Gulf and the sea of Oman. The climate is subtropical with hot summers. The average annual rainfall is less than 200 mm.

History of forest management

The economic role of forests became important in the nineteenth century when the exploitation of the northern forests of the country, mainly for timber for export, was undertaken by foreign contractors. In addition, before the nationalization of the forests in 1962, some landowners exploited their own forest lands. Although the High Council for Forest, Range and Soil was

established in 1951 and forest management regulations were ratified in 1958, forest areas continued to be exploited by foreign enterprises and forest owners.

In 1959 the first forest management plan was prepared and implemented in the Caspian area. Forestry plans covered only limited areas until 1962, when nationalization of forests led to the preparation of forestry and exploitation plans on a large scale. Multiple-use forestry plans are now based on non-wood products with wood production exclusively to cover local needs for fuelwood and fine wood industry. Fisheries, apiculture, animal husbandry and fodder production are integrated in forestry planning in suitable areas.

Forest ownership in Iran was transferred to the government following enactment of the Forest and Rangelands Nationalization Law (FNL), 1962 (Ratified by the Council of Ministers in January 1963). Most forest areas are now State-owned, except for a few plantations on private land. The State's role in forest management has been defined as "balancing the use of forest resources for the entire nation and potential stakeholders". State ownership has helped to regulate forest utilization in the Caspian forests, where timber can be extracted according to approved forest management plans (FMPs). The State's most significant contribution to forests has been in preventing further forest degradation resulting from such activities as:

- Extensive conversion of forest land to other land uses;
- Deforestation or forest degradation involving loss of forest area or biodiversity;
- Illegal logging.

Forest products and services

Several different goods and services are provided by forests, including industrial roundwood, woodfuel, non-wood forest products like honey, fodder, medicinal plants, etc. The majority of Iran's industrial round wood production is used for agricultural purposes such as posts and poles. A substantial quantity of sawnwood, plywood and pulp and paper are also produced by the wood industries in Iran based on wood supply from the country's forests. Inadequacy of local production has led to the imports of some quantity of forest products, mainly paper.

For many rural communities bee-keeping, animal husbandry and fishing are important means of livelihood. Fodder, medicinal plants, gums and other by products are important outputs from both forest and rangelands.

The most important ecological services provided forests and woodlands include watershed protection, arresting land degradation and desertification, conservation of biological diversity and carbon sequestration. In managing forests and woodlands in most of Iran, these ecological services are given primacy.

Policies dealing with forest and range management

Islamic Republic of Iran has paid considerable attention to the protection of its natural environment and this is clearly built into the country's constitution (See Box 20).

Box 20 Natural resources in the Iranian constitution

Article 45:

Wealth and property, such as uncultivated or abounded land, mineral deposits, seas, lakes, rivers and other public waterways, mountains, valleys, forests, marshlands, natural forests, unenclosed pastures, legacies without heirs, property of undetermined ownership and public property recovered from usurpers, shall be at the disposal of the Islamic government for it to be utilized in accordance with the public interest. Law will specify detailed procedures for the utilization of each of the foregoing items.

Article 48:

There must be no discrimination among various provinces with regard to the exploitation of natural resources, utilization of public revenues, and distribution of economic activities among the various provinces and regions of the country, thereby ensuring that every region has access to the necessary capital and facilities in accordance with its needs and capacity for growth.

Article 50:

The preservation of the environment, in which the present as well as the future generations have a right to flourishing social existence, is regarded as a public duty in the Islamic Republic. Economic and other activities that inevitably involve pollution of the environment or cause irreparable damage to it are therefore forbidden.

Since forests in Iran cover less than 10% of the total land area, the main objective of the national forest policy is to protect forests. In the national forest policy and forest protection strategies, priority has been given to rehabilitation and sustainable forest management of environmentally critical areas. Forest policy in Iran aims to accomplish all aspects of forest conservation and management and clearly lays down the process to be adopted to secure people's participation (See Box 21).

Box 21 Objectives of the Forest policy in the Islamic Republic of Iran

The forest policy of Iran aims to accomplish the following

- prepare integrated plans for all natural resources of the country and apply proper exploitation systems based on modern technology suitable for the sustainability of natural resources and increase timber and fodder production for economical exploitation;
- prepare and implement agro-sylvi-pastoral plans, especially in the Zagrosian vegetation region;
- establish wood industry units to create income-generating possibilities for forest dwellers;
- establish forest cooperative societies to manage, preserve, rehabilitate, develop and exploit the forest in collaboration with local people and within the conditions and limitations prescribed in the developed plans;
- procure technical facilities and required investment to develop road networks;
- industrialize the traditional animal husbandry systems in the northern forests by creating income-generating possibilities and procuring animal husbandry facilities in marginal areas outside forested lands;
- procure the required equipment and inputs to implement the country's natural resources development plans;
- improve timber production through mechanization and modern technology, and decreasing waste;
- procure the required facilities to replace fuelwood by other suitable kinds of fuel;
- determine rational ways of exploiting forest by-products to supply local needs and export the excess materials;
- extend agro-forestry, the plantation of multiple-use wood species and the plantation of fast-growing tree species to meet timber needs through short and medium rotations;
- preserve rare forest communities and species as national reserves;
- promotion of State, private and cooperative investment in developing, rehabilitating and utilizing all touristic areas and landscapes of the country;
- promote training and extension programmes and awareness raising about the importance of natural resources preservation and rehabilitation.

In the formulation of forestry policies and programmes all relevant administrative sectors are involved. The new policy, adopted to promote forest resources, was developed in partnership with all stakeholders. Several cross-sectoral measures have taken with other organizations such as the Meteorological Organization, the Ministry of Energy, the Department of Environment and the agricultural sector.

Stakeholders' involvement: Forest management plans are being implemented by the government, cooperatives and private sector. At present forest and rangeland protection is mainly carried out primarily in collaboration with local communities. Private sector involvement in planning, formulation and implementation projects is stipulated by law. Local communities, NGOs and indigenous people involve formally in the process of formulating, planning and implementing forest management plans and forest policy.

Legislation

In 1962, the entire forests and rangelands in the country were nationalized, making government the sole ownership of these resources (see Box 22) and are still owned by the government. However local rights are accommodated and fully recognised. For example, customary rights of the indigenous and local communities are recognized in all forestry projects and their involvement in the process of decision making is encouraged. Besides the land tenure right of the local communities is also officially recognized and respected by law. Wood trade is undertaken and managed according to customs laws and regulations.

Box 22 Forests and Rangelands Nationalization Law 1962 (Ratified on 16/01/1963)

"Clause 1: As of the date of approval of the above law, all natural lands and immovable properties located in forests and rangelands, wooded lands and forest areas are ruled out as public property and therefore belong to the government even if managed under the private ownership or received title deeds before the above date".

The nationalization law also stipulates exemptions, makes provision for paying compensation to owners of forests and rangelands and prescribes the mode of payment as also the budgetary provision to the Forestry Organization to pay the compensation.

Source: http://www.frw.kr.ir/index.php?option=com_content&view=article&id=312:-27101341-&catid=63:1388-06-22-04-46-34&Itemid=23&lang=en

The Law of Protection and Exploitation of Forest and Range, enacted in 1967, includes specific legislation relating to areas which may be declared as forest parks. They are administered by the Forestry and Range Organization and are maintained as parks designated primarily for recreation, although they often include important representatives of unique woodland stand types.

The Environmental Protection and Enhancement Act, 1974 identifies four categories of protected natural areas: national park, wildlife refuge, protected area and national nature monument. The first wildlife reserves were established in 1927. In 1956 the Game Council was created with a policy to set up hunting centres for the protection of endangered species and the control of hunting. In 1967, the Game and Fish Department was empowered by law to declare certain areas for the protection of flora and fauna.

Institutions

In Iran forestry (as also rangeland management) is in the hands of the Forestry, Rangeland and Watershed Organization (FRWO), under the Ministry of Agriculture Jihad-e-Sazandegi, while conservation and management of protected areas vests with the Department of Environment established in 1972.

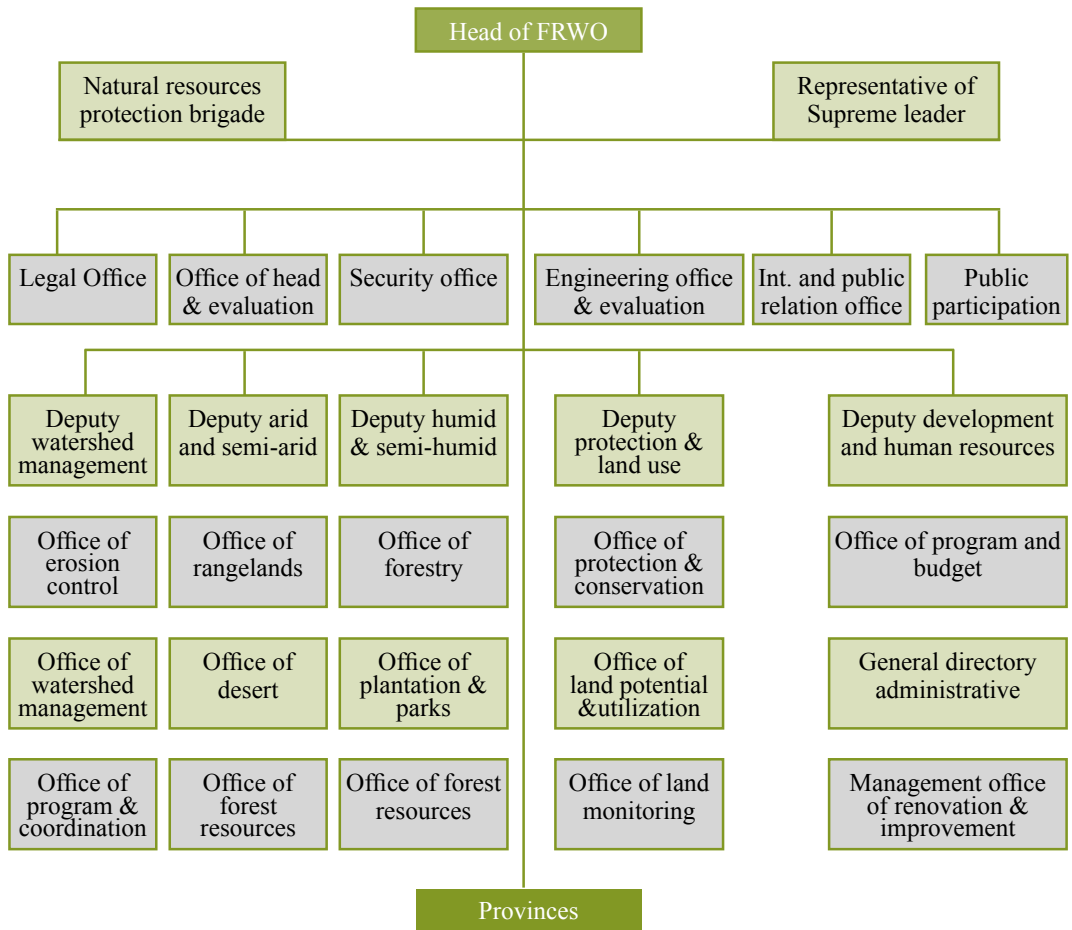
Forest, Range and Watershed Management Organization (FRWO)

The Forestry and Range and Watershed Management Organization is the key institution dealing with the management of forests and rangelands and the fact that two key resources namely forests and rangelands are under one organization paves the way for pursuing a highly integrated approach in managing these resources. FRWO has a long history and the concept of integration has been built into its structure for a long time. The chronology of the development of FRWO is as given in Table 6.

Table 6. Milestones in the evolution of the Forest, Range and Watershed Management Organization

Year	Evolution of FRWO
1823	Establishment of a Bureau for forest management
1920	Forestry Bureau is established
1940	Establishment of Forest Division
1942	Forest Division is upgraded as a full-fledged Forest Department
1949	Establishment of Forest Service
1960	Establishment of Forestry Organization
1967	Ministry of Natural Resources established
1972	Establishment of Forest and Rangelands Organization
2002	Establishment of Forest, Range and Watershed Management Organization

As the name suggests, forest and range management are well integrated in the current structure of the Forests, Range and Watershed Management Organization (FRWO) (See Figure 4) and consequently Iran has surmounted the coordination problems if forest and rangeland management were handled by separate institutions.

Figure 4 Forests, Range and Watershed management Organization, I.R. Iran

Source: Mostafa Jafari – October 2012³

Forest, Range and Watershed Management Organization (FRWO), operating under the Ministry of Jihad-Agriculture manages all public lands covered by the 1962 Forest and Range Nationalization Law. It is responsible for specifying guidelines, planning and enforcing policies, legislation and regulations pertaining to land use, forestry, range management, desertification control and watershed management. FRWO comprises of 5 Bureaus and 5 Departments as well as the High Council of Forest, Range and Watershed Management, Natural Resources Guard and the Representation Office of the Supreme Leader at the headquarters and 32 natural resources administrations in provinces. The main objectives of FRWO are:

- Protection, conservation and sound utilization of forests and rangelands and development of man-made forests and rangelands, as well as plantation development and reclamation of degraded forests ad rangelands;

³ Recently some modification has happened in FRWO's structural chart

- Establishment of industrial and cooperative complexes aimed at sound utilization of forests and rangelands based on related laws and regulations;
- Formulation and implementation of plantation projects as well as forests and rangelands reclamation programmes and establishment of forest parks;
- Implementation of laws and regulations related to forests, rangelands, soil and coastal lands and other laws relating to the Forests, Ranges and Watershed Management Organization;
- Research in the fields of forests, rangelands, soil and sand dune fixation

Forest management plans

In 1959, the first forest management plan was prepared and implemented in the Caspian area. Forestry plans covered only limited areas until 1962, when nationalization of forests led to the preparation of forestry and exploitation plans on a large scale. Functionally forests have been categorised as:

- Production forests extending over an area of 1.500 million ha, almost entirely in Caspian region;
- Area set aside for biodiversity conservation (0.153 million ha); and
- Multiple use forests extending over an area of 9.422 million ha.

Multiple-use forestry plans are now based on non-wood products with wood production exclusively to cover local needs for fuel wood and fine wood industry. Fisheries, apiculture, animal husbandry and fodder production are integrated in forestry planning in suitable areas.

In view of its commercial importance, Caspian forests have attracted most of the management attention. The first forest management plan prepared in 1959 followed the shelterwood system, largely in line with the practices in the temperate forests in Europe. However intense grazing, over exploitation and farming have led to severe degradation. Since 1997, there has been a shift towards selection system and forest management plans are increasingly geared to what may be regarded as “continuous cover forestry” or close to nature forest management, aiming to enhance biodiversity and to arrest soil erosion.

Forestry projects are carried out in the framework of forest management plans prepared, approved and supervised by FRWO on the basis of specific principles and guidelines. The existing principles and standards guarantee sustainable forestry at the area unit level. As expected, considerable attention has been paid to the more productive and economically important Caspian forests. To accomplish the objectives stipulated in the forest policies, Iran has implemented/ implementing a series of comprehensive national and regional plans (Table 7) addressing specific problems as indicated below:

Table 7 National and regional plans in forestry, range and allied areas

Plans and programmes	Thrust areas
National Plan for Formulation of Integrated Desertification Control Projects	<ol style="list-style-type: none"> 1. Desertification Control 2. Rehabilitation of Vegetation Cover 3. Exploitation of Surface and Underground Water Resources 4. Prevention and Control of Wind Erosion 5. Increase of Biological and Fodder Production 6. Immigration Control 7. Environmental Conservation 8. Creation of Job Opportunities 9. Protection of Residential Areas and Agricultural Lands 10. Control of Runoffs for Development of Vegetation Cover 11. Creation of New Opportunities for Developmental and Economic Activities
National Plan for Sustainable Rangeland Management	<ol style="list-style-type: none"> 1. Rangelands Qualitative and Quantitative Recovery 2. Sustainable Range Exploitation 3. Rehabilitation of Vegetation Cover, Control of Wind Erosion and Recharge of Underground Water Resources 4. Sustainability of Environmental Factors in Controlling Drought Cycles 5. Socio- Economic and Cultural Sustainable Development
National Plan for Development and Conservation of the Caspian Forests	<ol style="list-style-type: none"> 1. Conservation and Protection of the Caspian Forests 2. Development and Increasing of the Caspian Forests 3. Rehabilitation of Degraded Caspian Forests 4. Optimization of Management System in the Caspian Forests 5. Decrease of Social Problems aimed at Forest Development 6. Exploitation of the Caspian Forests Based on Ecological Potentials and Environmental Factors
Regional Plan for Removal of Livestock from the Caspian Forests	<ol style="list-style-type: none"> 1. Regeneration and Rehabilitation of Forests 2. Reduction and Elimination of Forest Degradation Factors 3. Removal of Livestock from Forests and Centralization of Sporadic Villages 4. Rehabilitation of Degraded Forest Areas 5. Alteration of Livelihood Patterns of Forest Communities

Plans and programmes	Thrust areas
Regional Plan for Silviculture in the Caspian Forests	<ol style="list-style-type: none"> 1. Upgrading Forest Stands 2. Maximizing Mixture of Species 3. Elimination of Harmful Effects in Forests
National Plan for Development and Conservation of Zagros and Southern Forests	<ol style="list-style-type: none"> 1. Identification of Forest Zones 2. Collection of Forest Data 3. Determination of Existing Forest Capacities 4. Identification of Forest Genetic Resources 5. Identification of Socio- Economic and Cultural Obstacles in Forest sector 6. Promotion of Fast Growing Species for Wood Production, and Focus on Forest and Range by-Products and Medicinal Herbs 7. Formulation of Forest Management Plans
Regional Plan for Green Spaces and Forest Parks Development and Forest Reserves Management in Arid and Semi-arid Zones	<ol style="list-style-type: none"> 1. Development of Arid and Semi-Arid Forests aimed at Water and Soil Conservation and Ecosystem Sustainability 2. Development of Wood- Culture aimed at Supply of part of the Wood Requirements and Reduction of Pressure on Forests 3. Participatory Management 4. Employment and Job Creation
National Plan for Land Survey	<ol style="list-style-type: none"> 1. Exercising Government Authority on National Resources 2. Promotion of Security for Investments 3. Promotion of Conservation and Development of Natural Resources 4. Land Survey and Delineation of Public and Private Lands
National Plan for Conservation and Protection of Forests and Rangelands	<ol style="list-style-type: none"> 1. Control of Forest and Range Degradation Factors 2. Control of Forest and Range Pests and Diseases 3. Reduction of Illegal Wood Cutting 4. Conservation of Genetic Reserves and Rare Species
National Plan for Watershed Management	<ol style="list-style-type: none"> 1. Control of Soil Erosion and Sedimentation in the Basin of Dams 2. Control of Soil Erosion, Sedimentation of Watershed Basins 3. Use of Water Spreading Techniques aimed at Enhancing Flood Water Efficiency 4. Control of Flood Occurrences in Urban and Rural Areas Exposed to Flood

Plans and programmes	Thrust areas
National Green Movement	<ol style="list-style-type: none"> 1. Conservation and Rehabilitation of Forests 2. Development of Natural Resources Management 3. Increase of Forest Cover to the 10 % of the Land Area of Country 4. Enhance the Participation of Community and Government for the Conservation and Rehabilitation and Development of Natural Resources 5. Creation of Job Opportunities in Natural Resources 6. Participation of NGOs, CBOs and Governmental Organizations 7. Attaining Sustainable Development and Ecosystem Conservation 8. Reduction of Exploitation in Industrial Forests and Rehabilitation of Degraded Forests 9. Development of Greeneries in Urban and Rural Areas and along roads
Regional Plan for Supervision on Exploitation in the Caspian Forests	<ol style="list-style-type: none"> 1. Implementation of Sustainable Development in Natural Resources Management 2. Regeneration and Reduction of Damages to Natural Resources 3. Soil Conservation and Erosion Control 4. Design of Appropriate Exploitation System for Natural Resources Management 5. Qualitative and Quantitative Promotion of Forest Products 6. Development of Wood-Based and Cellulose Industries

Afforestation and reforestation

In the last 25 years, programmes were established to plant irrigated and non-irrigated areas to meet local needs for timber and environmental protection. By the year 1999, the total planted area reached over 2.2 million ha. The main purposes are to supply wood for forest industry and to minimize impacts on the natural forests of the country.

Since 1965, the FRWO has undertaken a number of programmes to establish plantations in the vicinity of large towns as green belts and forest parks. Before the mid-1970s there was practically no experience in plantation establishment. In the early 1980s a new programme of tree planting was launched in irrigated and non-irrigated areas. An area of 253 000 ha was planted during the period 1989-1992. By 1994, according to unofficial estimates there were more than 466 197 ha of plantations (Jafari and Hossinzadeh, 1997). By 2000 the total planted area has reached almost 2.3 million hectares.

In implementing the afforestation and reforestation programmes, water shortage remains a major challenge. Site preparation and establishment of irrigation facilities are quite expensive in the water scarce conditions in most areas.

The process of nfp (national forest programme) in Iran

Following UNCED in June 1992, the National Committee on Sustainable Development (NCSD) was formed in 1996 to follow up and achieve UNCED main objectives. In 1993, formulation of a National Strategy for Environment and Sustainable Development (NSE) started under a UNDP and World Bank funded Capacity 21 programme. National reports were prepared on 20 cross-sectoral environmental issues and a NSE framework was developed from these reports. The NSE is linked to the National Development Plan (NDP), which is prepared every five years and articulates Iran's principal environment development objectives, establishing linkages with different sectors.

FRWO is responsible for the formulation of the nfp, as emphasized by the National Committee on Sustainable Development. In 1996, FRWO launched the forest management plan for sub-humid forests. The main tool for implementing sustainable forest management in Iran is forest management plans. The first forest management plan was prepared and implemented in the Caspian area in 1959. Forestry plans covered only limited areas until 1963, when nationalization of forests led to the preparation of forestry and exploitation plans on a large scale. Multiple-use forestry plans are now based on non-wood products with wood production exclusively to cover local needs for fuel wood and fine wood industry. Fisheries, apiculture, animal husbandry and fodder production are integrated in forestry planning in suitable areas.

Since 1997, the following economic and policy instruments have been applied to attain sustainable forest management:

Policy instruments:

1. Support participatory process in planning, implementation, monitoring and evaluation of forestry plans
2. Support and encourage private sector, local communities and NGOs involvement in forestry related activities
3. Promote cross- sectoral and international cooperation
4. Delineate and specify the boundaries of private forest and rangelands
5. Organize training programmes and provide technical services to participants

Economic instruments:

1. Provide low-interest loans for plantation programmes particularly, multipurpose tree species
2. Provide low-interest loans for forest-related cooperatives

3. Eliminate tariffs on wood import
4. Entrust low price lands for plantation

The Enabling Activity Project known as “The National Biodiversity Strategy and Action Plan” started in 1998 in collaboration with UNDP, GEF and IUCN. In 2001 four strategies were ratified as follows:

1. Promotion of the public awareness and participation
2. Formation of biodiversity information systems
3. Sustainable use of biodiversity resources
4. Integrated conservation of biodiversity

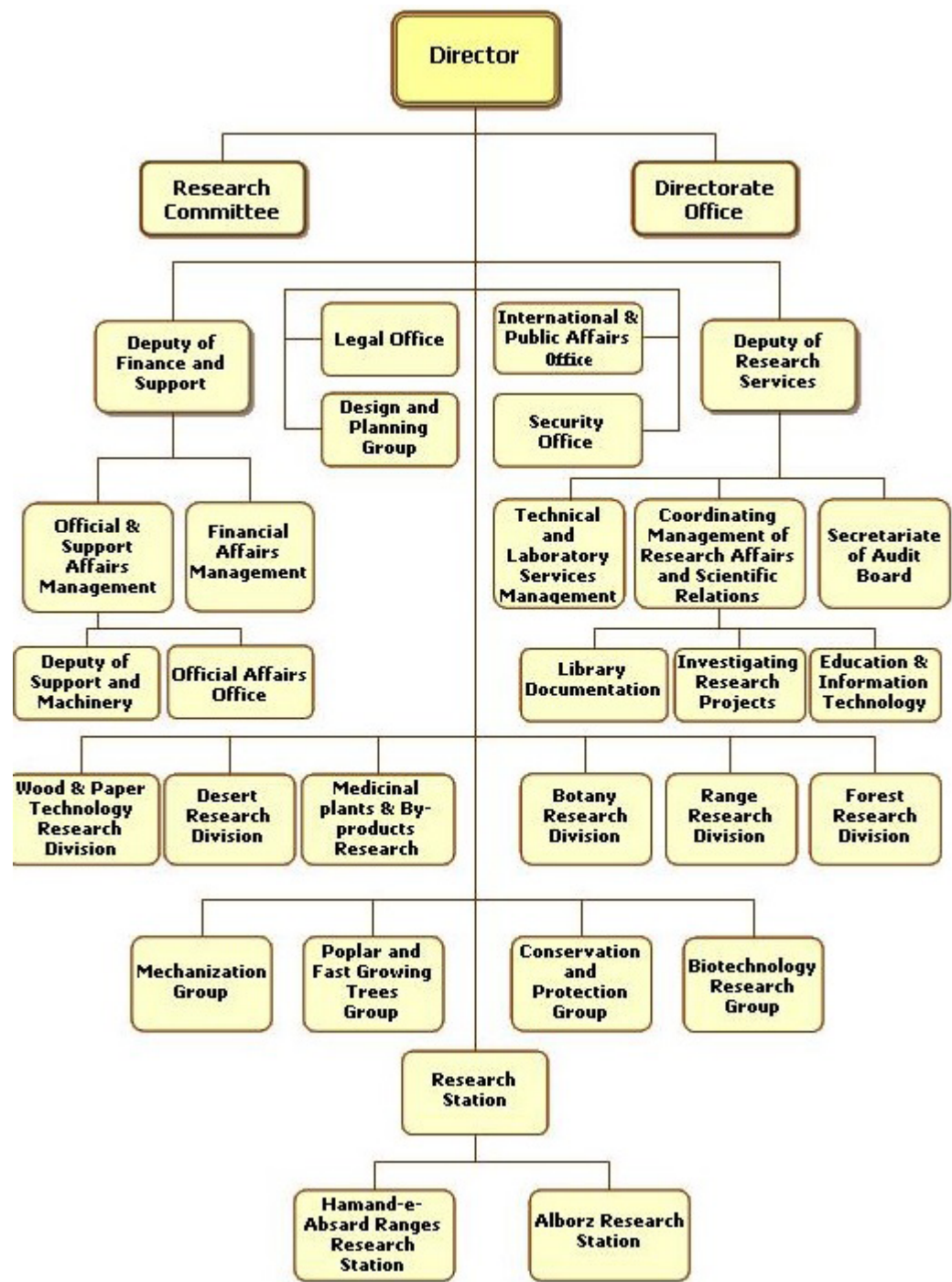
The National Action Programme to Combat Desertification of I.R. of Iran was finalized in 2004.

Formulation of NFP requires capacity building. Recently, many actions have been taken to combat deforestation and forest degradation including transfer of livestock from forests and resettlement of the forest dwellers, forest extension, and rehabilitation of degraded forests as well as replacement of fossil fuels with fuel woods parallel to measures taken to update and enact forest laws. All these have been undertaken within the framework of an integrated approach.

Education and research in forest and range management

A very positive situation exists in the Islamic Republic of Iran on account of very well developed institutions of education and research and highly qualified man-power. There are several universities which are focused on teaching and research dealing with natural resources with particular focus on forest and range issues. Research is conducted in ministries and universities. Almost all ministries have their own research institutes and centres. The Faculty of Natural Resources, University of Tehran includes the Department of Forestry and of Forest Economics which conducts studies relating to forest status and protection. A strong emphasis at the policy level and the compulsion to find practical solutions to field problems have encouraged a more holistic approach as regards range and forestry issues. The leading institution supporting applied and adaptive research in forest and range issues is the Research Institute of Forests and Rangelands (See Figure 5). The structure clearly indicates that both forest research and range research are getting equal attention.

Figure 5 Institutional chart of research institute of forests and rangelands



Source: Notification No. 808/91917 on 22/10/2005, Management and Programming Organization of the Country)

Further, FRWO has two training centres which take care of imparting skills to all professionals involved in the management of forests and rangelands (see Annex 3).

Department of Environment

The Department of the Environment, established in 1972 has the responsibility for conservation and enhancement of wildlife resources and controlling pollution. It is also responsible for drafting various regulations to improve habitat management. On the whole the present capacity of the Department to enforce conservation legislation and regulations is limited.

The Department of Environment is divided into a number of divisions dealing with different environmental matters; of these, the Division of Parks and Wildlife is responsible for protected area management. The division prepares recommendations for the establishment of reserves or changes in reserve classification. Before they are presented to the High Council of the Environment for approval, they are reviewed by all appropriate divisions of the Department of the Environment so that all government organizations having jurisdiction over lands proposed for protection get an opportunity to assess the impact on resources administered by their organizations.

Control of grazing and forestry within reserves is determined by regulations adopted jointly by the Forest and Range Organization and the Department of the Environment.

Management of rangelands

There are varying estimations of the total rangeland area in Iran. For instance, in 1980, Bavari (cited in FAO, 2004) estimated 10 million hectares of the country as rangelands, while it was estimated approximately 106 million hectares by (Sheidaei and Nemati, 1978). Primarily such wide variation in area estimates stems from the imprecise definitions of the term rangeland. The first reliable estimate of the area was presented by Niknam (quoted from FAO, 2004), who developed a map based on the definition of rangeland as stated in the forest and range exploitation law. According to this definition all lands apart from fallows, consisting of mountains, hillsides and flat plains, covered by natural vegetation during grazing season and traditionally recognized are defined as rangelands. The estimate of the rangeland area by Niknam was adjusted to 90 million hectares by satellite images taken by an American company, FMC. According to this definition used in the recent studies, rangelands occupy nearly 54.6 percent of the total land area and 65 percent of natural resources in Iran (Badripour, Eskandari *et al.*, 2006).

Economic importance of rangelands

Being the largest terrestrial ecosystem in the country, rangelands play an important role in the economy of the country by providing ecological goods and services (Ghafari, 1991). Rangelands are particularly important to certain sections of Iranian society, especially the semi-nomads whose number is estimated to be over 2.5 million. The rangelands are also

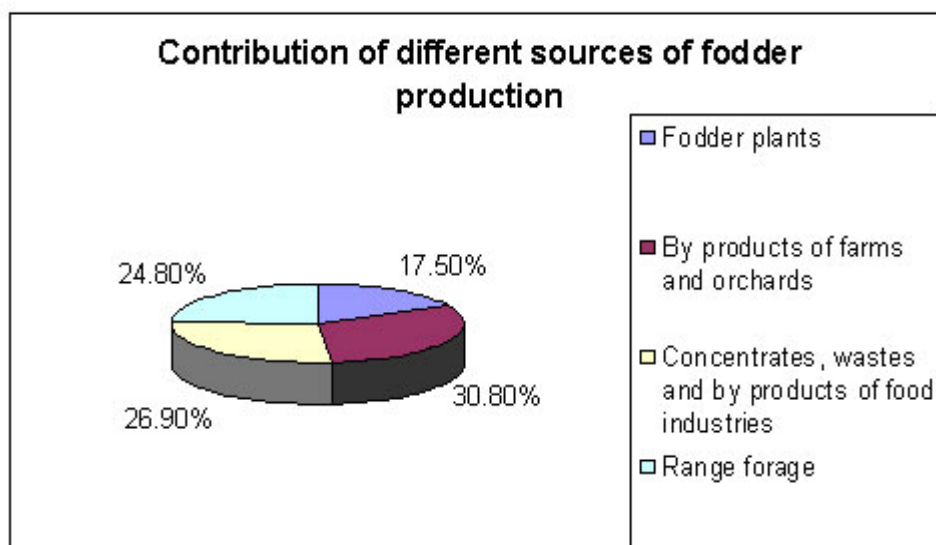
of great economic importance considering that 6 percent of the gross national product is meat, medical plants, herbs, and honey. Range and livestock production makes up about one-third of income earned in the agricultural sector—which itself is about 20 percent of the total non-oil GDP, and about 6 percent of the total GDP. Moreover, the rangelands fulfill a number of ecological functions such as the conservation of biodiversity and the maintenance and preservation of biological processes (Abolhassani, 2011).

Qualitatively rangelands have been classified into three categories based on dry matter productivity as indicated in Table 8 (Niknam, cited by Sheidaei & Nemati, 1970, Badripour, 2004).

Table 8 Condition of rangelands and dry matter productivity

Rangeland's Condition	Area (million ha)	Mean dry matter production (kg / ha)	Usable dry matter (million tonnes)
Good	19	450	8.55
Fair	25	150	3.75
Poor and very poor	56	30	1.68
Total	100		13.98

Figure 6 Contribution of different sources of feed in Iran, in 1999



Source: Badripour, 2004

In Iran, animal husbandry is the most productive use of the semi-arid zones. Despite the severe degradation in the recent decades they produce a significant share fodder and consequently meat production. The amount of forage consumption varies depending on

the production system of the rangeland. Table 9 gives an indication of the total amount of fodder and feed from different resources suggesting the critical significance of the range resources.

Table 9 Contribution of different sources of fodder production in Iran in 1999

Source of fodder	Production (1 000 tonnes TDN)	Contribution %
Fodder plants	4 155	17.5
Crop residues	7 322	30.8
Agro-industrial products	6 394	26.9
Range forage	5 885	24.8

Source: FAO 2004

According to Badripour, Eskandari *et al.* (2006), livestock population over the country is about 124 million animal units. 83 million of the total livestock population depends entirely on the rangelands for seven months (Abolhassani, 2011). Following tables indicates the composition of the total livestock and of the rangeland-dependent livestock, respectively.

Table 10 Composition of livestock population in 2001

Type of livestock	Population (1 000 heads)	Coefficient to AU	Equivalent population (1 000 AU)
Sheep	54 000	1	54 000
Goat	25 757	0.75	19 318
Native cattle	5 500	4	22 000
Hybrid cattle	1 806	6.5	11 739
Pure cattle	741.5	9.5	7 044
Camel	143	5.5	786
Buffalo	475	6.5	3 087
Draughts	1 727	3.5	6 044
Total			124 000

Source Badripour *et al.*, 2006

Although there are a number of theoretical and methodological issues in assessing the role of rangelands in the provision of ecological services, there have been efforts to put a price tag (See Table 3.7) on the services from rangelands.

Table 11 Economic value of one hectare of rangeland

<i>Environmental service</i>	Values in US\$
<i>Greenhouse gases</i>	7
<i>Regulation of water cycle</i>	3
<i>Erosion control</i>	27
<i>Soil formation</i>	1
<i>Pollution control</i>	87
<i>Pollination</i>	25
<i>Biological control</i>	23
<i>Production of raw material (grazing products)</i>	57
<i>Recreation</i>	2
Total	232

(Source: Eskandari Shiri, 2005 cited in Badripour *et al.*, 2006)

Considering the economic, social and environmental importance and increasing devastation of rangelands, maintaining and rehabilitating them has become very important (Lashgarara and Goudarzi, 2011). Rangelands have been recognised as a key resource considering their importance as a (a) source of fodder, (b) repository of biodiversity, (c) land use that provides substantial rural employment, and (d) provider of ecological services, especially water regulation and arresting land degradation and desertification (Molae, 2002).

Factors causing rangeland degradation

However, several factors have contributed to the destruction of rangelands, especially in the last couple of decades and efforts to reverse the situation has received some attention. Sustainable management of rangelands is constrained by:

- Limited human resources in institutions dealing with rangeland issues;
- Changing demography, in particular ageing of rangeland owners and those involved in management and the absence of younger people taking up range management;
- Limited technical knowhow as regards range management;
- Weaknesses in education and extension in range issues.

Historically governments have adopted a non-interfering or negative approach. However this is changing and increasingly emphasis is being given to adoption of integrated approaches with the full participation of local communities (Jalali and Karami, 2005).

Policies and institutions dealing with range management

Policies and institutions dealing with range management in Iran are integrally linked to the management of forests. Within the larger framework of FRWO, scientific and management issues relating to forests and rangelands are addressed by the respective forest and range

technical offices. As already pointed out, the 1962 nationalization encompassed both forests and rangelands. This along with the unified nature of FRWO, giving equal importance to forests and rangelands in its structure ensures that there are no conflicts between these two key land uses. There are different technical bodies to deal with scientific issues in forestry and range management issues but in overall view for management system, there is an integrated manner in decision making organization.

Stakeholders in range management

Stakeholders involved in range management include the Government and its main institution namely the Forests, Range and Watershed management organization. Farmers and people who keep the livestock and traditionally have right of using rangelands for feeding their animals are the second important stakeholder. Research Institute of Forests and Rangelands is the national body which helps them with providing scientific knowledge for better improvement and use of rangelands. In addition there are several NGOs which have interest to work with nomad and work in different dimensions including economic, cultural, traditional knowledge and social aspects. There are also several universities and research centres addressing range management issues. A positive aspect is the existence of well-developed institutions, especially FRWO, the Research Institute of Forests and Rangelands and the Universities, where integration is built into their structure and functions.

Institutions responsible for range management

At the national level, FRWO is responsible for range management within its larger mandate of managing all natural resources. Within FRWO, range management gets more or less equal attention as that of forests and range management is headed by Deputy Director General supported by Technical Bureau of Rangeland and other supporting bodies. A similar structure exists at the provincial level also; under the Director General of FRWO at the provincial level a Deputy DG along with Technical Office and a Committee on Rangelands forms the foundation for range management.

This is more or less replicated at the local level with a Director of FRWO office supported by experts as also mechanisms for consultation with farmers, nomads, etc.

Range Management Plans

As in the case of forest management plan being the key tool for forest management, range management plan is the main tool for sustainable management of rangelands and most of the rangelands are covered by such plans. The strategic plan for reclamation, development and utilization of rangelands started in 1963 along with the establishment of rangeland reclamation stations under FRWO. A number of projects were implemented under “Range Management and Fodder Production Programme”, “Range Management Implementation Programme” and “Range Capacity Management Programme”.

These have continued in the Fourth Five Year Development Plan in 2005 within the projects of “Rangelands Sustainable Management” at national level and “Reclamation and Improvement of Rangelands” at provincial level and comprises of activities such as

formulation, execution and monitoring of range management plans, grazing permit control, hoeing-sowing, seed and seedling production, control of range by-products exploitation, enclosures, water supply, construction of water points for livestock, water harvesting and conversion of low yield rain fed cereal farms to pastures. FRWO has formulated and implemented 6 000 range management plans in an area of 15 million hectares of rangelands throughout the country within the Fourth Five Year Development Plan.

Integration of forest and range management in projects

In addition to the integration of forest and rangeland management at the policy, legal, institutional and planning levels Iran has been implementing a number of area based environment and development projects that integrate forest and range management at the field level. Many of these programmes and projects receive support from bilateral and multilateral agencies and generally adopt a holistic approach ensuring integration of different land use components and the needs of diverse stakeholders. Details of some of the important projects implemented/ under implementation are given in annex 2.

Overall state of integration of forest and range management institutions

Among the countries in the Near East region, the Islamic Republic of Iran has made considerable efforts in bringing about integration of forest and range management and in fact this experience is a very useful lesson to many countries striving to pursue an integrated approach to land management. Integration has been accomplished at all levels, national, provincial and local levels and at the policy, legal and institutional spheres. The overall situation as regards integration can be summarised as given in Table 12.⁴

Table 12 Assessing the extent of integration of forest and rangeland management in Iran

Criteria	Issues to be considered	Points assigned ⁴
Integration at the policy level	• Are the policies relating to range and forests well integrated?	8
	• Are they formulated as an integral component of overall land use policy?	9
	• If not are there distinct / separate policies for managing forests and rangelands?	9
	• If there are separate policies, to what extent they take into account the issues relevant to the other sector	4
	• Do the forest/ range policy make any explicit reference to the policies relating to the other sector?	2
	• Do the forest and rangeland policies along with the agricultural policies provide a robust framework for sustainable land use?	3

⁴ Points to be assigned on a scale of 0 to 10, with 0 representing no integration and 10 representing perfect integration.

Criteria	Issues to be considered	Points assigned ⁴
Integration of laws/ rules and regulations	• Is the management of range and forests governed by the same set of legislation? Or are the laws/ rules/ regulations separate?	10
	• If they are separate, do the legislation/ rules relating to range/ forests have broad similarities?	9
	• Do they take into account the rules/ regulations in the other sector?	8
	• Are they complementary or contradictory?	6
Institutional integration		
• <i>National level</i>	• At the national level, are the departments dealing with range and forests in separate ministries or in the same ministry?	10
	• If they are in different ministries, are there any mechanisms to coordinate/ integrate the work of the different ministries?	No
	• To what extent these coordination mechanisms are effective?	8
	• If range and forest management are dealt with under two departments in the same ministry, what are the mechanisms for interdepartmental collaboration? Are these mechanisms effective?	
• <i>Provincial level</i>	• At the provincial level, are the functions relating to range and forest management under different departments.	No
	• If so what is the mechanism to bring about better integration/ coordination between the departments?	
	• How effective are the existing arrangements in bringing about integration/ coordination?	8
• <i>Local level</i>	• What are the mechanisms/ systems in place at the local level to implement forest and range management?	
	• Are there separate departments/ agencies to implement range and forest management at the local level?	No
	• If so how are coordination/ integration of different activities accomplished?	By DG in provincial level and Director in local level
	• Are these mechanisms for coordination effective?	7

Criteria	Issues to be considered	Points assigned ⁴
<ul style="list-style-type: none"> <i>Community level</i> 	<ul style="list-style-type: none"> What are the community level institutions dealing with range and forest management? Do the communities deal with forest management/ range management separately? Or are these well integrated? What is the level of integration between forest and range management at the community level 	<p>Local people participation in projects</p> <p>No</p> <p>8</p>
Integration at planning level	<ul style="list-style-type: none"> What is the planning process adopted in the two sectors? Does the planning process in one sector accommodate the concerns of the other sectors? Are the plans and programmes for range and forest management prepared separately? To what extent these plans take cognizance of what is being done in the other sector? 	<p>9</p> <p>7</p> <p>Yes From technical point of view</p> <p>5</p>
Integration at implementation level	<ul style="list-style-type: none"> How are the activities under the different plans and programmes implemented? What mechanisms exist for integration of different plans and projects at the operational level? Are there any conflicts between the two sectors and if yes what mechanisms are in place to overcome such problems 	<p>9</p> <p>Coordinated in FRWO level</p> <p>Sometimes they plan for their project for the same lands</p>

Issues in accomplishing better integration

Integration between forest and range take place in the organization level over all programming process. At the national level main decisions for integration between forest and range are taken in the management level of the organization which is headed by the Head of FRWO as deputy minister and his managerial boards which also include deputies of the organization and all director generals of related offices. The High Council for Forest, Range and Soil also will technically coordinate later between different sectoral projects.

Recently a research project has been approved to work on criteria and indicators (C&I) for sustainable forest management (SFM). By implementing this research project we will have chance to find better link between forests and rangeland management for sustainable development.

Because of unique decision making processes for forest and range in the organization (FRWO), there are congruencies in policies and management. But, there may be sometimes conflicts between FRWO organization (the ministry) and other governmental or private sector regarding to the land use and land use change policies and strategies.

Yet barriers exist in promoting collaboration between the different sectors considering the divergent perceptions of different stakeholders. Main constraints in this regard are:

- Insufficient data and information on the extent of traditional use of forest goods and services by local communities.
- Inadequate information on the value of forests and rangelands.
- Different law and legislation for the duty and responsibilities of various governmental or private sector bodies regarding to the land use and land use changes.
- Violation of existing provisions relating to management of forests and rangelands, especially for agricultural development, mining and infrastructure development.

Islamic Republic of Iran is also making efforts to involve stakeholders in forest management through cooperatives. Most forest areas are now state-owned, except for a few plantations on private land. Although forest management rights belong to the state, the implementation of forest management plans has been gradually devolved to diverse entities, including government institutions, semi-governmental companies and local cooperatives. At the moment, 48 percent of forests are managed by the government, 36 percent by private companies and 15 percent by local cooperatives (Nair and Abdel Nour, 2011).

The way forward

The way forward in IR of Iran may concentrate to highlight more vital role of natural resources including forest and range. Coordination between forest and range sectors is not a serious problem considering that management is well integrated at the policy, legal and institutional framework. The main thrust should be on the following:

- Expansion of forest resources in the private farm lands is not so successful in comparison with farming and crop production. To this end, it is necessary to provide incentives such as bank loans, land transfer and even training and extension.
- The current policy can have positive effects only through involvement of all the stakeholders who provide themselves parts of investment and protection.
- Provide a clear and transparent framework plan for policies and strategies for land use and land use changes and strategies for development programmes.

- More legal power should be given to the provincial natural resources authorities to prevent illegal land use changes.
- The empirical results of Semnan rangelands reveal that range management plans (RMP) holders have developed their own regulations. Yet these have not been formalised and mainstreamed into existing rules and regulations. Incorporating local experience and traditional knowledge provides a great opportunity to develop integrated resource management at the local level consistent with the national policies and priorities.

Proposed solutions to the non-visibility of potential outcomes and benefits as well as the lack of knowledge about the plan are to provide information. These should be distributed among the local population e.g. through information campaigns. Public ceremonies should be established to make sure that the local population has access to this information. Training sessions, TV and radio programs, symbolic ceremonies and organization of cooperative groups are proposed as well (Hedjazi, 2007).

Due to the frequent event of drought in some areas, it recommends conducting an in-depth monitoring of specific drought cycles as well as the long-term impact of droughts on dynamic of property regimes. With consideration to the fact that locating in the non-equilibrium environment is a major concern for all rangelands in arid and semi-arid regions, it is strongly recommended to investigate whether the Iranian rangelands meet the non-equilibrium conditions. If the conditions of the non-equilibrium do not meet, the drought management should be still the basic purpose of any improvement program (Abolhassani, 2011).

An alternative to the policies of the government might be a self-regulated system. Even if the common nature of rangeland resources, the diversity of interests of the local users, and the transaction costs of negotiation might be a challenge in a self-regulated system (McAdams and Rasmusen, 2007), applying this policy is still an effective option.

Implementation of this system requires the government to support the rangeland holders in establishing their own system, and provide them with some facilities in which they have difficulty, such as establishing enforcement system, sanctions and provision of necessary information. By applying this policy, the needs of the rangeland holders, such as changes in the income situation e.g. getting cheaper loans for equipment or finding additional occupation opportunities to should be considered. The lack of trust towards the government supports the suggestion for the implementation of this policy (Abolhassani, 2011).

4. INTEGRATION OF FORESTRY AND RANGELAND MANAGEMENT INSTITUTIONS IN MOROCCO

Sabir M., Qarro M. and Benjelloun H.

Introduction

Background

Being largely an agrarian economy, forests and rangelands play a key role in the livelihood of Moroccan people. Forests and rangelands occur as a land use continuum and there are strong linkages between the two especially as regards the various economic, social and ecological functions. At the local level communities are dependent on forests and rangelands for a wide array of products and services and seldom make a distinction between the two land uses. However, institutional arrangements intended to improve the management of forests and rangelands often create significant artificial barriers that go against the natural linkages.



The results of evaluation of several programs and development actions, on forest and pastoral lands, have shown that outcomes are far from the original objectives. In particular development of forest and pastoral land faces the following problems:

- Identifying clear targets through consultative processes between the different actors and partners involved in these spaces: local users, elected persons, associations, State services (ministries of the Interior, water and forests department, Agriculture, etc.);
- Development of integrated actions, harmonized and coordinated among the different actors, especially government services;
- Policy and Institutional problems in implementing integrated programs.

Ineffective communication, coordination and harmonization of actions between different players has accentuated inefficiency of the sectoral programs although there is a clear recognition of the urgency to act quickly and effectively to deal with degradation and take up rehabilitation and development through integrated approaches.

Objectives

It is in this context that the present study has been undertaken to assess the various issues in strengthening collaboration between the different institutions so that the two key land uses, namely forests and rangelands, are managed integrally enabling the realization of the full potential of goods and services. The main objective of the study is to analyze and address the barriers that hamper the coordination between forest and rangeland stakeholders (public, private, NGOs, communities, etc.) in the country and identify measures to effectively address the challenges facing the sectors in Morocco.

Specifically the study aims to:

- a. Analyze cooperation between the forest and range sectors with regard to promoting better delivery of services provided by forests & rangelands in the country;
- b. Identify the obstacles to improved coordination between the forest and rangelands stakeholders (public, private, NGOs, communities, etc.) enabling sustainable management of the resources and enhanced flow of goods and services. Specifically examine the policy, legal, institutional, financial and technical aspects, including the flow of information between the different stakeholders/ players as regards improved management of forest and range management;
- c. Analyze the measures taken in the country to improve coordination of efforts in the management of forest and rangeland resources and to what extent these measures have benefited the resources and responded to the expectations of the society;
- d. Assess the needs and opportunities for better coordination among stakeholders (public, private, NGOs and communities) and the way forward to sustainable resources management and improved livelihood.

Morocco : the larger context

Obviously how the use of forests and rangelands has evolved and what has hindered or facilitated integration of management largely depends on the larger social and economic context and how policies and institutions have evolved over time. A brief account of the larger context in which integration issues are to be considered is outlined below.

Demographic changes

Morocco, a southern Mediterranean shore country and a transition zone between different ecological environments, covers about 710 000 km². The population is just over 32 million. Although it grew rapidly during the latter decades of the 20th century, population growth has slowed down considerably during the recent years (See Table 13) and there are early indications of demographic transition and long term stability. The pace of urbanization is increasing and during 2010-15 the urbanization is estimated to be over 2.5 percent, much faster than the growth in population, implying a shift from rural to urban areas. Currently over half (58 percent) of the population live in urban centres.

Table 13 Population growth in Morocco

Years	Population (million)	Yearly growth rate (%)	Sources
1900	5.0	-	Escalier (1984).
1952	9.0	1.54	HCP (2004).
1960	11.6	3.61	
1994	26.0	3.65	
2004	29.9	1.50	FAO (2011) World Bank (2012)
2008	31.6	1.20	
2012	32.3	1.05	

It is the needs of this population, including rural, that influences the agricultural sector (agriculture, livestock). The intense and rapid population increase has led to significant pressure on natural resources.

State of the economy

The per capita income of Morocco in 2008 was about US\$ 4 263 (at PPP) and the economy has registered an average growth rate of more than 5 percent since 2000. Economic activity has been diversified with the rehabilitation of the agricultural sector and the dynamism of the non-agricultural activities. The main achievements are as follows:

- Economic growth between 2001 and 2007 was about 5.1 percent with the primary sector registering a growth of 4.3 percent. The services sector grew at an average rate of 5.2 percent due to the better performance of telecommunications and information technology sectors.

- The structure of the economy is undergoing fundamental changes especially on account of the increasing share of the tertiary sector, whose share has reached to 59% of the GDP in 2007;

Yet agriculture sector remains very critical as regards employment generation. In 2010 it accounted for about 78 percent of the employment in the economy (See Table 14) and most of the rural people are dependent on agriculture for income.

Table 14 Share of employment in different sectors of Moroccan economy

Sectors	Percentage of the active population
Agriculture, forest, fishing	78
Services	12
Industry	6
Others	4

Source: MAPM, 2010.

However, the agricultural sector remains very fragile as it is dependent on rainfall which is subjected to considerable variation. During the last four decades there were frequent and intense droughts.

On the whole Morocco remains a relatively low income country dependent on agriculture. This also constrains the ability of key stakeholders to make significant investments in sustainable management of resources.

Land use

The great diversity of the physical environments has resulted in diverse ecosystems and habitats and Morocco can be divided into 11 major biogeographic units:

1. North Atlantic Morocco
2. Middle Atlantic Morocco
3. Middle Atlas
4. High Atlas
5. Anti Atlas
6. Saharan Morocco
7. Saharan Atlas
8. Plains and plateaus of Eastern Morocco
9. Mountains of oriental Morocco Oriental
10. Mediterranean coastline
11. Rif Mountains

Morocco has considerable variation in climatic conditions: the average annual precipitation varies from 30 mm in Saharan zones and more than 2 000 mm in the centro-occidental Rif. All climatic types (perhumid, humid, sub-humid, semi-arid, arid and desertic) and all the bioclimatic variants (hot, temperate, cool, cold, very cold, and extremely cold) are represented. Morocco is distinguished by a growing aridity from the North to the South and from the West to the East, except in the mountains. In terms of the climate distribution, 78% of the territory is located in the arid and Saharan zone and 15% in semi-arid area. Almost half of the total area of the country is desert. Table 15 gives an indication of the area under different land uses. Expanding agriculture has led to a reduction in the extent of rangeland from about 23 million ha in 1977 to 21.3 million ha now.

Table 15 Land-use in Morocco

Type of land use	Area (million ha)	%
Rangeland	21.30	30
Grass land	3.55	5
Forest	5.68	8
Agricultural land	8.52	12
Non Agricultural land	31.95	45
Total	71.00	100

With its geographical situation, the diversity of its climate and its habitats, Morocco has diverse ecosystems supporting a remarkable biological wealth. With more than 24 000 animal species and 7 000 plant species and a rate of overall endemism of 11% for wildlife, and 25% for vascular plants, Morocco remains the most biodiverse country in the Mediterranean basin.

Importance of range and forest lands

Animal husbandry accounts for an important proportion of the agricultural GDP (26 to 32% depending on the year) and provides about 40 percent of rural jobs. It keeps the second place in agriculture value added after farming and has registered an annual growth rate of 5 percent during the last 15 last years. The livestock sector comprises of 3.3 million cattle, 17 million sheep and 5 million goats, though these numbers are subject to year to year fluctuation on account of rainfall related variation in fodder and water availability. Pastoralism is widespread and of the 71 million ha of the country, 62 to 65 million ha are used for grazing although only 21 million ha are permanent pastoral lands. Agricultural land also provides fodder during part of the year.

Moroccan forests are an integral component of the pastoral economy. They are used by local communities according to the use rights allowed by the forestry regulations in force. They are also sources of firewood, timber and other non-timber products. Table 16 gives an indication of the annual production of important forest products and the overall importance of forests in the Moroccan economy.

Table 16 Economic importance of forests in Morocco

Production	Type of Product	Quantity
Timber products	Timber wood of cedar and pine	220 000 m ³ /year
	Industrial wood	350 000 m ³ /year
	Fire wood	650 000 steres/year
Cork		15 000 t/year
Other products	Aromatic and medicinal Plants	16 000 t/year
	Honey	4 000 t/year
	Mushrooms	850 t/year
Fodder		1,5 million UF
Meat	Red meat of pasture in forest and Esparto (Alfa) steppes.	70 000 t/year
Harvesting and related activities	Enterprises of exploitation	500
	Enterprises of cork harvesting	30
	Cooperatives	110
Industrial units for value addition	Pulp production units	1
	Production of poles	4
	Cork processing	13
	Sawmilling units	49

Challenges in sustainably managing pasture and forest lands

Undoubtedly the rapid growth of population during the second half of the 20th century has been a key factor that led to unsustainable use of natural resources, including forests and rangelands. Poverty, especially in the rural and mountainous areas and consequent excessive dependence on natural resources resulted in exploitation far beyond the level of sustainability. Development programs have generally bypassed these people, as most of the attention of public authorities has centered on irrigated areas. Despite a decline in the rate of population growth, the pressure on land has not decreased so far. Further recurrent droughts have aggravated land degradation.

The steppes are threatened by desertification on account of severe overgrazing and unscientific farming of cereals. The forest is also on the decline, as overgrazing is transforming them into degraded Matorrals. This has undermined the environmental functions of forests. Storage of carbon in the soil is reduced by half. Runoff and erosion are very severe. The heavy silt load from mountains, estimated as about 75 million m³ per year has led to a drastic reduction of storage capacity of reservoirs.

Several strategies and plans have been developed for the rehabilitation, conservation and development of these resources. These include National Initiative for human development, fight against the effects of the drought, national Plan to Combat Desertification, Agricultural Strategy 2020, Plan Green Morocco, National Plan of Watershed Management, Reforestation Plan, etc. However, the complexity of the problems and the inconsistency of institutional, statutory aspects and practices constitute a major hurdle in the identification of clear objectives, the development of integrated action programmes and their implementation.

Range and forest management in the larger context

State of pastoral lands

Most of the pastoral lands are in the arid and semi-arid zones (see Table 17), more particularly in the Highlands of the oriental and sub-desert areas. The state of rangelands is largely a reflection of what is happening in the farming sector. Agriculture is predominantly rain-fed which suffers from low investment and the fluctuations in annual precipitation. Low investments imply continued reliance on expansion of rain-fed cultivation, which reduces the extent of pastoral lands. Coupled with an increase in animal numbers, the remaining rangelands are subjected to severe degradation. In terms of area, pastoral land has retreated by 0.6 to 1% per year, more or less at the same rate as the expansion of cultivated areas.

Table 17 Extent of pastoral lands in different zones of Morocco

Zones	Total area (ha) *	Forest area (ha)	Steppe area (ha)	Steppes (% per zone)	Grass surfaces (ha)
Sahara	49 000 000	0	49 000 000	100	
Presaharan steppes	5 675 000	5 700	5 643 000	99	
Oriental (Arid steppes)	5 000 000	300 000	4 700 000	94	
North Atlas Plains	1 300 000	286 000	1 014 000	78	
Souss (Argan forest)	1 500 000	705 000	795 000	53	
Middle Atlas	1 200 000	984 000	216 000	14	48 000
High Atlas	2 200 000	2 024 000	176 000	4	88 000
Rif	900 000	900 000	0	0	
Central Plateau	800 000	800 000	0	0	
Central Atlantic coast	175 000	0	175 000	100	
Total	67 750 000	6 004 700	61 719 000	91.1	136.000

* SAU and infrastructure not included.

Pastoral lands are degrading rapidly on account of one or more of the following factors:

- The irregularity of the rains is the first cause. The percentage of dry years increased in the past two decades, which increases the fragility of ecosystems.
- The mismanagement of pastoral land represents the most serious threat. The abandonment of rotations is a major cause.
- Expansion of cultivation compels the intensive use of the remaining pastoral areas.

- The poor distribution of water points has led to animal concentration along water points causing severe degradation in the vicinity of water points.
- The overexploitation of woody species for domestic purposes (firewood);
- The reduction of movements of herds and the abandonment of pastoral traditions, due to reduction of grazing areas.
- The increase in the overall numbers of animals induced by the demographic growth and the search for profits from the exploitation of free access resources.
- The acceleration of settlement phenomenon.

Forest areas and pastoral lands represent about 40% of the natural pastoral land and annually provide 1.5 billion UF per year making 17% of the national feed balance. In many provinces, grazing in forest is the main source of income for the population.

These pastoral areas are used by a herd estimated to 10 million head. The right of grazing is recognized by the legislation subject to the respect of sustainability. However, there is no balance between the actual load of the herds and the pastoral capacity of forest areas. This load is 3 to 5 times higher according to forests and regions; this is reflected by overgrazing, soil compaction, the lack of regeneration, ageing of forest stands, etc.

Use of collective grazing lands

By codifying the status of collective lands, the law has recognized ethnic ownership groups (tribes, fractions, Douars) and the collective enjoyment of agriculture or pasture lands, according to the traditional customs. The law has thus preserved the acquired rights and local practices. These traditional modes of farming and use are not stable and they evolve over time. Following the directions in which operate these modes of exploitation and use, it is to give, at the same time, the way to understand the evolution of the legal system behind them.

In arid zones, there is a right recognized by religion and a right of rather secular type based on a strict code of honor and supported by a strong social ethic. Currently, the way of life of pastoralists is evolving towards the practice of horizontal movements within land areas of traditional flux, so-called “Woulf” (usual). With regard to the use of pasture land, the principle of freedom of movement is recognized. Accordingly a family of pastors can use any desired pasture land occurring in the territory of the tribe or of the neighboring tribes. However, this freedom is subject to two rules:

- To respect two principles (local name “horma”): that of the area of the tent by showing respect (Tiqar) to the occupants, and that of the grazing area, by taking a respectful distance (Tissaa) from it;
- To enjoy the grass without interfering with the right of others to the same enjoyment.

These principles of social ethics, which are elements of a strict honor code regulating the socio-economic relations between steppe pastoralists, are also the basis of a system of use of space and the different strategies for its appropriation. Indeed, the description of nomadic lifestyle as wandering freely in infinite spaces, for water and grass, conceals the fact that

the producers obey a well-defined set of rules and codes that govern their relationship to space and to other herders. Traditional nomads or pastoralists use well defined spaces and follow regular routes in their movements.

Pastoral space is subject to a seasonal rhythm of use in accordance with the periodic movements of populations and their herds between the mountain and its borders. The mountain (Jbel) is used for summer grazing and the plateau (Azaghar) is grazed during winter. The public authority never had the means of directly controlling and supervising the community space. The eco-geographic diversity of land used by each community formed the foundation of livelihood and the prosperity of the community was dependent on the complementarity of different activities i.e.: pastoralism, farming, logging, fruit gathering, hunting, trade, etc.

Organization in space: nomadic, transhumant and sedentary users

A little more than a century ago most of the people in the Maghreb countries (Algeria, Morocco and Tunisia) were nomadic. Of a total population of 11 or 12 million in these three in 1880, only 45 percent were sedentary people. The territories of the steppes, mountains and even a part of the coastal plains were under extensive use by nomadic herder communities. One hundred years later, the population of the Maghreb has increased six-fold (68 million inhabitants in 2000), drastically changing the patterns of occupation of these spaces.

Nomadism involves the movement of the entire family along with the herd within a territory of more than 100 km. In the case of “semi-nomadism” the nomads have a point of attachment where they spend part of the year. This type of livestock farming occurred, in its traditional form, in the low productivity areas. These communities are rather average farmers or shepherds of the rich owners who are still practicing animal husbandry. In mountains, especially in the Atlas, the vertical transhumance of simple type (summer time) or double type (summer and winter time) is widespread. . In the steppes, the horizontal movements take place in a North-South transect, with winter in Sahara and summer in pastoral and cultivated lands of Northern Plains. Sedentary farming is present almost everywhere. Under this the herds move within limited distances, and return each night to the village.

The different livestock management systems - sedentary, transhumant and semi-nomadic – co-exist in many villages, all of which using the same territory, but each according to the divergent scope for taking advantage of fodder and water availability. Sedentary farming is found in most places regardless of adverse environmental conditions and generally it supports small herds. .

Legal regimes and access to range and forest resources

In Morocco a significant proportion of pasture areas are still under collective use. Their management is based on legal practices intermeshing the *traditional law*, *Islamic land law* and *modern State law*.

Traditional law dates back to pre-Islamic times and applies especially to the so-called land “of tribes”, which are organized in territories and not properties, and are most often for collective use. Until the end of the 19th century, these vast spaces for common use provided high mobility to various groups or ethnic communities without fixed habitats. This traditional law is still considered as reference, considering that it incorporates multiple resource use practices. These uses are sometimes recorded in a customary (Orf), but are more often based on oral law and which does not rely on other evidences. One of the widely adopted traditional systems of resource management in the Atlas mountains is Agdal (Box 23).

Box 23 The Agdal system of managing pastures

Agdal is a Berber word currently used in all mountainous regions of Morocco and refers to pasture land that is collectively managed by the community clearly specifying the opening and closure periods to facilitate natural recuperation. This practice is common in the High Atlas where there are two types of Agdals:

- The Agdals of the most productive pastures of altitudes and whose prohibition of use is, in principle, on spring time in order to provide the grass in a period of dryness. It is the most common practice either in the Middle Atlas or the High Atlas;
- The Agdals related to forest dominated by green oak and which are bordering villages. This concerns the prohibition of any cutting of wood and branches in these stands. In times of snow, when the animals are unable to have access to grass, the Agdal is opened and pastoralists are permitted to remove branches and leaves to feed the herd. The quantity to be collected is fixed on a household basis.

Opening and closing dates are fixed after meeting of representatives of eligible parts (Naib, sheikhs and wise members). Exceptionally, in some years, the opening and closing of the Agdal may be shifted for a few weeks in case of need, and this, at the request of rights holders to the Djemaa, for reason of needs of the herd, the state of the pasture or the weather conditions.

Islamic land law: Islamic law has two principles, the first being the prohibition of individual appropriation and the other is **revival** (Ihya) according to which land belongs to one who adds value and puts life into it through establishment of an orchard, digging a well and building a house. Since grazing does not add value to land, it does not confirm ownership. The ownership status of resources is closely linked to their use recognizing the management efforts of individuals.

Modern State law emerged in the context of Morocco’s colonization by the French empire at the end of the 19th century and early 20th century. Largely this led to a land policy that aimed to settle the colonists. The registration of land, the sharing of some collectives, the reservation of forests as state property and fixation of the boundaries of the major tribal territories, etc., were done as part of the introduction of modern law, but all these failed to provide an effective mechanism to resolve the various conflicts. In fact the modern state law and the traditional laws have been contradictory to each other, intensifying conflicts between local communities and the State. The intrusion of the modern law is not always well understood and most often these were no substitutes for traditional rights. This complicated the land situation and resulted in the poor management of pastoral resources. It is these weaknesses that led to abuses and conflicts (Gilles, 1993).

Factors that undermined traditional community management:

French colonization, against the resistance of the mountain inhabitants, exercised a global strategy of domination, aimed to control the resources and the people, especially by undermining the traditional land use systems. Pastoral spaces – initially in the plateaus and the plains and later in the mountains - were brought under colonial control. The tribes renouncing their winter pastures were forced to stay in the mountains to the detriment of their herds. Rules and regulations, including those governing forests, were formulated to restrict the access of resources to pastoralists.

At the end of the colonial era, a class of powerful individuals, who had interests outside the community and the country and who regarded customary rules as hindrance for their personal interests (Bedrani, 1993) had emerged from the local communities. Many of the customary practices have been undermined by them. Although they have diversified their sources of income, they persist with livestock management, significantly altering the pattern of resource use. Most had multiple sources of income (emigration of parents, trade, government jobs) and lived in cities where their children are studying. They continued their hold over their land in violation of customary rules, expanded their herd size and employed hired shepherds, bought animals to fatten up before the opening of the pastures, built sheepfolds and cultivated cereals in prohibited areas with the benevolent complicity of the authorities. Despising the customary rules, they set bad examples to the more modest farmers who also eventually emulated the same practices, totally destabilizing traditional practices, undermining sustainability of forest and rangeland use.

In Morocco, the phenomenon of privatization of collective pasture lands is widespread. Strategies of appropriation include the construction of individual sheepfolds (azib) and the practice, in steppe, of dispersed clearing that set the boundaries of a territory in the process of privatization. Cultivation –even in very dry years with little hope of harvest –is used to affirm the annexation of the pasture land. Although the problem is serious, customary institutions (Djemaa) are unable to control it especially considering the need to have consensus in taking action against erring individuals.

Changing pastoral systems

It is also important to take note that under the collective impact of various factors – demographic changes, economic changes, political and institutional factors, emergence of new technologies (for example transportation) – the pastoral systems have also undergone tremendous changes as indicated below:

- Erosion of the role of customary organizations: from the communal focus to the individualism

The customary organizations are already facing an erosion of their authority, especially in the context of increasing individualism. New market opportunities have encouraged some of the community members, especially large farmers, to increase the herd size, and traditional institutions are unable to check such behavior. The cooperative spirit that existed under traditional community institutions has given way to intense competition between individuals for personal benefits.

■ Changes of land status on the grazed area: Appropriation of land for cultivation

The desire for ownership, resulting in the appropriation of pasture land for cultivation has strengthened considerably over the years. In response to population pressure, collective lands, in the favorable sites have been parceled out and cultivated by community members resulting in a change from a pastoral system to a mixed farming system. This has accelerated during the second half of last century spreading to less favourable areas.

An evaluation of ownership change of collective lands shows that of the 10 million hectares of collective land, only 3.5 million are registered with 1 million cultivated during the last thirty years. But the reality is very different and the extent of unrecorded/ unreported privatization is much more than this.

■ Regression of mobility and sedentarization

Because of these significant changes of pastoral status, the space occupation modes and movements of pastoralists have changed considerably. For the semi-nomadic people whose number is, undoubtedly, on the decline, vehicular transport of livestock, feed, water, etc. has become widespread profoundly modifying the various practices. Large individual herds are brought in by trucks, taking the space used by small herds. Steppes which were less exploited in the past, show obvious signs of overgrazing. Motorization of nomadism has created a different model of the use of space: concentration of farming to the benefit of big herders and formation of a real ranch, resorting to hired shepherds and more intense exploitation of all resources.

A double dynamic, sedentarization and motorized mobility and privatization/cultivation of pasture land, obviously leads to a transformation of the pastoral system largely to produce red meat on a different model resulting in:

- a. A change from pastoral to the agro-pastoral system.
- b. A shift in the source of feed – From free ranch grazing to feeding of concentrates.

During the last twenty years, there have been major changes in behavior and practices of herders. The fight against, or adaptation to climate hazard has been strengthened by the systematic use of concentrated food prepared on the spot or most often supplied by governments.

Policies and institutions for range and forest management

Policies and institutions responsible for range management differ according to the legal status of land. Rangelands in the strict ecological sense (land covered by low vegetation) cover more than 53 million hectares or 75 percent of the country. The legal regulation is the collective use on 12 million hectares, of which only 5.8 million hectares are delimited. The rest of rangelands, strictly speaking, correspond to the space for collective use, managed by the tribes (tribal land) including Saharan pasture lands, which are under the domain of supervision of the state.

Stakeholder rangelands

Collective lands are probably one of the oldest forms of land tenure in Morocco. These are, at their origin, mainly tribal lands. With the arrival of Arabs, land is “divided” between eminent domain (raqaba), belonging to the prince, and usufruct (intifaâ) enjoying to its occupants, that is to say, most often to the tribes. There was no legal status per se of these lands, but a de facto occupation of territories, more or less stable, by often itinerant tribes. The protectorate, in order to simultaneously protect the lands of indigenous tribes and to control the population, has introduced, since 1919, severe restrictions to property rights of collective lands, accompanied by a trusteeship of the tribes. Broadly collective lands can be categorized as:

- Inalienable: that cannot be transferred or sold;
- Imprescriptible: that cannot be acquired by adverse possession as is the case of “Melk” (that is to say by continuous possession for 10 years);
- Not distrainable: that cannot be subject to execution, these lands cannot be used as collateral for mortgages;
- Subject to limits on rental right and a part of land of a theoretically equal area comes back to each claimant (Dahir (law) of 27 April 1919). This text, still in effect, determined the administrative boundaries of collective land, thus fixing the tribes within these limits. It establishes the authority of central government on these lands, and makes expropriation to some of them to install settlement perimeters.

Management of collective land comes under the control of the following institutions::

- The Ministry of Interior;
- The Ministry of Agriculture and Local Services;
- Traditional community institutions;
- Newly established institutions, in accordance with policies, national legislation and development programmes

The Ministry of Interior

The Ministry of Interior is in the overall charge of land and the authority for security, law and order. The provincial and local level structures of the Ministry of Interior are responsible for day to day administration and to resolve conflicts arising between the right holders and between neighboring ethnic groups. Regional, provincial and municipal assemblies deliberate on the development programs, plans and projects of interest within their jurisdiction.

The Ministry of the Interior exercises supervision over the ethnic communities, especially as regards the leasing or disposal of land. The Directorate of Rural Affairs Department is responsible for monitoring records of common lands as directed by the Minister.

The Ministry of the Interior manages, at the DAR, the budget and taxes pertaining to the

common lands. Payments are made in favor of ethnic groups/ owners of land and the budget available is used for common facilities (usually water points, trucks, etc.), which are proposed by the right holders and followed by themselves under the supervision of the local authority and relevant technical services.

The Ministry of Agriculture and its Local Services

The Ministry of Agriculture and its local services are involved in rangeland management, largely through the provision of technology packages and other support to farmers. Earlier the intervention of the Ministry in rangelands was limited to health campaigns, prophylaxis against contagious diseases and against diseases having economic impact in some poor regions. Subsequently, the establishment of “Fund for the Protection of Livestock”, helped to provide support to farmers, to cover the cost of cattle feed and transportation. Meanwhile, encouragement and incentives are granted to farmers for the promotion and development of livestock under the provisions of the Agricultural Investment Code.

In support of livestock development the Ministry of Agriculture has taken up three major projects extending over an area of seven million hectares:

- the Pastoral and Livestock Development Project in the Oriental,
- the Rural Development Project of Tafilalet-Dades, and
- the Rural Development Project of Taourirt-Tafoughalt.

Based on an evaluation of these projects in 1993, government has formulated a Development Strategy of Grazing Lands. This represents a radical rethinking of the earlier approach of pastoral management and addresses all aspects of design, implementation and monitoring and evaluation. Specifically it favours the effective participation of beneficiaries and the integration of grazing land in their socio-economic environment, represented by agricultural and forestry lands, and the market. Together, they constitute one of the levers by which governments can reduce the disparities between favorable and unfavorable areas generated by the policy of large-scale irrigation. However this strategy, approved in 1995, has still not been operationalized through an action plan.

Pastoral projects, undertaken until the early 1980s, were distinguished by their sectoral character and their top down approach. Since then there was a significant change in objectives and approach based on the lessons learn from earlier efforts. Projects of “Central Middle Atlas” and of “Development of pastures and Livestock in the Oriental” reflect this change. Thus, the objectives of these projects have a broader developmental dimension and their implementation is based on dialogue and consultation, taking advantage of institutions like pastoral cooperatives and other collective arrangements. Pastoral lands have been rehabilitated with the consent of the local populations. The techniques used include, among others, the closure of areas, rotational grazing and pasture improvement through planting of fodder shrubs.

The most significant indication of the success of these projects is the acceptance, for the first time, by the user populations and there have been visible improvement in the condition

of pastures. However, notwithstanding their positive impacts on the resource base and herd productivity, these initiatives have not been sustained. Sustainability would indeed require continued government commitment especially through provision of incentives. This was not the case, and the various interventions have ceased with the end of funding by donors (World Bank and International Fund for Agricultural Development IFAD). In the very harsh environments it is unrealistic to expect a totally autonomous and self-reliant system of resource management. The withdrawal of the State may only relate to the form and manner of interventions, but not from extending financial support.

Traditional institutions

The collective lands are governed by inalienable collective ownership by a group or Djemaa (grouping). The collective lands are a common property to the group of the same ethnic origin where the members have a customary right to enjoy agricultural and pastoral use. Each descendant of the ethnic group will be able to enjoy the use of this property. But the collective lands are inalienable and non-transferable.

Each group or tribe designates, by election, “Nouabs” (plural of Naib, the delegate) who are the interlocutors with local authorities, the Ministry of Agriculture, and all relevant departments as regards the management of pasture lands. These “Nouabs” are the guarantors against abuse of the law and ensures the prohibition of any sale, purchase, division, ownership, construction or any purpose other than grazing. Ethnic communities are represented by the assembly of delegates, who are chosen according to the customs of each tribe. This assembly is responsible of managing the assets. The Naib is the representative of the community in defending its interests, but he also functions as the enforcer of authority within the “collectives”.

The Trusteeship Council

The Trusteeship Council is an administrative body and is composed, in addition to the Interior Minister as chairman, by the Minister of Agriculture, the directors of Political Affairs and Administrative Affairs of the Ministry of Interior and by two members designated by the Minister of the Interior. The Trusteeship Council is convened by the Minister of the Interior to assist in the investigation of complaints. It has “the jurisdiction to settle disputes when it comes to the application of customs.” In addition, the Trusteeship Council:

- reviews applications for the allocation of funds among members of ethnic communities;
- decides on the claims of collective land acquisition made by the state, municipalities, public institutions or ethnic communities;
- examines claims provided in the second paragraph of Article 4 of the Dahir No. 1-69-30 of 25 July 1969 related to collective lands located within the perimeters of irrigation;
- decides on the disputes between heirs as regards the property of deceased persons (Article 8 of Dahir No. 1-69-30 of 25 July 1969 cited above).

Modern institutions

The rural commune

In accordance with the charter of 1976, the rural communes must play a key role in planning and implementing development projects of its space. However, it is clear that its action is hampered by inadequate human and financial resources and the inadequacy of legal provisions. On pastoral land, the weight of the guardianship and the importance of electoral issues are that the rural commune does not display a proactive vision for the conservation of pastoral resources. Moreover, rational management of pastoral resources can be reasoned, only in the case, when its development plans are established at an intercommunal level.

The province

The provinces and prefectures manage their own affairs through their prefectural or provincial assemblies. These assemblies deliberate on plans and development programs relevant to the province.

The region

The law (Dahir of April 2, 1997) states that the Regional Council decides about the actions to take, to ensure the economic, social and cultural development of the region. Also, in terms of pasture, this role is to plan the development of regional planning (coordination of public and private investment program of pastoral livestock, giving advice on the hierarchization of priorities and location of these investments, participation in the working out of pastoral development plan...) and to encourage public participation.

Agricultural Professional Organization

The chambers of Agriculture, cooperatives and associations of breeding and pasture improvement are all involved in pastoral development as the first-class interlocutors and partners for management options and funding.

Stakeholders of pastures in forests

With about 9 million hectares, Moroccan forests play important roles, not only for water conservation and protection against soil erosion, but also provide a number of goods, especially timber, firewood and a number of non-wood forest products. Important economic functions of forests are:

- Provides 30 percent of the timber and industrial wood;
- Accounts for 30 percent of the energy;
- Supplies 17 percent of the food needs of the national herd;
- Creates 100 million workdays of employment per year.

Forests and forestry in the Mediterranean region have received considerable attention from the international community for a long time. Awareness of the social, economic and environmental benefits of woodlands in the region and the harmful effects of their degradation and destruction, explains the more and more interest generated by the forestry sector. In this context, the Department of Forestry has developed a series of strategic studies to support forest planning:

- National Forest Inventory (February 1996);
- Reforestation Master Plan (1997);
- National Plan of Watershed Development (December 1996);
- The National Study on Biodiversity (1995);
- Studies of forest management and pastures of more than one million hectares between 2009 and 2012.

The National Forest Policy (NFP) aims to conserve and sustainably develop forest ecosystems. This objective requires taking into account all environmental data (physical space, demography, social groups and, legislative and institutional frameworks) and to integrate them into an overall strategy.

The strategic plan including the NFP is rooted in three approaches that are:

- **a patrimonial approach**, which seeks the involvement and accountability of all actors involved in regional planning;
- **a territorial approach**, which aims to integrate the actions as part of a dynamic local development;
- **a participatory and partnership approach** involving members of the user population, local people and the private sector in the planning process and sustainable development of forests.

The role of the different stakeholders as regards pasture lands within forests are outlined below.

The Forest Department (High Commissionership for Water, Forests and to Combat Desertification -HCELFCD)

Evolution of the Forest Department

Since the protectorate, the responsibility for design and implementation of forest management has been entrusted to the Administration of Waters and Forests, specially created for this purpose and gradually developed and decentralized over a period of time. The Dahir of July 1, 1914 introduced the concept of public domain and state ownership of forests. This was further affirmed by the Dahir of 10 October 1917 which in addition to the conservation and exploitation of forests also emphasized the need and urgency for the state to take action to safeguard and develop the forest resource. The purpose is to enable forest ecosystems to play fully their functions regarding the production of timber and other products

(cork, medicinal plants, game, wild animals,), protection of ecological environment (soil protection action against erosion, regulation of water cycle, air purification), recreation and leisure (hunting, fishing, tourism,). It is therefore an administered management of forest resources.

Since 1950 the action of the state in safeguarding and development of forests aims to encourage afforestation and / or reforestation on state forest lands, collective and private lands. To facilitate this, a National Forestry Fund was established by the Dahir of 12 September 1949, levying a 10% tax on the sale price of key forest products.

Another action of the state consisted of the establishment of natural reserves, the creation of national parks and the implementation of conservation and restoration of natural resources therein (flora and fauna). The creation of national parks began with the Toubkal (1942) and continued by other parks which are of botanical and zoological interest (Tazekka Idda ou Tanane, Souss-Massa on the coastline at South of Agadir). The regulations, on the protection of fauna and flora, are not always strictly enforced, mainly because of the large extent of these reserves and the limited resources. In addition to the problem of development and management posed by the shortage of qualified managers in the field of management of national parks and natural reserves, the services of Water and Forests have always struggled with the problem of the right of use of resources in these parks and reserves; rights claimed and exercised are often abused by local residents.

As regards protection and conservation of forests, the State has mostly focused on a policing role and the procedure of delimitation of forest estate and providing a legal basis for what is permissible and what is not.. The procedure of delimitation of the forest estate permitted the control of forest resources. The delineation, of the nature and consistency of use rights of these resources by local populations, allows to better determining how to exercise these rights. As for the function of management of forest resources, as defined above, it allows the state, to undertake actions aimed at developing the potential of forests, to preserve environmental balance, to meet priority needs of the country in forest products and services and to integrate the forest to other economic activities in rural areas.

However until recently actual management of forests was based purely on technical options and choices (equipment, development and exploitation of the estate forest) neglecting the questions of what the Moroccan society wants and what forest policy and strategy should be implemented for this purpose. .

At the institutional level, the Administration of Waters and Forests has seen many and various administrative reforms, since the beginning of the Protectorate to the present, to define, extend, decentralize or deconcentrate the administrative structures and skills in order to strengthen the presence and effectiveness of the state at central, regional, provincial and local levels. After being a simple service of Forestry, at the beginning of the Protectorate, and then, a central Directorate of the Ministry of Agriculture or still a Ministry, fully charged, department of water and forests, it has now become the High Commissionship for Water and Forests and to Combat Desertification (HCEFLCD).

The forestry sector is therefore now a strong state apparatus, including executives and staff that are invested with statutory functions and tasks of para-military character. But, in the

opinion of these staff and forest officers successive structural changes have not always been accompanied by an increase in human and material resources, or support in training, compared with the real needs of officering.

Structure and functions

The Forest Department - “High Commissionership for Water, Forests to Combat Desertification” (HCEFLCD) - is composed, in addition to the High Commissioner’s Office, a central administration and decentralized services.

The central administration is composed of:

- ✓ The General Secretariat;
- ✓ The General Inspection;
- ✓ The Department of Planning, Information Systems and Cooperation;
- ✓ The Directorate for Combating Desertification and Nature Conservation;
- ✓ The Directorate of Forestry Development;
- ✓ The Directorate of Forest Domain, Legal Affairs and Litigation;
- ✓ The Directorate of Human Resources and Administrative Affairs;
- ✓ The Forest Research Centre.

The decentralised system consists of:

- ✓ 12 Regional Directorates of Water and Forests and Combating Desertification
- ✓ The National Zoological park in Rabat;
- ✓ The National Centre of Hydrobiology and Fish of Azrou.

At the central level, the Directorate of Forestry Development is responsible for the management and development of forest areas. It consists of three divisions: Reforestation, Forest Economics and Forest Management and the latter is responsible for the management and development of forest pasture.

At the decentralized level, each Regional Directorate includes four services including “management studies and Planning “and “ Partnership for the Conservation and Natural Resources Development. These two services are heavily involved in studies and implementations of forest and grazing management of forest areas.

Each province has a provincial department of forests (EFLCD), responsible for coordinating the work of one or several “Centers of Conservation and Development of Forest Resources” (CCDFR) which are entities that manage the forests. Each (CCDFR) includes at least two to three engineers and technicians. It is composed of several “Forest sectors” which are the smallest units of local forest management. Each sector is managed by a technician and subordinates.

The Forest Department's primary role is the conservation and sustainable management of forest and sylvo-pastoral ecosystems. This task is increasingly difficult because of the increasing pressure exerted on these resources, especially as demand far exceeds the production capacity of the land. Until the late 1970s the social engineering aspects of pastoralism in Morocco have been neglected. Indeed, the development of forests, made before 1978, did not approach any of these aspects to get an estimate of the state of pastoral potential and the degree of overgrazing exercised on forest ecosystems.

From the early 1980s, efforts were made to develop pastoral rules. This decade also saw the completion of a series of management plans for forest areas and suburban forests in representative areas. These plans included the establishment of an integrated management of space and to provide solutions to the problems of forest resource depletion.

National and Provincial Councils of Forests and Forestry

In 1976 a National Council of Forests and Forestry and Provincial Councils to coordinate and strengthen the action for forest conservation and extension were established. One of the main responsibilities of the National Forestry Council are the coordination of programs and budgets related to activities of economic development in forest areas and pastures, the review of legal and regulatory solutions relating to disputes between users and administration, and the formulation opinion on the principles of de-reservation or extension of the forest lands.”.

As for the Provincial Councils of Forestry, they are asked to advise on equipment programs, enhancement and exploitation of forest areas under their jurisdiction and on adjudication programs, to participate in the organization and control of adjudications, to consider all forms of participation, of user populations, to forest exploitation and to promote the creation of forest development agencies (especially cooperatives), and to follow their development and functioning..

In addition, the communal councils are required to adjust, by their deliberations, “ the requests for temporary occupation of forest land under their jurisdiction, the requests for authorization giving rights to hunting and fishing, the requests for removal of dead wood, wood for construction, brush, grass and branches, the requests for gathering plants of industrial or pharmaceutical character, and the organization of pasture in forest, the exploitation of pastures and fodder reserves and the cutting programs and alienation of forest products”.

National forest programme (nfp)

The National Forest Program, adopted in 1998, sets the strategic orientation (specialization of forest areas, administrative decentralization, implementation of a rural mountain policy, participation of local people, increasing the role of local associations including communal, private sector involvement in investment and job creation). In practice, however, the Administration of Forestry continues to act by methods more or less restricting, without consulting other actors to give just one simple opinion and giving precedence to his own

point of view because remaining attached to its statutory powers and never give up from its ability to take independent decisions. The lack of or inadequate training of staff and forest supervisors in participatory planning and development on one hand, and insufficient human and material resources on the other hand hinder this. From another side, one may wonder about the consequences of administrative decentralization actions on decision making and execution, especially considering the increased number of stakeholders, complexity of decision circuits, delay in decision-making and diffusion of responsibilities.

The establishment of various institutions and bodies was aimed to involve the concerned stakeholders around rational collective choices in term of organization and management of forest resources, and this, according to procedures based on consultation, coordination, participation and / or contracting in the making decision and the exercise. In practice, such institutions, bodies and procedures, do not lead to the expected results, often for lack of technical, managerial and financial capacities for many stakeholders (user populations of forest resources, rural communities, ethnic communities, cooperatives, associations of herders, NGOs, etc.).

Policies on the use of range and forests lands

Organization of the population and introduction of participatory approach

The relations of the social structure to space are governed by a set of rules and social relationships (cohesion) and according to the type, by status and use of this space. The parks of pasture are held for the tribe, but in practice, each faction has its own territorial movement and uses of the pastoral lands.

One notes that the limits of this movement are often poorly marked and that the use practices within a tribe can vary from one social group to another and from one year to another depending on the magnitude changes in climate and vegetation status. Overall, a strong relationship exists between social organization and the organization of pastoral areas, especially as regards nomadism or transhumance.

From the above it is clear that the traditional systems of use and range management are complex to be handled at the national or provincial levels by a bureaucratic system. This complexity has made several government initiated pastoral development programs operationally difficult. Understanding of how these systems are functioning becomes a prerequisite for better participation of livestock farmers to a more rational management of pastures.

The participatory approach is based on establishing a regular dialogue with the population and various local stakeholders. Indeed, the participation calls for attitudinal changes of behavior towards the system of natural resource management, conditions of implementation of forest projects and the promotion of private initiatives to support progressive and concerted development actions at the pasture land or park of pasture. The participatory approach certainly is relevant now as it could better accomplish the objectives of community management of pastoral areas and address the concerns of natural resource sustainability

and social justice in favor of rural peri-forest populations. This has been further encouraged by the various international initiatives (for example Agenda 21, Criteria and indicators for sustainable forest management, etc.) all of which call for the active participation of the population in negotiated management of the forest area. This problem shows the importance of identifying and initiating organizational forms operating in resource management.

Sylvo-pastoral planning

For Moroccan forests, the sylvo-pastoral management is defined as a diagnosis of the natural and social environment, pastoral and forestry potential, and the development of an appropriate action program for the rehabilitation and improvement of pastures in harmony with regeneration and conservation of forest formations. It also involves the establishment of a system for supervising and organizing of herders for common use of pastoral land. Thus, the sylvo-pastoral planning is a process focused on long-term sustainable management. In implementing this process, the following approach is adopted:

- 20 percent of the area of the grazing land is set aside as “regeneration plot, during which it remains closed to direct grazing by animals; however removal of grass is permitted.
- The rest of the forest while continuing to receive silvicultural treatments (cleaning, thinning, etc.) is open to grazing subject to registration by pastoralists and payment of royalties.

Strategy of the Department of Agriculture

The strategic objective is the profitability of pastoral activity and its sustainability. The thrust areas of the strategy are:

- The satisfaction of the projected demand for red meat (2020)
- The creation of an economic environment compatible with the above objective, allowing the accession of producers and sustainability of animal production systems
- The promotion of social organization and promulgation of modern institutional instruments governing pastoral activity
- The conservation of natural resources and improvement of livestock productivity

The main lines of the said strategy are:

- the inventory of pastoral heritage;
- the creation of a centre for study and research on pastoralism;
- the rehabilitation of various pastoral ecosystems;

Roles and responsibilities in the management of forests and pastures of different stakeholders

Role and evolution of approaches in the management of forest pastures

Despite the sustained efforts for the conservation and development of forest and sylvo-pastoral resources, the Moroccan forest, composed of fragile ecosystems, and burdened with usage rights that are recognized by law, is under strong anthropogenic pressure. It is indeed an open complex and multi-functional system subject to different forms of exploitation stemming from conflicting interests. Degradation processes are often gradual and may be irreversible.

Thus, the major constraints to the conservation and sustainable management of forests are of ecological (fragile ecosystems), social (population growth), economic and institutional (coordination and insufficient resources).

Role of the Department of Agriculture in the management of livestock and rangeland

Considering the severity of rangeland degradation during the last two decades the state has given increasing attention to the following:

- The establishment of an appropriate institutional structure for the rational use of collective rangelands;
- The safeguarding and protection of the national herd (in case of food shortage);
- The conservation of basic resource especially soil and vegetation, and whenever possible, the improvement of the productivity and composition of vegetation cover.

Actions, often of unequal importance, have been carried out either as part of current programs of the services of Provincial Directorates of Agriculture and offices of agricultural development or either as part of integrated agricultural development projects where a component pasture is often included as a part of integrated rural development.

Development activities of rangelands during the first phase in the 1970s were “experimental” and exploratory. The lack of reliable data and inventory of resources (soil, vegetation and water) and adapted technological packages, coupled with inadequate qualified managers and technicians with specialization in pastoralism, have, often, forced the decision-makers to use imported technologies from Europe or elsewhere without giving due consideration to the specific social, legal or biophysical conditions in Morocco.

However, the results reached by educational and research institutions and the capitalization of lessons learned from different experiences have given rise to a participatory and holistic approach of development conceived at the scale of an entire ecosystem (case of the Central Middle Atlas project). The new guidelines for pastoral development defines more clearly the objectives of pastoral development and the spatial extent of the involved pastures with the central role being assigned to the beneficiary population (for example the recent projects on Pastoral Development (Taourirt-Tafoughalt, Tafilalet-Dades).

In this context, the implementation of the strategy development of pastures can be divided into two periods:

- The period from the starting of the strategy (1995) till the end of the plan for economic and social development (2004). The actions included:
 - ✓ Introduction of rotational grazing in 8 000 000 ha;
 - ✓ Fencing of 1.5 million ha;
 - ✓ Improvement of vegetation on 420 000 ha;
 - ✓ Creation of 114 pastoral cooperatives;
 - ✓ Establishment and improvement of 3 800 water points.

The achievement of interventions was only partial and their sustainability is in doubt on account of non-adherence of local populations to the monitoring and maintenance of these programs. The period from 2005 to 2020 which requires the mobilization of substantial funds of around 120 million Dh per year. The physical targets are:

- ✓ Rotational grazing to cover 40 million ha;
- ✓ Fencing of 8.3 million ha;
- ✓ Improvement of vegetation on 1 000 000 ha;
- ✓ Creation of 700 pastoral cooperatives;
- ✓ Creation and improvement of 12 500 water points.

While praiseworthy efforts have been made for the conservation and enhancement of grazing lands, much remains to be done to achieve the above goals. In addition, the evaluation of the balance sheet of pastoral development projects reveals that little progress has been made as regards poverty alleviation. For example, the pasture improvements made as part of the development project of range and livestock in the Oriental, have mostly benefited the wealthier farmers, while the cooperative services have benefited primarily their most powerful members. The credit component of the project intended primarily for small farmers has not been implemented as the scheme was not adapted to the conditions of credit applicants.

This highlights ***the lack of coordination and integration of institutional actors*** involved in supporting the management of natural resources. Moreover, if the association of rural elites is encouraged on the argument that their involvement will help to provide momentum, there is danger of exclusion of a large number of people with limited resources, thus failing to achieve the goal of equitable development. .

National strategies and measures to mitigate the effects of drought:

The Moroccan government has set up structures and taken significant pro-active steps to mitigate the effects of drought. However, most of the measures taken so far are focused on crisis management. When drought is declared at national scale, a national program to fight against the effects of drought is established and the necessary means for its implementation are allocated.

Thus, a protection program of livestock has been established and is a tool to cope with the effects of drought. This program was strengthened and launched in 1998 in a form of grants for animal feed and suspended in 2000 and resumed in 2001. The protection program of livestock initiated during drought allow the ranchers to maintain or increase the size of their herds, even in drought years, while small farmers, facing liquidity problems, are obliged to reduce their herds at the risk of losing them completely. However, overall, livestock numbers have increased compared to the productive capacity of rangelands. Although the Moroccan government has phased out subsidies for livestock feed, reducing taxes on products intended for animal feed may have a similar effect. It is imperative to continue consultation and dialogue on policies to be adopted between the local and national authorities.

As a normal phenomenon of the Mediterranean climate, drought must always be integrated into the development strategies in these regions. When the crisis becomes collectively unbearable and therefore politically dangerous, the response to climatic risk returns to the field of public action. . This concern has become important in Morocco especially in the Oriental for the last twenty years. But efforts of the state tends to be counter- productive in addressing the challenge and often contrary to what most pastoralists are doing to integrate drought into their strategies.

The role of the Interior Ministry

The role of the Ministry of Interior, guardian of the management of rangelands for public use, is limited to the supervision and guidance of the institution “Niaba” (delegation) in connection with the enforcement of law and local “Orf” (traditional local law). The guardianship provides the role of arbitration in allocating use rights and management of conflicts between rights holders.

On the whole, livestock farming is the main economic activity for survival of populations in forest and pastoral areas. The activity of livestock in these areas is normally accompanied by a lifestyle based on transhumance and nomadism. But the abandonment of pastoral traditions leads to system changes by encouraging the process of settling in forests and pasture lands and the disruption of the agro-sylvo-pastoral balance. These phenomena and mutations trigger the processes of desertification that reach advanced stages in some cases.

Ministry of Agriculture and Maritime Fishing (MAMF)

Regarding the Ministry of Agriculture, there was a significant decline in the attention to pastures in particular and to extensive livestock in general. Indeed, the structures concerned with pastures, before the last restructuring of the department, have been reduced considerably to a simple service, that of “planning and monitoring of pasture managements” having a single engineer.

At the central level, this service is embedded in the Ministry of Agriculture and Maritime Fishing (MAMF) which includes eight central directorates including the Department of Irrigation and Agricultural Land-use Planning which has three divisions including the Division of managements that account 3 services including the one of “planning and monitoring of pasture managements”.

At regional level, the PMMA consists of 16 regional departments having no service dedicated to pastoral affairs. Actions on these spaces are done in partnership with other stakeholders, the Ministry of Interior and the Ministry of Agriculture.

Planning and coordination of pasture management and its effectiveness

Pastures outside forests

In Morocco, the pasture lands are of various types and are under different legal systems (pasture land within the private domain of the state such as forest pasture, pasture lands located on collective lands, rangelands belonging to individuals or companies like the Ranch Hadarouch). And improvement, good management and wise use are primordial for increasing the income of herders, for the stabilization of pastoralists and for environmental protection (fight against soil degradation and desertification).

The implementation of most of these programs and projects, however, met with many difficulties or limitations for various reasons. Some, because the intervention of the administration has often met with strong opposition or hostility of users, for whom this intervention was often seen as a direct or indirect threat to their way of farming, for their subsistence and social organization; others, because they have misunderstood or poorly understood the existence and value of the systems and traditional knowledge of herding and transhumance still alive. To a large extent beneficiaries were not involved in planning, execution, monitoring and evaluation of pastoral development programmes.

Management of pastoral resources is regulated, too, by a multiplicity and diversity of laws and regulations which are all partial, fragmentary and difficult to apply, particularly with regard to collective pasture lands. The rules do not contain specific provisions about their protection and management and how they have to be developed.

Institutionally, the traditional model of community social organization no longer exists anywhere in its initial form as they also have undergone considerable changes. But it still survives, and in many places, by some of its characteristic aspects (existence of Jmaa of Douars and/or fractions, Naïbs communal lands, management committees of the pasture, practice of Agdal within a highly codified customary framework, with a designation of a Moqaddem or a Naib to ensure adherence to the rules).

However, the ability of local customary institutions (Jmaa) to manage the collective pastures and to resolve conflicts has declined considerably. Various factors, both endogenous (absence or low capacity of local leaders as regards the development and implementation of management rules for the rational use of rangelands, the inability of Jmaa to master the facts of settlement of herders and cultivation of plots); and exogenous (vagueness of laws and regulations, lack of or insufficient reinforcement of the Administration as regards the application of texts, economic constraints imposing new modes of more individualistic existence, concurrent role of the rural community and voluntary organizations of civil society in relation to that of Jmaa), have contributed significantly to the decline of customary institutional regime.

The problem is particularly severe in the context of implementation of various projects. Disputes over collective land boundaries and for use rights, lack of technological packages, lack of supervision and limited financial resources remain the major challenges. Indeed, all the 15 projects of pastoral improvement implemented until 2002 have experienced various problems, in particular conflicts between beneficiaries on the limits of the pasture land and the use rights, refusal of people to undertake improvement works of pastures, disregard for ethnic lines when defining the perimeters of pasture improvement, etc..

Organizationally, a Central Commission for Monitoring and Supervision of all these projects has been established, comprising representatives from all concerned Central Departments and whose mission is to implement the intervention of the State under the new approach defined by Law No. 33-94. Further a Local Commission for Agricultural Development has been created for each project involving, among other representatives, livestock farmers and whose mission is to give an opinion on the economics of development project in bour. A multidisciplinary team is responsible for preparing the project with the participation of the population beneficiaries.

As to the scope of the action of the institutional set up, including the implementation of development projects,, it is constrained by administrative factors like short duration of time allowed for the preparation of some projects, delay in signing the decrees of delineation of project areas, rigidity of financial procedures, inadequate human and material resources for action at central, provincial and local levels and the implementation of a priori actions in contradiction with the requirements of the participatory approach.

Financial allocation for the management of rangelands and forests

Budget for forest management

At the High Commissionership for Water, Forests and Combating Desertification, it is very difficult to separate the budget for the activities of pasture from the one allocated to forest management. The component “pasture” is intimately related to the forestry component. The main right of use of forests is the pasture by the herds of residents. Indeed, forests are primarily managed to meet the various demands of users. And for several years, these developments are made through a concerted and a participatory manner between forest managers, user populations and other local actors. Therefore, all studies of forest management include a section reserved for the pasture component. Most of the forest management operations are multi-purpose. The pruning, thinning and cleanings are important for the development of healthy forest stands (timber production); they also help to improve forage production of trees (oak), shrubs and herbaceous growth.

Management activities undertaken by forest development services and the service of forest and sylvo-pastoral pastures

The activities of pastoral nature that could be considered as undertaken by the forest development service, in the context of its activities are:

- The pasture component within forest management studies ;
- The silvicultural operations having a direct impact on forage production of forest stands: thinning out (green oak and cork oak), coppicing, thinning, cleaning, etc.

The service of pasture in forests and rangeland, recently introduced in the flowchart of forest department (HCEFLCD) is primarily in charge of the study and forest pasture improvement planning, in close consultation with the Forest development service.

The coordination between these two services is done at the level of the division of development that brings them together.

Constraints in the accomplishment of better integration

Perception of different stakeholders as regards goods and services provided by forest and rangelands

In general, the ecological processes of forest ecosystems and their pastoral and socio-economic roles represent functions and services provided by these areas. If the biological processes take place at all natural ecosystems (forest and range), it remains true that the functions and services appear only with men who use these processes for a specific purpose. Thus, the function of timber production is related to the productivity of trees and timber exploitation for economic purposes (financial). Similarly, the protection function is only useful if the issues to be protected are defined by social actors (roads, dams). So again, the social uses of the forest exist only in relation to users (pasture, firewood, etc.).

The functions and roles of the forest and the stakeholders who have a core interest in them are indicated below:

➤ *The protective functions of forests (water, soil and biodiversity): Moroccan Government.*

The forest has many advantages related to its high biological diversity and its impact on the socio-economic development. It plays an important role in soil and water conservation, and arrests desertification and land degradation. The forest is an important reservoir of biodiversity and is the only area where there is still a wilderness.

Therefore, protection of forest wealth is the major concern of the Government of Morocco, including the Department of Water Affairs and Forestry. This is justified by their ecological and social interests, which are considerable in terms of degradation processes that affect them.

➤ *The forest producing timber and other goods (pasture, firewood): economic actors.*

Revenues from timber production (work: 600 000 m³/year; fire: 10.5 million m³ per year) are paid at 80% to the budgets of communes and 20% to the state budget. The 80% are used by the concerned forest communities. The 20% is used by the state to plan and implement development activities of forest areas in these communes. Theoretically, this way to do things encourages the communes to better invest in the protection of forest areas. But this is not the case.

The forest, annually, produce about 1.8 million units of fodder. This pastoral wealth is used mainly by users of forest areas (31% of the needs of the national herd). The pastoral role of forests and forest areas is crucial for the maintenance and development of the livestock sector, notably the extensive. The rights holders (users), the traditional institutions that represent them (Nouabs, Jmaa) and the supervisory department (Ministry of Interior) of rangeland, organize the management of these areas with a view to ensuring a local development stability of populations. The use rights also give those users the right to procure firewood (dead wood) for domestic purposes.

In theory, the opportunity to take advantage of these resources (revenues for users, communities) would be a powerful incentive for their protection and development. However, the reality is different.

➤ ***Social function of the forest: jobs, economic actors.***

The forest is a source of employment and income for 114 000 persons including 20 000 permanent. It allows the existence and functioning of:

- ✓ 125 companies of reforestation;
- ✓ 400 units of firewood operators and industry;
- ✓ 49 units of operators and sawyers;
- ✓ 40 cooperatives of exploitation and Works;
- ✓ 10 processing units of cork;
- ✓ 4 units of plywood panels and packaging;
- ✓ 1 manufacturing unit of pulp (100 000 tons / year).

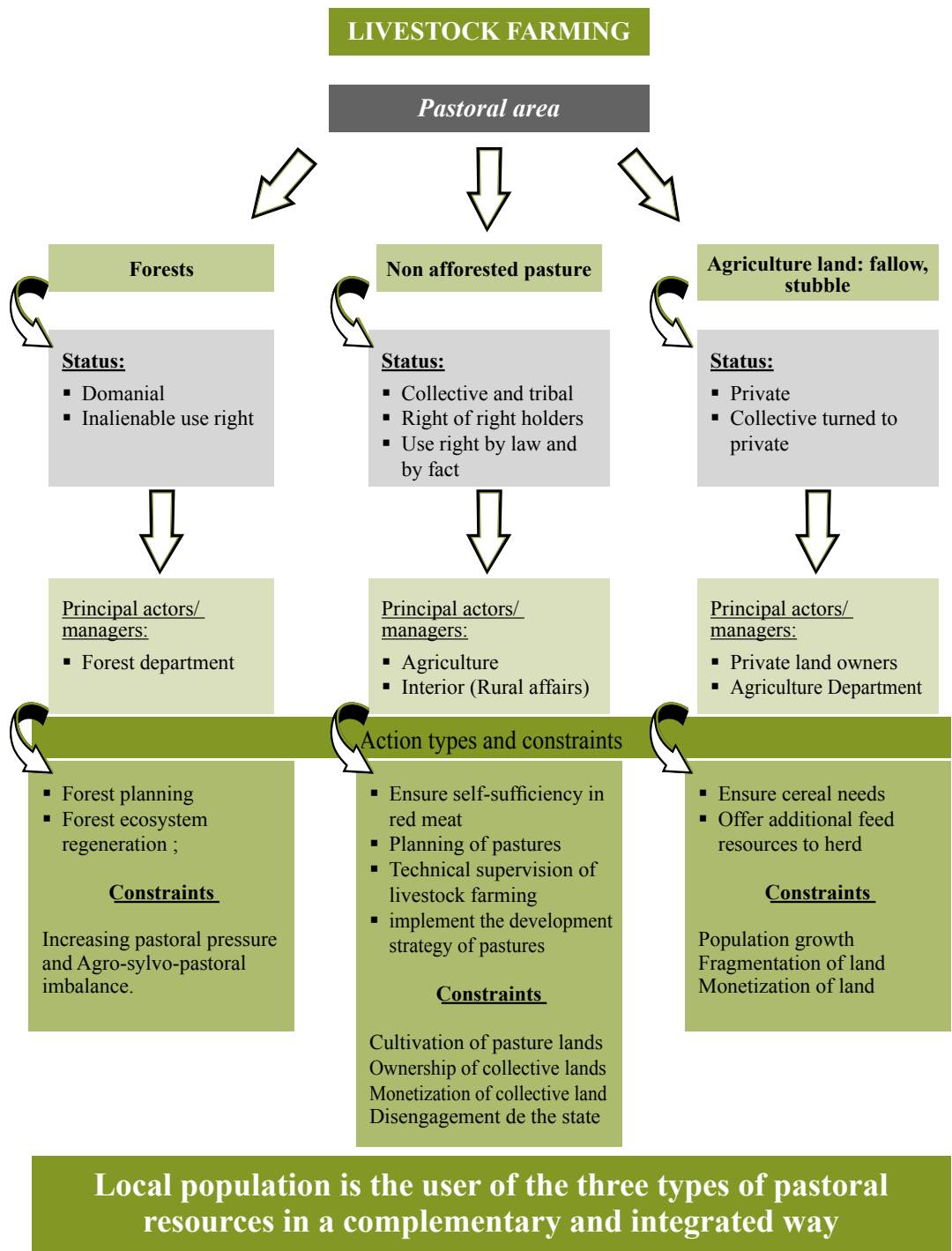
The Moroccan forest becomes more and more a recreational and leisure space in near urban areas and tourism centres. This function is taking an increasingly important strategy of forest department (HCEFLCD).

Coordination: a problem in sustainable management of forests and pastures.

Extensive livestock farming in Morocco takes place, generally, in both pasture land and forest land. Stakeholders and institutional actors differ according to the type of terrain and the legal status of the area. Rules and regulations governing the pasture lands and forests were established independently from each other and without any understanding of linkages between the two (see Figure 7).

The rural areas used by local communities extend always to the forest, agricultural and pastoral land. Farmers are thus confronted with various institutions in the pursuit of their socio-economic activities. Pastoralism is an activity that is both a basis of the economy of the local population and a source of protein. In the field, the operators and stakeholders do not share the same goals and concerns.

Figure 7 Livestock farming in Morocco



The complexity of resource management lies mainly on two levels:

Multiplicity of stakeholders on the space:

- **The forest pastures** are under the administrative and technical supervision of the Forest Department whose primary role is management and supervision of forest heritage;
- **the pastures outside forests:** collective or tribal are the property of ethnic communities and governed by Dahir of 1919 and which stipulates that the right of making decision and management is belong to the institution Niaba (representatives of ethnic groups). These lands are under the administrative supervision of the Ministry of Interior and the technical supervision of the Ministry of Agriculture;
- **the pastures of stubble and fallow:** are privately owned or privatized, that is to say from the sharing and illegal appropriation of communal land. The technical supervision belongs to the Ministry of Agriculture.

Strategy of operators:

- The Forestry Department: The strategy and objectives of the department do not favor the pastoral production and the role of forest range in the economy of users. The forest is under old legislation that recognizes ancestral rights over these areas and particularly the right of pasture. The Department of Water Affairs and Forestry, has always believed that livestock farming is a secondary production of forest areas. However, in many forest areas, pastoral production is more important than that of wood;
- The Ministry of Agriculture aims, essentially, to ensure the performance of the herd through actions allowing fighting against the mortality of animals using veterinary treatment (vaccine, treatment of epidemics, etc.) and by subsidizing food supplementation in drought period. Retention of livestock during drought and complementation of livestock on rangelands are an example of antagonistic actions and that impact on the sustainable management of forests and rangelands;
- Farmers: their goals are to cope with the increased demand for cereals (population growth) and meet the demands of daily life (Modernism) by the monetization of the land and especially those originating from the privatization of collective land

The result of all these processes and various and antagonisms management strategies, has serious consequences on the sustainability of forest and pastoral resources. Coordination of these actions that seems difficult is an absolute necessity to slow the degradation of these areas and encourage their development. Examples of coordination around projects exist and can give lessons on the harmonization of interventions of various stakeholders for a common goal: the preservation and development of forest and range spaces.

Level at which management decisions are taken as regards forest and range management

Management of forests and forest pastures

The Department of Water Affairs and Forestry has been subject to many and various administrative reforms to define, extend, devolve or decentralize structures and

administrative skills in order to strengthen the presence and effectiveness of the government at central, regional, provincial and local levels.

Since 1976, were created a National Council of Forests and Forestry and Provincial Councils to “coordinate and strengthen the action of the State and users in the development of the forest heritage of the State, its conservation and extension “.

The main responsibilities of the National Forest council:

- ✓ coordination of programs and budgets related to economic development activities in forest areas and pasture lands;
- ✓ proposition of legal and regulatory solutions to disputes between the administration and users;
- ✓ providing advice on the principles of distraction or extension of the forest system lands and disposal of forest products.

The Provincial Councils of forests are responsible for:

- ✓ advise on equipment programs, enhancement and exploitation of forest areas under their jurisdiction and award programs;
- ✓ participate in the organization and supervision of auctions;
- ✓ to consider all forms of participation of user populations to the exploitation of forests and promote the creation of forest development agencies (including cooperatives), and follow their evolution and their supervision.

Communal Councils are required to adjust by their deliberations:

- ✓ requests for temporary occupation of forest under their jurisdiction;
- ✓ application “amodiation” for the right of hunting and fishing;
- ✓ applications for extraction and collection of dead wood, timber, brush, grass and branches;
- ✓ applications for gathering plants for industrial or pharmaceutical use;
- ✓ the organization of pasture in forest;
- ✓ exploitation of mountain pastures and fodder reserves and
- ✓ cutting programs and alienation of forest products. “

On the other hand, users are asked to participate in the development of the forest heritage of the state. This participation is exercised by the concerned rural communal councils and their groupings or associations.

In addition, the forest legislation is dualistic as regards sylvo-pastoral development, because a pastoral territory is subject to two different legal systems, one of the Dahir of 10 October 1917 and its implementing regulations with regard to the forest pastures and the other of the Dahir of 27 April 1919 and its implementing regulations with regard to the pastoral collective rangelands.

One may wonder about the consequences of actions taken on administrative decentralization and the implementation of decisions: increasing the number of stakeholders, complexity of decision circuits, extensions of time, diffusion of responsibility, etc. In practice, such institutions, bodies and procedures do not lead to the expected results, often for lack of technical, managerial and program coordination and cooperation among many stakeholders (state services, user populations, rural communities, ethnic communities, cooperatives, farmer associations, NGOs).

Pastures outside forests

Apart from lands “melk” (private properties) that are managed by the general rules governing the organizing both registered as unregistered properties, the other regulations are governed by, in addition to general rules, special rules of each status.

On collective rangelands enjoyment of the right is recognized to the rightful owner of the entire pasture land, with regard to the respect of customs that safeguard the rights of other persons entitled to the same enjoyment.

In both cases, these general rules have evolved the concept of collective was transformed. On rangelands, significant areas have been converted to cropland appropriate by fact to users.

Entitlement and right of use:

In the legislation governing collective lands, the quality of a person entitled has not been defined in a clear manner. Generally, the beneficiary is a member of the ethnic community to which he belongs because he is descended from a common ancestor of the tribe.

The right of use is to free access on a pasture land by all persons entitled to collect natural resources (firewood, water) for domestic needs of their homes. However, this right remains subject to review by the communities, particularly during drought years.

Traditional institutions:

Rangelands are shared between the fractions according to old conventions and agreements that are often respected, but the demarcation dispute arises between them due to the lack of demarcation in several communes. Each fraction or tribe designates by election, “Nouabs” which constitute the Jmaa (group). The Jmaa as a common representative or Nouabs as individual representatives, are the contacts with local authorities, services of the Ministry of Agriculture, and all departments involved in planning operations or investment in these pastures. These Nouabs are the guarantors against abuse of the governing law that prohibits any sale, purchase, division, ownership, construction, or any purpose other than grazing.

These traditional institutions, the Jmaa and its Nouabs, have become unable to manage the problems of collective land management or to enforce the decisions emanating from this institution. This state of things is enhanced by:

- ✓ Development of the settlement of pastoralists;
- ✓ Disengagement of local authority as regards regulations of collective land management (offenses plantations and construction on collective land not sanctioned);
- ✓ Disintegration of Jmaa because of the favoritism played by the local authority and some Nouabs, individualism, politics and the role of justice.

In some regions (East), the phenomenon of clearing has taken important dimensions. Rangelands are progressively converted into cropland. This phenomenon has become very prominent from the seventies.

Congruence and conflicts in the forest and rangeland policies and management

As was mentioned above, the institutions that organize the management of forests and rangelands, each in its concern, are the High Commissioner for Water, Forests and Combating Desertification, the Ministry of Interior and the Ministry of Agriculture. There is a crucial lack of information exchange between these institutions. The identification and implementation of development activities of rangeland lack coordination and spatial-temporal harmonization

In forest rangelands, the intervention is provided primarily by the High Commissioner often in consultation with the users and their representatives. However, the pastoral component of forests is often considered secondary to the production of wood or cork. The natural or artificial regeneration (reforestation) of forest stands often leads to conflicts between the Forest Department and the users, their representatives and the local authority. These conflicts are expected to be resolved by provincial and municipal councils; however old regulatory frameworks seldom facilitate coordination and resolution of conflicts.

The Ministry of Interior has the authority on collective lands, which are often non-forested rangeland (steppes). It organizes its management in consultation with representatives of users who are “Nouabs” (elected), the “Jmaa” (grouping), associations and cooperatives. The Ministry of Agriculture is associated to some planning cases as a technical or financial supporting department. The organization of the management of these areas by the Ministry of the Interior is expected to be easy and effective. However, the numerous objectives challenges (security, stability of the population, political issues, financial constraints, etc.) and actors (government, users, Jmaa, associations, private, etc.) make this difficult. The current dynamics of the Moroccan society (more individualism and privatization) add to the complexity of management of collective pasture lands. These rangelands are being rapidly transformed into privatized farmland.

The Ministry of Agriculture is focused on technical issues like pasture improvement, animal health, etc. It is focused on:

- ✓ collective pastures in consultation with the Ministry of the Interior and representatives of users (Nouabs, Jmaa, associations, cooperatives);
- ✓ State-owned steppe pastures in consultation with the High Commissioner and user representatives.

Taking into account the past experiences of its organs (Offices of regional development, provincial directorates) and its new strategy, restructuring of the Ministry of Agriculture has placed little emphasis on the pastoral and silvo-pastoral sectors (one service at central level). The focus is on private and voluntary partners to develop an intensive livestock (breed improvement, stall herds, access to financial credit).

From experiences shared by these institutions, we can say that the programs conducted under integrated projects (Oued Srou watershed planning, Sidi Driss watershed planning, Middle Atlas Project, Project of pasture development of the Eastern region (PDEPO)) experienced greater efficiency. Oued Srou project, started in the early 80s, was a school (very slow) of learning of how to work together for better integration. The management structure of the “Oued Srou project” was a multidisciplinary team (agronomists, foresters, socio-economists, sociologists, etc.), multi-institutional (Forestry, Agriculture, Interior) and coordinated by a forest engineer. It was a financially autonomous structure. The contact with the population and its representatives (NGOs, associations) was easy and efficient because of the mutual trust built through a process of sincere and responsible consultation. The German cooperation was the essential support to this team (technical, financial).

Barriers to the integration of forest and rangeland management

Policy of development for irrigated agriculture

Since the sixties, Morocco identified agricultural development as a priority of economic and social development. The agricultural development policy favored the construction of dams (mobilization of water resources) and has focused its activities on the plain lands favoring a minority of farms and some crops (citrus, vegetable crops, sugar crops) increasing disparity between regions. Areas in Bour and mountains have been largely neglected for a long time.

It is only recently that a more equitable distribution of investments between irrigated areas and less favorable areas (area in bour, mountains) has been initiated. The development strategy of the mountain has not been able to be processed for political reasons (regionalization). The severity of land degradation (forests and rangelands) and the necessity of ensuring food security of the country, explain the strong current awareness of the importance of the mountains. The National Forest Program (High Commissioner for Waters, Forests and Combating Desertification) and Pillar II of the “Green Morocco Plan” (Ministry of Agriculture and Marine Fisheries) aim to balance between economic development and conservation of natural resources. However, the implementation of these national programs is coming up against difficulties of institutional and budgetary problems.

Non harmonized Regulations

The pastoral and forest resource management is governed by a multiplicity and diversity of laws and regulations that remain partial, fragmentary and difficult to apply, particularly with regard to collective pasture lands , among others:

- Dahir of 27 April 1919 organizing the administrative supervision of indigenous collectivity and regulating the management and disposition of community property;

- Agricultural Investment Code of 25 July 1969 in its provisions for the protection and restoration of soil and water conservation on communal land in semi-arid areas;
- Forest legislation has provisions relating to the use of forest pasture land and to silvopastoral planning (Dahir of October 10, 1917, Dahir of September 20, 1976, etc.).
- Communal Charter of 1976 in its provisions for the participation of rural communities to manage forests on which they are contiguous and the role of these communes in the economic and social development of their respective territorial divisions and then the pastoral areas within them;
- Act No. 33-94 of 1994 in its provisions for areas of pastoral improvement in perimeters of development of bour.

The application of these laws is beset with many problems and the outcomes have been far from satisfactory. Traditional practices encouraged by the Dahir of 1919 are confronting more and more difficulties. The traditional collective seasonal land fencing against grazing (Agdal) is less and less respected. The ancient pastoral pacts that regulated the use of rangelands have lost their effectiveness. The use rights in forests, organized by Dahir of 1917, are being converted. In some forests (Argan forest), they are similar to property rights. In others (Middle Atlas forests), they opened the possibility for the establishment of often illicit association, between rights holders and private investors to use, for free, a forage resource.

Insufficient financial resources.

Morocco is a poor country. The creation of wealth at the national level is very limited. The Moroccan government has not enough resources to invest in economic development and safeguard its environment, including its natural resources. Since independence (1956) priority is being given to economic sectors with high financial returns and allowing large foreign exchange inflows (exports of mining and agricultural products, tourism). The budget part reserved for management and conservation of natural resources (water, land, forests, and rangelands) is negligible compared to the severity of the problem they face. The budget of the Forest Department is insignificant in comparison with what is allocated to the Public Works Department, compared to investment in public works (building of dams). The budget for the conservation of forest and pastoral resources represent only 2.2% of that of the High Commissioner for Forestry and the fight against Desertification. Implementation of policies relating to conservation of natural resources faces severe financial constraints. Further the current development policy has not encouraged private sector investment in forest and pastoral sectors.

A rich technical experience, but inadequate approaches

Since the early 1950s, Morocco has implemented several programs of land management (farming, grazing, and forestry) at local, regional and national scale. This has helped to gain considerable experience among its managers and technicians in the departments responsible for resource management and in terms of its technological process (institutes and schools of education and research). The pastoral, silvo-pastoral and forestry planning techniques

are highly controlled. Manuals and data sheets have been published by the Departments of Forestry and Agriculture.

However, since the early 1980s, assessing the results of these projects showed that the major obstacle to success is the approach used. Indeed, consultation and participation of stakeholders and involvement of beneficiaries in problem identification, solution design and implementation are lacking. It is only in recent years, after the experience of “Oued Srou project” that the administration, in general, has adopted a participatory process of development. Democratization of the country was heavily involved in this opening. Several cases of concerted and participatory development of forest and rangeland are in progress. Coordination of actions of different departments around these plans (pasture development of the Oriental, Forest management in Chefchaouen, Ifrane Park, Toubkal Park, etc.), is being set up. The formation of multidisciplinary management units and multi-institutional ones (transversal), but mostly autonomous in decision making, allows for better coordination.

Coordination mechanisms of forests and rangelands management

Coordination of management of forest and rangelands are aimed to be accomplished through the national, the provincial (regional) and communal councils. Although there are several institutional structures established to improve coordination, they are not at all effective. Coordination between the different institutions is practically lacking. The exchange of information is almost nonexistent. Each institution sticks to its positions. Table 18 summarizes, in a scale of 1 to 10 this coordination.

Table 18 Assessing the extent of integration of range and forest management in Morocco

Criteria	Issues to be considered	Points assigned (In a range of 1 to 10)
Integration at the policy level	<p>Are the policies relating to range and forests well integrated?</p> <p>Are they formulated as integral components of overall land use policy?</p> <p>If not are they distinct / separate policies for managing forests and rangelands?</p> <p>If they are separate policies, to what extent they take into account the issues relevant to the other sector</p> <p>Do the forest/ range policy make any explicit reference to the policies relating to the other sector?</p> <p>Do the forest and rangeland policies along with the agricultural policies provide a robust framework for sustainable land use?</p>	2

Criteria	Issues to be considered	Points assigned (In a range of 1 to 10)
Integration of laws/ rules and regulations	<p>Is the management of range and forests governed by the same set of legislation? Or are the laws/ rules/ regulations separate?</p> <p>If they are separate, do the legislation/ rules relating to range/ forests have broad similarities?</p> <p>Do they take into account the rules/ regulations of the other sector?</p> <p>Are they complementary or contradictory?</p>	2
Institutional integration		
National level	<p>At the national level, are the departments dealing with range and forests in separate ministries or in the same ministry?</p> <p>If they are in different ministries, are there any mechanisms to coordinate/ integrate the work of the different ministries?</p> <p>To what extent these coordination mechanisms are effective?</p> <p>If range and forest management are under two departments in the same ministry, what are the mechanisms for interdepartmental collaboration? Are these mechanisms effective?</p>	2
Provincial level	<p>At the provincial level, are the functions relating to range and forest management under different departments.</p> <p>If so, what is the mechanism that brings about better integration/ coordination between the departments?</p> <p>How effective are the existing arrangements in bringing about integration/ coordination?</p>	3
Local level	<p>What are the mechanisms/ systems in place, at the local level, to implement forest and range management?</p> <p>Are there separate departments/ agencies to implement range and forest management at the local level?</p> <p>If so, how are, coordination/ integration of different activities, accomplished?</p> <p>Are these mechanisms for coordination effective?</p>	2

Criteria	Issues to be considered	Points assigned (In a range of 1 to 10)
Community level	What are the community level institutions dealing with range and forest management? Do the communities deal with forest management/range management separately? Or are these well integrated? What is the level of integration between forest and range management at the community level?	4
Integration at planning level	What is the planning process adopted in the two sectors? Does the planning process in one sector accommodate the concerns of the other sectors? Are the plans and programmes for range and forest management prepared separately? To what extent these plans take cognizance of what is being done in the other sector?	6
Integration at implementation level	How are the activities under the different plans and programmes implemented? What mechanisms exist for integration of different plans and projects at the operational level? Are there any conflicts between the two sectors and if yes what mechanisms are in place to overcome such problems	3

Challenges in accomplishing improved integration of forest and range management

In the light of all what was said, the challenges through better integration of the management of forest and rangeland may be advertised as proposals:

- Change in attitudes and administrative culture among decision makers, executives and employees of the institutions responsible for the management of these areas. We all work for the same goals: to develop the country and preserve its resources. Certainly, the Administration has a history in the regal management of the country resources. However, the role of the state was redefined in several texts, notably the new constitution;
- Adopt a development approach based on effective consultation and participation with all stakeholders;
- Establish simple and consistent system of procedures (single wicket): Harmonize and adapt the regulations;
- Ensure the effective implementation of regulations. The degradation actions (land cultivation) must be stopped and punished;
- Establish a network of effective and efficient communication and exchange of information between different institutions and stakeholders;

- Establish effective forms of organization of users to improve the efficiency of development activities: create real partners (professional) in development projects (associations, cooperatives);
- Clarify the status of collective pastoral land by the demarcation and registration of those lands and limit the dynamics of fragmentation and the practice of shifting cultivation;
- Establish a system of extension and technical assistance to the actors involved in the exploitation and reclamation of forest and range spaces. Strengthening the staff for a better valuation of investments and the integration of livestock in the exploitation would be a prerequisite for improving livestock productivity on rangelands;
- fight against poverty among users of rangelands and forests: the poverty of users does not allow to develop a system of rational exploitation and valuable resources. These are overexploited. Free forage resources promote the establishment of non-regulatory association system for their exploitation;
- Create an economic environment where the shepherds and foresters can promote their work and investments: improving marketing channels in favor of farmers (access to markets and credits);
- Assist the transformation of exploitation systems: moving from extensive systems degrading resources (traditional pastoralists, inefficient local breeds) to locally intensive systems favoring niches that are ecologically favorable;
- Establish a system of monitoring and evaluation of development programs.

The way forward

The following table provides possible recommendations to improve integration at the political, legal, institutional and operational levels, for short, medium and long term. These recommendations aim, at the same time, to improve the coordination of resource management and reduce their degradation process.

The feasibility of these recommendations depends on several factors:

- The political issues at national, provincial and local levels;
- the issues of population stability and social security;
- the financial issues;
- the heaviness of legislative and administrative systems, and
- the priorities of the Government of Morocco.

This feasibility of implementing the various recommendations is indicated on a scale of 1 to 5:

- F1: Very weakly feasible;
- F2: weakly feasible;
- F3: moderately feasible;
- F4: highly feasible;
- F5: surely feasible.

Table 19 Recommendations to improve coordination at the national level

Nature	Short term	Medium term	Long term
Policy	<ul style="list-style-type: none"> - Coordinate between sectoral policies of livestock and rangeland development (forests, rangelands). F4 	<ul style="list-style-type: none"> - Define a single policy for the development of livestock and pastures: What livestock farming and what forest for Morocco of the future? F2 	<ul style="list-style-type: none"> - Improve and adjust the policy development of livestock and grazing. F2
Legal	<ul style="list-style-type: none"> - Amendments Dahir of 1917 and 1919 for the harmonization of measures and regulations on the use of rangelands and forests. F3 	<ul style="list-style-type: none"> - Develop a Pastoral National charter (forests and rangelands). F4 	<ul style="list-style-type: none"> - Monitor and adjust the national charter pastoral. F4
Institutional	<ul style="list-style-type: none"> - Revitalize the interdepartmental committee on rural development. F4 	<ul style="list-style-type: none"> - Create a transversal institution responsible for managing livestock and grazing at the Presidency of the Government (Agency for Development of Livestock and Range ADLR). F3 	<ul style="list-style-type: none"> - Strengthen structures of ADLR. F3
Operational	<ul style="list-style-type: none"> - Organize regular meetings of the interdepartmental committee. F4 - Develop an action plan for the interdepartmental committee. F4 - Adopt the approach of integrated and territorial projects for all rural development. F4 - Choose strictly a financial programming by integrated and territorialized project. F4 	<ul style="list-style-type: none"> - Look for financial means. F3 - Provide the ADLR of necessary financial and human means resources. F3 	<ul style="list-style-type: none"> - Comparative evaluation of assignments executed projects by the ADLR. F4

Table 20 Recommendations to improve the situation at provincial level

Nature	Short term	Medium term	Long term
Policy	<ul style="list-style-type: none"> - Adopt an integrated and participatory territorial approach for planning and management of livestock and pastures. F4 - Revitalize the role of the Governor at the level of coordination of sectoral policies. F4 	<ul style="list-style-type: none"> - Adopt the approach of regional development plans (agriculture, rangelands, and forests). F4 	<ul style="list-style-type: none"> - The Region is an integrated development area in which the state has a role of supervision and control. F2
Legal	<ul style="list-style-type: none"> - Application without flaws of the current regulations. F2 	<ul style="list-style-type: none"> - Establish regional pastoral charters. F3 	<ul style="list-style-type: none"> - Evaluation and adjustment of regional charters. F4
Institutional	<ul style="list-style-type: none"> - Establish autonomous, multi-disciplinary and multi-institutional units of project management related to livestock and pastures. F4 	<ul style="list-style-type: none"> - Set up regional structures of ADLR. F3 	<ul style="list-style-type: none"> - Evaluation of the performance of regional structures of ADLR. F4
Operational	<ul style="list-style-type: none"> - Create a system for storing and exchanging information at the provincial level. F4 - Strengthen the capacity of provincial structures in terms of communication, participation and integrated management of resources. F4 - Create self-governing units of project management: selecting qualified managers. F2 - Provide the current judicial system of human and logistical resources. F1 - Provide the self-governing units (existing or to be created) in human and logistical resources. F1 	<ul style="list-style-type: none"> - Provide the provincial structures of the ADLR in human and logistical resources (recover the self-governing units of project management). F1 - Implementation and monitoring of integrated and territorial development projects by regional structures of ADLR. F3 - Limiting the role of sectoral structures to technical support and control. F3 	<ul style="list-style-type: none"> - Comparative evaluation of projects implemented by the ADLR at regional level. F4

Table 21 Recommendations to improve the situation at local level

Nature	Short term	Medium term	Long term
Policy	<ul style="list-style-type: none"> - Opt for basic community organizations (BCOs) representative of local actors for land management. F3 	<ul style="list-style-type: none"> - Delegation of pasture management (rangelands and forests) to functional and responsible BCOs. F2 	<ul style="list-style-type: none"> - Establish a policy of privatizing the management of livestock and pastures. F2
Legal	<ul style="list-style-type: none"> - Legitimizing the BCOs, at the provincial level, by the Governor. F4 	<ul style="list-style-type: none"> - Establish regulatory provisions supporting the missions and legitimacy of BCOs. F3 	<ul style="list-style-type: none"> - Establish a procedure for evaluating the BCOs. F4
Institutional	<ul style="list-style-type: none"> - Ensuring better links between modern and traditional institutions (Jmaa, Nouab). F4 	<ul style="list-style-type: none"> - Establishment of a transversal institution of local actors having the responsibility of territorial management BCOs. F3 	
Operational	<ul style="list-style-type: none"> - Build capacity of local actors in terms of communication, participation and integrated resource management. F4 - To organize training for local actors on BCOs and their roles in resource conservation. F4 - Establish systems for storage and exchange of information. F4 - Stop and punish the offense of conversion of pastoral land and forests to cultivation land. F3 - Prohibit the associations between rights holders and foreign investors to the area for the exploitation of resources for free. F3 - Develop integrated management plans for livestock farming and grazing (forests and rangelands). F4 	<ul style="list-style-type: none"> - Elaboration of land capability maps (forest, rangeland, agriculture, urbanization, etc.). F4 - Ensure that development activities reflect the maps of land use. F3 - Preparation of marketing channels for local products (livestock). F4 	<ul style="list-style-type: none"> - Encouraging the plan of intensification and labeling of animal husbandry. F3 - Evaluation of the application of land capability maps. F3

Role of international organizations in fostering integrated management of forests and range.

The roles of international organizations in favoring and promoting integrated management of pastoral and forest resources in Morocco can be enumerated as follows:

- Assist to clarify the proposed measures and facilitate the study of their feasibility
- Support the adjustment of current regulations and the introduction of new regulations;
- Technical support for the design and implementation of the proposed structures at national, provincial and local levels;
- Capacity building programs: communication, participation and integrated resource management;
- Support the identification and implementation of storage and management systems and information at national, provincial and local levels;
- Support the mobilization of donor resources.

Summary and conclusions

Morocco with a land area of 710 000 square kilometers has more than 30 million people, with more than half (51%) living in urban centres. Population grew rapidly until a decade ago and now there are indications of slowing down. Agriculture (including livestock) contributing to 15 percent of the GDP and 78 percent of rural employment remains the main source of livelihood for majority of the people. Within agriculture livestock is a key sub-sector, accounting for 26 to 32 percent of the agricultural GDP and 40 percent of the rural employment. Population growth and the high level of dependence on land for livelihood have created significant pressure on land, including forests and rangelands. Fragility in the agricultural sector is compounded by low and erratic rainfall and the increasing frequency of drought years.

Forest lands and rangelands account for 43 percent of the total area of the country. For pastoralists, the lands, actually used for pasture, exceed 87 percent of the land area. The cultivated areas also provide fodder during part of the year in the form of stubble and grass and other growth during the fallow period. Forests are an integral part of Moroccan rangelands. They are used by local communities through the use rights allowed to them by the forestry regulations in force. They are also sources of fuel wood (standing dead), of timber and other non-wood products.

However, these rangelands are subject to severe degradation. The steppe areas are threatened by desertification due to overgrazing and a chronic, extensive and uncontrolled cultivation. Degradation and de-densification have affected forests. Forests and rangelands are overgrazed and turned into mosaics of agricultural plots for cereal cultivation nested in degraded matorrals, affecting the productive and ecological functions. Natural resources are considered as a common property subjected to free access.

Several strategies have been formulated and development programmes initiated for the rehabilitation, conservation and sustainable management of these resources. However, the complexity and inconsistencies in institutional and regulatory mechanisms have undermined their effectiveness. Clear and consistent policies are lacking to implement integrated resource management. The major challenge is as regards coordinating the activities of the various departments in charge of forests and pastoral lands, especially the High Commissioner for Waters, Forests and the Fight against Desertification, the Ministry of Interior and the Ministry of Agriculture. The evaluation of several programs and development activities pertaining to forests and rangelands has brought out severe shortfalls in accomplishments. The development of forests and rangelands often collide with the following disabilities:

- Difficulties in clearly identifying targets based on consensus between the various stakeholders - users of the resources, elected representatives, associations, state agencies (Ministries of Interior, Water and Forestry, Agriculture, etc.);
- Difficulties in developing integrated, harmonized and coordinated actions among the various stakeholders, notably, the government services;
- Institutional and regulatory difficulties in implementing integrated programs.

The experiences of coordinating and harmonizing actions of the three departments are very rare. A tripartite agreement has been tried for the management of part of the Oriental pastures in recent years. Its implementation is hampered by a critical lack of communication and coordination. This lack of communication, coordination and harmonization of public actions has been the cause of the inefficiency of sectoral programs. It is imperative, in order to act quickly and effectively in reducing resource degradation, its rehabilitation and development, to propose and implement innovative schemes in terms of integrated actions between these three departments.

Bringing about better integration of forests and rangeland management would require:

- Changes in the administrative culture among decision makers, executives and employees of the institutions responsible for the management of these resources. Certainly, the government departments have a long history of managing the natural resources. Considering the larger changes in society, there is a need to redefine these roles, clarifying the future role of the forestry and livestock sectors in Morocco's economy and what should be the policy towards these spaces.
- Strengthen communication, consultation and participation with all stakeholders;
- Establish a system of simple and consistent procedures: to harmonize and adapt the regulation texts;
- Assess land capabilities for sustainable uses: forestry, pastoral, agricultural and urban;
- Focus on poverty alleviation of people dependent on forests and rangelands.

Once there is clarity as regards policies and the tasks of different departments, many of the present problems can be easily overcome. In fact the absence of clarity on policies is the major factor contributing to absence of coherence and coordination. At the end integration has to be accomplished at different spatial levels (national, regional and local) and at the different functional levels (policy, legislation, strategy, programme and project levels). Establishment of a Government Development Agency of Livestock and Pastures (DALP) in the Presidency of the Country could help better coordination and consistency in plans and actions.

5. INTEGRATION OF FORESTRY AND RANGELAND MANAGEMENT INSTITUTIONS IN SUDAN⁵



Introduction

General characteristics

The Republic of Sudan (RoS) is bound by Egypt, The Red Sea, Eritrea, Ethiopia, Republic of South Sudan (RSS), Central African Republic, Chad and Libya has an area of 1 886 000 km². The most salient geographical features of the country are the Nubian and Bayuda Deserts in the north, the Nile Valley, Jebel Marra, Nuba, Ingessena and the Red Sea Hills. The Blue Nile originating in the Ethiopian Highlands is joined by the White Nile, running from the Equatorial Lakes, in Khartoum and with their tributaries form the River Nile, joining the Mediterranean Sea.

The rainfall varies from zero in the northern desert to more than 1 200 mm in the High Rainfall Woodland Savannah in the south western portion of the country. Sandy soil covers about 60% of the country, particularly in the northeast, north and northwest. Heavy cracking clay soils form a triangular central eastern plain which makes up some 25% of the country. Red soils of different types are characteristic of the remaining south-western portion.

⁵ Prof Hassan Abdel Nour

The vegetation can be divided into six principal types which in general follow the isohyets and form consecutive series from north to south : 1. Desert; 2. Semi-Desert; 3. Acacia Short Grass Scrub; 4. Acacia Tall Grass Scrub; 5. Broad-leaved Woodlands & Forests; 6. Swamps (permanent swamps, seasonally inundated land), 7. Grassland and 8. Mountain Meadow.

Demographic and economic characteristics

The total population in is about 33.4 million in 2010, with an annual growth rate of about 2.8 percent. About 30 percent of the population lives in urban centres and 63 percent in rural areas. The remaining 7.0 percent leads a nomadic lifestyle. Literacy is about 71 percent among the males and 51 percent among the females.

Although most of the country is arid, the economy has predominately depended on the agricultural sector, including livestock production, forestry and fishing which accounts for about half of the gross domestic product (GDP) before the discovery and exploitation of oil in 1999. Since then the share of agriculture has declined to 35 percent during the years 2007- 2010 and in 2011 it accounted for 31.6 percent of the GDP (of which 20% was from crop production and 11.6% from livestock). Although the share of agriculture in the GDP has registered a continuous decline, it still forms critical for the rural sector, employing about 70 percent of the labour force.

Land use and farming systems

The total arable land is just about 21 million ha or about 11 percent of the land area. Of this only some 4.6 million ha are irrigated and another 12.2 million ha is rain-fed. Although most of the country is arid, the economy is highly dependent on the agricultural sector, including livestock production, forestry and fishing. Farming systems have evolved mainly as a function of agro-ecological conditions, acquired technology, market and socio-economic conditions. Crop production is practiced in three main farming systems, namely: irrigated, mechanized rain-fed and traditional rain-fed (Anon 1999).

Irrigated agriculture

Irrigated agriculture covers some 4.6 million ha (Anon 2011), watered basically from the Nile and its tributaries through gravity irrigation from dams, pumps or flood irrigation from seasonal rivers like Gash and Tokar. A small area is irrigated from ground water. Five dams (Sennar, Jebel Awlia, Roseires, Khasm el Girba and Meroe) have been erected during the 20th and early part of 21st centuries to provide irrigation water and hydropower.

The main crops in the irrigated sector are Sugar cane, sorghum, cotton, wheat, ground nuts, winter pulses, vegetables, fruit and green fodder. The sector uses the bulk of imported agricultural inputs. Irrigation systems are government owned. Land is under government control and is allocated to tenants in holdings of 15-40 fed. Production relations are based on water rate and administration. These are undergoing drastic changes especially in Gezira Scheme.

The expansion of irrigated and mechanized rain-fed agriculture, particularly the latter, was entirely at the expense of forest and rangelands. Large expanses of woodlands and pasture lands were brought under the plough and the reduction on forest and rangelands was directly proportional to the increase in the extent of cultivated area.



Mechanized Rain-fed Agriculture

Mechanization is considered a most suitable means of cropping in Sudan's extensive central plains in view of (a) the heavy clay requiring mechanised soil preparation, (b) shortage of labour on account of the sparse population and (c) shortage of drinking water. Mechanized cropping started in the mid 1940s in small areas in Gadaref area then expanded to about 6.0 million ha, in the 400-800 mm rainfall belt, concentrated in Gadaref, ed Damazine, Kosti and Dilling. Land is government owned and is leased to investors for 25 year periods in holdings of 1000, 1500 and 2000 feddans for individuals, cooperatives and companies respectively. Sorghum is the leading crop in this sector followed by sesame, sunflower, millet and cotton. Productivity is generally low and fluctuates with rainfall.

Traditional Rain-fed Agriculture

The area of traditional rain-fed agriculture is estimated at 6.3 million ha. It is practiced primarily in west and central Sudan. Being dependent on rainfall there is significant year to year fluctuations in area cropped and productivity. Land is collectively owned and usufruct is granted according to family needs. Since traditional rain-fed cultivation is labour intensive and uses mainly traditional hand tools, the area that can be cultivated by a family is very limited. Yet, this segment of agriculture is vital to the country's food security and accounts for 90, 48, 28, 11 and 100 percent of the production of millet, ground nuts, sesame, sorghum and gum Arabic respectively.

Both the irrigated agriculture, especially based on the large irrigation schemes, and the mechanized agriculture are highly structured based on well-developed institutions and with significant investments by the public sector (especially the development of the irrigation system), involving large tracts of land. This kind of investments and highly centralized institutional arrangements are in direct contrast with the institutions and technology adopted in the case of traditional rain-fed agriculture.

Forests and forestry in Sudan

Current status

As per the FAO Forest Resource Assessment 2010 (FAO, 2010) the extent of forests in Sudan (including the area now constituted as Republic of Southern Sudan) is estimated as about 69.95 million ha, or about 29.4 percent of the land area. In addition Sudan also has a large extent of other wooded land accounting for 20 percent of the land area (See Table 22). No separate information is available on forests distribution between Sudan and the Republic of Sudan; but considering the fact that Sudan is largely in the arid and semi-arid zone with very unfavourable conditions for tree growth, the percentage of land covered by forests could be very low in comparison with the pre-bifurcation situation.

Table 22 Sudan forest cover and areas in 1990, 2000 and 2010

FRA categories	Area (in 000ha)		
	1990	2000	2010
Forests	76 381	70 491	69 949
Other wooded land (OWL)	58 082	54 153	50 224
Other land	103 137	112 956	117 427
Inland water bodies	12 981	12 981	12 981
Total area	250 581	250 581	250 581
Percent of forests area %	32.1	29.7	29.4
Percent of OWL area %	23.2	21.6	20.0

Source: FAO (2010)

The global forest resource assessments indicate a decreasing trend in the forest cover from 76.4 million ha in 1990 to 70.49 million ha in 2000 and 69.95 million ha in 2010 (30.5% to 28.1% and 27.9% of the country total area, respectively).

The removal rate for Other Wood Lands (OWL) during the period 1990-2010 was based on the assumption that the total removal of forest and OWL is proportional to the area of each of the two classes (57% for forest and 43% for OWL). Although some OWL may have been converted into forest during this period, some of this loss was outweighed by the substantial increase in the area invaded by mesquite (*Prosopis chilensis*), which is classified as OWL and was estimated to be 149 420 ha/year (FAO 2010). Accordingly, the figures in Table 22 suggest that the OWL area as percentage of the country area decreased from 23.2% in 1990 to 21.6% in 2000 and 20.0% in 2010.

Almost all the change in the extent of forests and other wooded lands has been attributed to the expansion of agriculture, especially large scale irrigated agriculture and mechanized farming (See Box 24). In fact the period of largest decline in forest area coincides with the period of rapid expansion of mechanized farming. The impact of agricultural expansion is not confined to just forests and other wooded lands, but has also impacted rangelands, in particular negatively impacting traditional transhumance.

Box 24 Major causes of deforestation and forest degradation

Agricultural expansion: The most important direct cause of deforestation in Sudan is the conversion of natural forests to cropland and pasture. Some 40 million feddan (17 million ha) have been converted into mechanized and traditional rain fed and irrigated agriculture during the period 1940-2012. The country is home to some of the largest irrigation schemes in the world (Gezira, Rahad, New Halfa, Suki, Kinana and White Nile Sugar Schemes).

Energy consumption: The energy sector is closely linked to deforestation through wood extraction for fuel and charcoal. Sudan depends mainly on the forestry sector as a household, services and industrial energy source. Forests contribute the equivalent of 4.11 million TOE, representing 70-81% of energy supply in the country (FNC, 1995). Demand for wood fuel increased in the last two decades due to rapid population growth, urbanization and shortage in supply of other forms of energy. Sudan consumed 21 million m3 round wood in 2010 including wood fuel, construction, maintenance and furniture wood. The wood fuel share of the total is estimated to be 87.5%.

Refugees and internally displaced people: Contribute to the removal of forests to obtain their requirements of fuel-wood and building houses (IDPs in Darfur and refugees in the Eastern and Western Sudan).

Factors affecting forest health: Little information is available about insects, diseases and other hazards impacting forests and the forest sector in Sudan. One report estimated that 102,874 km2 of forested areas in four states – Darfur, Kordofan, Eastern and Central – were affected by insect pests and diseases. Fire, fungal and insect attacks and overgrazing hinder natural regeneration. Fires are used for land preparation for cultivation but it also destroys the rangeland and large animals leave their habitats to remote areas or may be subjected to death. Fire is a serious problem in nearly all forest areas in the Sudan.

Forest plantations

Although afforestation and reforestation activities have been undertaken in the Sudan since 1911, hitherto the area planted is very small. In 1982 the area of all plantations in the country was about 52,000 ha (Badi et al. 1989). In 2009 it reached a total of 1,440,861 ha (FNC, 2011), which is about 2 percent of the total forest area and about 12.7% of the reserved forests area. About 187 750 ha are in the Southern states (Republic of Southern Sudan) and 1 253 111 ha in the Northern states. The largest share of plantations is grown in reserved forests (42.7%) and gum Arabic orchards (43.7%) in comparison to private (companies) forests (8.8%) and other community forests (4.8%).

Government plantations rely mainly on rain-fed system in the savanna region. About 5% of the plantation area is supported by irrigation in irrigated agricultural schemes and community tree formations. These are grown in variable rotations and their management is based on working plans that attempt to maintain a sustainable flow of goods and services at community and national levels. However, the small area of plantation upsets the goals that aim at demand satisfaction of forest products from these plantations (FNC, 2011).

The annual extent of afforestation and reforestation ranged from 2,100 ha to 2,520 ha during the period 1910—1950 (FNC, 2011). Since the establishment of FNC, the scale of planting increased considerably. For example since 2002 the annual area afforested/ reforested increased many-fold, although there has been considerable year to year fluctuation (see Table 23), largely related to resource availability, including for example external assistance. Substantial areas have been recently planted by FNC on behalf or by individual mechanized

farmers in compliance with the regulation that mechanized farms should maintain 10 percent of their land under trees to fulfil protective and productive functions. A positive aspect is the significant increase in the extent of community plantations, and to a great extent this is due to the facilitating role played by the Forests National Corporation.

Table 23 Annual forest planting Programme in Sudan 2002-2010

Year	Type of planting ha (rounded)		
	Public on reserved and other land	Private and Community forestland	Total
2002	21 000	17 700	38 700
2003	10 300	10 600	20 900
2004	12 600	5 100	17 700
2005	12 200	5 700	17 900
2006	13 400	42 300	55 700
2007	42 200	55 900	98 100
2008	36 500	23 500	60 000
2009	20 900	25 400	46 400
2010	19 700	75 700	95 400
Total	188 800	262 000	450 800

Source: FNC (2011)



Benefits from Sudan forests

Forests and rangelands in the Sudan provide a wide array of products and services. Broadly they can be grouped as productive functions and protective or ecological functions. Local communities derive a significant part of their income (most often in terms of the daily necessities) from forests. Some of the important benefits derived from forests are indicated below:

- Protective functions of forests, trees and rangelands in Sudan encompass their role in protecting watersheds, arresting land degradation and desertification, protecting crops from dry winds and thus helping to maintain productivity and habitat for livestock & wildlife.
- Wood products include lumber, sawn timber, industrial wood, building poles, firewood and charcoal.

(©FAO/Seyllou Diallo)

NWFPs on the other hand include a wide range of products such as browse & range material; ivory; bush meat; bee-honey & wax; gums & resins; bark derivatives such as tanning material; fruits, nuts & seeds such as Gonglais (fruit of *Tabeldi* = Boabab- *Adansonia digitata*), Goddeim (fruits of *Grewia tanix*), Aradaib (fruit of *Tamarindus indica*), Lalob = Desert dates (Fruit of *Balanites aegyptiaca*), Dom (fruit of *Hyphane thebaica*), Dolaib (Fruit of *Borassus aethiopum*) and Nabag (fruit of *Ziziphus spina-christi*) together with medicinal plant parts such as Senna pods & leaves (*Cassia senna*), Garad pods of *Acacia nilotica*.



*Products from forest tree leaves include robes, baskets, mats, food covers and hats made from Dom and Doleib fronds together with bark of Tabeld; Range products include browse and grazing material from thorny trees & shrubs together with thatching material and food covers made from Banu (*Arigrostis* spp.).*

The most valuable non-wood forest product in Sudan is gum Arabic, whose exports in 2010 totaled around 55,000 tons with a value of around US\$78 million (Sudan Customs 2010). Gum Arabic is one of the most important ingredients in the manufacture of soft drinks and pharmaceuticals and Sudan accounts for almost 80 percent of the world supplies. Other

products include live animals, honey, hides, fruits, handicrafts and medicines (see Table 24). Trees also represent an important diet for livestock in the dry months; however, precise data on this value are not available. Table 24 gives a broad indication of the value of non-wood forest products; as a large quantity goes for subsistence use, the actual contribution of non-wood forest products is much more than what is depicted in official statistics.

Table 24 Non-wood forest products in Sudan ranked in terms of value

Rank	Product	Unit	Quantity	Value (1000 SD)*
1	Gums (<i>Arabic, Talih, Kakamout and Luban</i>)	Ton	55 000	US\$78 million
2	Living animals	Unit	664	132 384
3	Wild honey and bee-wax	Ton	1 350	297 000
4	Hides, skins and trophies	Unit	1 389	5 626
5	Fruits		-	4 400
6	Fodder		-	-
7	Raw material for utensils, handicrafts and construction		-	100
8	Other plant products		-	-
9	Raw material for medicine and aromatic products		-	1 000
10	Ornamental plants		-	-

Sources: World Bank 2007; FAO 2010. *except gums which are in US dollars

Evolution of modern forestry in Sudan

Unlike agriculture and rangeland management, modern forestry has a long history in Sudan dating back to the Anglo-Egyptian Condominium Rule in 1898 and the promulgation of the Woodlands and Forests Ordinance in 1901 leading to the establishment of the Department of Woodlands and Forests. In 1908 the Ordinance was replaced by the first Forest Act and since then the implementation of various administrative and legislative measures continued with the objective of managing forests largely to produce timber and woodfuel, especially to develop infrastructure, in particular railways. The first Forest Policy was announced in 1932 and alongwith the enactments of Central and Provincial Forest Ordinances. These addressed a number of issues, largely focusing on forest reservation, levying royalty on wood collected from outside forest reserves, sharing of authority between federal and provincial forest departments, etc. Adopting the principles of sustained yield and rational exploitation of the resources, the Department commenced to manage wood stations along the Nile and its tributaries to supply firewood to steam boats and to establish forest reserves to undertake harvesting and regeneration and to protect the forests against fire. Table 25 gives an indication of the trends in forest reservation:

Table 25 Area of reserved forests by type of ownership (in 1000 hectares)

Type of ownership	1985	2000	2005
Public forests	1,253.3	10,032.3	11,362.2
Institutional forests	5.0	13.7	13.7
Community forests	0	4.2	26.0
Private forests	0	4.8	59.8
Wildlife protected reserves (Publicly owned under Ministry of Interior)	17,740.8	17,740.8	17,740.8
Total	18,999.1	27,795.8	29,202.6

Source: FNC, 2011

Since its early beginning in 1901, forest policies, legislations and institutions have undergone a series of changes responding to the prevailing political, social, economic and environmental concerns (See Box 25). Underlying all these are the divergent decisions on how forests and woodlands will be managed, the priority to be assigned to different products and services and the relative roles of different players – governments (Federal and State), local communities, farmers and end users of wood and wood products. Most of the time the main issue has been as to who will exercise control over forests and how they will be managed. With a well established professional department at the national level, the tendency for central control has been very strong, although the various legislations have focused on devolving management responsibility to the provincial and later to the community levels.

Box 25 Timeline of the evolution of forest policy and legislation in Sudan

Evolution of forest policy, legislation and institutions has a history of over a century in Sudan and this has important implications on the issue of integration of forestry with other land uses, in particular range management. Key developments since 1900, including general policies and legislation that have impacted forests and forestry are summarised below:

- 1901:** Enactment of the first forest act,
- 1932:** Announcement of the first policy statement together with enactments of provincial & central forests ordinances,
- 1939:** Endorsement of the Royalty Ordinance,
- 1948:** Reform of the provincial forest act to delegate power to the local level,
- 1971:** Enactment of the local people government act,
- 1972:** Endorsement of the Southern Sudan self-autonomous government,
- 1980:** Enactment of the regional government Act,
- 1981:** Endorsement of the local people government Act,
- 1985:** Re-centralization of central forests authority,
- 1986:** Amendment of the 1932 forest policy & adoption of 1986 forest policy,
- 1989:** Enactment of Forests National Corporation (FNC) and new forest act,
- 1994:** The adoption of the federal system,
- 2002:** Endorsement of the forests and renewable natural resources law replacing the forests & (FNC) acts of 1989,
- 2006:** Drafting of a new forest policy which is in process of approval.
- 2007:** Agricultural Revival & Revitalization,
- 2011:** Cessation of Southern Sudan.

The salient features of policies adopted at different time points are summarized below:

The 1932 forest policy

Right from the early days of the Anglo-Egyptian condominium rule of Sudan (1898-1956) divergence of interests over the management of forest & range resources between the central government and provincial authorities have surfaced. The central authorities were particularly concerned about wood supply for domestic and services sectors of people in towns, construction and running of national infrastructure. Fuel-wood (firewood & charcoal), telegraph & telephone transmission poles, building poles are the sought commodities together with sawn timber in the form of railway sleepers and construction timber. Provincial authorities on the other hand focused on local demand for fuel-wood, non-wood forest products (NWFP) and fodder for rural and nomadic populations and their livestock herds.

The situation necessitated the division of functions and authority between the Central and Provincial governments. Two acts, namely the Central Forest Ordinance and the Provincial Forest Ordinance were approved in 1932, in support of implementing the 1932 Forest Policy. Accordingly, the Central Directorate of Forests and the Governors of the Provinces were respectively entrusted to satisfy the country's and the provinces' needs for forest products from central and provincial forest reserves. The status of the forest reserves can only be repealed (de-reserved) by the Governor General for over-riding national interests.

Revision of the forest policy in 1986

The forest policy of 1932 is considered unique as it was the first attempt to divide authority over, benefits from and responsibilities towards natural resources between the central and provincial authorities. The Forest Policy of 1932 remained under operation till it was amended and replaced the 1986 policy. A number of internal and external factors led to the revision of the 1932 policy. A change of government from a military regime to a parliamentary democracy led to wide public debate on economy, environment and governance. This also coincided with a Forestry Sector Review (FSR) carried out in 1984/86 by a joint team consisting of representatives of Government of Sudan (GOS) and the World Bank (WB) and several of bilateral and multilateral agencies. The FSR instilled the then emerging concepts of popular participation in natural resources management. It also introduced the then global mechanism of Tropical Forest Action Plan (TFAP), which subsequently emerged as national forest programme (nfp). The 1984 FSR was considered Sudan's phase 1 of national forest programme.

The 1986 forest policy highlighted the role of forests in environmental conservation and the need for community participation, especially of local communities in forestry activities. This led to the establishment of new categories of forests like community forests, private forests and institutional forests in addition to the already existing public federal and state (provincial) forest reserves. The new policy also emphasized the role of forest extension and the need to make available tree seedlings to farmers, local communities and individuals. Over and above the 1932 statement, the Forest Policy 1986:

1. Stressed the role of forests in environmental protection,
2. Recognized and encouraged the establishment of community, private and institutional forests,
3. Subjected tree cutting outside forest reserves to the discretion of the Director, Central Forest Administration (CFA) provided that these areas are reserved immediately following their utilization for the purpose of their protection and regeneration,
4. Made obligatory the utilization of tree stocks on land allocated for agricultural investment (not to be burnt into ashes) and to leave specified percentage of tree cover inside and around agricultural investment schemes in the form of shelterbelts and windbreaks,
5. Stressed the mobilization of popular and international efforts for participation in afforestation, tree planting and forest protection,
6. Raised the national goal of forest reserves from 15 to 20 percent of the total area of the country for environmental protection and meeting the population's needs for forest products,
7. Stressed the role of forest extension,
8. Conceptualized the multiple use of forest.
9. Divided forest administration responsibility between the Central Government and the Regions (States).
10. Made the Director, CFA, the official counselor to the regional authorities and institutions on forestry matters.

Sudan's Forest Policy (1986) thus defines and recognizes several levels of forest ownership. These include:

- i. Federal Forests which fulfill national protective, productive & social functions (such as the *Acacia nilotica* forests along the banks of the Blue and White Niles & tributaries thereof, montane forests on watersheds and forests on the fringes of the desert which curb the spread of the desert), owned by the Federal Government and managed on its behalf by the national forest service, currently the Forests National Corporation (FNC).
- ii. State Forests which fulfill productive and social roles at the State (Provincial) level, contribute to national protective functions, owned by the State Government and managed on its behalf by State Forest Service or by FNC.
- iii. Institutional Forests such as the ones in large agricultural schemes e.g. Gezira, New Halfa and Rahad Schemes and sugar estates as in Kenana, Assalya, W. Sennar N. Halfa, Guneid and White Nile Sugar Companies. These fulfill productive/ protective / social functions in the vicinity but contribute to the national environmental matrix and carbon dynamics. They are owned by the respective institutions and are managed by on their behalf by own forest units.
- iv. Community Forests which fulfill a multitude of functions to their respective communities are owned and managed by them.

- v. Private Forests which fulfill various functions and are owned and managed by their initiators.

The 2006 Forest Policy

In 2005, a new forest policy and law proposals were formulated through support from the FAO project (TCP/SUD/2903: Revision of Forest Policy, Legislation and Institutional Reorganization in collaboration with FNC, Sudan). The policy was developed adopting a consultative process involving a wide spectrum of stakeholders. This helped to articulate the vision for the sector, national goals, policy priorities and specific objectives that will help to accomplish the policy priorities.

A number of national drivers were behind the initiation of policy revision. External factors including the FAO TCP project had a catalytic and facilitation role. The national drivers behind the review of forest policy encompassed:

- The quest towards poverty alleviation and improvement of people's well-being.
- The concern about amelioration of physical environment and combating desertification.
- Maximization of the positive and mitigation of the negative impacts of exploitation of oil resources.
- Reform for stabilization and liberalization of the national economy.
- The Comprehensive Peace Agreement (CPA) between the North and Southern parts of the country.
- The demand for better governance.
- Commitments to international conventions & treaties.

The Draft 2006 Forest Policy is yet to be endorsed by the legislature.

Changes in forestry institutions and the role of Forests National Corporation (FNC)

Forestry institutions in Sudan encompass the Forest Administration, Forestry Education and Forest Research. With its inception in 1902, the Forest Service of Sudan has a long history during which it has undergone a number of changes in terms of its functions, organizational structure, affiliation, human resources development, etc. The history reveals (see Box 26) the changing perceptions of the governments at different times as regards the functions of forestry administration, in particular how the divergent needs are to be balanced and how forestry has to be integrated in the larger system of natural resource use. For a long time, as elsewhere in the world, forestry was under the Ministry of Agriculture and generally remained a low key department or unit. Increasing realisation of the environmental role of forests has led to separating forestry from agriculture, bringing it under the Ministry of Natural Resources.

Box 26 Evolution of Forest Administration in Sudan

On its inception in 1902, the Woodlands and Forest Directorate was part of the Department of Agriculture. It was run by a British Director, two Egyptian officers and some Sudanese labourers. The government continued to recruit foresters from various European countries. The year 1946 saw the establishment of Forest Rangers School (FRS) with a batch of 10 retired army officers who graduated as Forest Rangers (FR) in 1948. In 1949, three Sudanese students were sent off to study forestry in Scotland, UK.

On the establishment of the Ministry of Agriculture in 1948, the Forests Department (FD) was structured to have four divisions and two circles. A Silviculturist was added to this arrangement in 1950 and afforestation and saw-milling were segregated. The administrative structure then comprised: Head of Department, four Conservators of Forests (CF), 11 Assistant Conservators of Forests (ACF), one Silviculturist, five sawmill technicians, six Forest Officers (FO) and 23 FR.

The year 1951 saw the segregation of Agriculture and Forest Departments whereby the Director of Forests Department (DFD) answered directly to the Minister of Agriculture. The process of Sudanization of senior forestry posts started in 1954 and the country acceded to independence in 1956. With independence in 1956, the title of Chief Conservator of Forests (CCF) was changed to Director of Forests (DF).

During the period 1973- 1975, the Forestry Education and the Forestry Research Divisions were segregated from the FD. The former was affiliated to the Department of Higher Education of the Ministry of Education, while the latter was affiliated to the Agriculture Research Corporation (ARC) of the Ministry of Agriculture, Food & Natural Resources.

In 1975, a new hierarchy was approved for the Ministry of Agriculture which was renamed Ministry of Agriculture, Food & Natural Resources, and embracing three agencies namely: Agricultural Services, Natural Resources (NR) and the Animal Resources. The three agencies were composed of a number of corporations, institutions and general administrations made up of twenty eight administrations. The NR agency comprised the FD, Range & Pasture Administration (RPA), Soil Conservation and Land Use & Water Programming in addition to the Wildlife Administration.

The FD HQs hierarchy constituted of five Administrations (Afforestation, Utilization, Management & Inventory, Gum Arabic and Wind-breaks & Shelter -belts) in addition to two units (Planning and Finance & Administration).

In response to the adoption of the regional government system in 1980, a Presidential Decree (PD) was issued, concerned with the establishment and specified the mandates of the central ministries. The adoption of the regional government system implied the division of the country into six Regions namely; Central Region, the Eastern Region, the Northern Region, Darfur Region, Kordofan Region and Southern Region. In each of those regions, a regional government which comprised a number of regional ministries was established. The Ministry of Agriculture & Natural Resources (MANR) was one of those regional ministries. In accordance with that Decree, the central Ministry of Agriculture & Irrigation (MAI) was established under which the FD was affiliated to the agriculture agency responsible directly to the Under-Secretary of Agriculture.

In 1982, the Wildlife Administration was separated from the MANR and affiliated to the Ministry of Interior as a regular force administration.

In 1985, after a popular uprising in April 1984, the MAI was replaced by the MANR. The organization structure of the new ministry comprised of the Natural Resources Administration consisting Forestry, Range & Pastures and Soil Conservation Administration.

Perhaps the most important change in the institutional arrangements in forestry in the Sudan began in the 1980s, after the multi-donor supported Forestry Sector Review (FSR) undertaken in 1984. Establishment of the Forests National Corporation (FNC), a parastatal body, through an Act of the Parliament in 1989, replacing the Central Forests Administration, was one of the most path-breaking initiatives in strengthening the forestry institutional framework. Being a parastatal organization, FNC is a self-financed entity, raising its income through levying royalty fees on wood and other products. In addition, it

also receives financial support from the government from the development budget.

The overall responsibility for management of FNC rests with the Management Board and the Director General assisted by a Deputy Director General (DDG) with Secretariat and Legal Advisor, is responsible for implementing the various decisions. At the Headquarters in Khartoum, its organizational structure consists of six administrations (Planning, Technical Affairs, Afforestation, Gums & NWFP, Utilization, and Finance & Administration). All the 17 states have Forest Directorates, with varying organizational structures, as required by the specific functions to be performed (See Annex 5 for the organigram of the Forests National Corporation)

The FNC Act 1989 has clearly stipulated the duties and responsibilities of the Director General (DG). The Director General is a member of and answerable to the Management Board which is appointed by the Council of Ministers on the recommendation of the responsible Minister. The Management Board answers to the concerned Minister, currently the Minister of Environment, Forests and Physical Planning. The Board approves the annual budget and forwards it to the Ministry of Finance which processes it in the context of the Federal Budget to be approved by the National Assembly (Parliament). Besides the Internal Auditor, the financial performance is scrutinized by the Auditor General. Three month after the closure of accounts at the end of the Physical Year (Dec 31st), the annual accounts have to be presented to General Assembly made up of the Ministry of Finance, the Auditor General and Public Corporations Department of the latter.

Annual and other plans are passed by the DG through three Sectors to 17 State Administrations. These are based at State capitals. In some States there are two Forest Offices, one answerable to the FNC in charge of Federal Forests and another in charge of State and other forests answerable to Responsible Minister in the State almost invariably, that of Agriculture. The FNC has an office in every Locality (Province). These are in charge of Forest Circles, Ranges or Sawmilling units.

Integration of range management in forestry

While successive forest administrations have largely concentrated on forest management, primarily aimed at producing timber, woodfuel, poles and non-wood forest products, there have been attempts to accommodate the needs of pastoral communities, mainly through:

- A major concern in constituting reserve forests is the unhindered mobility of livestock, especially to water sources. Allowing livestock right of access to water and allowing their grazing in forests beyond the pole stage were rights explicitly permitted when a forest reserve is gazetted,
- Cattle were allowed to graze and trample creepers in forest plantations at the end of the rainy season as a regular silvicultural activity,
- Fire line clearance in and around forest reserves is being undertaken as a regular seasonal activity with the purpose of protecting trees, shrubs and range resources,
- Several species of range grasses, shrubs, and creepers were included in the mix of plants used for biological sand dune stabilization undertaken by forest authorities.

Grasses such as Tumam (*Panicum turgidum*) together with such herbs as *Senna spp.* and bitter melon Handal (*Citrullus vulgaris*) are regularly used for dune stabilization in White Nile and Kordofan amongst such shrub/tree species as *Acacias* and Marakh (*Leptedenia pyrotechnica*). These help to enhance fodder availability to livestock.

Forest authorities were keen to ensure that there are no conflicts with transhumant population, mainly to ensure that forests are protected. There were occasions where conflicts have led to serious consequences and forest management made every efforts to avoid such conflicts. There have been efforts to accommodate the demand for forest fodder by nomadic cattle, including studies on the impact of different levels of forest fodder harvest on tree growth and the nutrient values of forest fodder. The impact of seasonal movement of livestock was explicitly taken into account in the forest management plans, as in the case of the El Rawashda and Wad Kabo forests in Gedaref (see Box 27).

Box 27 Integration of fodder needs of transhumant cattle in forest management in Rawashda – Wad Kabo forests

Rawashda – Wad Kabo forests, extending over an area of 125,000 feddans (52,500 ha) is in the Geadaref State and form the intersection point with three livestock corridors originating from the Butana region and ending at the borders of Ethiopia. Rawashda is now a vital stop-over for some 1 000 000 head of camels, sheep and goats for last months of summer and onset of rains.

These are some of the last remnants of Low Rainfall Woodland Savannah in Eastern Sudan. They lie in the transition between *Acacia mellifera* thornland and *Acacia seyal*-*Balanites aegyptiaca* woodland. Rawashda was gazetted as a national reserved forest in 1960, mainly to safeguard charcoal supplies to Khartoum. Since their gazetting, however only passive approach was adopted in their management, largely because of inadequate resources. The first step in improving the management of Rawashda (and later Wad Kabo) forests came with the implementation of the Fuelwood Development for Energy in Sudan Project in 1983. With the revised forest policy in 1986, the establishment of FNC and the increasing concern to meet the needs of divergent stakeholders, there has been a shift in the approach to management and greater thrust to pursue an integrated approach. The 1987 plan for management had the following objectives:

1. To protect and maintain environmental stability;
2. To provide forest products mainly fuel-wood, poles and fodder towards national, regional and local demand

To meet these divergent needs of different stakeholders, the forests were divided into five working circles as indicated below:

- i. National Fuelwood Working Circle, comprising 68% of the forest area, in which management is geared towards fuelwood/ charcoal production for regional/ national use;
- ii. Village Working Circle extending over 13% of the area intended to meet the needs of the adjoining villages;
- iii. Hashab Working Circle (5% of the area) focused on gum production;
- iv. Fodder Working Circle (2% of the area) to be managed for grazing and fodder production

Although the system is said to work satisfactorily, there is a need for a systematic evaluation of the effectiveness of the integrated approach, especially in accommodating the needs of the livestock, especially considering that Rawashda – Wad Kabo forests have virtually become an island in the midst of the vast tract of mechanized farming. There is increasing concern that an integrated approach at the forest level faces severe constraints in the absence of more broad based integration of all land uses at the regional and national levels.

Source: Salah El Shazali Ibrahim, 1995 and Hassan Abdel Nour (Personal Communication)

Range resources and their management in Sudan

Rangelands cover an estimated area of 96.4 million hectare composed of 53.4 million ha of grassland and 42.9 million ha of woodlands containing scattered trees and shrubs (Africover, 2003). This vast area encompasses different ecological zones extending from desert and semi-desert in the north to low and high rainfall savannah to the south. Nearly 80% of all rangelands are located in semi-desert and low rainfall savanna zones characterized by variable and unpredictable rainfall.

Rangeland resources and livestock production

The rangelands of importance to traditional livestock raising are mainly found in the semi-desert, low rainfall savannah, and the northern fringes of the high rainfall areas. In the semi-desert zone the plant cover is a mixture of grasses and herbaceous plants intermingled with *Acacia* trees and shrubs representing the main grazing areas for camel and sheep. The low rainfall savannah on clay and sand have a plant cover of a mixture of *Acacia* species, shrubs and a number of herbaceous plants. Total production of forage from rangelands is estimated as about 34.8 million tones. Total available feed is 50 million tons composed of 34.8, 14.1, 0.5 and 0.2 million tons of forage from rangelands, crop residues, irrigated pastures and concentrates, respectively. The availability of different kinds of feeds in the different provinces is given in Table 26.

Table 26 Estimated forage supply in Sudan (million tonnes), 2011

States	Rangeland	Crop residues	Irrigated forage	Concentrates	Total
North Kordofan	4.70	0.910	0.09	0.01	5.71
South Kordofan	8.19	1.400	0.00	0.03	9.62
North Darfur	1.05	0.08	0.00	0.00	1.13
South Darfur	0.50	0.770	0.005	0.015	1.29
West Darfur	12.06	0.037	0.0014	0.005	12.10
El Gadarif	2.70	2.700	0.02	0.035	5.46
Kassala	1.30	2.423	0.009	0.015	3.75
Red Sea	0.38	0.037	0.00	0.00	0.42
Blue Nile	1.90	1.00	0.00	0.02	2.92
Sennar	0.26	1.070	0.020	0.02	1.37
El Gezira	0.49	2.600	0.030	0.01	3.13
White Nile	0.47	0.790	0.041	0.02	1.32
River Nile	0.35	0.250	0.155	0.02	0.78
Khartoum	0.42	0.08	0.18	0.0009	0.68
Total	34.77	14.15	0.54	0.20	49.67

Sudan has the largest livestock inventory in Africa after Ethiopia. The nomadic pastoral sector accounts for more than 90% of the population (See Table 26). Sudan's total national herd is estimated in 2010 at 103.6 million head of livestock (sheep, cattle, goats and camels) and 8.3 million heads of equine (donkeys and horses).

Rangelands contribute substantially to the income and subsistence of a large sector of the population who are either pastoralists (nomads) or agro-pastoralists by providing important forage feed resource. It supplies about 80% of the total feed requirement of national herds. Cattle, sheep and goats provide an important capital asset and a risk management tool for pastoralists and farmers at times of drought. Income from the sale of livestock is used to meet household food requirements, medicines, vaccines, salt, feeds, pay water fees and tax.

Table 27 Estimate number (thousands) of livestock population in Sudan by States, 2010

State	Cattle	Sheep	Goats	Camels	Total
North Kordofan	960.5	7 223.4	3 605.6	1 212.6	13 002.1
South Kordofan	7 349.9	3 098.7	3 366.7	519.2	14 334.5
North Darfur	668.2	3 760.1	2 888.8	578.3	7 895.4
South Darfur	4 217.9	3 843.4	2 997.4	155.8	11 214.5
West Darfur	4 050.8	3 905.9	4 367.5	417.9	12 762.2
El Gadarif	1 044.0	2 135.2	1 055.6	334.7	4 569.6
Kassala	960.5	2 020.7	1 668.1	674.5	5 323.8
Red Sea	125.3	416.6	716.8	280.2	1 538.8
Blue Nile	2 004.5	3 905.9	451.8	13.9	6 376.1
Sennar	1 461.6	1 374.9	1 633.4	114.2	4 584.1
El Gezira	2 463.9	2 473.8	2 137.3	120.7	7 195.6
White Nile	3 466.2	2 551.9	2 550.0	34.7	8 602.7
Northern	250.6	979.1	1 146.8	48.1	2 424.6
River Nile	83.5	1 005.1	1 203.3	111.9	2 403.8
Khartoum	250.6	442.7	642.9	6.5	1 342.6
Total	29 358.0	39 137.4	30 452.1	4 623.0	103 570.5



The importance of pastoral sector goes beyond its influence on the economy to its role in securing national and strategic food. It allows self-sufficiency in meat (100%) estimated to be about \$2.2 billion/year while animals export amounts to about 24.6% of the non-petroleum exports. In addition, the contribution of the sector in the national income estimated as 18–25% and it represents a livelihood activity for about 60% of the population as well as providing labour for about 40% of the population. In addition to the multiple economic benefits, livestock ownership is valued on account of its social and cultural aspects (See Box 28).

Box 28 Value of livestock – More than money

In almost all Arab and African societies animal rearing is deeply rooted in their cultures and beliefs. For an average Arab, a she camel is perceived as more precious than sky-scrapers, Land cruisers or refrigerators. Almost 90% of Sudan's livestock (camels, cattle, sheep and goats) and equine (horses and donkeys) are owned by villagers and tribesmen. Hundreds of the latter each owns many herds each composed of thousands of head of one species or mixtures. The number of herds owned is something to boast about (wealth on the hoof), and cited in enumerating the attributes of celebrities together with bravery, hospitality and donation. Almost all rural communities keep free range chickens and goats. And, when people move to live in towns and cities they take their goats and cattle with them. With so many goats roaming around cities and cows mooing in the back yards in cities like Wad Medani or Khartoum, one frequently hears or reads remarks that the rural people have 'ruralized' the city.

Problems in the management of range resources

Rangeland is endowed with a great diversity of forage plant genetic resources (FPGR) and a total count of 704 plant species was reported (over and understory), however the loss of FPGR is being experienced at an alarming rate. Immense changes occurred within the different vegetation zones compared with the 1958 base line survey (Harrison and Jackson Report, 1958) but little work was carried out thereafter. Many of the valuable range plants species are endangered while others have become rare. Species such as *Andropogon gayanus*, *Blepharis linariifolia*, *Chrosophora brochidiana*, *B. edulis*, *Ischaemum ishaemoidis*, *Desmodium dichotomum*, *Aristida papposa* are among the most endangered. Forage plants are not only source of livestock feed, they constitute the origin of many crops of the present day and in future.

Decrease in the annual rainfall and increase in its variability have contributed to drought conditions in many parts of Sudan, which occurred in the northern and central parts. Average annual rainfall has declined from about 425 mm/year during the 1941-1970 period to about 360 mm/year in the 1970-2000 period. The unreliable nature of rainfall, together with its concentration in short growing seasons, heightens the vulnerability of grazing and rain-fed agricultural systems. There has been a south-ward shift in the agro-climatic zones, negatively affecting pastoralists and agro pastoralists in many parts of the country. The potential impact of such changes on national food security could be severe. The rangelands are the most vulnerable to climate change; this vulnerability is further exacerbated by misuse and mismanagement of the land resource. Furthermore, rangelands are used in common with animal being in the move searching for feed and water. The impact of the climate change in FPGR is clearly manifested in:

- Steady deterioration of both the productivity and biological diversity of the rangelands in the area coupled with dominance of undesirable range plant species, disappearance of valuable forage species, loss of biodiversity and change in species composition,
- intensifying pressure on the fragile and deteriorating resource base and
- Reduction of rangelands productivity per unit area from 1.2 ton/ha in 1980s to 0.2 ton/ha in 2009 (Range and Pasture Administration 2009).
- This has affected livestock and livestock products, contributing to poverty and food insecurity; and exacerbating the vulnerability of pastoralists.

Stakeholders in range management and their objectives and priorities

Considering the critical importance of the livestock sector to Sudan's economy and the livelihood of rural population, the entire Sudanese Nation is a stakeholder as regards rangeland management. The contribution to food security (meat and dairy products) and contribution to GDP and foreign exchange earnings makes the national economy the prime stakeholder. Provision of subsistence, livelihoods, work opportunities and contribution to local economies bring in village based livestock owners, communities, nomadic and transhumant pastoralists as owners/stakeholders. Within the government institutions, the main stakeholders are the Range and Pastureland Administration, Agricultural Research Commission, academic community (especially faculties of agriculture or natural resources), internationally assisted projects, Pastoral Union, local communities and their traditional institutions.

For all the main stakeholders of rangeland management, the main concern is sustainable utilization of range resources, avoiding and addressing conflicts especially with other land uses, halting degradation and encroachment of incompatible uses such as mechanized farming and cutting large areas of rangelands and forests for oil exploration and extraction. Two important concerns of most stakeholders at present are:

1. Approval of a national law to protect and guide the proper use of rangelands;
2. A clear delineation and mapping of rangelands especially considering the changes in land use and shrinkage of the range resource.
3. Reviving and building the capacity of RPA at national and state levels

The Ministry of Animal Wealth, Fisheries & Range and The Range & Pasture Administration are the custodians of the animal and range resources respectively as much as FNC is to the forest resources.

Traditionally every stakeholder had a role to play in the management of forest and range resources. It is closely linked to the concept of land ownership and usufruct rights. In the past local councils in collaboration with native administration and with the active participation of rural communities shouldered the responsibility of establishing fire breaks to protect vegetated areas traditionally utilized for grazing and for other purposes. Pastoralists traditional seasonal movements with their livestock, and utilization of rangelands, community forest and water sources used to be regulated and controlled by traditional

rules and regulations “Urf”. A lot of changes have taken place that make returning to old systems of management and control difficult in most areas. However, some elements of those can be integrated into modified management systems with consensus of targeted communities. Some traditional mechanisms, as tribal conferences, which are officially recognized and encouraged, can lend themselves to management of forests and rangelands, ensuring rational utilization and addressing conflicts.

Policies relating to rangeland management

One of the major challenges as regards range management has been the absence of a well-defined policy and the only framework available as regards the use of rangeland is the traditional or customary ‘Hema’ (= protectorate) system. No formal range policy analogous to that on forestry existed or exists at the Central or Provincial levels. This largely stems from the inability to exert effective government control over a resource that had been traditionally managed by local communities. Also this stems from the fact that rangelands did not provide an opportunity for large scale resource appropriation for colonial governments. Largely range and livestock sectors remained outside the formal system of national and provincial governance, especially in a situation of dominance of traditional institutional arrangements (see Box 29) and the inability of governments to develop an effective institutional framework to support range management.

Box 29 Traditional land tenure and livestock management

Traditional land tenure in rural areas of Sudan is mainly based on the concept of customary tribal homelands. Even in the northern riparian regions, land became a commodity only during the 18th century. The Funj (1540) and Fur (1890) Sultanates empowered the ruler to grant land rights to administrators and reputed religious figures. The Turco-Egyptian government (1821-1885) consolidated this system. The Mahdiya (1886-1889) changed the tribal leadership and put it in the hands of army leaders. The colonial government (1899-1953) issued in 1899 the ‘Titles to Land Ordinance’ and registration as private property started for continuously cultivated lands in north and central Sudan. This excluded the rain-fed and all lands in Southern Sudan (Mohamed, 2007).

Areas classified as government-owned was divided into “Subject to No Right” and “Subject to Customary Rights”. Land tenure legislation after independence in 1956 remained similar to that of the colonial era. Some tribal systems of land tenure are still in force such the Fur Agricultural System and the Baggara Pastoral Production System.

Up to the advent of forest and wildlife park reservation in 1920s and mechanized rain-fed agriculture in 1940s to feed the Allied Forces in North Africa, almost all forests, woodlands and rangelands in Sudan were communally owned. The Islamic Shariya recognized the rights of all to the ‘three amenities: water, range and fire’. Tribal, religious and native administration leaders indicated/demarcated land for traditional agriculture according to the family’s capability. The ‘Hema’ system of rotational grazing was strictly enforced by these community leaders. Disputes over land, grazing and trespassing were resolved amicably.

Thus, nomads in the east and central clay plains of the Sudan were allocated certain areas for grazing of their animals and access routes to the rivers and other watering places. Those allocations were made since 1904 to avoid conflicts over land resources between the nomads and the settled farming communities. While the nomads were strictly cautioned against trespassing on crop fields they make agreements with the farmers to permit foraging of herds on crop residues after harvest. The cultivators were equally restrained from encroaching upon the nomadic grazing areas and passage corridors. The land use systems went on smoothly with mutual benefits, to both the farmers and the nomads until the advent of mechanized farming. More importantly, the systems were sustainable because of the resilience of the communities, who were able to cope with the environmental hazards while maintaining ecological equilibrium (Seif Eldin, 1986).

Various contemporary political, administrative and socio-economic changes have collectively brought the demise of the traditional forest and range management systems in the Sudan. Perhaps the most important of these are:

- a. The advent of forest and wildlife parks reservation in the 1920s and the establishment of the Range and Administration 1954, heralding the concept of 'white collar' custodianship of these resources,
- b. The dissolution of the Native Administration in 1970 stripped community leaders of their authority and influence,
- c. The involvement of tribal youngsters in institutions like the army and mass exodus of skilled labour to oil rich gulf countries and overall elevated awareness through exposure to formal education and information media have all brought in a generation of people with no tribal affiliation or loyalty.

The breakdown of traditional institutional arrangements and the absence of an effective alternative system, especially to resolve conflicts between the different stakeholders especially as regards sharing of land, range and water resources has been a key factor that led to the escalation of local conflicts into civil wars.

Range and Pasture Administration

The Range & Pasture Administration (RPA) was established in 1954 under the umbrella of the Ministry of Animal Wealth. In 1973, the RPA was affiliated to the Ministry of Cooperation & Rural Development and in 1975 to Ministry of Agriculture, Food & Natural Resources (MAFNR). In response to the adoption of the regional governments in 1980, different regional ministries were established. The regional ministries of agriculture and natural resources were one of those regional ministries. The central MAI was established in 1982 under which the RPA was affiliated to the Agriculture Agency responsible directly to the Under-secretary of Agriculture.

The adoption of the federal system in 1994, impacted the RPA institutional setup, affiliation and functions. As part of the agriculture services, the RPA authority was decentralized. RPAs were established at State levels affiliated to the State Ministries of Agriculture. The federal RPA administration was put under the responsibility of the Federal MAF affiliated to the General Administration for Natural Resources. The federal RPA comprises of three Divisions: Natural Range, Irrigated Pasture and Range Farms in addition to three units namely; Technical Studies & Supervision of Range Farms, General Demonstration Range Farms and the Commercial Pasture Farms.

Functions and organizational structure of RPA

Although no clear policy statement has been drawn up, the Range and Pasture Administration was established in 1954 with the following objectives:

1. Propose the general policy for range and pasture administration and prepare and endorse the range and pasture federal law;
2. Protection of natural ranges and opening of fire line network,

3. Conservation of genetic resources and the establishment of nurseries for propagation of fodder seeds,
4. Collection of natural fodder seeds and rehabilitation of deteriorated areas,
5. Contribute to the development of externally funded project and supervise their implementation,
6. Survey and mapping of range resources on national level and contribute to the development of land use planning,
7. Conduct surveys and environmental or related studies,
8. In coordination with the States RPA prepares range programs,
9. Mobilise external resources to implement pilot projects,
10. Provision of capacity building program for the staff at central and State levels,
11. In coordination with the related authorities, open animal migration routes,
12. Conservation of environmental balance and combat desertification and protection of the rangeland and watershed within the rangelands,
13. Establishment of pilot range farms as alternative to the traditional common ranges.
14. Create strong ties and relations between nomads and range resources through effective range extension programs.

While the RPA has wide ranging mandate and responsibilities, it has not been able to fulfil them in view of the severe resource constraints, both human and financial. As regards human resources, in 2011 it had a total professional staff of 40 (26 with BSc, 13 with MSc and one with PhD). This staffs are distributed in the different states, with particular thrust being given to the rangeland-rich provinces. Staff in the RPA have specialised in forestry (2 persons), Range & Pasture (9), environmental studies, agricultural engineering, plant protection, crop production, sociology and agricultural economics. None of the contemporary issues like climate change, integrated resource management, wild-land fire management are addressed.

Effectiveness of RPA

Considering the very meagre number of 40 staff to manage rangeland spread over an area of 96 million ha (on a per staff basis this amounts to 2.4 million ha) and an animal population of 103 million (about 2.6 million heads of animals per staff member), the overall effectiveness of RPA remains extremely limited. Some of the RPA's stated objectives are central by their very nature, while others are regional/local. Planning of such activities as national surveys and training are conceived in HQs and implemented in the field at state or locality level. There is considerable interaction of RPA at central level with other departments/agencies. They participate actively in all sorts of gatherings such as workshops, seminars etc. on such aspects as land-use, environment, climate change, desertification etc.

However, the interaction with different agencies at the decentralized levels remains extremely poor, partly stemming from the low priority being assigned to range management

in the context of the compulsion to give priority to other sectors like health, education, water supply, etc. and the consequent shortage of financial and human resources. The RPA currently faces a number of challenges the most important being the need to enlighten concerned stakeholders, decision makers and the population at large about the intrinsic natural and man-induced constraints which undermine the sustainable management of rangeland resources, especially in the context of:

- Impact of climate change on range resources, especially unpredictable variation in rainfall over time and space and increasing aridity;
- Decline in the extent of rangelands in the context of petroleum exploration, dams, road construction and mega-irrigation schemes like Kenana and Rahad that are all being implemented at the expense of natural rangelands,
- Lack of national functional land use plan,
- The fluctuating institutional situation of the RPA and its' affiliation.
- Lack of policy statement that reflects the of the government willingness to conserve and develop R&P resources and which reflects the vision of the Nation with clearly identified National Goals and Specific Targets.

Although the Forests & Natural Resource Act 2002 included some articles emphasizing protection and development of rangelands, animal migration routes and other related issues, the lack of specific R&P law has been a major impediment in making any tangible progress.

Lost opportunities – Emerging options

Realising the significance of rangelands in the national economy, there has been some efforts in the past to revamp the RPA. These included

- A proposal for the constitution of a National Council for Rangelands,
- Creation of a para-statal corporation or commission for R&P,
- Upgrading of the RPA to a National Corporation,
- Establishment of National Corporation for Forests & Rangelands,

Although none of the above have materialised there are some emerging opportunities for promotion of integration/cooperation/coordination between forest and range in Sudan in the changed context of creation of the Republic of Southern Sudan and the attendant political and economic imperatives facing Sudan as indicated below:

Political/ administrative considerations

Immediately after the cessation of South Sudan in July 2011 it became apparent that utilization and management of natural resources particularly oil and range resources are potential contention issues. Herders from North States such as Sennar, White Nile and South Kordofan have been evicted from the South. Herders from Messariya who had institutionalized watering & grazing rights up to Bahr Al Arab are already facing difficulties in continuing the practice,

Need for streamlining institutions

The advent of cessation of South Sudan called for many far reaching measures including the drafting of a new constitution. It has already transpired that the questions of coordination/merger between forest and range institutions together with modalities of sharing the responsibility for the management of and benefits from forests between the three governance levels are fore front on the agenda of the drafting committee.

Coordination at academic level

Realising the strong linkage between rangeland management and forestry, the process of integration has already commenced at the academic level in most of the education institutions in Sudan. The Forestry Technicians Department, established 1946, awarding a Diploma in Forestry and affiliated to Khartoum Polytechnic (KP) was upgraded into College of Forestry Sciences, awarding B.Sc. (For.). In 1990, Khartoum Polytechnic was upgraded as Sudan University of Science & Technology (SUST). In 1998 a new curriculum was adopted and the name changed to College of Forestry & Range Sciences. In 2003 the B.Sc. (For) programme was upgraded to B.Sc. (Hon.) in Forestry & Range Sciences.

The National Council for Higher Education is in the process of issuing a policy directive to all universities with Forestry Degrees to establish a Department for Range and gradually transform the degrees into Forestry & Range. The Faculty of Forestry of the University of Khartoum is already in the process of transforming its B.Sc. (Hon) into that of Forestry & Range.

Issues in the integration of range and forest management

Although forests and rangelands fulfill more or less the same functions, their divergent evolution during the last 100 years seems to have created a number of institutional/ policy barriers in pursuing an integrated approach. The most important barrier/hurdle to forest and range integration is lack of appreciation of the values and roles of the sectors by the majority of decision makers. Some of the challenges in this regard are indicated below:

Absence of a well-defined rangeland policy

Although local communities have been using rangelands from time immemorial, and well defined traditional management systems existed, there are no well-defined national policies relating to range, land management. This is in sharp contrast with forests, in which case there are at least three forest policy statements in Sudan over the past century. However, if circumstances do lead to the formulation of a range policy and it is accomplished in a participatory manner, there should be no reason or room from divergence from the gist of forest policy.

Easy to integrate at the academic level

Perhaps the easiest barriers to overcome are the technical issues. Coordination and even complete merger of range and forest management at the academic level is very much underway. In SUST, the second oldest university in the country, the Forestry degree has been transformed into a Forestry & Range Degree since 2003. The University of Khartoum,

the oldest and most reputable in the country is also attempting at integration. Providing a common foundation, especially considering that range and forests are land use continuums, would ensure better coordination in future, especially when graduates with a broad base and who understands the strong linkages between the two join the ranks of the forest and range administrations.

Integration of policies and legislation

The second easiest to overcome is the policy and legal issues. Although historically policies are formulated on a sectoral basis, increasingly the process has become consultative and more broad-based giving involvement of all stakeholders. If the broad-based approach, which necessarily involves accommodating the divergent needs of different stakeholders, is adopted, there will be no reason for divergence in the management of these two resources.

While there are at least three forest policy statements in Sudan during the last one century outlining the objectives of forest management and the various institutional structure, unfortunately there is none as regards range management. This remains a major bottleneck that limit the integration of two important complementary land uses. If circumstances do lead to the formulation of a range policy and it is accomplished in a participatory manner, there should be no reason or room for divergence between the range and forest policies, especially considering similarity in the nature of products and services provided by them. Especially in the context of increasing concern about ecological services, the opportunities for integration of range and forest management are particularly enormous.

Institutional integration – the most challenging

However, the greatest challenge is related to institutional barriers. There are substantial differences between the forest and range institutions and the differences have become more pronounced in the context of the divergent historical pattern of development of the two institutions. Being more than a century old, forestry institutions (administration, education, research) have enjoyed a reasonable level of autonomy and support from Sudan Government and development partners. The FNC is pretty well established federal, state and local levels, with necessary staff, infrastructure, budget, communication facilities and so on. This is not the case with the Range and Pasture Administration. Bringing about a complete merger of the RPA with FNC would require major policy and legal adjustments. Especially considering the divergent history, objectives, capacity and resources available to the different institutions integration will remain a challenging problem.

In the course of federal system in force in Sudan since 1994, range and horticulture management have been devolved to the lowest level of government; the locality. In view of economic constraints, localities are more pre occupied with security, education and health concerns.

Current level of integration between forest and range management

An effort was made to qualitatively assess the level of integration at various levels – policy, legal, institutional levels as also at the national, provincial and local levels. Table 28 below gives an indication of the extent of integration:

Table 28 Assessment of the extent of forest and range integration in the Sudan

Criteria	Issues to be considered	Points assigned ⁶
Integration at the policy level	• Level of integration of policies relating to range and forests	0
	• Are they formulated as an integral component of overall land use policy?	0
	• If not are there distinct / separate policies for managing forests and rangelands?	0
	• If there are separate policies, to what extent they take into account the issues relevant to the other sector	5
	• Do the forest/ range policy make any explicit reference to the policies relating to the other sector?	0
	• Do the forest and rangeland policies along with the agricultural policies provide a robust framework for sustainable land use?	0
Integration of laws/ rules and regulations	• Is the management of range and forests governed by the same set of legislation? Or are the laws/ rules/ regulations separate?	5
	• If they are separate, do the legislation/ rules relating to range/ forests have broad similarities?	7
	• Do they take into account the rules/ regulations in the other sector?	7
	• Are they complementary or contradictory?	5
Institutional integration		
• National level	• At the national level, are the departments dealing with range and forests in separate ministries or in the same ministry?	0
	• If they are in different ministries, are there any mechanisms to coordinate/ integrate the work of the different ministries?	0
	• To what extent these coordination mechanisms are effective?	0
	• If range and forest management are dealt with under two departments in the same ministry, what are the mechanisms for interdepartmental collaboration? Are these mechanisms effective?	0

⁶ Points to be assigned on a scale of 0 to 10, with 0 representing no integration and 10 representing perfect integration.

Criteria	Issues to be considered	Points assigned ⁶
• Provincial level	• At the provincial level, are the functions relating to range and forest management under different departments.	0
	• If so what is the mechanism to bring about better integration/ coordination between the departments?	0
	• How effective are the existing arrangements in bringing about integration/ coordination?	0
• Local level	• What are the mechanisms/ systems in place at the local level to implement forest and range management?	0
	• Are there separate departments/ agencies to implement range and forest management at the local level?	5
	• If so how are coordination/ integration of different activities accomplished?	0
	• Are these mechanisms for coordination effective?	0
• Community level	• What are the community level institutions dealing with range and forest management?	7
	• Do the communities deal with forest management/ range management separately? Or are these well integrated?	8
	• What is the level of integration between forest and range management at the community level	8
Integration at planning level	• What is the planning process adopted in the two sectors?	0
	• Does the planning process in one sector accommodate the concerns of the other sectors?	0
	• Are the plans and programmes for range and forest management prepared separately?	0
	• To what extent these plans take cognizance of what is being done in the other sector?	0
Integration at implementation level	• How are the activities under the different plans and programmes implemented?	0
	• What mechanisms exist for integration of different plans and projects at the operational level?	0
	• Are there any conflicts between the two sectors and if yes what mechanisms are in place to overcome such problems	4

Although there is some subjectivity, some broad conclusions can be drawn from Table 29 as indicated below:

- In the absence of a well-defined policy on range management, it has not been possible to develop to an integrated framework for range and forest management, although for all practical purposes, there is considerable scope for integration considering the nature of products and services provided by rangelands and forests. Although historically forestry has focused on producing wood, it does provide fodder to livestock. Also rangelands do produce woodfuel for meeting the needs of the local communities. Both forests and range provide common ecological services – water conservation, conservation of biological diversity, arresting land degradation and desertification and carbon sequestration.
- Integration is non-existent at the national and provincial levels; weak at best at the local and strong at the community level. This is quite understandable considering the functions and structure of the institutions that dominate at different levels. At the local level, communities still tend to play an important role in resource management.

The way forward: recommendations to enhance collaboration/integration

At the local level, especially when range and forest resources are managed by community institutions, there is no distinction between the different land uses and communities meet their basic needs from cultivated areas, pasture lands and forests. Institutional separation between land uses have emerged when new markets for selected products or services develop. Considering the historical divergence between range and forest management and the differential capacity of the two institutions, a concerted approach is required to enable better integration of range and forest management. There are already some signs of improvement, especially at the academic level; all that is required is to systematically build up integration at the policy level, which should lead to integration at the legal and institutional levels. Certainly this will require major restructuring at the level of institutions, including integrating Range and Pasture Administration and the Forests National Corporation. More important will be to revitalise community institutions that have faded out in the context of increasing dominance of government institution at the national and provincial levels. Important steps to be taken to improve integration between the two major land uses, namely forests and rangelands are summarised in Table 29.

Table 29 Recommendations for improved integration of range and forest management

Level	Short term	Medium term	Long term
Federal (National)	<p>Reinstate the roles of native administration and civil society organizations in forest and range management/protection,</p> <p>Recent political/administrative changes, namely the creation of the Republic of South Sudan and the eruption of disputes between the two countries make it imperative that the question of forestry, range, nomadism and transhumance be accorded special strategic consideration,</p>	<p>Prepare land use and investments maps and formulate supporting legislation.</p>	<p>Collaborative research program to address common problems and identify optimum management and compatible grazing practices that ensure long-term sustainability of forests,</p> <p>With forest trees & shrubs and range herbs & grasses all being plants, standardize studies and analysis methodology to enable smooth integration between forest and range sectors,</p> <p>Put all renewable natural resources under one administrative/institutional umbrella and allocate land and resources to them united/integrated (forests, Rangelands, soil conservation and land use, and wildlife)</p>
Provincial	<p>Reinstate the roles of native administration and civil society organizations in forest and range management/protection.</p>	<p>Formulate land use and investment maps and supporting legislation,</p>	
Local	<p>Reinstate the roles of native administration and civil society organizations in forest and range management/protection</p>	<p>Formulate land use and investment maps and supporting legislation</p>	

The challenge for institutional integration between forest and range administration goes beyond the two sectors. The weak linkage is largely a reflection of the absence of an integrated approach to land use covering agricultural land, pasture land and forests. Forests

and rangelands have been encroached by agriculture, urban and industrial development and more recently mineral and oil exploration and extraction. As the area available for livestock declined, particularly on account of the rapid expansion of mechanized farming, the remaining pastures and forests were subjected to intense pressure resulting in accelerated degradation. One option that has been pursued is the sedentarization of nomadic population in demarcated settlements. However, this has proved to be ineffective, firstly this being an alien concept to the nomadic population and secondly, a significant increase in degradation of the area adjoining the settlements. Traditionally nomadism has evolved as a response to low and fluctuating pasture productivity; settling them in one area rarely helps to solve the basic problem unless fodder (feed) and water are brought from outside. This has proved to be a challenging proposition considering the costs involved and the ability of the communities to pay.

Summary and conclusions

As such forest and range are inseparable and in the broader context of agriculture with its plant and animal facets they are the back bone of the economy and principal pillar of food security. They top the nation's priorities in attention.

Perhaps the only known 'strategy' or 'policy' related to range resources is the customary 'Hema = protectorate' rotational grazing system. No formal range policy analogous to that on forestry is known to have been passed or endorsed by a Central/Federal Ministry. This might be attributed to the fact that Sudan derives almost its entire forestry heritage from India and the latter did not have a distinct range sector as such. Traditionally every stakeholder had a role to play in the management of forest and range resources. It is closely linked to the concept of land ownership and usufruct rights. Traditional land tenure in rural areas of Sudan is mainly based on the concept of customary tribal homelands.

a) The advent of forest and wildlife parks reservation in the 1920s and the establishment of the RPA in 1954 heralded the concept of 'white collar' custodianship of these resources,

b) The dissolution of the Native Administration in 1970 stripped community leaders of their authority and influence,

c). The involvement of tribal youngsters in institutions like the army and mass exodus of skilled labour to oil rich gulf countries and overall elevated awareness through exposure to formal education and information media have all brought in a generation of people with no tribal affiliation or loyalty.

There is considerable interaction of RPA at central level with parallel departments/agencies. They participate actively in all sorts of gatherings such as workshops, seminars etc. on such aspects as land-use, environment, climate change, desertification etc.

Perhaps the weakest point/least effective interaction is with decentralized offices. RPA is short of human and other material resources. The second and third tiers of government; the State and Localities to whom range management was devolved amongst many services are grabbing with demands for more pressing necessities like health, education, water supply etc.

Analogous to the situation of range in forest management, intentionally or otherwise there are a number of forest management activities undertaken by range administration. These include:

- Conservation of genetic resources and their protection against fire, basic functions of RPA, do encompass forest tree/shrub species,
- Forests authorities inviting/allowing cattle to graze and trample creepers and tall weeds in forest plantations at the end of the rainy season is regular silvicultural activity,
- Fire line clearance in and around forest reserves, a regular seasonal activity is with the purpose of protecting trees, shrubs and range resources.

The RPA currently faces a number of challenges the most important of which are:

1. The need to enlighten concerned stakeholders, decision makers and the population at large about the intrinsic natural and man-induced constraints which threaten the very existence of the resource such as:
2. National developments projects i.e. petroleum exploration, dams, road construction and mega-irrigation schemes like Kenana and Rahad that are all being implemented at the expense of natural rangelands,
3. Lack of national functional land use plan,
4. The fluctuating institutional situation of the RPA and its affiliation.
5. Lack of policy statement that reflects the of the government willingness to conserve and develop R&P resources and which reflects the vision of the Nation with clearly identified National Goals and Specific Targets.
6. Although the Forests & Natural Resource Act 2002 included some articles emphasizing protection and development of rangelands, animal migration routes and other related issues, the lack of specific R&P law is an evident impediment to any tangible progress.

There are some emerging opportunities for promotion of integration/cooperation/coordination between forest and range in Sudan. These include:

At the political / legislative level

1. Immediately after the cessation of South Sudan in July 2011 it became apparent that utilization and management of natural resources particularly oil and range resources are potential contention issues. Herders from North States such as Sennar, White Nile and South Kordofan have been evicted from the South. Herders from Messariya who had institutionalized watering & grazing rights up to Bahr Al Arab are already facing difficulties in continuing the practice,
2. The cessation of South Sudan called for many far reaching measures including the drafting of a new constitution. It has already transpired that the questions of coordination/merger between forest and range institutions together with modalities of sharing the responsibility for the management of and benefits from forests between the three governance levels are fore front on the agenda of the drafting committee.

At the academic level

- The Forestry Technicians Department, established 1946, awarding a Diploma in Forestry and affiliated to Khartoum Polytechnic (KP) was upgraded into College of Forestry Sciences, awarding B.Sc. (For.). In 1990, KP was upgraded into Sudan University of Science & Technology (SUST). In 1998 a new curriculum was adopted and name changed to College of Forestry & Range Sciences. In 2003 the B.Sc. (For) was upgraded to B.Sc. (Hon.) in Forestry & Range Sciences.
- The National Council for Higher Education is in the process of issuing a policy directive to all universities with Forestry Degrees to establish a Department for Range and gradually transform the degrees into Forestry & Range.
- The Faculty of Forestry of the University of Khartoum is already in the process of transforming its B.Sc. (Hon) into that of Forestry & Range.

As much as there are at least three forest policy statements in Sudan over the past century of forestry practice, there is unfortunately not a single one in the sphere of range. However, if circumstances do lead to the formulation of a range policy and it is accomplished in a participatory manner, there should be no reason or room for divergence from the gist of forest policy.

The most conspicuous barrier/hurdle to forest and range integration is lack of appreciation of the values and roles of the sectors by the majority of decision makers.

1. Perhaps the easiest barriers to overcome are the technical issues. Coordination and even complete merger of the two concepts at the academic level is very much underway. In SUST, the second oldest university in the country, the Forestry degree has been transformed into a Forestry & Range Degree since 2003. The University of Khartoum, the oldest and most reputable in the country is following suite. So at least for future generations they approach their working life with integration well set in their minds.
2. Perhaps the second easiest to overcome are the policy and legal related issues. If and when a range policy is to be drafted and if done in a participatory consultative manner there should be no room or reason for divergence.
3. The most difficult barrier to negotiate is to do with institutions. There are substantial differences between the two institutions. All in all the forestry institutions (administration, education, research) have always enjoyed a reasonable level of autonomy and support from Sudan Government and development partners. The FNC is pretty well entrenched at the Federal, State and Locality levels, with office space, nurseries, forest reserves, staff, communication means and running budgets. RPA has none of these. Therefore to bring about a complete merger the RPA has to be afforded means of revenue and massive support from the Federal Government.

The following recommendations are deemed feasible and doable and are thus posed to improve the situation of forest and range sector in Sudan:

- Integration of Range & Forest sectors, Wildlife and Soil Conservation should be accorded priority in forthcoming Federal Constitution and Legislations,

- Recent political/administrative happenings, namely the cessation of South Sudan and the eruption of disputes between the two sister countries make it imperative that the question of forestry, range, nomadism and transhumance be accorded special strategic consideration,

The following roles are envisaged for regional such as Arab Organization for Agricultural Development (AOAD), Arab Authority for Agricultural Investment & Development (AAAID), Arab Ministerial Conference on the Environment (AMCEN) and international organizations such as FAO in fostering integrated management of forests, range, wildlife and soil conservation in the Near East:

1. Build capacity at national level in Region's member countries in natural resources accounting and auditing particularly among senior level personnel in relevant academic and administrative institutions,
2. Invest in the future through assisting Region's member countries build, update, revise curricula of basic, secondary and higher education to highlight/bring-up conservation, sustainable management and integration of various facets of natural resources,
3. Raise awareness among ministers in charge of forests, range and wildlife in Region's member countries through inclusion of such aspects/topics in agenda of regional conferences,
4. 4.Raise awareness among rank and file of population in Region's member countries through production of televisable documentaries on conservation of natural resources in general and forest, range, wildlife and soil.

6. INTEGRATION OF FORESTRY AND RANGELAND MANAGEMENT INSTITUTIONS IN TUNISIA⁷

INTRODUCTION

Background

Forests and rangelands play important functions contributing to the livelihood of people in Tunisia. In addition to several products – wood and non-wood – they provide valuable environmental services, in particular water flow regulation, biodiversity conservation, arresting land degradation and desertification and carbon sequestration. For an economy which is increasingly relying on tourism, forests and rangelands make significant contribution on account of their amenity values. With rapid urbanization the role of trees and green spaces in improving the quality of life in urban areas is well recognised.



⁷ Dr Mohamed Nejib Rejeb

The forest and rangelands patrimony contribute effectively to the economy by job creation, lumber for industries, firewood, cork, hunting and fishing.

As in most countries, the greatest challenge facing the management of forests is deforestation and degradation, the main causes of which being human activities, including land clearing for agricultural expansion, excessive collection of firewood, production of charcoal and the uncontrolled exploitation of wood. Other causes are the resettlement of populations, fires, overgrazing and loss of vegetation cover due to recurrent droughts. Moreover, factors related to land occupancy, poverty and food shortages could affect forest management. Forest and rangeland development remains lagging behind and the sector suffers because the development of Tunisian agriculture is focused in priority on the development and intensification of agricultural production.

The Tunisian environment, characterized by a relative scarcity of water resources, soil and natural vegetation cover and the fragility of these resources is called to meet the needs of a growing population. In this study, our interest is about range and forest lands which are considered as the most important natural resources of Tunisia. An important issue is to assess how two important land uses, namely forests and rangelands which provide a similar set of products and services are managed integrally and what may be done to enhance the synergy between the two land uses.

Objective of the study

The main issues of this study cover forests and rangelands and their institutional responsibility, present state and use of this sector, the current policies and objectives and future strategies in the country to improve their management.

Tunisia: the larger context

Tunisia has a land area of 16.2 million hectares and has a privileged geographical position at the crossroads of the eastern and western basins of Mediterranean Sea, between Europe and Africa. Tunisian morphology is very varied and landscapes are considerably different from North to South. Mountainous areas are in north and west, steppe in centre, vast plains to the north east (Sahel) and in the center, and a desert area in South. Tunisian climate is characterised by rainfall scarcity and a wide variability of rainfall within the year and through the country. The climate is humid at the extreme north, sub-humid in the north and along the coast, and semi-arid and arid in the centre and the south and desertic in the extreme south.

Demographic changes

As per the latest demographic survey the population in 2010 is estimated as 10.5 million giving a density of about 68 persons/ km². During the last few decades, annual population growth rate has declined and currently it is about 1.0 percent (INS, 2012).

Table 30 Tunisian demographic growth (2000 – 2010)

Year	2000	2005	2010
Population (thousands)	9 552.5	10 029.0	10547.1
Urbanisation rate (en %)	62.6	65.2	66.1
Density of Population by km²	61.5	64.4	67.7

Source: National Institute of Statistics-Tunisia, 2012

In 2000, urban population was about 63 percent of total population. It reached 66 percent in 2010 while rural population was about 34 percent with about one million people living inside forest area. Certainly urbanization is reducing the direct pressure on forests, but it is also creating several new problems resulting in a decline in the quality of urban life. As regards the spatial distribution of the population, one-fifth of the population is concentrated in Tunis and there is a steady migration to the coastal area and the cities.

The economic context

Tunisian economy is highly dependent on agriculture and tourism sectors. In Tunisia, GDP was growing steadily for several years until 2010, indicating economic stability. In 2006, GDP was about 45 756.2 million Tunisians Dinars with a growth rate of 9.3 percent. In 2010, it reached 63 500.0 million Tunisian Dinars which gives a growth rate of 8.1percent. However, Tunisia's GDP fell by 7.8 percent in first quarter 2011 compared to 2010, largely on account of the political upheavals. It may take some time before the economy picks up, especially considering the global economic downturn.

According to the various economic indicators, all sectors excepting agriculture registered declines. The tourism sector, contributing to 7 percent of Tunisian GDP is clearly affected since January 2011 by the decreasing number of visitors. The tourist visits recorded a decline of 39% from January to July 2011. Improvement in the situation may take quite some time depending on political and social stability.

All this suggests the challenges facing land use, including forestry and animal husbandry. .

Land use

Of the total area of 16.215 million hectares, only 10 million hectares have an agricultural potential (lands with high to low fertility) and 6.215 million hectares are non-agricultural lands (Sand accumulations and rocky outcrops: 3 million hectares, Saline expanses (Sebkhas): 1 million hectares). Forest and rangelands cover approximately 5.6 million ha. Forest occupies 1.14 million ha of which 368 000 ha are natural forests. Reforestation correspond to 515,000 ha, maquis and garrigues 275 000 ha, Alfa area 452 000 ha.

Need for better integration and improved linkages in land management

Forest and range degradation is related principally to agricultural expansion, fuel wood gathering, and overgrazing. Tunisia has prepared and adopted a strategy and national action plan of natural resources (Pastoral plan, water strategy, forest plan, soil and water conservation plan, biodiversity plan, desertification plan, and climate change plan) to address this situation. Strategies adopted have a common basis of perspectives and appreciation of natural resources. Sustainable management of forests should be considered as an integral part of national strategies reconciling economic growth, social equity in development and environmental protection.

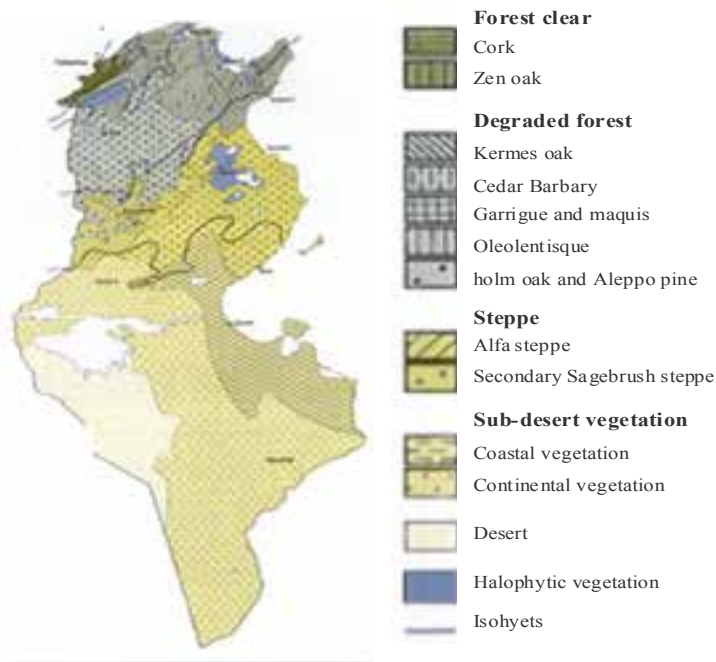
Flora and fauna resources and biodiversity could contribute significantly to social and economic development, but so far, the sustainable development of these resources has not improved significantly in Tunisia. Moreover, in most cases, government institutions responsible for forests and rangelands have policies and programs require better coordination and harmonization.

Referring to pastoral and forest inventory (DGF 1995, 2007), analysis of vegetation cover revealed three distinct regions with different vocations:

- North part of Tunisia is a region with Agro-forestry-pastoral potentiality
- Central Tunisia is a region with dominated Agro-pastoral
- Southern Tunisia is predominantly pastoral region

General characteristics of the vegetation are indicated in Figure 8.

Figure 8 Tunisia – Vegetation cover map

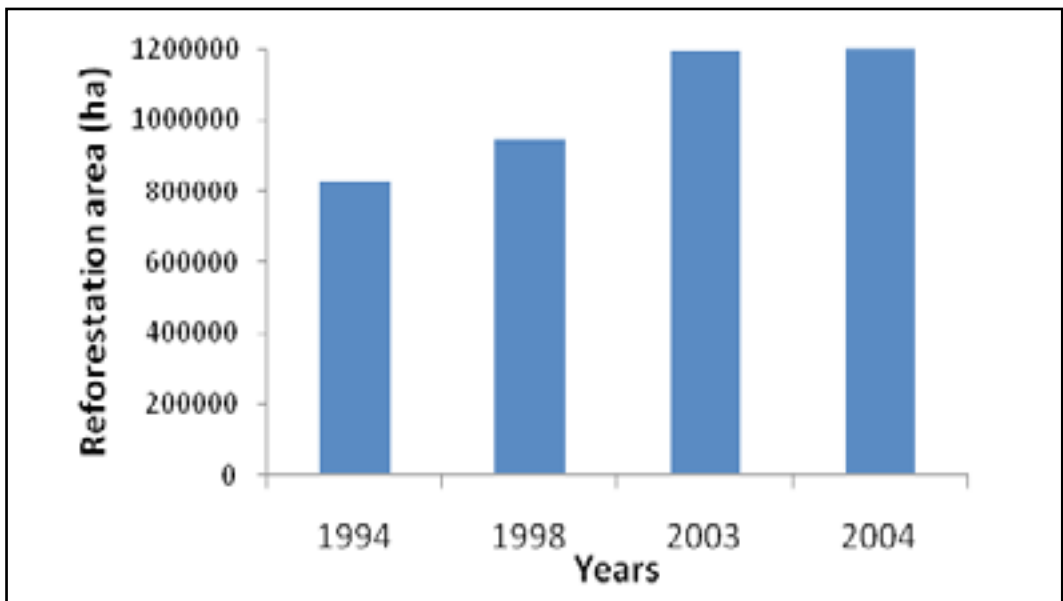


Forests area distribution

Tunisian forest has undergone considerable changes during the last few centuries. During the Roman period, forest extended over about 3 million hectares. Forest area declined to 1.25 million ha in 1881 and then to 400,000 ha in 1956. Since independence, several efforts have been made to expand the area under forests mainly through afforestation and reforestation. Currently, the extent of forests is estimated at between 1.2 and 1.4 million hectares (Figure 9). This value is still low especially with the problems of overgrazing, drought and climate change.

Currently, the forest area presents 7.8 percent of total national area and 12.7 percent of the area of Tunisia without Chott and Sahara while in 1995, these rates were respectively about 5.12 percent and 8.3percent. It was 2.5 percent in the beginning of the independence.

Figure 9 Evolution of Tunisian forests area



Source: DGF, 2012

According to DGF (2012), public forest cover 80 percent of total forest area (925 000 Ha), 20% are private forest and plantation in private agriculture land (225 000 ha).

Generally Forest designed area occupied by forest formations. The main forest formations are:

- Forests: This is formed by wood trees whose height exceeds 7 m and density is about 100 plants/ ha.
- Maquis: it is a high and dense matorral, bonded to a silica substrate and under annual rainfall of 600 mm.
- Garrigue is a medium and open matorral, linked to a limestone substrate.

Maquis and garrigue may be with or without trees.

The area under different formations is as follows (OTEDD, 2009):

- Forests : 672 980 ha
- Maquis and garrigues wooded : 150 098 ha
- Maquis and garrigues without trees : 336 790 ha

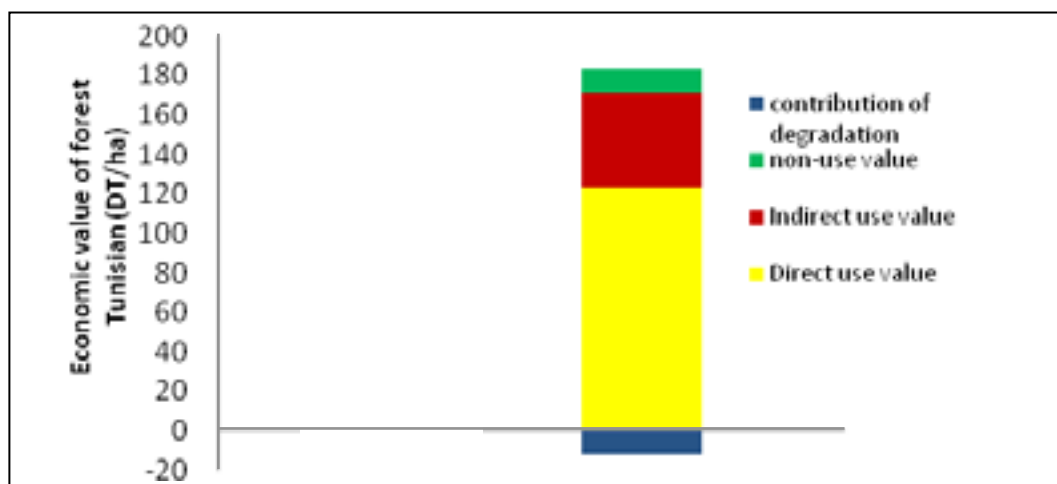
Most forest areas are located in nine Tunisian governorates, which together account for 88 percent of the total forest area as given below:

- Kasserine : 15.61%
- Siliana : 12.38%
- Jendouba : 10.51%
- Kef : 11.58%
- Bizerte : 8.61%
- Zaghuan : 7.42%
- Beja : 7.50%
- Kairouan : 8.08%
- Nabeul : 6.43%

Costs of Degradation

The forest is vulnerable to various anthropogenic pressures, fires, pests and diseases, extreme climatic events, especially prolonged droughts. Damages are related to lack of consideration of the degradation costs and open access to the forest. The total economic value of Tunisian forests in a year is estimated as (Fig 6.4) as TND 203.5 million in 2010 (or 172 DT / ha), approximately 0.4% of GDP. Annual budget allocation for forestry is approximately 41 million DT).

Figure 10 Economic value of Tunisian forests (DT/ha)



Source: Daly and al 2012

Assessment of the economic value of forests indicates that:

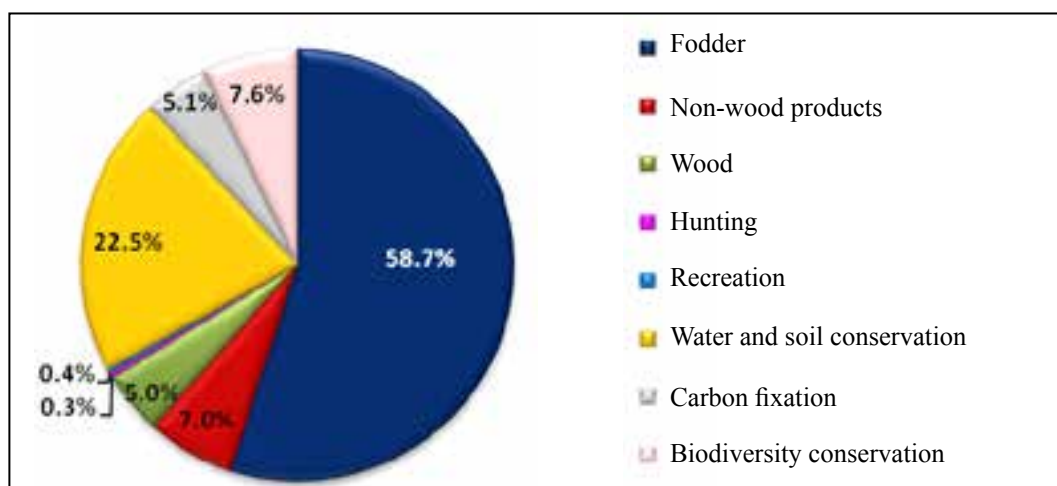
- Fodder production is the main direct benefit of the forest; followed by the water and soil conservation whose benefits could be very high especially considering the importance of water supply to agriculture.
- The current accounting system fails to give the actual contribution of forests to the economy.
- Excessive use of resources results in a high social cost associated to a decrease of current and future productions, to carbon emissions, land degradation and loss of biodiversity. Similarly, the mismanagement of wildlife causes damages in the surrounding farmland.
- The local population is the main beneficiary of forest goods and services but sustainable management with Reforestation and establishment of nature reserves are likely to restrict public access to these resources and consequently reduce their benefits.
- Sustainable management and conservation should be accompanied by a compensation for loss of income. The development projects of forest products should be encouraged with the participation of local people and by the introduction of conditional incentives for those implementing sustainable practices. Economic tools, including payments for environmental services, can usually fill the gap between private and social benefits (Daly *et al.*, 2012).
- Production services such as hunting, recreation should be developed through for example concessions to improve profit of the local population and to allow sustainable environmental services production.

Despite the gains enjoyed by local people, the forest is often considered by local communities as an obstacle to development and not as a source of incomes. This fact is explained by low household incomes, the limited resources of forest land and unemployment which generate conflicts between the forestry administration and local people regarding the use of forest resources. The cost of employment in the forest is low about 26 DT/ ha, consisting mainly at cork harvesting and firewood collecting, while it is much higher for livestock with a cost of family employment of 178 DT/ ha.

The contribution of Tunisian forests to the national economy includes:

- 15 to 25 percent of the forage needs of the herd
- 14 percent of national energy needs
- 30 percent of the average annual income for some families
- Forest Provide about 7 million days of work per year and foreign exchange by exporting cork, dough allies and medicinal and aromatic oils.

Figure 11 Distribution of the total economic value of Tunisia forests in 2010



Source: Daly *et al.*, 2012

Forest products and resources contribute about 15 to 25 % of animal feed and 14 percent of the energy need and the non-wood production cover 30 % of the annual rural people need.

- Wood potential production is estimated annually to 400 000 m³. However, production is highly variable depending on the years. Only 50 percent is harvested and 650 000 m³ are imported to cover the national demand (110 million Dinars). Firewood contributes about 14 percent of national consumption of energy.
- Annual forage production in forest area is about 300 to 400 million UF. Including the steppe community, a production reached over 900 million UF. Grazing can cover 1/3 of the needs of the national herd.
- Non wood Forest products present about 1/3 of annual revenue of forest people (600 dinars for 2 000 to 3 000 families).

Goods and services provided by forests accrue to the different segments of society as indicated below:

- The local population (61 percent),
- Tunisian society (22 percent)
- The state budget (5 percent)
- The global community (12 percent)

The State revenues represent only a small portion of the profits (5%). The investment in forests should take into account all the benefits, not just the products sold by the administration.

Management of rangelands

Rangelands include different formations like as natural rangelands, Alfa steppe, pastoral plantations, riparian plants and other ranges with Forest pastoral land (Table 31).

Table 31 Area of different kinds of range

	Area	
	Hectares	Percent
Natural rangelands	4 040 000	86.91
Alfa steppes	452 000	8.58
Pastoral plantations	107 606	1.93
Riparian plants	80 199	1.45
Other range	62 772	1.13
Total	4 742 577	100

Source : ODD, 2009 and DGF, 2012

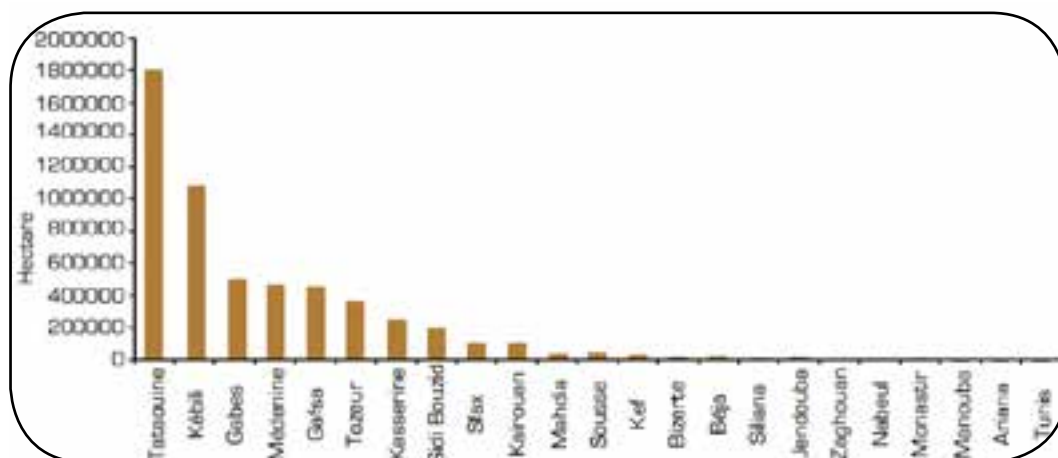
Rangelands cover 27.5 percent of total national area that means 4.5 million ha. This area is distributed in:

- 1.30 million ha of private area
- 2.75million ha correspond to collective ranges which represent 65percent of total rangelands.
- 0.45 million ha of steppe

Range development differs by regions and their specificity is mainly climatic. So, we could distinguish three zones:

Geographical areas of the range are represented in figure 12.

Figure 12 Geographical areas of range



The socio economic role of range is very important in central and south part of the country, its area cover more than 60 % of the total area and it exceeds 75 % in arid and Saharan regions.

Steppes

Beside Natural rangeland, steppes are open and low formations dominated by one or two herbaceous plant species and / or shrub, characterizing mainly semi-arid and arid. We can distinguish:

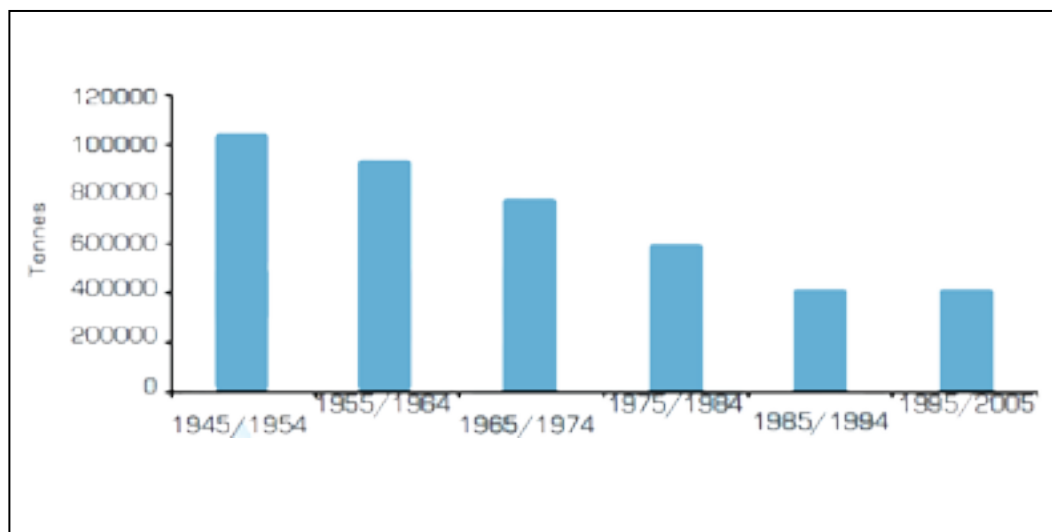
- Steppe grasses, the most important of which is Alfa steppe.
- Steppes chamophytes including “chih” (sagebrush) or “arfej”(Rantherium).
- Halophyte steppes of salty lands and borders of sabkhas.

The area occupied by Alfa is steadily declining. From 1 112 500 ha in 1895 it fell to 630 000 ha in 1963, a reduction by about 50 percent. Currently, steppes cover 452 000 ha situated in the Center and South under arid and semi-arid climate. This decrease is related to agricultural lands expansion and uncontrolled grazing, which explains also the reduction of 60% of the steppe during the last century. In Central Tunisia, steppes are covered by calcareous and limestone soils in the plains and fertile soils on the glacis.

Steppes have many advantages and generate an important economic income for the country. Indeed they provide the raw material necessary the pulp industry (the factory at Kasserine produces about 14 000 tons from 40 000 tons of raw material).

Steppes degradation is accompanied by a production decrease. In the previous decade, decline area is estimated about 5000ha per year and annual production fell to 40 000 tons for the same period (Figure 13).

Figure 13 Evolution of the average annual production of Alfa per decade



Source: OTEDD, 2009

Assessment of the state of pastures

Indicators of grazing are as follow:

- An area of 1.5 million hectares or 34 percent of the total rangeland has a vegetation cover ratio less than 25percent.
- An area of 2.46 million hectares or 54% of the total rangeland has a vegetation c o ver ratio between 25-50 percent.
- An area of 0.54 million hectares or 12% of the total rangeland has vegetation cover ratio more than 50 percent.

Pastoral herds

Rangeland is important because of its contribution and its forage value for grazing herds composed by sheep, goats, cows and Camels (Table 32).

Table 32 Composition of the herd in Tunisia

	Number of Pastoral herds (1000 heads)						
	2004	2005	2006	2007	2008	2009	2010
Sheep	3963	4044	4095	4181	497	2450	3873
Goats	809	809	820	856	822	811	708
Cows	435	445	450	451	449	440	440
Camels (female	-	-	-	-	-	-	80

Source: Department of the Regional Office of Livestock and Range of Gabès, 2012

Estimated production of rangelands

Rangeland production varies from 1 200 million of UF/year during rainy years and to 450 million in dry year while the needs of the flock are about 4 400 million of UF/year. Rangelands therefore provide about 10 to 25 percent of the needs of the herd.

Policies and institutions dealing with range management

Pastoral land cover the third of Tunisian area, 87 % is in the central and south of the country. The strategy adopted is as follow:

- Plantation of Pastoral trees and shrubs on 21 000 ha per year
- Plantation of *Opuntia ficus indica* on 16 500 ha per year
- Management of 27 500 ha per year
- Subsidy of 30 percent of selected pastoral seed acquisition
- Subsidy of 30 percent instead of 25 percent to cow acquisition by young farmers
- Creation of rabbit, goat and sheep technical centres

To achieve this action plan, technical approach adopted consists to make:

- Plantation of *Opuntia ficus indica* on line and to conserved soil and water conservation unities
- Plantation of pastoral shrub on line (Acacia, Medicago, Atriplex) and near the water resource
- Fertilization of pastoral land
- Interdiction of grazing for a determined period

Until the end of 2011 the realizations are as follows:

- Change of 650 000 ha of commune rangeland under forest authorities
- Creation of 30 000 ha of permanent rangeland in the north
- Creation of 67 000 ha of ameliorate rangeland opened for grazing in drought period
- Plantation of 294 000 ha of pastoral plants and 275 000 ha of cactus (*Opuntia ficus indica*)
- Management of 470 000 ha of Alfa land and 800 000 ha of commune rangeland

Table 33 indicates the national targets for range improvement and the accomplishments during 2002-2011.

Table 33 National strategy for 2002-2011

	Projected 2002-2012	Realizations 2002-2012	Percent of Realization
Planting of fodder shrubs	210 000 ha	50 000 ha	24
Planting <i>Opuntia ficus indica</i>	165 000 ha	52 000 ha	32
Management and planting	275 000 ha	120 000 ha	44

Source: El Fahem, 2012

There are different types of ownership but range management policies don't take care of this case and there is one strategy for the different ownership.

The main objectives of the forest policies are:

- Enhance reforestation
- Fire forest protection
- Ameliorate forest production
- Combat desertification
- Increase the number of natural parks and reserves
- Increase the income to local forest inhabitants

Prevailing property and rights holders use

Prevailing property and rights holders use are represented in table 34.

Table 34 Property and rights holders use

Kind of ranges	Property	Rights holders
Forests and range forest	Property of the State forest	People of forest
Ranges in steppes	Property of the State forest or collective lands	People of forest or Group concerned
National Range	Private Property of the State	Institution acting
collective ranges	collective lands	Group concerned
Private range	Private Property	Holder

Forest strategy

To fight against forest degradation, the national forest strategy is based on many actions as follows:

- Reforestation and plantation of pastoral plants at 30 000 ha/year
 - Create 27 000 ha of permanent pastoral area in the north country
 - Change 600 000 ha from common regime to forest regime
 - Management of 470 000 ha of Alfa steppe and 550 000 ha of pastoral common area under forest authority
 - Create 7 national parks and 14 natural protected areas
 - Develop scientific research in forest and pastoral sectors
 - Create natural museums in the national parks such as Bouhedma, Chaambi, Boukornine, Zaghouan, SidiToui, Jbil, Oued Dekouk and Saddine.

This action plan aims to enhance the extent of forest area to 12.5 percent of the land and the area of Alfa to 470 000 ha. Forest laws and forest code have been revised and people's participation living inside/ in the vicinity of forests (whose number is estimated at about 1.0 million) has been built into the programme. The perception of different stakeholders as regards goods and services provided by forest and rangelands was taken of account in the forest and rangeland strategy but the results are not satisfactory. The forest and rangeland population and the NGO's don't accept and participate very well to these strategies at local level.

Forestry and range institutions

The institutional aspects of forest and rangelands management include several actors at national, regional and local levels. The main stakeholders belong to the Ministry of Agriculture. The most important directions involved are the Forest General Direction

(DGF), the Office of Livestock and Pasture (OEP), General Direction of facilities and agricultural land conservation (DGACTA), South Office for Development (ODS) and North West Office of Silvo-Pastoral Development (ODESYANO).

Forest General Direction (DGF)

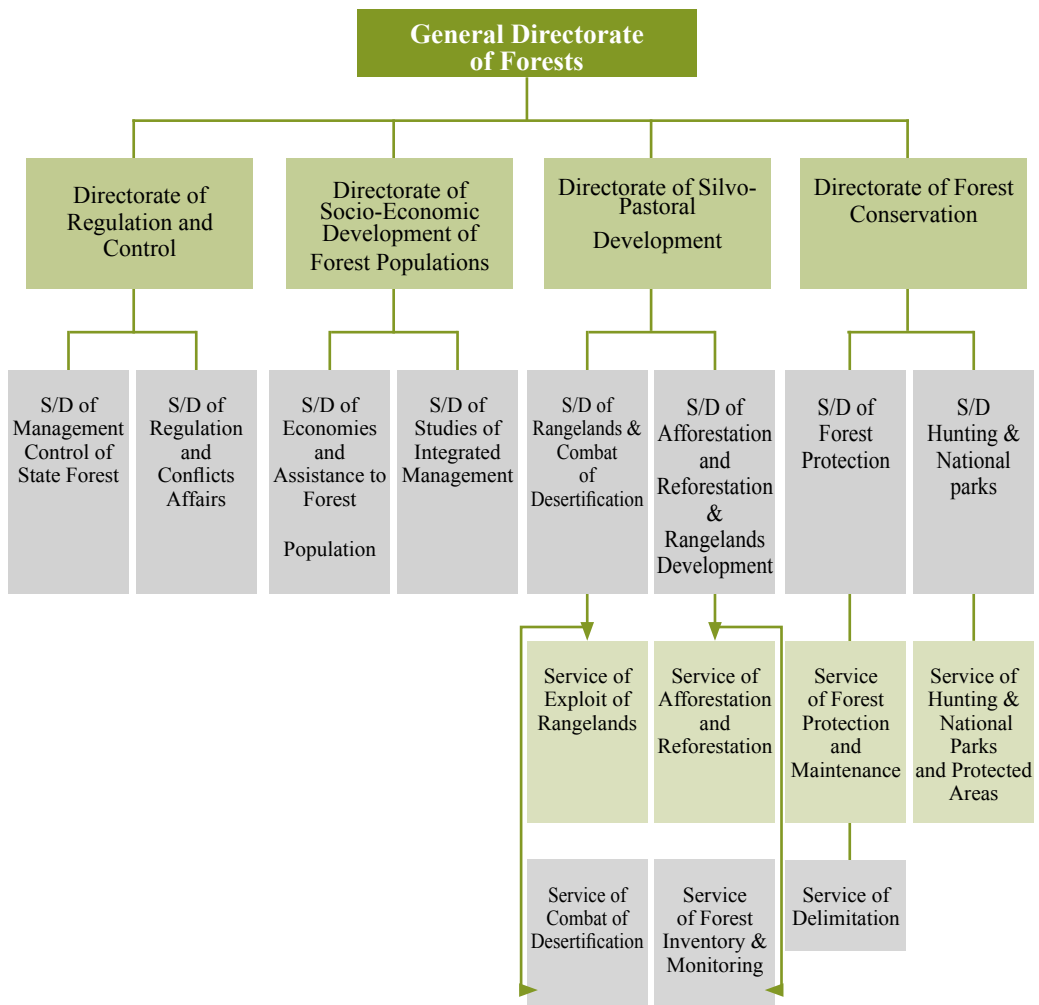
The Tunisian Forest Service has a long history of evolution starting from 1883. A number of legislations have been promulgated addressing various technical, managerial and organizational aspects. Some of the milestones in the evolution of the Department are indicated in Table 35.

Table 35 Milestones in the development of the forestry in Tunisia

Year	Important developments
1883	Establishment of the Tunisian forest service
1920	Grazing as a use right
1958	Restriction on goat raising in forest lands
1966	<ul style="list-style-type: none"> Promulgation of the first Forest Code Promulgation and ratification of Act establishing the Livestock & Pasture Land Authority. Creation of National Institute for Forest Research
1970	Establishment of Silvo-Pastoral Institute, Tabarka
1974	Promulgation and ratification of Forest Act on Forest Management Plan
1981	Establishment of Silvo-Pastoral Development Authority in North West Tunisia (ODESYANO)
1994	<ul style="list-style-type: none"> Reorganization of DGF Creation of National Institute for Research in Agricultural Engineering, Water & Forestry
2005	Forest Act establishing concessions in public forest land

Source: Nair & Abdel Nour 2011

General Forest Directorate under the Agricultural Ministry has a department representative in each CRDA (regional commissariat of agricultural development). Its objective is to conserve and develop forest and rangeland. It is in charge of combating desertification and forest fire protection. The DGF is the most important player as regards forest and range management organization (See Figure 14).

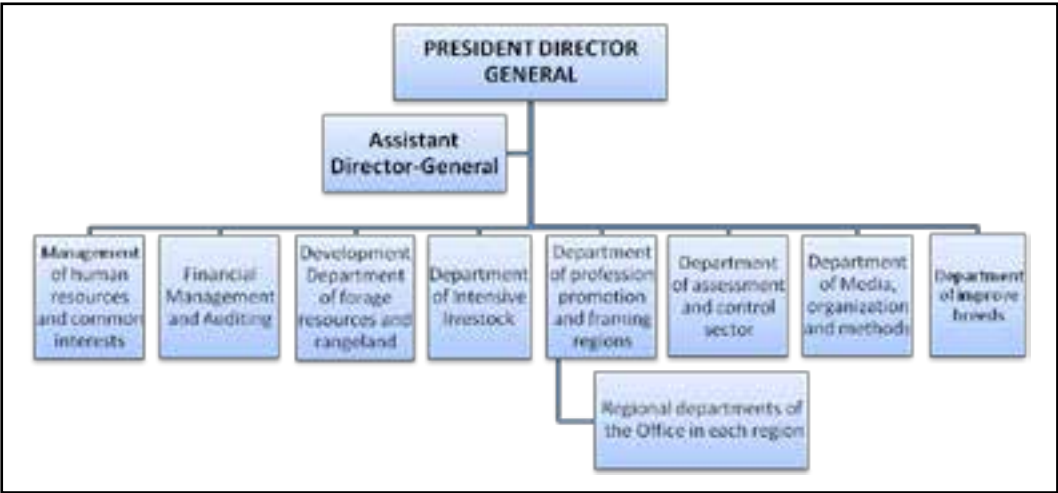
Figure 14 Organization of General Direction of Forests in Tunisia

The DGF is the first state institution responsible for forest and rangelands in Tunisia. The range is led by Development sylvo-pastoral Direction with sub direction for range and combating desertification, sub direction of reforestation and department for exploitation of range and Alfa. DGF is in charge of range from north to south, and must coordinate with all other institutions but has no direct authority over these institutions.

Office of Livestock and Pasture (OEP)

Office of Livestock and pasture (OEP) is situated in Tunis. It has representative technicians in the regions. Its objective is to develop the domestic animal fauna. In fact, OEP realize its program without any coordination with DGF which has no administrative authority on it. Its organization is schematized in figure 14.

Figure 15 Organization of Office of Livestock and Pasture

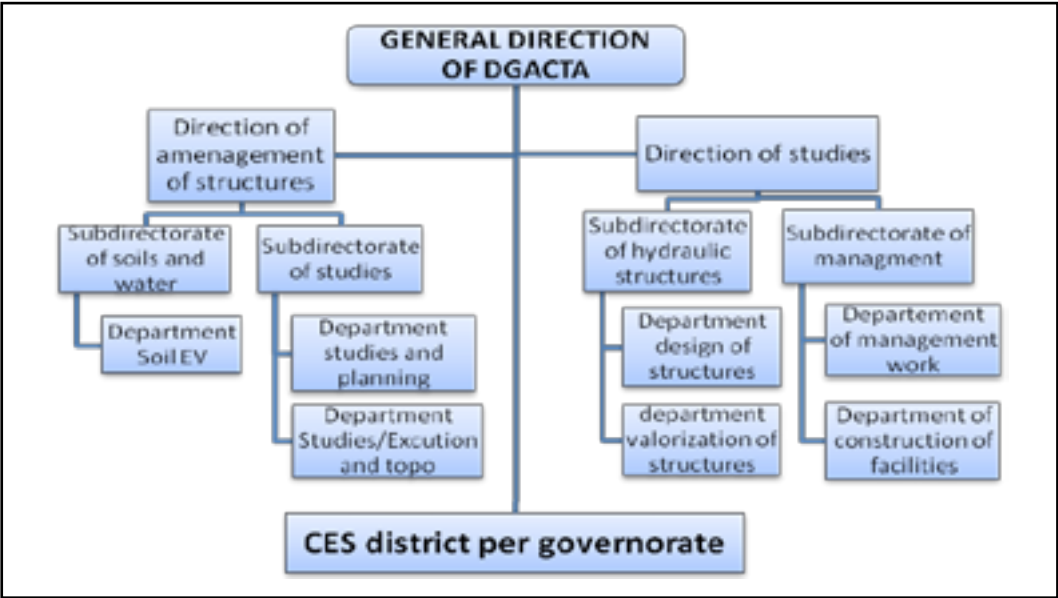


General Direction of facilities and agricultural land conservation (DGACTA)

The DGACTA built structures and consolidated it by planting forage and pasture species. These actions were related mainly to program of the DGACTA and planting is carried out without any coordination with DGF.

Its objective is to conserve agriculture, soil and water. Its organizational structure is indicated in Figure 15.

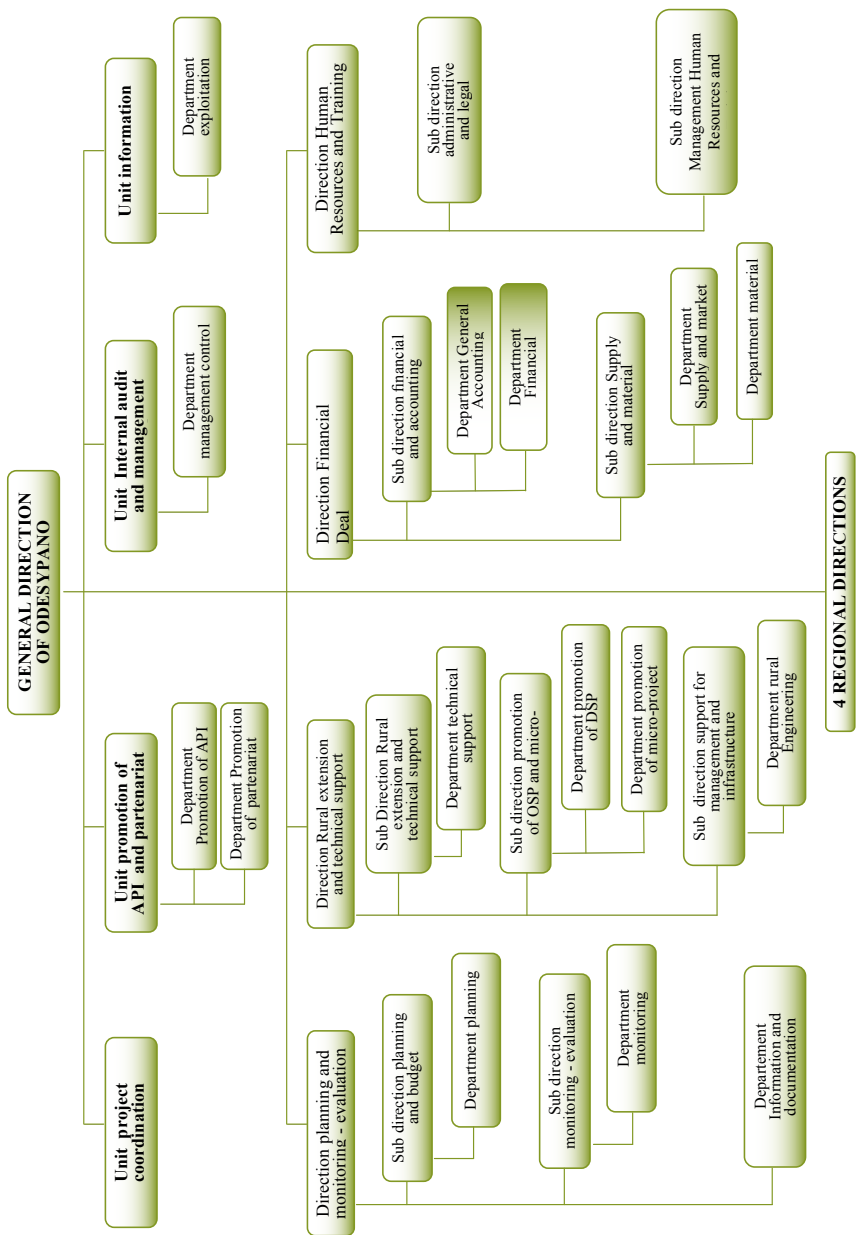
Figure 16 Organization of General Direction of facilities and agricultural land conservation



North West Office of Silvo-Pastoral Development (ODESYANO)

North West Office of Sylvo-pastoral Development is an area focused programme in the North West giving particular attention to integrated development of agriculture, animal husbandry and forestry adopting a participatory approach. The organigram of ODESYANO is given as Figure 17.

Figure 17 Organization of ODESYANO



ODESYPANO's integrated approach has become a model for wider application. It has established permanent meadows in forest clearings, carried out water and soil conservation operations and introduced agroforestry with the full involvement of rural communities. Success of this has been instrumental in the launching of Pilot Integrated Development Operations (PIDOs) with the involvement of non-governmental organizations (Larbi, 1999). In addition to forestry, integrated development programmes also undertake:

1. Development of infrastructure such as paths, drinking water, health centres, electrification and habitat improvement;
2. Investment to increase agricultural production;
3. Environmental protection activities
4. Improvement of human skills through training and the promotion of micro-projects such as small livestock production, distillation of aromatic essences and value added forest products. (Larbi, 1999)

Policies dealing with soil and water conservation management

More than 4 million ha of agricultural soils are endangered by erosion and the loss of dam's capacity to stock water was estimated to 28 million m³. 72 water table falls down under the normal level and the water quality was degraded. Water flow menaced 68 population villages. Infrastructure was endangered by water and soil erosion.

The first strategy started since 1990.

First action plan: 1990-2001 The realizations of this strategy were as follows:

- Management of 672500 ha of Watershed. (realization: 133 percent)
- Management of 305 000 ha of cereal soils. (realization: 23 percent)
- Protection of 337 000 ha of anti-erosion (realization: 39 percent)
- Construction of 1000 lake. (realization: 58 percent)
- Construction of 3556 unities of water conservation and recharge (49%)

The second CES action plan: 2002-2011

- Watershed management of 360 000 ha
- Cereal soil management of 1568 ha
- Unit CES protection concerns 700 000 ha
- Construction of 195 lake

The provisional finance of this strategy was estimated to 780 million dinars and only 38% of this finance was affected to this action plan. The strategy doesn't take of account the other component of the watershed and need more integration of this component. The local population isn't involved in implementing this action plan.

Sector financing

Sector financing is totally public and it concerned both forest and range areas. Budget has increased over the decade 1990-2000 with 3.1% annually going from 38 million dinars in 1990 to 51 dinars million in 2000. A quarter of the financial support comes from external funding. During the decade 2000-2010, we recorded a reduction in budget which reached 40 million dinars since 2004. This financial decrease resulted in a revised strategy which leads negatively impact especially on the range sector, the fight against desertification and on pilot operations of integrated development. 75% of funds allocated to the national program are reserved for the payment of permanent workers and funds registered in the 11th and 12th nationally plan are inadequate to achieve the established strategies.

Administrative and institutional organization

Forestry and pastoral areas are legally under the authority of the DGF since 1883. It is responsible for its protection and development according to the Forest and Range Code. Intervention of DGF could be summarized as following:

- Administrative role in the management of forest and range sector
- Legal role in law application according to the Forest and Range Code
- Economic role in exploitation of forest and range resources
- Social role in the integration of local people in the sector management

Reduction of human resources

Referring to standards set in the Mediterranean region, forest and range sector need 1000 technicians including 840 technical staff and 160 engineers. In Tunisia, the total number of technicians has reached 603 in 1981. Currently, it decreased to 346 which represent 35% of the forestry and pastoral needs. This decrease related to the non-replacement of retired technicians. The number of workers is about 9000. Thus, the ratio is still very low especially in mountainous areas and rangelands.

Changing patterns of forest management

The forest management presented often a source of conflicts between managers and users because people want to live in and the forest administration wants to protect these areas. For a sustainable and equitable management of forest resources, the search for consensus is indispensable.

Progressive management based on a participatory approach including involvement and empowerment of local people in forest management had a positive impact. This required substantial efforts at training staff, awareness generation and supervision at all levels. In parallel, the governing institution must be revised to establish new structures for the better organization of the forest population and better collaborative management of these areas.

Such consensus and adoption of participatory approaches created a climate of trust between users and managers and allowed to more sustainable realization than those obtained with the top down management pursued earlier.

The main steps of change patterns of forest management are schematized in figure 18.

Figure 18 Diagram of change patterns of forest management (a)

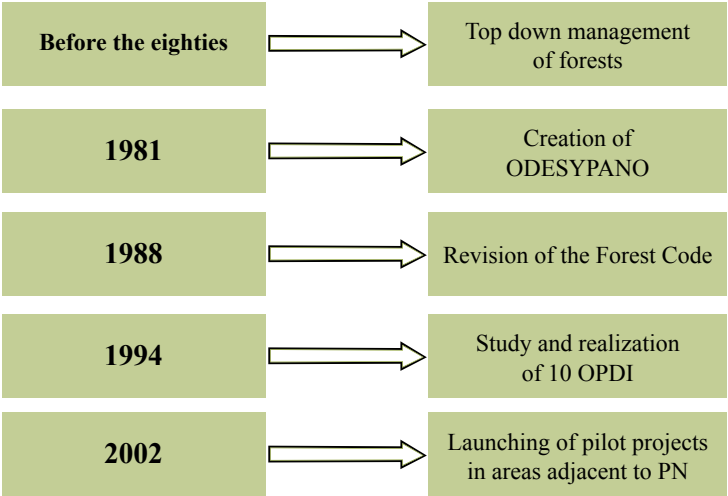
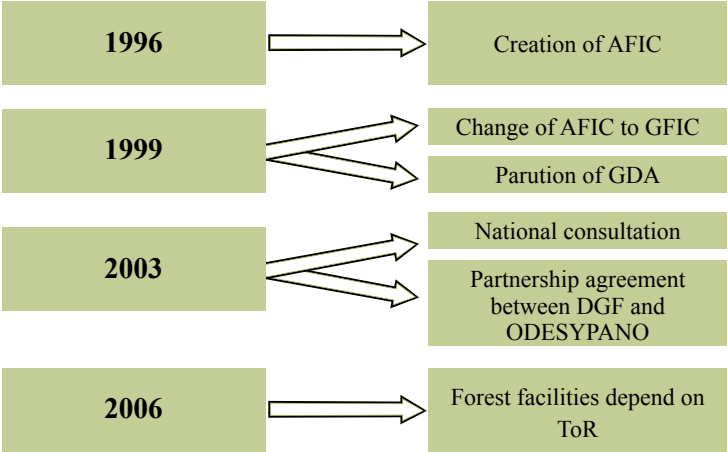


Figure 19 Diagram of change patterns of forest management (b)



Issues in accomplishing better integration

Barriers to the integration of forest and rangeland management

In Tunisia, resources are subject to the adverse effect of several natural and anthropogenic factors: climatic, topographic, and socio-economic.

Various processes of land degradation are involved:

- Saharan and Mediterranean climate with: 6% sub-humid, 16.4% semi-arid, 77.6 % arid to desert.
- A fairly pronounced bioclimatic variability from north to south
- Climate factors strongly contrasting with drought, torrential rains and anthropogenic factors.

Beside natural factors, some anthropogenic factors such, agricultural intensification, cultural practices, overgrazing and drought longer and longer, the production of agricultural and rangelands has steadily decreased in Tunisia. These factors are also causing the decrease forest area

The forest and range sector has struggled just after the revolution (January 2011). During the first quarter of 2011, agents of forest and technicians are overwhelmed by local people and offenses in forestry and pastoral sectors have increased. The main infractions found are as following:

- The illegal cutting of forest trees estimated at 10 000 trees of pine forest of Menzel Belgacem in Nabeul, hundreds of cork oak in the forest at Sejnane and about 10,000 plants of pine at Kasserine
- Destruction of 400 ha of coastal forests in the Ghdabna region for its exploitation in agriculture and quarrying of sand:
- Illegal Constructions on fixed sand dunes in Nabeul, Bizerte and Gammarth
- Destruction of 5000 hectares of Alfa grass by plowing to turn it into farmland
- Illegal occupancy of rangeland and destruction of range reserve and ameliorated ranges and illegal constructions
- Destruction of facilities in the National Parks
- Increase in arson incidences. 200 Arson during summer 2011 especially on 400 Ha in the forests of Dar Chichou- Nabeul, on 350 Ha at Bechateur Bizerte and on 264 Ha in Takrouna at Kef. This situation is considered exceptional and requires forest officers to write more than 1512 PV of Offenders.

Analysis of forest and range environment

Analysis of forest and rangeland environment and their management highlights many difficulties, gaps and concerns at different levels.

Forest environment

- A difficult forest environment
 - Forest Resources are limited and often degraded.
 - The soil resources are inadequately exploited and degraded. Infrastructures (roads, firewalls, guardian..) inadequate and poorly maintained

- Strong human pressure
 - Forest areas are inhabited mostly by poor people looking of short-term improvement of their living conditions
 - Exploitation of forest resources are often unlimited,
 - Importance of forest resources especially some non woody products

Farming is the main activity carried out in forest areas, which reduces regeneration and causes a risk of damage to young stands not sufficiently guarded. Furthermore, the forestry sector suffers from regular damage by clearing, plowing and illicit felling of wood for heating, manufacturing charcoal or construction.

- **Degradation due to fire risk and protection**

Fires are a constant threat to forest formations. Development of forests and measures against fire are well implemented. Despite the increase in forest cover in Tunisia, the annual area burned is in continuous decline since the 50s: from 300 000 ha burned during the period 1900-1950 to 50 000 ha in the last 50 years. Over the period 1985-2006, the fires had burned 1 264 ha per year on average. In 2010, the burned area was 711 ha.

The damage cost method is used for assessing the costs associated with the loss of cork oak forests: production losses of cork, wood, acorns, and water resources due to sedimentation of reservoirs and carbon emissions. For the current year and in the future (30 years), damages are evaluated at a rate of 2%. The cost of damage is estimated at 4 032 DT / ha.

A favorable legislative framework, but requires thrust on implementation

- Forest Code promulgated in 1966 aims to protect threatened forest patrimony but it is still not enough.
- The revision of the Forest Code in 1988 underscores public participation in forest management but the involvement of the population remains very low until now.

Since the revision of the Forest Code in 1988, policy of Tunisian government includes decisions and measures to implement gradually. They aim to:

- Protect nature and environment
- Improve socio-economic conditions of the rural population and especially in forestry

So, to achieve these decisions and actions, some priorities have been established in forest policy of Tunisia.

- Development of water and soil conservation
- Improve Environmental protection
- Socio-economic development of forest people to raise their Income and to improve their life standard
- Development of production of wood, cork and valorization of NWFP
- Promoting secondary activities of forest like as development of ecological tourism.
- Provide managers simple and rational documents

Barriers of rangeland development

Institutional

Many institutions are in charge of range management but the priority of each institution is other than pastoral development. Indeed, reforestation is the main concern for DGF, water and soil conservation for DGACTA. For OEP, the priority is animal husbandry while ODESYPANO and ODS have supported regional and local development essentially.

- Regional committees work in charge of identification collective rangeland slowed
- Requirements for rangeland improvement programs do not agree with the desired layout.
- The role and performance of agricultural development and pastoral councils is still limited.
- Lack of educational institutions specialized in range formation and studies.

Propriety constraints

Ownership issues continue to affect the development of rangelands.

- The important areas of range are collective which represents an important obstacle for conservation and development of this land (management councils).
- The wish for privatization of collective land

Material and environment conditions

- Lack of water in pastoral land
- Local and autochthon pastoral seeds are not available or in small quantities and the seed importation isn't well organized in both quantity and quality
- Problem of finance of pastoral management projects
- Lack of technicians specialized in rangeland management
- Absence of integrated project with pastoral and animal integration
- Forest and pastoral lands are over exploited because of the low fees of exploitation
- Number of camels and pastors are going down in El Ouara and there isn't local NGO's and organization cordoning their intervention such as GDA (Agricultural development group)
- Implementation constraints and many of the action plans prepared for 20 years have not been fully implemented.

Social and organizational

- Application of some rangeland developing is confront to the social difficulties mainly poverty in these areas
- Increase of number of animals (of 4 million heads in the sixties to more than 9 million heads now).

- After the revolution 50 % of the 43 GEFIC (community of common interest) stopped their activity.
- Private sector isn't involved in rangeland management

Table 36 gives an overall indication of the extent of integration of forests and rangeland management in the country in the policy and legal spheres as also at the institutional level – at the national, regional and local levels.

Table 36 Integration of range and forest management , Assessing the extent of integration in Tunisia

Criteria	Issues to be considered	Situation in Tunisia	Points assigned ⁸
Integration at the policy level	<ul style="list-style-type: none"> • Are the policies relating to range and forests well integrated? • Are they formulated as integral components of overall land use policy? • If not are there distinct / separate policies for managing forests and rangelands? • If there are separate policies, to what extent they take into account the issues relevant to the other sector • Do the forest/ range policy make any explicit reference to the policies relating to the other sector? • Do the forest and rangeland policies along with the agricultural policies provide a robust framework for sustainable land use? 	<ul style="list-style-type: none"> • Policies related to range and forests are well formulated and integrated but not applied • Yes but not implemented • No separate policies • Yes • Yes 	5

⁸ Points to be assigned on a scale of 0 to 10, with 0 representing no integration and 10 representing perfect integration.

Criteria	Issues to be considered	Situation in Tunisia	Points assigned ⁸
Integration of laws/ rules and regulations	<ul style="list-style-type: none"> • Is the management of range and forests governed by the same set of legislation? Or are the laws/ rules/ regulations separate? • If they are separate, do the legislation/ rules relating to range/ forests have broad similarities? • Do they take into account the rules/ regulations in the other sector? • Are they complementary or contradictory? 	<ul style="list-style-type: none"> • Yes, range and forests are governed by the same set of legislation but they aren't very well applied • Yes • They are complementary 	5
Institutional integration			
• National level	<ul style="list-style-type: none"> • At the national level, are the departments dealing with range and forests in separate ministries or in the same ministry? <hr/> <ul style="list-style-type: none"> • If they are in different ministries, are there any mechanisms to coordinate/ integrate the work of the different ministries? <hr/> <ul style="list-style-type: none"> • To what extent these coordination mechanisms are effective? <hr/> <ul style="list-style-type: none"> • If range and forest management are dealt with under two departments in the same ministry, what are the mechanisms for interdepartmental collaboration? Are these mechanisms effective? 	<ul style="list-style-type: none"> • We have many institutions dealing with range and forests in the same ministries. DGF is the main institution and the coordination mechanisms with the other institutions aren't effective • Coordination mechanisms aren't effective 	5

Criteria	Issues to be considered	Situation in Tunisia	Points assigned ⁸
• Local level	<ul style="list-style-type: none"> • What are the mechanisms/ systems in place at the local level to implement forest and range management? • Are there separate departments/ agencies to implement range and forest management at the local level? • If so how are coordination/ integration of different activities accomplished? • Are these mechanisms for coordination effective? 	At the local level, we have the same institutions dealing with forest and range but the main problem is the effectiveness of mechanisms for coordination between all levels	4
• Community level	<ul style="list-style-type: none"> • What are the community level institutions dealing with range and forest management? • Do the communities deal with forest management/ range management separately? Or are these well integrated? • What is the level of integration between forest and range management at the community level 	<ul style="list-style-type: none"> • At the community level, there is the community council which is an ONG dealing with range and forest management • Yes, they are separated and not integrated 	4
Integration at planning level	<ul style="list-style-type: none"> • What is the planning process adopted in the two sectors? • Does the planning process in one sector accommodate the concerns of the other sectors? • Are the plans and programmes for range and forest management prepared separately? • To what extent these plans take cognizance of what is being done in the other sector? 	<ul style="list-style-type: none"> • Planning process is prepared in the same department • The planning process accommodates the concerns of the other sectors • No, management isn't prepared separately <p>The forest sector has always the priority</p>	4

Criteria	Issues to be considered	Situation in Tunisia	Points assigned ⁸
Integration at implementation level	<ul style="list-style-type: none"> • How are the activities under the different plans and programmes implemented? • What mechanisms exist for integration of different plans and projects at the operational level? • Are there any conflicts between the two sectors and if yes what mechanisms are in place to overcome such problems 	<ul style="list-style-type: none"> • Activities under the different plans and programmes are badly implemented. • The integration of different plans and projects of different plans and projects at the operational level is very important and need better coordination between all actors • There are conflicts between the two sectors and the forest sector has always the priority 	4

On the whole range and management activities are integrated, and integration is built into the policies and legislation as also the institutional framework. The main factors that have contributed to an integrated approach are:

1. Integration of forest and range management is built into the structure of the DGF at all levels.
2. There is clear recognition in the policies and legislation that forest conservation will not be accomplished without taking care of the basic livelihood needs of the forest dependent people. Meeting the fodder needs of livestock has thus become a priority interest for the Forest Department.
3. Integrated area development approach has been widely accepted and regional programmes like ODESYANO have clearly demonstrated how forestry, pasture development, watershed management, agriculture etc. can be weaved into a compact framework fully understanding the inherent linkages.
4. Tunisia has pioneered participatory approaches and facilitated by well-established institutional mechanisms supported by non-governmental organizations.

5. The shift in the approach of donors towards integrated resource management and people's involvement has provided a strong base to strengthen collaboration/integration between different departments. Such support has been particularly valuable in the initial periods of transition.

The way forward

To improve forest and rangelands, it is necessary to accomplish some actions whose main ones are:

- Attend 10 % of forest covertures by augmentation of private reforestation and private investment in forest sector
- Creation of special fund for the forest and range development
- Development of ecological tourism in natural parks and reintroduction of endangered animals
- Valuation of forest products and services.
- Undertake regular national forest and range inventory
- Enhance private sector involvement in forest and range sector by promoting private investment, the creation of forest and range GDA group of agricultural development
- Revision of the composition and the function of local range council

To develop forest and rangeland there is two kinds of measures, immediate and long term measures.

Immediate measures

- Need of urgent intervention with local and national security services to defend forest and rangeland against all types of vandalism, land clearing and aggression. These infractions were increased after the revolution in 2011.
- Recruitment of technicians on the local level
- Financing the rehabilitation of centres, parks and infrastructures undamaged after revolution
- Protection of fauna against non-organized hunting
- Encouragement of the participatory approach for forest management
- Encouraging the involvement of feminine gender in forestry work
- Conduct awareness campaigns and information for the benefit of users
- Encouraging the creation of NGO's, a better organization of local actors

Long term measures

- Property of rangeland remains the biggest problem for its good management. It urges to reform and regularize the situation of forest and rangeland.
- Reorganization of DGF at the central and regional levels improving its administrative and finance facilitation.
- Reorganization of range sector on the central, regional and local levels and identify one responsible of rangeland
- Reinforce REF and enlarge its activities to range sector
- 30 % of finance of forest and range exploitation will be done by small private enterprise
- Reinforce technical staff of forest and range institutions
- Need of a better forest and range formation (quality and quantity)
- Create specialized research institute of range studies
- Reduce the surface guarded by forest rangers from 1000ha to 500 ha
- Regulate the administrative situation of forest and range workers
- Increasing use of forests by urban and suburban citizens in search of nature
- Progressive urban pressure
- Meet public expectations while ensuring the sustainability and identity of urban and suburban forest habitats
- Rehabilitate and expand urban and suburban forests particularly on land outside the forest domain of the State
- Save these unique forests of any mutation or oversupply that could affect their functions and balances their natural landscapes
- Educate the public, future generations and local stakeholders in forest conservation and peri-urban

Summary and conclusions

The forest goods and services in Tunisia cover the wood and non-wood products, wood fires, forage, recreational activities, protection of watersheds, conservation of biodiversity, hunting products etc. Beneficiaries are primarily the state that owns public lands. Local population, Tunisian society and the international community have the right to use. Agro forestry is one way of meeting local needs for fuel, food and other forest and rangeland services and goods.

The settlement of inhabitants has significantly limited nomadic pastoralism. In the absence of career planning, this has resulted in an imbalance between regions in terms of grazing, which resulted in a depletion of the steppes and a decline in profitability.

A large part of the rural inhabitants depends on forest and rangeland as a source of fuel. They also obtain wild foods and medicinal and aromatic plants and these resources are essential for people's wellbeing.

This analysis helps to understand the conflicts and complementarities that may occur between users of goods and services to develop better coordination and governance between stakeholders for improved sustainability. To meet these challenges, some considerations for a sustainable strategy for the sector could be executed.

- Elaborate regional plan of development of forest resources including researches, training, information and forestry and range extension
- Regenerate deforested lands as a result of population pressure by introducing suitable tree species.
- Involve local people who are beneficiary of forest products in the monitoring and develop activities of products transformation or tourism to increase their income;
- Recognize the ecological and environmental function of forests and promote a proactive policy of protection, rehabilitation and extension of Tunisian forests;

At level of development directions, objectives and priorities should be defined on the basis of various analyzes that will guide the entire planning process. Target setting should take into account the specific priorities of Tunisian forest policy. Therefore, it is necessary to have a prioritization of objectives according to the specific conditions of the forest and range to develop this by:

- Selecting and prioritizing various roles in the forest and range area to be developed,
- Dealing these roles with different economic and social actors involved in development
- Setting a final goal which is not limited to a stack of special interests, but represents a compromise and justifies the development plan and conditions.

The valuation of goods and services is necessary to orient forest and range management and justify its finance.

Moreover, maintaining a balance between grazing areas remains an important issue, although it does not arise as acutely. Therefore the current management of ranges should be

improved to reach more rational management. So, efforts are needed for range management and development of their resources. It is also important to adopt a method of periodic grazing in plots limited, so as to control the load exerted by animal on rangeland and preserve resources.

REFERENCES

- Abate, A.L.** 2006. Livestock production challenges in the rangeland ecosystem of Southern Sudan, In. Proc. *Workshop on Environmental Management Plan for Post-conflict Sudan*, Juba.
- Nair, C.T.S & Abdel Nour, H.** 2011. Public sector forestry institutions in the Near East. FAO, Cairo. (Also available at <http://www.fao.org/docrep/015/i12558e/i12558e00.pdf>).
- Abolhassani, L.** 2011, *Rangeland management in Iran, a socio-economic analysis and case study of Semnan rangelands*, The University of Freiburg, Freiburg. (PhD Thesis)
- Anon.** 1999. Agriculture in the Sudan (Arabic). Ministry of Agriculture & Forests. Sudan Currency Printing Company. Khartoum.
- Arab Organization for Agricultural Development (AOAD).** 1998. Study on Suitable Modern Technologies for Forest Wealth Development, Khartoum.
- Anon.** 2011. Sudan land use - Summary. The Library of Congress Country Studies; CIA World Factbook. (Also available at http://www.photius.com/countries/sudan/economy/sudaneconomy_land_use.html_ 13 May 2011.summary) .
- Badi, K.H; A. El Houri Ahmed & A.M.S. Bayoumi.** 1989. The Forests of the Sudan. Forests National Corporation. Khartoum.
- Badripour H.** 2006. Country Pasture, Forage Resource Profiles, Islamic Republic of Iran, FAO, also available at <http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Iran/Iran.htm>.
- Badripour, H., Eskandari, N., and Rezaei, S. A.** 2006. Rangelands of Iran, an Overview. Ministry of Jihad-e-Agriculture, Forest Range and Watershed Management Organization, Technical Office of Rangeland, Tehran, Iran, Pooneh.
- Bedrani A.,** 1993. L'intervention de l'Etat dans l'agriculture en Algérie : constat et propositions pour un débat. In : Allaya M, ed. *Les agricultures maghrébines à l'aube de l'an 2000*, pp 83-99. Montpellier, CIHEAM, 1995. (Also available at <http://om.ciheam.org/om/pdf/b14/CI960044.pdf>).
- Daly H., Croitoru L., Tounsi, K., Aloui A. & Jebari S.** 2012. *Evaluation économique des biens et services des forêts tunisiennes*. Rapport FAO. (Also available at <http://www.fao.org/forestry/37727-0ac5f97c6680a6a313c77675966ee816b.pdf>).
- DGF.** 2012. *Secteur des forêts et des Parcs, situations actuelles et défis*. Tunis.

EL Fahem E. 2012 : Les parcours naturels en Tunisie. Rapport INAT. Tunis.

Elsiddig, E.A. and Abdelgadir, A. Y. 1997. Carbon fluxes in relation to land use changes and forestry. In. Proc. *Training workshop on CO₂ inventory in Sudan*. Higher Council for Environment and Natural Resources, Khartoum.

Elsiddig, El Nour A., Abdalla G. M. and Talaat D. A.M. 2007. Sudan Forestry Sector Review. Forests National Corporation and National Forest Programme Facility. (Available at <http://www.fao.org/forestry/14184-0f7db07a76b05f7f6fcd714d97c3a7b7.pdf>).

Emad K Al Karableih, 2010. Effects of socio-economic factors on rangeland institutional options on the semi-arid regions in Jordan, *Journal of Agricultural Sciences*, Vol 6 No 3, pp 387-410

FAO. 2010. *Forests and range: adapting to global changes for sustainable development, amendment of name and mandate of the Near East Forestry Commission to the Near East Forestry and Range Commission*. Cairo. FO:NEFC/2010/4.1. (Available at <http://www.fao.org/docrep/meeting/024/Mc933e.pdf>).

FAO. 2010. *Global Forest Resources Assessment 2010 – main report*. FAO Forestry Paper No. 163. Rome. (Also available at www.fao.org/docrep/013/i1757e/i1757e00.htm).

FAO. 2010. *Global Forest Resources Assessment 2010 - Country Report, Sudan*. FAO Forestry Paper No. 163. Rome (Also available at www.fao.org/docrep/013/i1757e/i1757e00.htm).

FAO. 2011. *The State of World's Forests 2011*, Rome (available at <http://www.fao.org/docrep/013/i2000e/i2000e00.htm>).

FAO. 2012. Forest Products, 2006-2010. FAO Forestry Series No. 45/ FAO Statistics Series, No. 201. Rome .

FNC. 2011. Forest plantations/woodlots in the eastern and north-eastern African countries of Kenya, Tanzania, Uganda, Burundi, Rwanda, Ethiopia and Sudan. The African Forest Forum, Sudan Report. Khartoum.

Gari, L. 2006. A history of the “Hima” conservation system, *Environment History*, Vol 12 (2) pp 213-38.

Ghafari, T. 1991. Economical Importance of Rangeland in Iran - part 1. A Quarterly Journal of Pastoral Nomads of Iran *Zakhayer-E Enghelab* 14: 51-78.

HCP, Morocco . 2004 *Households consumption and expenditure surveys from 1985 to 2001, and standard of living from 1991 to 2007.*

Hedjazi, Y. 2007. Balancing Livestock with Grazing Capacity: New Approaches in Sustainable Managements of Rangelands in Iran. *Journal of Sustainable Agriculture* 31(1): 61-37. Also available at <http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPC/doc/Counprof/Iran/Iran.htm>.

Institut National de la Statistique, Tunisia. 2012. *Bulletin mensuel de la statistique.* Tunis, Tunisia. (Available at <http://www.ins.nat.tn/indexfr.php>).

Gilles, J.L. 1993. New directions for African range management: observations and reflections from past experience. In. *Proc. New directions in African Range Management and Policy.* UK, IIED, ODI, London.

Jafari, M. 2012. *Promoting collaboration and coordination on forest and range sectors in the Islamic Republic of Iran - Country case study,* FAO Cairo.

Jafari, M. & Hossinzadeh, A. 1997. *Present status of afforestation in I.R. of Iran.* Cited from four articles on forests. Technical Publication No. 176. Research Institute of Forests and Rangeland, Iran.

Jalali, M. and Karami, E. 2005. Determining of Effective Factors on Beneficiaries Participation in Rangeland Cooperatives in Kordestan Province. *J. Pajouhesh and Sazandegi*, 70: 35-36.

Larbi, C.M. 1999. Moving towards integrated management of forests in Tunisia, **Unasylva** 197 (50): 16-20. (Also available at <http://www.fao.org/docrep/x1880e/x1880e00.htm>).

Lashgarara, F. & Goudarzi, N. 2011. Role of Natural Resources Extension in Maintaining and Reinstating of Rangeland (Case Study of Zarandiyeh, Iran), *American-Eurasian J. Agric. & Environ. Sci.*, 11 (5): 758-762, 2011, IDOSI Publications.

McAdams, R. H. & Rasmusen, E.B. 2007. *Norms in Law and Economics*, Elsevier.

Molaei, R. 2002. Evaluation of Extension Effectiveness in Maintaining and Reinstating the Rangeland of Zanjan Province. Islamic Azad University, Tehran. (MSc Thesis)

Ngaido, T. & McCarthy, N. 2004. Collective action and property rights: institutional options for managing rangelands, *Vision 2020 for Food, Agriculture, and Environment.* Focus 11, Brief 9 of 16, Washington DC, International Food Policy Research Institute. (Available at (<http://ageconsearch.umn.edu/bitstream/16575/1/fo041109.pdf>)).

OTEDD. 2009: Rapport de l'Observatoire Tunisien de l'Environnement et du Développement Durable, Indicateur des forêts durables Tunis.

Qarro M. 2005. Approche pour l'aménagement des ressources pastorales. Programme « appui à la pauvreté, la désertification et les effets de la sécheresse ». Rabat. Pp : 66.

Rae, J., Arab, G., Nordblom, J., Jaini, K. & Gintzberger G. 2001. *Tribes, state and technology adoption in arid land management, Syria*, CAPRI Working Paper No 15, International Food Policy Research Institute, Washington DC. (Available at <http://www.ifpri.org/sites/default/files/publications/capriwp15.pdf>).

Sabir M., Qarro, M., Berkat, O, & Merzouk, A. 1992. Effets de la charge animale sur le développement de la végétation dans un milieu steppique aride : Aarid, Haute Moulouya. *Ann. Rech. For. Maroc.* 26 :59-67.

Seif Eldin, A.G. 1986. Integrated Land Use in Forest Reserves in Eastern Region. Global diagnosis and involvement of people. FAO, GCP/SUD/033/NET. Khartoum.

Sheidaei, G. & Nemati N. 1978. New Rangeland Management and Fodder Production in Iran. Forest and Range Organization. Tehran.

Telahique, T. & Abdouli A. 2001. Strategies for institutional options for rangeland management in the NENA Region, In. Proc. *International Conference as Policy and Institutional Options for Management of Rangelands in Dry Areas*, Hammamet, Tunisia.

World Bank. 2012. *World Development Indicators*, The World Bank, Washington DC. (Available at <http://data.worldbank.org/news/world-development-indicators-2012-now-available>).

Mohamed, Y. A. 2007. Sudan National Environment Action Plan. Report for Ministry of Environment and Physical Planning. HCENR in Collaboration with European Commission, Nile TEAP and UNEP. Khartoum.

Annexes

Annex 1

TABLE 1 Extent of forests, other wooded land and pasture land in the Near East Region

Country	Land area (000 ha)	Forest area (000 ha) ¹	Other wooded land (000 ha)	Pasture land (000 ha)	Forests, other wooded land and pasture land as percentage of total land area
Algeria	238,174	1,492	2,685	32,885	15.5
Egypt	99,545	70	20	-	
Libya	175,954	217	330	13,500	8.0
Mauritania	103,070	242	3,060	39,250	41.3
Morocco	44,655	5,131	631	21,000	59.9
Sudan	250,581	69,949	50,224	117,180	94.7
Tunisia	16,361	1,006	300	4,840	37.5
Bahrain	71	1	NS	4	7.0
Iran	174,515	11,075	5,340	29,524	26.3
Iraq	43,832	825	259	4,000	11.6
Jordan	8,878	98	51	743	10.0
Kuwait	1,782	6	0	136	8.0
Lebanon	1,040	13	106	400	49.9
Oman	30,950	2	1,303	1,700	9.7
Qatar	1,100	0	1	50	4.6
Saudi Arabia	200,000	977	1,117	170,000	86.0
Syria	18,518	491	35	3,856	23.7
UAE	8,360	317	4	305	7.4
Yemen	52,797	549	1,406	22,000	45.4
TOTAL	1,470,783	92,461	66872	461,373	42.2

Source: Extent of forests and other wooded lands based on FAO Global Forest Resource Assessment 2010. Area of pasture land based on FAO Land Use Statistics.

Annex 2: INTEGRATED PROJECTS IMPLEMENTED/ UNDER IMPLEMENTATION

Carbon Sequestration in Desertified Rangelands of Hossein Abad Project”

This project is under the Energy and Environment mandate of the UNDP but it also has a large element of poverty alleviation, capacity development and gender empowerment. As such it is also in line with Millennium Development Goal (MDG) 1, MDG3, MDG7 and MDG8.

Project Area: The area under Phase One encompassed 30 villages and with the implementation of Phase Two, an additional 15 villages have been added to the Project. Many of the households who inhabit this area were once nomadic herders. Although they have now settled in villages, herding sheep and goat continues to form a large part of local income. In addition to this, many women and some men in the area are also engaged in carpet weaving.

The rangelands of the area are heavily degraded mainly due to over-gazing and unsustainable land-use practices. The area also experiences what is known as “the 120 day winds”, a period of seasonal winds that last from approximately April until July. These winds can reach up to 120 km/h and cause considerable erosion and vegetation damage. In the years prior to the commencement of the Project, with the degradation of the minor shrubs in the area, the rate of this erosion has increased. The area has also suffered from recurring droughts since 1997. This increased scarcity of water has meant that large scale agricultural production has become difficult and in some cases unsustainable.

Project components: **Rangeland Rehabilitation:** Actual rehabilitation of the degraded rangelands started in 2005 along with the establishment of the Village Development Groups. Through the full participation of the local communities, these groups helped in maintaining plant nurseries, selecting and replanting patches of land and finally protecting the replanted areas.

Mobilization of Local Communities: The project mobilises local communities by helping them to organise themselves in Village Development Groups (VDGs). These VDGs were specially formed to empower not only the communities in general, but also women in particular. By appointing a president and a secretary for each VDG, the local communities were able to fully participate and monitor the activities of the VDGs. The decision making process of each VGD has been based on regular participation of its members. In addition a forum of presidents and secretaries representing all VGDs were established to undertake higher level decisions that were to affect the entire area. In order to give these organisations the necessary legal coverage and identity an umbrella cooperative was also established with the assistance of the project.

Development of Micro-Credit Funds: There is a direct link between poverty and desertification, thus combating desertification should help in working against poverty. One strategy applied by the project is the establishment of a microcredit mechanism for VDG members. The Micro-credit Fund has been financed both by the project and by the small

savings made from VDG members. Every fortnight during the VDG meetings, the villagers offer their own savings into the Micro-credit Fund, which is money that will at a later point in time be re-loaned to them. By selecting a Board of Directors representing the local communities, the targeted area has full ownership over the Micro Credit Fund. The participatory approach of the project allowed for a sound collaboration among a host of international, national and local partners. The steering committee of the project therefore includes representatives from various ministries representing various sectors of the Ministry of Agriculture, the Department of Environment, the Budget and Planning Authorities in the country as well as the national GEF focal point.

Results: Dryland Rehabilitation – In order to rehabilitate the local dryland, while also working to engage the local community, the project contracted with local VDGs to have seedlings grown and planted in the area. This work was done as part of the microfinance funds given to the VDGs, which then used the loans to grow and sell the seedlings. They were then contracted to plant the seedlings in agreed areas. In this way, both the villages and the environment benefitted from the projects activities. This also had an added benefit of a reduced cost for the project would have had if third parties been contracted to conduct this work. Approximately 180 hectares of land located around three agricultural wells have now been planted with shrubs with the assistance of the project, Ministry of Jihad Agriculture, and people from the villages.

Gender Empowerment: During the second phase of the project new villages were added to the project area. Accordingly new VDGs were set up and training activities needed to be conducted. In order to help consolidate the knowledge and experience gained during Phase 1, the project asked the women already trained in the project to train the new project beneficiaries. This allowed for a closer relationship between project members. Further, as the existing members were aware of the likely problems the new members would face, training was made more efficient and effective.

Microfinance Model in Hossein-Abad - By the end of 2010, a total number of 54 VDGs have been formed including nine female VDGs, 17 male VDGs and 28 mixed gender VDGs. There is a total of 1694 members comprised of 679 women (41%) and 1015 men (59%), covering 35 villages.

Key Elements of Success: Excellent and constructive cooperation with the national team led by the Forests, Rangelands and Watershed Management Organization (FRWMO) under the Ministry of Agriculture Jihad Ensuring the active participation of the local community to create a sense of ownership in the project and collective spirit. Gaining the trust and confidence of the local community, Encouraging women to be engaged in the project activities and working to empower them and increase their self-confidence, and Awareness raising and engagement of local offices of other government agencies and institutions

Lessons Learned: During the first phase of the project, the micro-credit fund established a mechanism to provide loans to the people and enable them to start a business in the respective villages. However, by expanding the loans and repayments, the existing mechanism could not respond properly. Therefore, during the second phase, the micro-credit fund mechanism was revised by a national consultant and the procedures were redefined. The main objective

of this was to ensure that the lending and repayment mechanisms were easier and maintain the motivation of borrowers.

For higher impact the results and achievement of the project need to be propagated across the country through the national decision making forums. By replicating the project experiences in areas with similar situations, the outcome could affect the country's ability to counter the global climate change, while simultaneously improving the livelihoods of the rural and marginalised communities as well as halting desertification.

OTHER NEW, ONGOING AND COMPLETED PROJECTS

NEW PROJECTS

Rehabilitation and Expansion and Sustainable Management of Arid and Semi- Arid Forests in Ilam Province-GEF/UNDP

Building a Multiple- Use Forest Management Framework to Conserve Biodiversity in the Caspian Forest Landscape in Mazandaran Province-GEF/UNDP

The Participatory Forest and Rangeland Management Project in Chaharmahal-va-Bakhtiari Province-JICA

ONGOING PROJECTS

Rehabilitation of Forest Landscapes and Degraded Land with Particular Attention to Saline Soils and Areas Prone to Wind Erosion (RFLDL)

General Project Information:

Project Title: Rehabilitation of Forest Landscapes and Degraded Land with Particular Attention to Saline Soils and Areas Prone to Wind Erosion (SFLM)

Project Site: Bam – Kerman province & Sarayan- South Khorasan province

Project Components and Outputs:

- * Best practices in SLFM implemented in the province and long-term capacity development to implement SLFM elsewhere;
- * Land and forest degradation reduced or reversed in the province;
- * Best practices disseminated across all of Iran to allow up-scaling of SLFM techniques in other location;
- * Desertification in the province is reduced through control of wind erosion and sand dune stabilization;
- * Local capacity to implement future desertification control programs is crested;
- * Soil fertility improved on at least 50,000 ha of saline soils in the province;
- * Local capacity is crested to implement future programs to restore soil fertility in saline areas;

Institutional Strengthening and Coherence for Integrated Natural Resources Management (MENARID)

General Project Information:

Project Title: Institutional Strengthening and Coherence for Integrated Natural Resources Management (MENARID)

Project Site: Semnan, Kermanshah, Sistan & Balouchestan provinces

Counterpart Agency: GEF/ UNDP

Total Budget: 4,400,000 USD

Start Date: 2010

Project Components and Outputs:

- * Appropriate high level inter-agency institutions/ mechanism at national and provincial levels;
- * A land- use change and drought early warning system (EWS), to include coverage at the community level;
- * A multi- institutional national agreed strategy for managing and reducing the negative effects of land-use change and drought on ecosystem services;
- * A consolidated law on sustainable management of land, ecosystems and water resources;
- * Promotion of alternative livelihoods to reduce dependency of local communities on natural resources. PES mechanisms piloted in four watersheds in arid and semi- arid lands;
- * Vulnerability reduction of local communities to drought by conservation of natural ecosystem;

Sustainable Management of Land & Water Recourses (SMLWR-Phase 2)

General Project Information:

Project No: 00041368

Project Title: Sustainable Management of Land & Water Recourses (SMLWR) (Phase 2)

Project Status: Ongoing

Project Site: Firouzkouh- Garmsar & Tehran

Counterpart Agency: UNDP

Total Budget: 8,200,000 USD

Start Date: July 2005

End Date: July 2010

Project Components and Outputs:

- * Documentation of Successes gained and Lesson learned in Phase 1;
- * Macro –level strategic planning for the sustainable management of land and water resources in the Hable- Rud basin;
- * Establishment of a comprehensive monitoring and evaluation system;
- * Micro- level community-based planning and capacity building for diversified and sustainable livelihoods;
- * Advisory support service provident capacity building;
 - * Inter-agency and multi-sector co-ordination for river basin management;

- * Development of a suitable model of the community-based approach to sustainable management of land and water resources;
- * Advocacy and awareness raising for local community leader, government officials, decision-makers and stakeholders on participatory approach to SMLWR

Carbon Sequestration in the Desertified Rangelands of Hossein Abad (Phase 2)

General Project Information:

Project No: IRA/01/G35

Project Title: Carbon Sequestration in the Desertified Rangelands of Hossein Abad

Project Status: Ongoing

Project Site: Hossein Abad-South Khorasan province

Counterpart Agency: UNDP/GEF

Total Budget: 1,000,000 USD

Start Date: April 2009

End Date: April 2012

Project Components and Outputs:

- * Community-based management arrangements;
- * Establishment of Co-management plans;
- * Implementation of Co-management plans/agreements;
- * Social communication initiatives;
- * Performance monitoring and assessment of rehabilitation

IMPLEMENTED PROJECTS

Flood and Debris Flow in the Caspian Coastal Area

General Project Information:

Project Title: The Study on Flood and Debris Flow in the Caspian Coastal Area focusing on the Flood-hit Region in Golestan province

Project Status: Completed

Project Site: Golestan province

Counterpart Agency: JICA

Total Budget: government input 500 million Rials

Start Date: 2005

End Date: 2006

Carbon Sequestration in the Desertified Rangelands of Hossein Abad (Phases 1)

General Project Information:

Project No: IRA/01/G35

Project Title: Carbon Sequestration in the Desertified Rangelands of Hossein Abad

Project Status: Ongoing

Project Site: Hossein Abad-South Khorasan province

Counterpart Agency: UNDP/GEF

Total Budget: 1,709,939 USD

Start Date: April 2003

End Date: April 2009

Ecosystem Conservation of the Anzali Wetland

General Project Information:

Project Title: Integrated Management for Ecosystem Conservation of the Anzali Wetland
Project Status: Completed

Project Site: Gilan Province (Anzali wetland)

Counterpart Agency: Department of Environment and JICA

Total Budget: government input 500 million Rials

Start Date: May 2003

End Date: May 2005

Watershed Management in Karoun Watershed

General Project Information:

Project Title: Watershed Management in Karoun Watershed

Project Status: Completed

Project Site: Khuzestan, Esfahan, Chaharmahal & Bakhtiari and Kohkilouyeh & Boyerahmad Provinces

Counterpart Agency: JICA

Total Budget: government input 500 million Rials

Start Date: 1999

End Date: 2000

Sustainable Management of Land & Water Resources (SMLWR)

General Project Information:

Project No: IRA/97/004/A/01/99

Project Title: Sustainable Management of Land & Water Resources (SMLWR)

Project Status: Completed

Project Site: Hableh- Rud – Tehran and Semnan Provinces

Counterpart Agency: FAO

Total Budget: 377500 USD plus Rls. 7,646,500.000 government input

Start Date: November 1997

End Date: November 2000

Caspian Tree Seed Production and Improvement Center

General Project Information:

Project No: IR/89/015/13/01/12

Project Title: Caspian Tree Seed Production and Improvement Centre

Project Status: Completed

Project Site: Mahmoudabad - Mazandaran province

Counterpart Agency: FAO

Total Budget: 436310 USD

Start Date: September 1991

End Date: September 1993

Caspian Model Forest Management Plan

General Project Information:

Project No: IRA/89/014/B/01/12

Project Title: Caspian Model Forest Management Plan

Project Status: Completed

Project Site: Lirehsar, Tonekabon,- Mazandaran province

Counterpart Agency: FAO

Total Budget: 1,380,000 USD

Start Date: January 1991

End Date: January 1996

Integrated Range Improvement Program

General Project Information:

Project No: IRA/89/016/A

Project Title: Implementation of an Integrated Range Improvement Program

Project Status: Completed

Project Site: Zarand –Saveh, Markazi provinces

Counterpart Agency: FAO

Total Budget: 510,880 USD

Start Date: March 1990

End Date: March 1995

In-service Training in Watershed Management

General Project Information:

Project No: IRA/86/004

Project Title: In-service Training in Watershed Management

Project Status: Completed

Project Site: Tehran & Zanjan provinces

Counterpart Agency: UNDP

Total Budget: 1,450,000 USD plus 200 million Rials (approximately)

Start Date: 1989

End Date: 1992

South Khorasan Rangeland Rehabilitation

General Project Information:

Project Title: South Khorasan Rangeland Rehabilitation and Refugee Income Generation Project

Project Status: Completed

Project Site: Qaen – South Khorasan province

Counterpart Agency: IFAD/UNHCR

Total Budget: 22,000,000 USD

Start Date: June 1989

End Date: June 1996

Annex 3: FRWO Training Centers in Iran

Approximately 136 million hectares from 164 million hectares of total area of I.R of Iran falls under renewable natural sources. This is equal to 83% of total land area of Iran which include forests, other wooded lands, rangelands and deserts. The responsibilities of reclamation, development, conservation and sustainable use of these resources rests with Forests, Range and Watershed Management Organization (FRWO) that is responsible for the supply of forest and range products aiming to guarantee the sustainable development of the resources. Therefore, FRWO, on the top of its duties, has the responsibility of training staff and field experts for the management of natural resources and based on that has established two specialized training centers to address the growing needs of the sector as follows:

- 1. Javanshir Natural Resources Training Center**
- 2. Kellarabad Natural Resources Training Center**

1.Javanshir Natural Resources TrainingCenter

Javanshir Natural Resources Training Center was established in 1985 to provide FRWO staff with trainings and the latest scientific findings in the field of natural resources in the form of in-service and vocational trainings. The Center was named after Dr. Karim Javanshir in March 1999, honoring his great contribution to natural resources.

The center, with an area of 11 hectares, is located in Karaj near Tehran in close vicinity of the greatest and oldest university in Iran “The Faculty of Natural Resources of Tehran University” and is specialized in the field of water and soil sciences. The center is equipped with educational and recreational facilities including library, audio-video section, amphitheater, computer room, experimental farms, dormitory, restaurant and gymnasium.

Training Courses

The Center has organized many different courses on Natural Resources Management and offers courses on water and soil sciences, forestry, rangeland and watershed management etc with the permission of Ministry of Culture and Higher Education at Associate of Arts and Bachelor levels.

Joint Overseas Courses

The Center has so far organized many overseas courses with I.T.C of Netherlands, JICA of Japan and UNESCO in different course of studies at Master of Sciences level, based on bilateral agreements.

Vocational Trainings

The Center has organized a wide range of short- term vocational courses on natural resources management for FRWO’s staff and land users in order to update them with the latest advances and scientific achievements.

In-Service Programs

Taking into consideration the training needs of FRWO's staff, The Center also organizes a good number of workshops, meetings and seminars on natural resources management.

2. Kellarabad Natural Resources Training Center

Kellarabad Natural Resources Training Center was established in 1991 with an area of 57 hectares in Tonekabon – Mazandaran province in close vicinity of Hyrcanian Forests which gives it a special status for studying forest sciences. The Center provides FRWO's staff with trainings and the latest findings in the field of natural resources in the form of in-service and vocational trainings.

Training Courses

The Center has organized many different courses and offers courses on forest and forestry such as community forestry, forest health, forest conservation as well as rangeland and watershed management with the permission of Ministry of Culture and Higher Education at Associate of Arts and Bachelor levels.

The Center also offers a wide range of short- term vocational courses on natural resources management for FRWO's staff and land users in order to update them with the latest advances and scientific achievements.

In-Service Programs

Taking into consideration the training needs of FRWO's staff, The Center also organizes a good number of workshops, meetings and seminars on natural resources management.

Annex 4: ANALYSIS OF MANAGEMENT AND OUTCOME OF SOME FORESTRY AND PASTURE PROJECTS IN MOROCCO.

Range management projects within forests

1. Bouhsoussen project:

The Project Bouhsoussen is taken as an example of proposed forest range management in Morocco. It resulted in a set of integrated actions between 1983 and 1987, aiming to preserve evergreen oak forest (over 20 000 ha) and its rational use by livestock, particularly through the creation of user groups. The activity of these user groups remained modest in view of the omnipresent Forestry Administration and the weak efforts to promote the participation of the population. Diet and health status of herds have improved. A protocol for monitoring and evaluation is proposed to measure the effects of project on the components: forest, livestock and user groupings.

The bodies involved in the preparation, execution and monitoring - evaluation of the project are:

- National public organisms that are:
 - ✓ Ministry of Interior,
 - ✓ Ministry of Finance,
 - ✓ Ministry of Agriculture and Agricultural Development (MAMVA) / (Directorate of Water, Forests and Soil Conservation (AEFCS).
- Representatives of civil society (cooperatives, professional associations, NGOs);
- Local Collectivities;
- External partners: World Bank.

The weak participation has led, to a reluctance of the population towards the project actions (with the exception of thinning out and implementation of water points that do not pose particular problems), a non-membership to pastoral disciplines required by the administration (non-respect of fenced land and their encroachment are permanent as soon as they approach the living space of the breeder, because he fears the reduction in the area usually used and surrounding the dwelling place). The management system has provided neither the compensation nor the preventive actions for this type of repetitive situations.

Based on this observation, the project enters, since 1990, in a new phase funded by the IBRD (International Bank for Reconstruction and Development). With respect to the significance of investments to be made, the forestry administration has set, as a goal, an effective involvement of herders in the management of pastoral resources offered by the forest.

Thus, and since 1994, it was agreed, by common consent, to set up seven existing pastoral groupings in pastoral cooperatives that constitute consultative bodies and act as interface with herders.

2. Oued Srou project (OSP):

Oued Srou project (OSP) is the result of the cooperation between the Kingdom of Morocco and the Republic of Germany, represented by the *Gesellschaft für Technische Zusammenarbeit* (GIZ). The project was led by the Department of Water Affairs and Forestry - Provincial service of Khenifra, supported by a multidisciplinary technical team attached to the service. OSP aims the watershed management of Srou river on the basis of local participative development (douar) balancing the production (agricultural) and land conservation (erosion control).

The project developed a methodology based on the village land management and integrated and participatory popularization. The main difficulty of OSP is that, it was unable to integrate the management of estate forest at the beginning. The main handicap was the lack of mutual trust between user populations and the forestry staff. The OSP has focused on organizing and training the population to meet the needs of local sustainable development (douar). Arboriculture (olive tree), agroforestry (alley cropping) and in sheds livestock were well developed. Management of forest areas (pasture, firewood, etc.) has lagged far behind and took advantage of the growing confidence, among the state agents (foresters) and the population, acquired through OSP actions in agriculture.

3. Project of Protection and Participatory Management of Forest Ecosystems of the Rif in Chefchaouen (GEF FIR):

The GEF RIF project aims the simultaneous resolution of technical, institutional, legal and participatory problems that constitute, at present, barriers to implementation of reasonable and collaborative management of Rif forest areas. As such, it was considered a pilot project and serves as a platform for extrapolating the results to two other projects funded by the European Union (EU), under the MEDA Program (AEFCS, 2001).

Project management was provided by a “unit of project management” financially autonomous, who head of the unit is under the direction of the officer and the forestry directorate plays the role of supervisor and approve expenditure.

Project Partners:

- Ministries:
 - ✓ The Ministry of Agriculture, Rural Development and Forestry,
 - ✓ The Ministry of Land Management, Urban Planning, Housing and Environment,
 - ✓ The Ministry of Interior,
 - ✓ Ministry of Energy and Mines
 - ✓ Ministry of Finance and Foreign Investments,
- Development Agency of the Northern Provinces,
- Some national and international NGOs:
 - ✓ The Association of Talassemtane for Environment and Development (EDTA);
 - ✓ The Association of the National Union of Moroccan Women, the Bab Taza antenna;

- ✓ The Association of Young Property developer of the province of Chefchaouen.
- Delegation of the European Commission in Morocco kingdom.

Taking into account the specific aspect of Rif area and particularly the intense clearing of the estate forest, considered as a land reserve for the cultivation of cannabis, the intervention issues aiming the preservation of the ecosystem can only be controlled by the participatory approach. Despite the difficulties at the beginning, the GEF-RIF project was able to establish a climate of trust through dialogue with users and actions on the ground.

This project has facilitated the setting up of partnership of institutions that promoted the implementation of several projects of socio-economic development having a direct impact on improving living conditions and public awareness to the preservation of natural resources.

4. Participatory Rural Development Project in the Central Middle Atlas “Khenifra Project”:

The Khenifra project, said Project Participatory rural development in the Central Middle Atlas of Khenifra province, is part of the implementation of the National Forest Plan and also in the MEDA II program of cooperation between the European Community and the Kingdom of Morocco.

The project, whose main contractor is the Ministry delegate of Water and Forests, is organized as a Project Management Unit (PMU) that supports the Chief of Provincial Service of Water and Forests of Khenifra (SPEF) in its tasks of management and coordination. The PMU, reinforced locally by international and national technical assistance, is composed of a multidisciplinary team. It is supported on the field by three Operational Planning Units of (OPU).

The project is managed nationally by a national monitoring committee (NMC), and provincially by a Steering Technical Committee (STC). For the execution of development plans, the project established agreements with local bodies of the Ministry of Agriculture (Provincial Department of Agriculture / Work Centers) and all other relevant partners.

The project MEDA – KHENIFRA, from the start, has been engaged in a participatory and partnership process and on the farmers’ organization. Interventions at local level (the social aspects being involved) required caution and slowness in the implementation of actions. Thus, the MEDA II (2000-2006) “Participatory Rural Development in the Middle Atlas” allowed to twelve “douars” (rural villages) to join their efforts to both, improve the living conditions and implement management of natural resources. This involvement has seen the starting of new governance through village committees or associations of management and development of land territory (AGAT). The AGAT are the preferred partner in this process for the preparation of Concerted Development plans of Forests. Conflicts of interest with rural communities have emerged: some forest resources being donated to associations and not for the benefit of local communities.

This last point marks the constraint of ownership of the process by local authorities that have often been reluctant to implement the activities. Moreover, even if partnership agreements

were signed between the commune, the project and the local population, procedures cause delays that lead to gradual demobilization of the population.

5. Project of development and protection of forest in the province of Ifrane:

The project of participatory development of forest in Ifrane province is part of the forestry strategy and the national forest program. The Office for Water and Forests and the Fight against Desertification is the working master of the project; project management is delegated to the Regional Directorate of Forestry in Meknes. To strengthen planning and national and regional coordination, management of activities is provided by a National Committee of Guidance, Programming and Monitoring and a Provincial Committee of Coordination and Monitoring, chaired by the Governor of Ifrane Province.

The overall project goal is “the management and exploitation of forests in the province in a rational and sustainable manner, with consultation and to the advantage of the collectivity and users, while preserving the environment and biodiversity”.

To ensure the functions of management of the project, a strengthening of the Provincial Service of Water and Forestry has been committed: a cell, initially consisted of six executive managers with two coming from the Provincial Directorate of Agriculture and four from Forestry department, is in charge of programming, coordination, organization and management, monitoring and project supervision. This cell has, from the start, the advantage of a punctual technical assistance.

Project Partners:

- National public organisms;
 - ✓ The Ministry of Agriculture and Maritime Fishing,
 - ✓ The Ministry of the Interior;
 - ✓ The Ministry of Finance and Foreign Investments;
 - ✓ The Ministry of Land Management, Urban Planning, Housing and Environment;
 - ✓ The Provincial Directorate of Agriculture (PDA) of Ifrane;
- The local collectivities;
- The user population and local associations;
- The foreign Partners especially the Europeans: The French Development Agency (AFD) and the French Fund for Global Environment (FFGE).

In general, the project was able to make innovations in the forestry sector. In accordance with the National Forest strategy, innovative achievements have been obtained in terms of collaborative forest management. These achievements are concerned, especially, with the validation of forest management plans, the implementation of contracts between government and local associations for the management of agro-sylvo-pastoral defined territory lands. Contractualized actions focused, for example, on partial clearing of green oak by local populations, the establishment of compensation during the time of land fencing against grazing, the integration of the perimeters of pasture in the forest zoning plans.

The project also provided to support strengthened partnerships with national partners (NGOs) and international (Belgian Cooperation, WWF, University of Rennes).

With regard to project activities in the pastoral field, these have remained at a “confidence building” of the field actors and do not seem to have yet reached the expected final goal, which consisted to significantly decrease the pressure of sheep (and goat) on the natural ecosystems of forests and pastures.

Pasture development projects outside forests

The Development Project of pasture and Livestock in the Oriental (PDPEO) aimed to increase the income of herders in Oriental Morocco and improve living conditions, especially the poorest of them, thanks to an increased production of rangelands and livestock, a reversal of the process of rangeland degradation, a reconstruction of their productive potential and a farmers’ cooperative organization to manage these pastures. The originality of this project was the fact that pastoral cooperatives, thus created, were to be made on the basis of existing lineage social structures. This, if successful, would provide a lasting solution to the problem of herding in the Eastern Region in particular, but potentially generalizable to the rest of the country’s pastoral areas.

As for **Enhancement Projects in Bour**, establishing areas of pastoral improvement, according to the principles and provisions of Law No. 33-94, their overall objective is arresting pasture degradation, firstly and, secondly, their rational exploitation, after their improvement and recovery. And the adopted approach to this is participatory in both institutional and financial terms.

In conclusion, we can say that the projects are distinguished, from each other, by their specific objectives, the quantitative importance of concerned pastoral populations, the funds mobilized and the nature of the taken actions. All these projects share, however, the same purpose, namely the raising of the living standards of rural populations of respective areas of intervention and the same operational objectives, namely arresting and reversing the degradation of forest pastures and rangelands, improvement of the productive potential of these pastures and the rational use pastures. Moreover, the same methodology of participatory approach underlies all these projects, even if the institutional formulas and techniques of participatory implementation vary from one type of project to another. Finally, all these projects include a socioeconomic component aiming to improve socio-economic conditions of rural population without which the pastoral and livestock development, in the project areas, cannot neither be fully realized.

Organization and functioning of projects in their respective areas of action

1. The case of PDPEO :

The technical and administrative device of PDPEO had a number of flaws and its functioning was quite litigious. Indeed, the project area extended over the two provinces of Figuig and Oujda, and involving both concerned Provincial Directorates of Agriculture (PDA). But effective management of the project was entrusted, by order of the Minister of Agriculture,

to the Provincial Director of Agriculture of Figuig and not to a self-governing responsible. From which there are operational problems (difficulty to the Project Director to mobilize human and material resources required under the PDA of Oujda, difficulty to coordinate and harmonize the various project components on the entire project area, heaviness and complexity of project management.).

Overall coordination of the project was entrusted to a “Technical Committee” which, instead of being a decision-making body, eventually became just a place to exchange information, thus losing all legitimacy. And piloting of the project must return to a “Interprovincial Committee”, chaired by the governors of the two concerned provinces and comprising representatives of all stakeholders and partners in the project (project team, pastoral ethnic lineage cooperatives, and rural communes). However, this committee has had, in fact, only an advisory role.

Finally, the programming and implementation of project activities adhered to a lengthy and cumbersome administrative procedure, punctuated by various mandatory and successive steps (the elaboration, each year, of activities program by the project manager, consultation between services of the two PDA and distribution, between them, of these activities according to their relative abilities of execution; submission of program of activities to the Central Livestock Directorate for review, revision, if any, and approval; implementation of the program of activities after informing farmers at their co-operatives on the content of this program. In fact, the actors and the project partners were not involved in decision making and action planning.

As for the execution of these actions, it was up to the involved work centres, supported by the services of PDA. Finally, the functioning of the project was partitioned and of vertical segment because of the cutting to sectors and a purely technical organization of project components at the expense of a more horizontal or synthetic approach that require certain components of structural nature (research and development , extension, cooperative action, promotion of women).

2 The case of the perimeters of Bour Enhancement (PMVB) with mainly pastoral component:

Indeed the institutional structure for implementation of PMVB, whatever their main component (development of agricultural land, soil conservation and pasture improvement), is identical.

Indeed, it is the Provincial Director of Agriculture or the Director of the Regional Office of Agricultural Development, who are responsible for project management (preparation of tenders, market commitment, monitoring and control of performance of work, monitoring and enforcing the provisions of law No. 33-94 ...). To do this, they rely on “programming units”, each responsible for a particular area.

A “Local Commission for the Development (CLMVA)” was established for each PMVB. It is chaired by the concerned representative of the Provincial Governor and groups, together local elected officials (the president and a council representative), representatives of agricultural

professional organizations (president of the Chamber of Agriculture, representatives of associations of agricultural water users) and representatives of Administration (technicians of the Ministry of Agriculture, representatives of the Ministry of Public Works). The role of this CLMVA is merely advisory by providing advice on various issues related to PMVB (equipment program, compensation awards, and participation of the population by providing labor, list of beneficiaries of pasture, notice and sanctions).

Finally, are established, at the provincial level, a “Multidisciplinary Commission” and “Provincial Steering Committee” of PMVB. The “Multidisciplinary Commission”, which is composed of senior technicians of the Provincial Directorate of Agriculture, the Regional Water and Forestry Directorate and representatives of other ministry provincial departments, is responsible for the preparation of projects (basic studies, preparation of project files, project validation, planning actions, development of program contracts and conventions). As for the “Provincial Steering Committee,” is composed of the same staff of technicians as the “Multidisciplinary Commission” and is responsible for monitoring projects (monitoring the implementation of operations, periodic evaluation of results, land enhancement control, monitoring the implementation of the provisions of Law No. 33-94).

In practice, however, the functioning of the institutional structure and the approach and methodology adopted in the preparation and execution of these PMVB, know a number of serious problems or various constraints (inadequate staff skills regarding implementation of the participatory approach, difficulties in mobilizing multidisciplinary teams, limited involvement of local stakeholders and project partners in the planning and implementation of project activities, lack of organization of project beneficiaries, stiffness and slowness of budgetary procedures and therefore their incompatibility with the participatory approach, ...).

Forms of organization of beneficiaries and participatory procedures implemented within these projects

➤ The case of the PDPEO:

The institutional arrangement, the most appropriate to organize the livestock farmers and shepherds and encourage their participation in the development and management of rangelands is that of pastoral ethno-lineage cooperative, where the cooperative institution of modern type is articulated to the socio-ethnic lineage structure. The pastoral ethnic lineage cooperative is considered likely, if not to recreate the solidarity of the past as regards management and use of pastures based on ancient customary practices, at least build new solidarities of cooperative type, enlivened by the old values of solidarity and mutual aid that still characterize the pastoral society of the Oriental.

The choice of the cooperative form is also explained by the goals that were assigned to it and the role it will play, namely:

- ✓ be the interlocutor of the Administration as regards the development of pasture lands (choice of pasture improvement perimeters and areas to fence against grazing, recording offenses and identifying the criminals, ...);
- ✓ ensure the sustainability of pastoral improvements (land fencing, rotation, planting

of fodder shrubs) beyond the project period;

- ✓ manage civil infrastructure made by the Administration (water points, treatment facilities and vaccination);
- ✓ supply cooperative breeders animal feed and veterinary products;
- ✓ Undertake joint actions with other partners (rural communes, Jmaa of ethnic communities, agricultural cooperatives, chamber of agriculture, associations and groupings of producers and farmers).

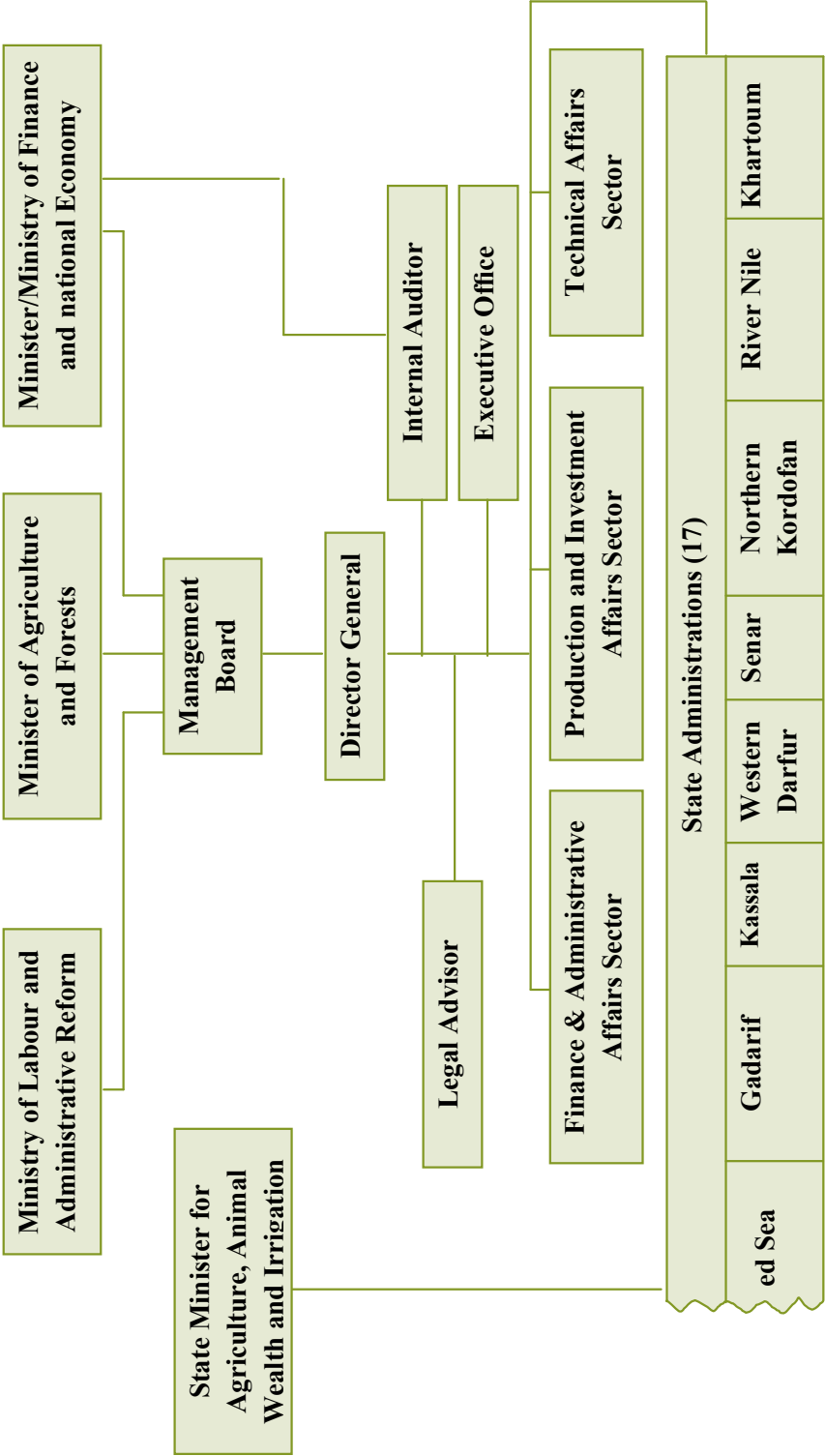
Thus, during the implementation of PDEPO, the pastoral ethno-lineage cooperatives have been associated with various project activities (development of action programs, coaching information of breeders, and management of opened areas to grazing (previously prohibited), watering infrastructure management and treatment of livestock, participation in livestock vaccination campaigns). However, these cooperatives were not involved in decision making process and their participation was reduced, after their information to the simply implementation of taken decisions and actions adopted by the project responsible and approved, ultimately, by Headquarter.

➤ **The case of the PMVB:**

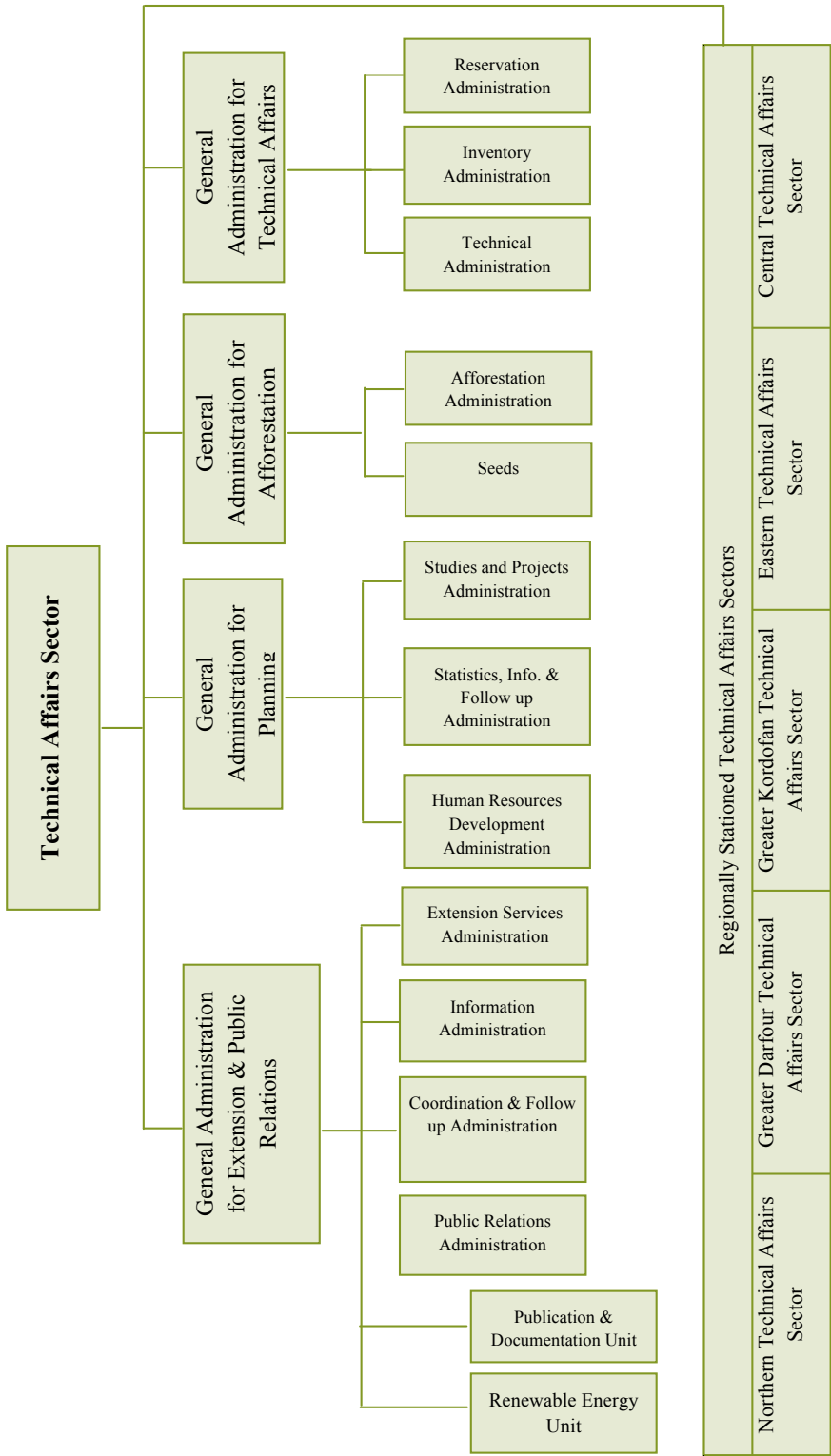
The development project which component is “pasture improvement” does not favor any specific institutional form of organization of the beneficiaries.

As to the participation of the beneficiaries, although it is strongly recommended by Law No. 33-94, and even erected into a principle of the functioning of projects, it is virtually obscured in favor of a top-down approach regarding implementation of these projects.

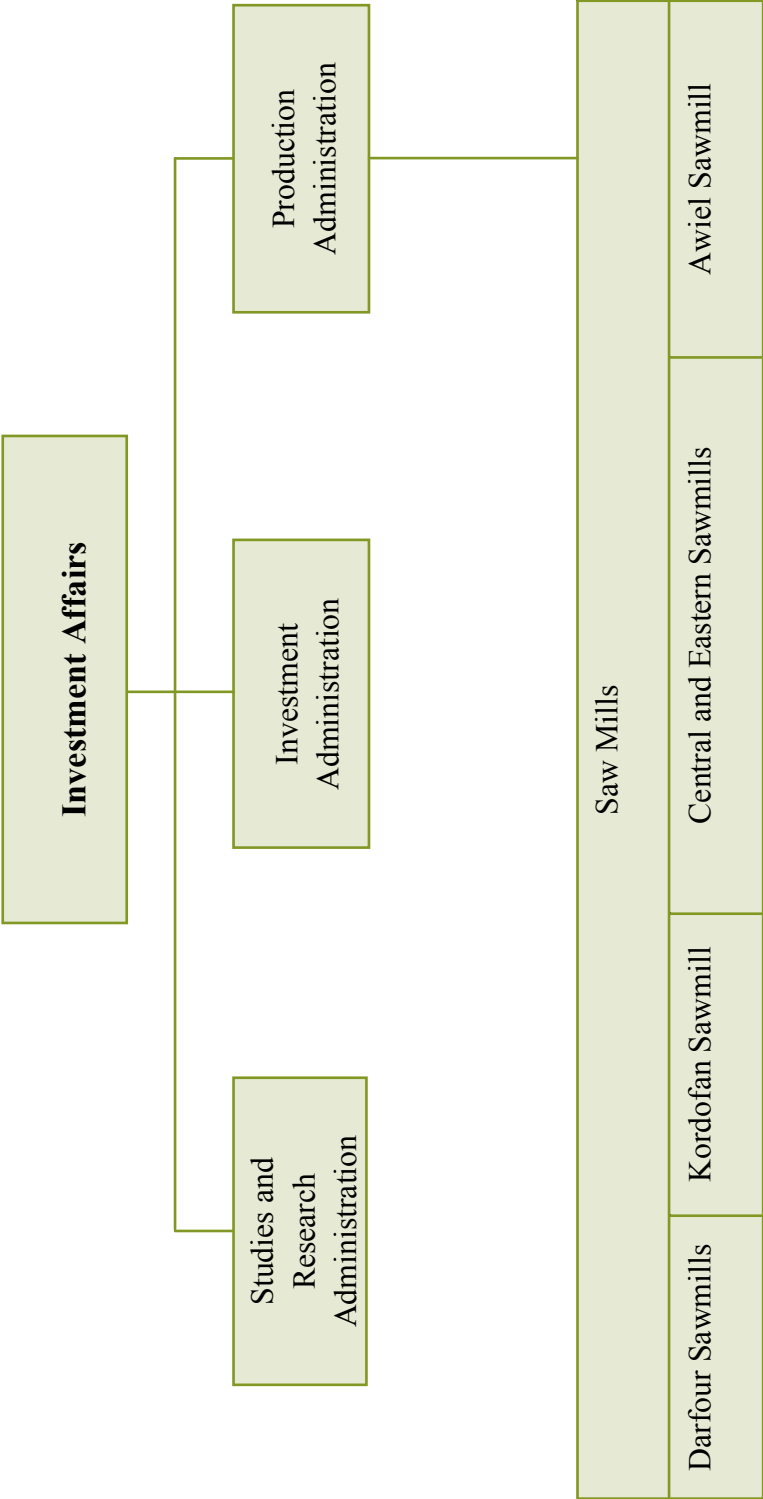
Annex 5. Organizational Structure of Sudan Forest National Corporation (FNC) -2012



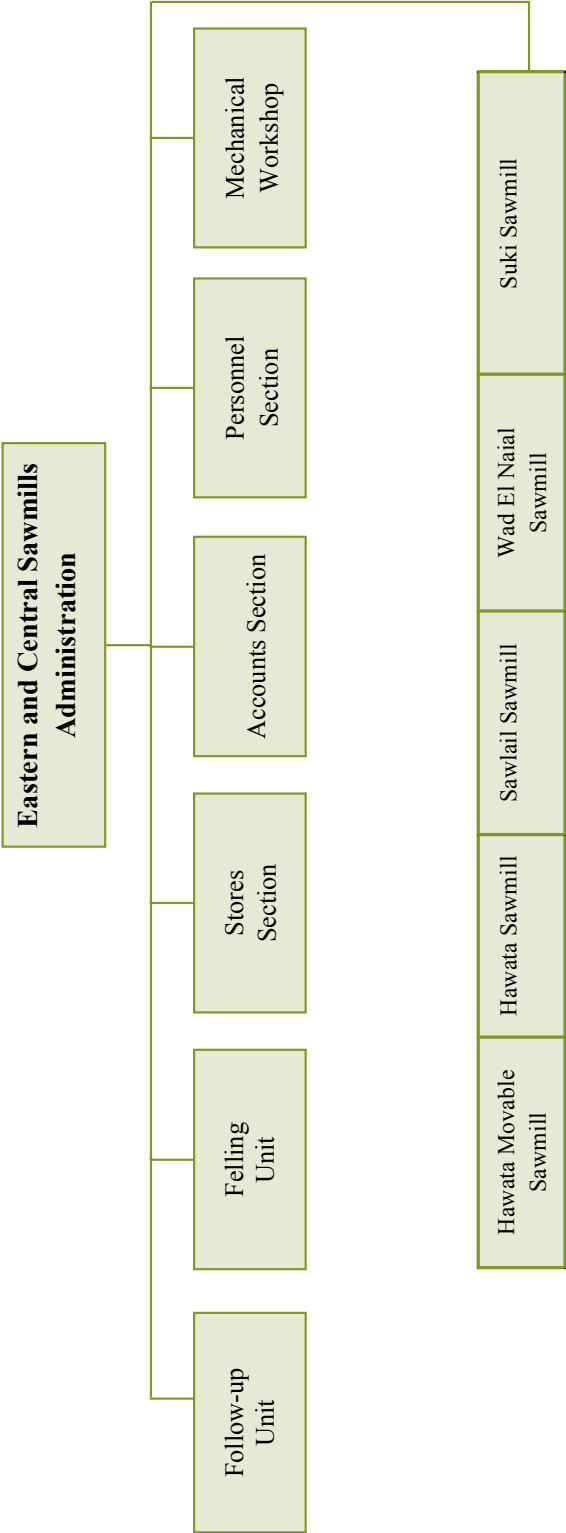
Detailed Structure of the Technical Affairs Sector – The Present Situation



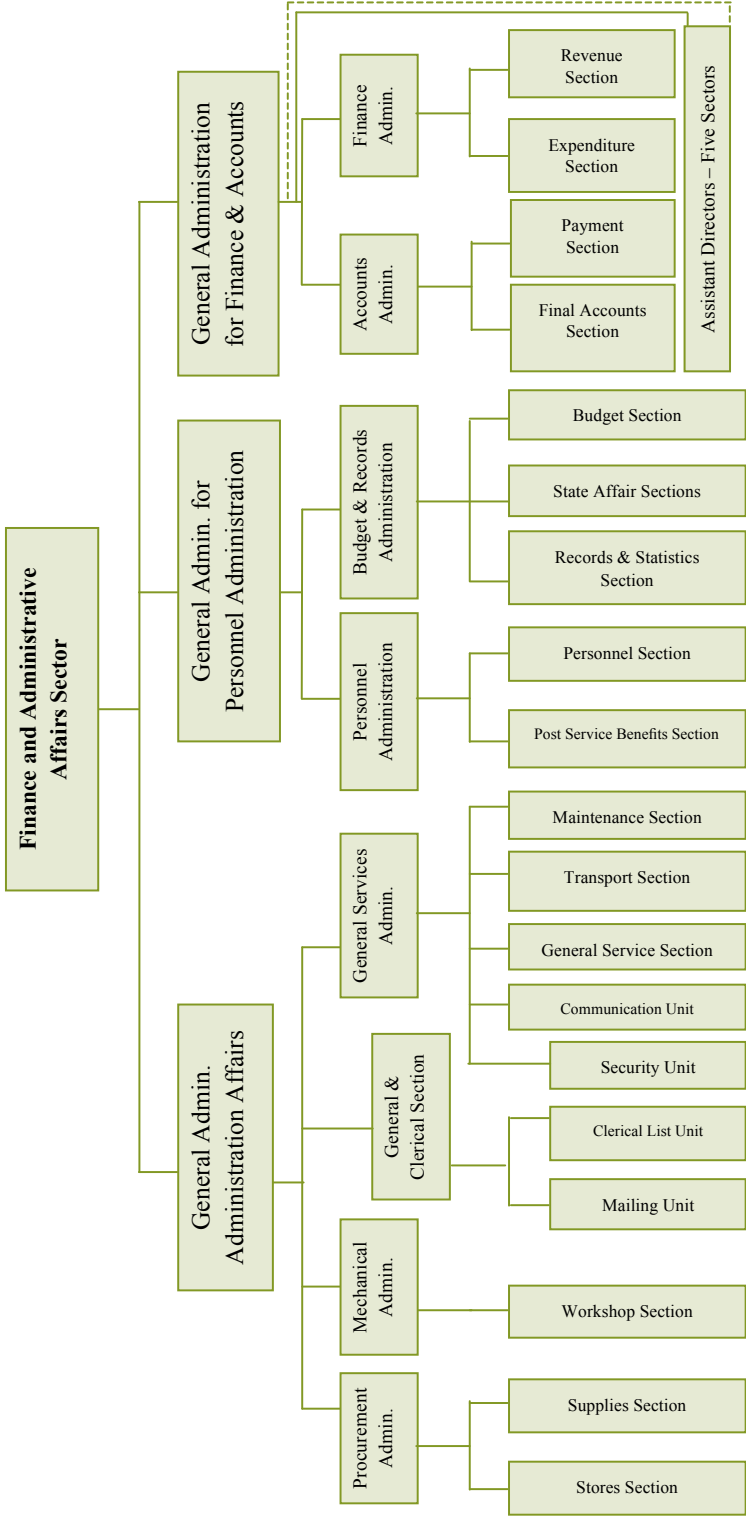
Detailed Structure of Investment Sector



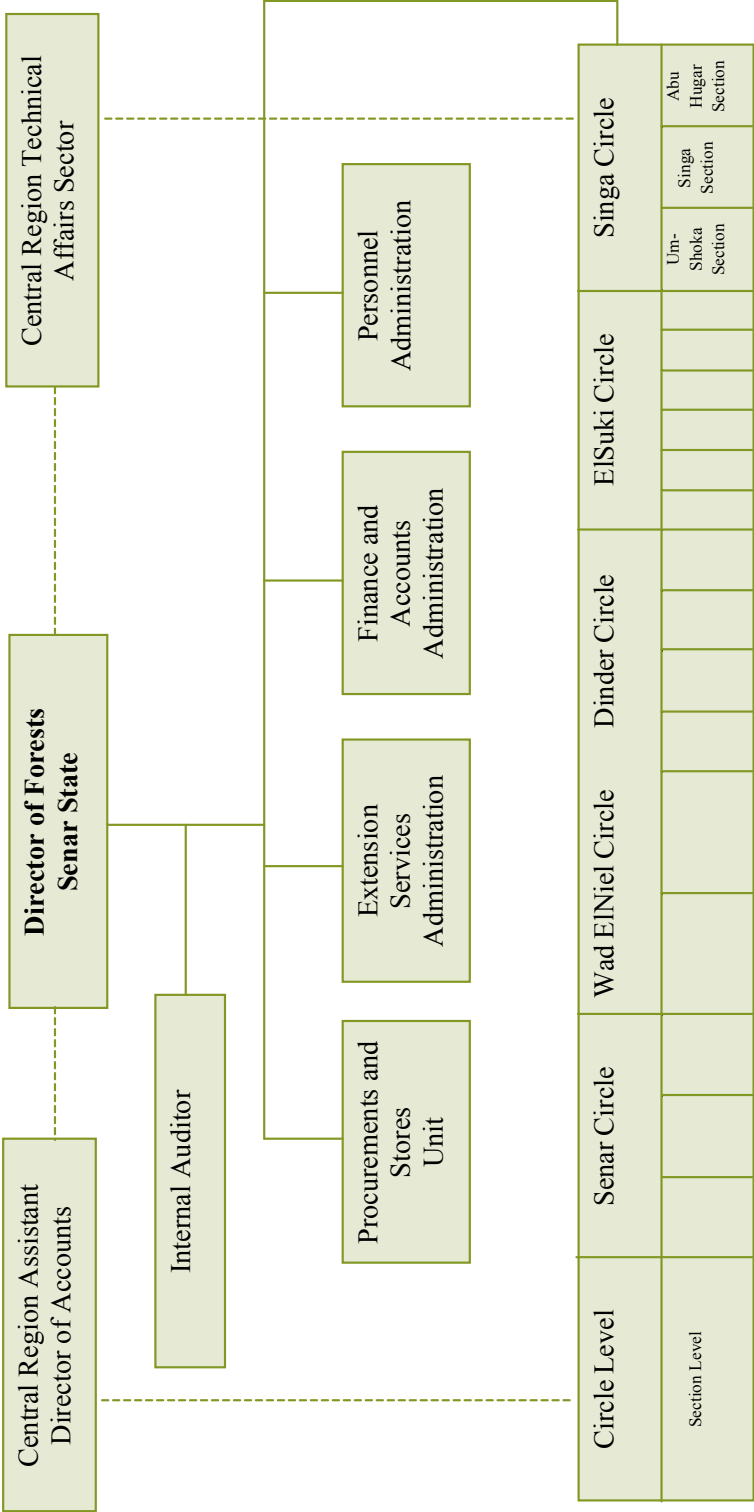
Detailed Structure of Eastern and Central Sawmills Administration



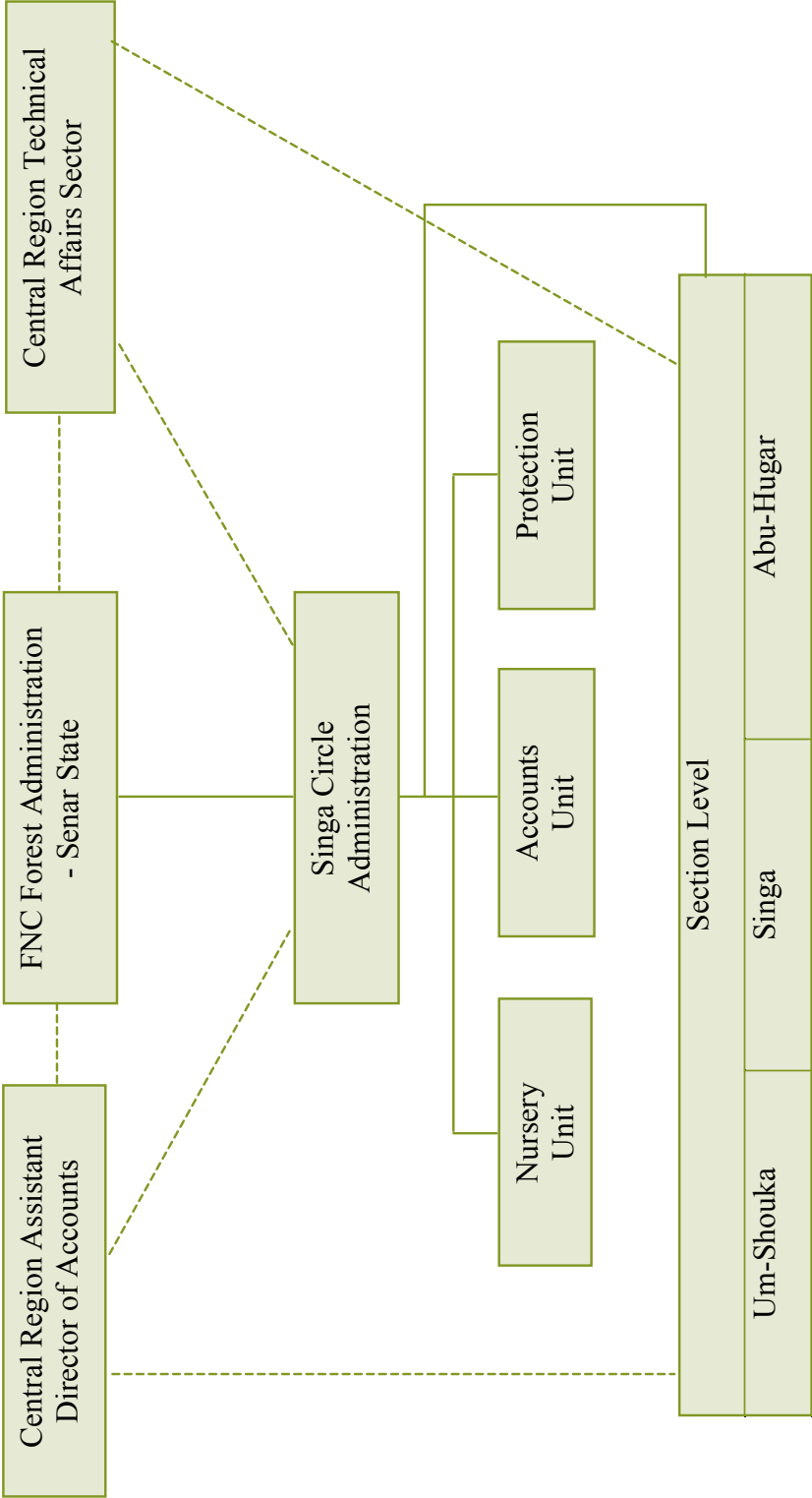
Detailed Structure of Finance and Administrative Affairs Sector



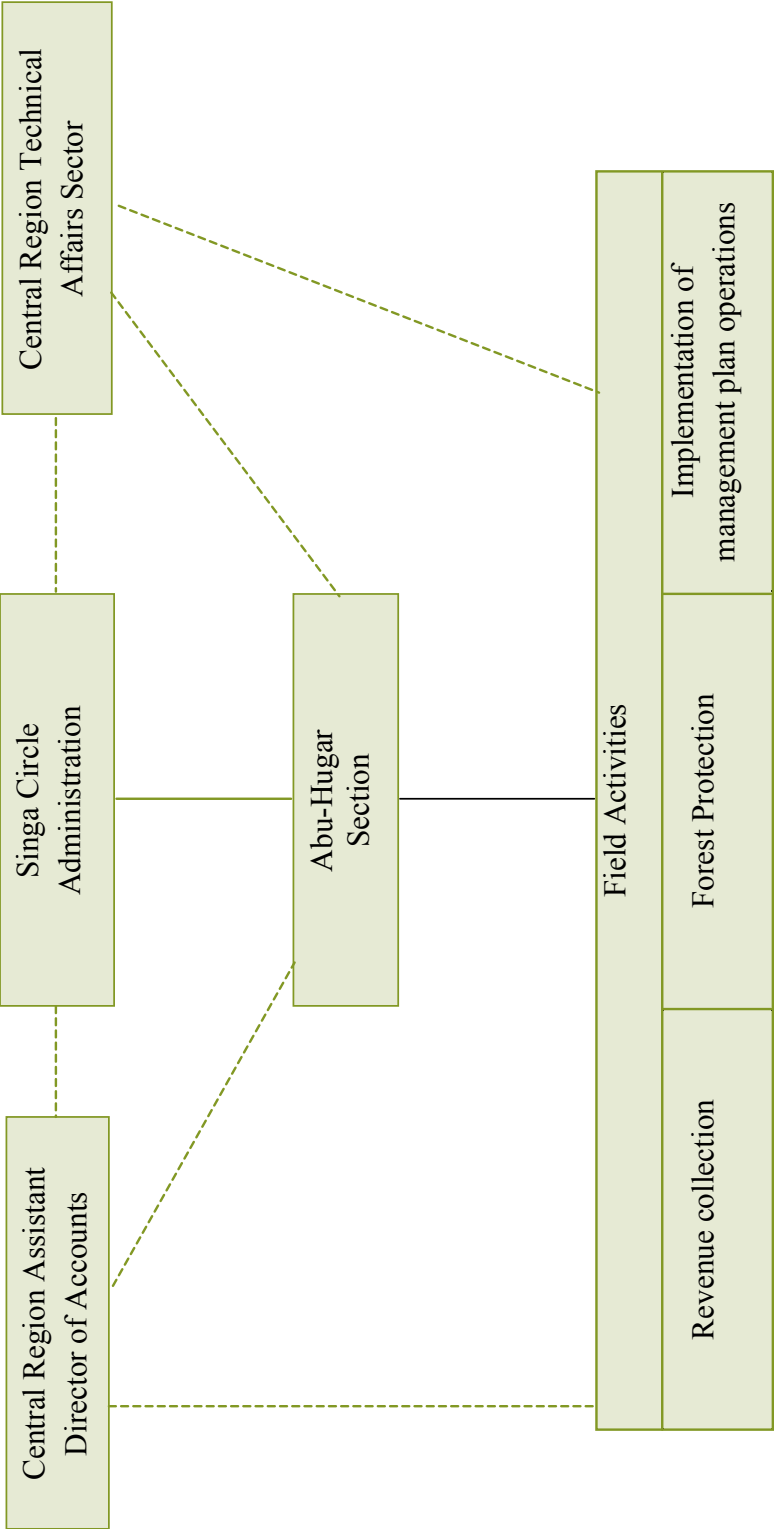
Detailed structure of FNC State Level – Senar State as an example.



Detailed Structure of FNC Circle Level – Singa Administration as an Example.



Detailed Structure of FNC Section Level – Abu-Hugar Section as an Example.





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