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Food and Agriculture Organization of the United Nations

Planted Forests and Trees Working Papers

**THE NETHERLANDS TRUST FUND SUPPORT TO SUSTAINABLE
FOREST MANAGEMENT IN LOW FOREST COVER COUNTRIES**

***ROLE OF PLANTED FORESTS AND TREES OUTSIDE
FORESTS IN SUSTAINABLE FOREST MANAGEMENT:***

***ISLAMIC REPUBLIC OF IRAN
COUNTRY CASE STUDY***

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Foreword

People of developing countries facing desertification and severe land degradation, particularly in arid and semi-arid areas, can experience extreme food insecurity and abject poverty. In most countries, their relationships with forests and trees are inseparably interlinked and interdependent. Poor people recognize that forests and trees protect soil, water and biological diversity, provide shelter and shade for their villages as well as havens for cultural customs and help to combat desertification. To meet their basic food, fuel-wood, fodder, medicine and construction materials from the meagre resources available, they adopt survival attitudes, overexploit forests and rangelands, and provoke alarming rates of deforestation and forest degradation, which further erode their livelihoods.

Decentralized, participatory, intersectoral and multidisciplinary approaches to policy, planning, implementation and monitoring are new to many developing low forest cover countries. They require new institutional frameworks as well as training and skills in forest planning and management. The voice of the forestry sector, which has generally been marginalized, needs to be mainstreamed in intersectoral planning committees and working groups to derive national development priorities and national forest development strategies. In so doing, it should examine the real value and potential roles of natural forests, planted forests and trees outside forests in supporting landscape restoration and sustainable livelihoods in urban and rural landscapes.

It is critical to integrate planted trees and forests in more holistic approaches to provide environmental services, biodiversity benefits and meet people's short and long-term needs. It is also necessary to make modern technology and traditional knowledge available in more people oriented approaches to be shared through national and international networks, and sound extension and technical support systems and demonstrations.

This case study was carried out under the FAO-Netherlands Partnership Programme to support Sustainable Forest Management in Low Forest Cover Countries in the Near East and African Regions. It is one in a series of six carried out in Iran, Oman, and Tunisia in the Near-East Region to form the basis of the Teheran Workshop, 28-31 October 2002 and Mali, Ethiopia and Namibia in the African Region to form the basis for the Nairobi Workshop 26-29 November 2002.

The case studies, chosen to represent the uniquely different ecological, social, cultural, environmental and economic conditions prevailing in the regions, were conducted to evaluate the role of planted forests and trees outside forests in supporting sustainable forest management and landscape restoration in low forest cover countries. Natural forests, rangelands, woodland resources, trees outside forests, agroforestry, urban and peri-urban forestry all play important roles in supporting the social, cultural, environmental and economic landscapes, particularly in low forest cover countries.

This case study focuses on the major issues, the policy/legal/institutional contexts, status of forests and rangelands, constraints, opportunities, gaps in knowledge, lessons learned and the proposed actions for the way forward. This is a first step in translating policies and proposed actions towards implementation.

Acknowledgements

The mission wishes to express its thanks to all persons, institutions and organizations that made the accomplishment of its task possible. In particular, the mission is grateful to FAO HQs (Rome), FAO RNE (Cairo) and FAOR Teheran for their constant availability and backstopping.

Our thanks go also to the numerous organizations (Forest and Range Research Institute, Teheran Parks and Green Areas Organization, Environmental Department, Faculty of Natural Resources of Teheran University, Kalok Natural Resources Training Complex etc.) that extended their hospitality to the mission and expressed their willingness to contribute actively to any regional cooperation and capacity building programme for the benefit of the LFCCs of the region.

The mission wishes to express its special thanks to the Forest and Range Organization, FRO's High Council, the "Teheran Process" Secretariat and all Provincial Natural Resources offices for the excellence of the logistics provided and of the visits organized, as well as for their full contribution and engagement in all discussions and exchanges with the mission members.

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List of Acronyms

AAF	Average Annual Flow
AFW/EFC/ILO	Forest Fire News Publication
AU	Animal Unit
BCM	Billion Cubic Meters
BSc.	Bachelor of Science
CBD	Conservation of Biodiversity
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DE	Department of Environment
DESCONAP	Desertification Control National Action Plan
EEC	European Economic Community
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization of the United Nations
FAO/ECE/ILO	Committee on Mediterranean Forestry Questions
FAOR	FAO Representation
FAO-RNE	FAO Regional Office for the Near East
FORIS	Forestry Information System
FR.D	Forest Research Division
FRA	Forest Resources Assessment (FAO)
FRO	Forest and Range Organization
GDP	Gross Domestic Product
HQs	Headquarters
I.R.	Islamic Republic (of Iran)
IRA	Iran
IFAD	International Fund for Agricultural Development
IFF	Intergovernmental Forum on Forests
IPF	Intergovernmental Panel on Forests
IGADD	Intergovernmental Authority on Drought and Development
ICRAF	International Centre for Agroforestry Research
UNEP	United Nations Environment Programme
IUCN	International Union for conservation of Nature
LFCCs	Low Forest Cover Countries
MAB	Man and Biosphere
MSc.	Master of Science
MT	Metric Ton
MoJA	Ministry of Jihad-e-Agriculture
NCCD	National Committee for Combating Desertification
NCSD	National Committee for Sustainable Development
NBSAP	National Biodiversity Strategy and Action Plan
NE	North East
NGO	Non Governmental Organization
NWFP	Non-Wood Forest Product
PGAO	Parks and Green Areas Organization (Teheran Municipality)
PhD	Doctor of philosophy

Ramsar	Convention on Wetlands
RIFR	Research Institute of Forests and Rangelands
RIs.	Rials
RRA	Rapid Rural Appraisal
TDN	Total Digestible Nitrogen
TOFs	Trees Outside Forests
TOR	Technical Office of Rangeland
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNESCO/MAB	UN Educational and Scientific Organization / Man and Biosphere
UNFCC	United Nations Framework Convention on Climatic Change
UNFPA	United Nations' Fund for Populations' Activities
UNHCR	United Nations' High Commissioner for Refugees
UNOCHA	United Nations' Office for Coordination of Humanitarian Assistance
US \$	United States' Dollar
V.A.	Value Added
WHC	World Heritage Convention

Executive Summary

Preamble

The Netherlands approved to support targeted outputs and activities as a follow up to the “Teheran Process”. As a result, country studies that outline the causes and effects of deforestation and forest degradation as well as the priority needs to enhance the role of planted trees are being prepared. The present one, which concerns the I.R. of Iran, has highlighted the following:

Iranian forests and rangelands have lost very substantial areas in the last decades, following nationalization of all lands, rapid population growth as well as human activities and other natural causes. Iranian foresters are very conscious of this. Indeed, Iranian forestry achievements to protect, rehabilitate and manage these resources have been very significant, but the challenges ahead are colossal because the forest and range policy aims not only at conserving the resources, but also at alleviating poverty.

Forestry in Iran has been initially developed with a strong emphasis on introducing exotic tree species and on using western European silvicultural systems and management models to manage the commercial broadleaved forests of the Caspian Sea region.

Iranian foresters have since gained very valuable experience in such fields as sand dune fixation, mangrove regeneration, poplar and other fast-growing species plantation, management of NWFPs, development of extensive urban and peri-urban forests, development of intermediary forms of participation to forest and range sustainable management etc.;

Iranian forestry has also some shortcomings among which the following:

- Training has achieved very high academic results at BSc., MSc., and PhD levels probably well above the present absorbing capacity of recipient institutions. Training at intermediate level has remained modest and probably insufficient with regard to the actual and future needs;
- There exists no training on the techniques of communication and of participatory as well as on arid, semi-arid and tropical silviculture and management, etc.
- Forest rehabilitation activities remain often isolated of the context within which they take place. Tree planting operations are mostly formulated without any clear vision of their future use;
- Participation has become a leitmotiv for future forest and range management in the country. It is at an infancy stage and is still carried out in most cases following a top-down approach.

The Forestry and Range future Vision 2020 is very ambitious. It demonstrates the will of the government to pursue its efforts towards improving and rehabilitating the country’s forests and rangelands. The present blueprint of the “Green Revolution” programme is obviously still conceived following a top-down approach. It is to hope that the programme will be later devised at local scale, following a more appropriate participatory approach.

Iran has recently engaged in a dynamic effort to enhance cooperation within the region. It is to hope that the workshop on LFCCs will be the starting point for genuine and sustainable interregional cooperation.

Conclusions

The conclusions of the mission are summarized as:

Development choices:

1. Despite imposing resource rehabilitation programmes, FRO has not significantly and sustainably contributed to poverty alleviation among forest and rangeland dwellers;
2. The ambitious Vision 2020 of the forestry sector demonstrates the will of the government to pursue its efforts towards improving and rehabilitating the country's forests and rangelands;
3. Following nationalization of all lands, rapid population growth as well as unsustainable human activities and other natural causes, Iranian forests and rangelands have lost very substantial areas in the last decades.

Institutional and legal:

1. Planning and decision-making are highly centralized, leaving little space for provincial and local initiatives to programme & project formulation, planning & decision-making;
2. It is necessary to re-assess the country's training needs for participatory forest and range protection, rehabilitation, management and development;
3. Research needs to focus on integrated participatory agroforestry, community forestry and smallholder forestry and should be better prepared for the dissemination of its results;
4. Legislation is not adequate as it does not spell out with force the need for effective protection and for decentralized and participatory programme development and decision-making;
5. The I.R. of Iran has engaged in important regional cooperation programmes;
6. Inter and intra-sectoral coordination are inadequate;
7. Coordination within the FRO institutions and with other stakeholder bodies and organizations is weak.

Natural resources use & management:

1. The socio-economic role of forests and rangelands is very significant, as more than 5 million people live in forests or their vicinity, and 450 000 persons derive a permanent occupation from rangelands;
2. Planted forests are established without any preconceived idea of their future sustainable management.

Trees outside forests are not yet well perceived in terms of their actual or potential contribution to the national economy and to the well being of people.

General conclusion: The current situation of Iran's natural resources is a reflection of its past and present social, ecological, technological, economic, political and administrative measures.

Technical or engineering solutions are not enough; they need to take into account the needs, priorities and aspirations of the rural poor.

Recommendations

The recommendations made by the mission are as follows:

Development choices: Recommendations with regard to development choices and issues include:

1. Biodiversity conservation: Adopt participatory planning and resource management approaches to sustainable forest resources management, with due regard for biodiversity conservation;
2. Assessing and monitoring ecosystems: Complete the assessment & monitoring system by providing funds, staff & equipment to implement the project UTF/IRA/024/IRA formulated in May 1999;
3. Popular participation: Participatory planning and management become a standard approach to understand the needs and aspirations of communities and individual families to contribute in those matters that directly impact upon their sustainable livelihoods;
4. Tenure rights: Develop a people oriented policy, planning and technical support system in contrast with traditional planning, management and production systems;
5. Poverty alleviation & support to local communities: Enhance & promote long term employment & revenue opportunities among forest and rangeland dwellers by strengthening stakeholders' interest and investments in sustainable resources management;
6. Development and widespread distribution of alternative domestic energy: Provide alternative domestic energy sources to cover the entire rural countryside.

Institutional and legal: Recommendations with respect to institutional and legal improvements include:

1. Need for decentralization: Ensure genuine community commitment as expressed by the recently formulated forest policies and strategies, more decentralization at planning and decision-making;
2. Need for a better adapted legislation: Review legislation and regulations to incorporate the human dimension and recognize the right of traditional land users to access and share management over resources;
3. Cross-sectoral coordination and co-operation: Establish national and provincial cross-sectoral coordination and co-operation mechanisms involving all institutions and organizations concerned with rural development in general and natural resources rehabilitation, conservation and development in particular;
4. Regional cooperation between LFCCs: Initiate cooperation programmes between Iran and other LFCCs including follow up by the Secretariat of the LFCCs to ensure that various cooperation proposals as detailed in the main report materialize;
5. Training and research: Adjust and normalize the balance of qualifications between professional graduates and technicians trained; diversify the training curricula and research topics to include tropical semi-arid, and arid environment protection and forest and range rehabilitation, management and development; and use the national training capability to help the neighbouring Low forest Cover Countries.

Resource use and management: Recommendations with respect to resource management include:

1. Improved agricultural production systems: Promote more environmentally and people friendly approaches to agricultural development and expansion, by adopting efficient and non-destructive production systems, particularly in mountain areas, and rehabilitating lands that have been exhausted of their productive potential, to their initial land-use choice;
2. Land productivity improvement: Improve land productivity and soil fertility in rehabilitation of degraded lands, including incorporating trees and planted forests in the landscape.

Enhancing the role of planted forests: The recommendations with respect to enhancing the role of planted forests in sustainable forest management include:

1. Integrated planted forests in a broader land-use context in an attempt to respond to the priority needs and aspirations of people;
2. Maintain or increase the present rate of afforestation/reforestation; and
3. FRO and RIFR prepare arid, semi-arid and tropical silvicultural and management models as well as guidelines for the rehabilitation, silvicultural treatment, management and development of mangroves, fodder tree plantations, and *Haloxylon persicum* stands developed through plantations and seeding.

Enhancing the role of Trees Outside Forests: The recommendations with respect to Trees Outside Forests include:

1. Recognize TOFs as a valuable resource and introduce their concept and issues as points of discussion for the coming LFCC workshops;
2. Grant more support to farmers to maintain and expand poplar and fast growing species' plantings for shade, shelter and other uses;
3. Promote TOFs in private holdings, particularly in agroforestry where trees support agriculture and livelihoods;
4. Develop an adapted silviculture for the specific needs of urban/peri-urban forests and publish silvicultural guidelines for various species in different ecological contexts;
5. Consider the productive capacity of the urban and peri-urban forests and prepare management plans accordingly;
6. Promote the planting of Trees Outside Forests, mainly fodder trees in sylvo-pastoral systems;
7. Arrange a short training course on the silvicultural treatments of fodder tree and shrub species and on sylvo-pastoral management of recently rehabilitated wooded rangelands

Introduction

This mission mounted by FAO, has been initiated after the Netherlands approved to support the targeted outputs and activities agreed upon in the framework of the Teheran Process. It aims at preparing a “Country Case Study Report” for Iran, in readiness for the “Low Forest Cover Countries” Regional Workshop for the NE to be held in September 2002 in Teheran.

The case study, whose terms of reference are detailed in annex 1, outlines the causes and effects of deforestation and forest degradation in Iran. It highlights the lessons learned and stresses the priorities for enhancing the role of planted forests, and of Trees Outside Forests etc.

Following briefing sessions at the FAO offices in Rome and Teheran, the mission composed of Mr. S. Rouchiche international consultant (mission leader) and Mr Mirsadeghi Mohammad Ali H. national consultant took part to a number of meetings and visits in Iran (23/4–21/5/2002) as specified in annex 2. It was accompanied during the field trips by Mr. Pedram Attarod and assisted by Miss Fateha Hatami. The detail of the persons met is given in annex 3, while some forestry definitions used in the text are presented in annex 6.

Considering the country’s dimension and the huge achievements and vast set of issues of the Iran’s Forest and Range Sector, the time allocated to the mission was insufficient for in-depth exchanges, bibliographic research, field visits and report writing. The mission was furthermore hindered by the scarcity of English-written documents, requiring much translation time from the national consultant. Thanks to the very effective support of FRO and the sense of organization demonstrated by Mr. M.A.H. Mirsadeghi, the mission was able to proceed and fulfil its terms of reference as best as possible.

1. General setting

1.1 Context

1.1.1 Brief historical account¹

Iran is one of the oldest cradles of human civilization as witnessed by the multiple archaeological remains and the historical and cultural monuments uncovered throughout the national territory. Cyrus, Darius, Alexander the Great, the Parthians, the Sasanid dynasties are all part of the county’s great historic background as well as cultural and political heritage. The Arab conquest in the 7th century introduced Islam, which replaced Zoroastrianism as the principal faith of the Iranians. Iran witnessed subsequently successive waves of invaders (Mongols, Tartars etc.) until the Safavid dynasty restored its former greatness.

In its more recent past and following its weakening by successive wars, conquests and invasions, the country came under the influence of the former USSR, Great Britain and other western powers. This persisted until the advent of the Pahlavi dynasty, which was ousted, ensuing the Great Islamic Revolution of 1979, under which Iran became an Islamic Republic.

¹ Source: Iran Today: Prepared and published by Gita Shenasi, 2001.

1.1.2 Government and administrative set-up and organization²

The constitution of the Islamic Republic of Iran was drafted and ratified by popular vote in 1979. The political institutions were established the same year.

At the top of the government structure is the Faqih (expert in religious jurisprudence), the ultimate decision-maker. His role has evolved into that of a policy guide and arbitrator. He approves candidates for presidential elections and may dismiss a president who has been impeached by the legislative assembly or found to be negligent in his duties by the Supreme Court. Under him, a distinct separation of power exists between the executive and the legislative branches.

The executive branch includes a president, who is, according to the constitution, “the holder of the highest official power, next to the office of Faquih”. He selects a cabinet that must be approved by the legislative assembly or Majlis. The President is elected for a four-year term on the basis of an absolute majority vote; he may be re-elected for one additional term. The constitution stipulates that the government of the Republic derives its legitimacy from both God and the people. The latter have the right to choose their leaders among those who have demonstrated both religious expertise and moral rectitude. All citizens who have attained 16 years of age are eligible to vote in these elections. There are also local elections for a variety of urban and local positions.

As of 2000, Iran was divided into 28 provinces (Ostans) and 293 counties (Shahrestans) headed respectively by a Governor General (Ostandar) and a Governor (Farmandar), both appointed by the Minister of Interior. The counties consist each of two or more districts (Bakhshes). The 777 districts are further divided into 885 cities, 2 293 rural sub-districts (Dehestans) and 68 122 villages (1996 census).

The capital of Iran is Teheran. According to the 1996 national census the most populated cities of Iran are Teheran, Mashhad, Esfahan, Tabriz and Shiraz, with 6 758 845; 1 887 405; 1 266 072; 1 191 043 and 1 053 025 inhabitants respectively.

1.1.3 Political and legislative framework

The legislative power is invested by the constitution in the Consultative Assembly, the Parliament, or Majlis. Deputies, representing each a geographic constituency are elected by direct, secret ballot once every four years. The constitution provides for the Council of Guardians to examine all legislation passed by the Majlis and ensure that it is conform to the Islamic law. It provides also for an independent judiciary headed by the High Council of Justice, whose responsibilities include preparing draft bills related to the judiciary, and supervising the appointment of jurists.

² Source: Ministry of Jihad-e-Sazandegi, Forest and Range organization: Integrated Land Management Project of the Islamic Republic of Iran (Coffey MPW Pty Ltd and Kinseeds Pty Ltd).

1.1.4 National central & decentralized planning procedures

Ministry offices at province level make initial decentralized “Five-Year Development Programme” proposals, which they submit to their respective ministries for approval. These regional proposals are reviewed, tuned and adjusted to amount to a National Development Programme to be approved by the central Government. The national Programme is subsequently submitted to the Majlis for final approval. Once approved, the individual programmes and associated budgets are passed to each ministry for implementation. The procedure is similar with regard to the annual development plans and budgets.

1.2 Environmental characteristics

1.2.1 Brief geographical description

Iran, with an area of 1,65 million km², is one of the largest countries in Asia. It is located in the northern temperate zone of southwest Asia, between latitudes 25,40 and 39,40 degrees north and longitudes 44-63,5 degrees east. The country is bounded by the Caspian Sea, Turkmenistan, Azerbaijan, and Armenia on the north, Afghanistan and Pakistan on the east, the Oman Sea and the Persian gulf on the south, and Iraq and Turkey on the west (see relief map in annex 7). The frontiers extend over 8 731 km, of which 2 700 of coastline boundaries.

1.2.2 Geology, landscapes and soils³

Planimetric measurements from the outline map (scale 1:2 500 000) show clearly the mountainous aspect of Iran (see details in annex 8: table 1). About 60% of Iran’s surface area is mountainous, whereas deserts cover one third of the territory. The main mountain ranges include in the Alborz in the north, and the Zagros extending from northwest to southwest. Located between these two mountain ranges, the Central Plateau extends from northwest to southeast and east; it includes two important deserts, namely the Dasht-e-Kavir and the Dasht-e-Lut.

Iran is located between the northern Euro-Siberian platform and the southern deltaic platform, to which it belongs through the Caspian littoral and the Khuzestan Plain respectively. From southwest to northeast, the country displays seven main structural geologic units: 1) Khuzestan Plain; 2) Thrust-folded zone of the Zagros system; 3) Autochthonous folded zone of the Zagros system; 4) Central Plateau; 5) Alborz Range; 6) Kopet-Dagh or Turkeman-Khorazan range, northeast of Alborz; and 7) Caspian littoral

Iran has a great variety of soils that belong to the following principal units:

- Soils of the plains and valleys: They include: i) alluvial soils, ii) coarse-textured alluvial and colluvial soils and regosols, iii) sand dunes, iv) hydromorphic soils, solonchak and solonetz soils, v) saline alluvial soils, and vi) salt-marsh soils;
- Soils of the arid/semi-arid Plateau: They comprise: i) grey and red desert soils, ii) sierozem soils, iii) brown soils, iv) and chestnut soils;

³ Source: Soils of Iran: Ministry of Agriculture – Soil and Water Research institute.

- Soils of the Caspian piedmont: Here are found: i) brown forest soils, ii) red-yellow podzolic soils, iii) grey-brown podzolic soils and in some transitional areas, iv) red-brown Mediterranean soils;
- Soils of the dissected slopes and mountains: these are, in general stony soils, shallow over bedrock, without a definite profile development, despite some accumulation of organic matter.

1.2.3 Climate⁴ (see Climate of Iran, annex 9)

Owing to its highly contrasted topography, Iran displays diverse climates, of continental type for the most. Temperatures vary considerably (extremes between + 50 °C and – 30 °C) and observe a certain pattern throughout the country, decreasing from south to north and from east to west. With a mean annual rainfall of 253 mm⁵, Iran is seen as a drought-prone region (see rainfall details in table 2, annex 8). The broad pattern for the country as a whole is that of decreasing rainfall from north to south and from west to east. Except for the Caspian Sea littoral and the Zagros Mountains, rainfall is rather unpredictable and scanty, with high annual variations.

Iran features three main climatic zones, which are: (i) the hyper arid and arid regions of the central and eastern parts of Iran; (ii) the Mediterranean semi-arid and sub-humid climate of the western Zagros Mountains, the high plateau of Azerbaijan and the Alborz Mountain; (iii) and the humid regions mainly in the Caspian coastal area, west Azerbaijan and southwest Zagros.

1.2.4 Biological resources⁶

The country's wide assortment of land types and climate variety has brought about a rich diversity in ecosystems, plant and animal species, that make of Iran one of the most important gene pools in the world. Indeed, according to a conservative estimate, Iranian habitats support some 8 200 species of plants, of which some 1 900 are endemic. Field studies in Iran confirm the presence of over 500 bird species and 160 species of mammals.

The wetlands are globally significant to large numbers of migratory birds that winter there or use them on their way to and from wintering areas in Africa or the Indian sub-continent. The marshes of the south Caspian lowlands are particularly important to some 20 duck and geese species. The Persian Gulf coast's mud flats are of critical importance to shore birds, gulls and terns. Their mangroves are important fish and seafood habitats. Marine turtles are observed in Iranian waters⁷, some endangered ones reproduce in the southern coastal ecosystems. Many of the aquatic resources are exclusive to the region, and are thus of great importance in terms of biological diversity. The southern Caspian is home to over 120 fish species. Various marine mammal species are observed in the southern waters of Iran (the blue, fin, sperm and humpback whales, the common dolphins, the black finless porpoise and the dugong).

⁴ Source: Iran Today: Prepared and published by Gita Shenasi, 2001.

⁵ Estimation made over records of the last 29 years.

⁶ Source: Biodiversity CRTIC: National CBD Report for the I.R. Iran- last updated on: 2 May 2002: <file://C:\bio-3.htm>

⁷ These are: the Leatherback, the Olive Ridley, the Green, the Loggerhead, the Hawksbill and the Black turtles.

The main endangered forest species are *Buxus hyrcana*, *populus caspica* and *Taxus baccata*. *Quercus robur* is considered to be vulnerable, while *Sorbus acupario* is rare. The Environmental Department is identifying all endangered, vulnerable, rare and extinct animal and plant species, consistent with the 1988 IUCN guidelines. According to the World Conservation Monitoring Centre, 20 mammals, 14 birds, 8 reptiles, 2 amphibians, 7 fish, 3 invertebrates and 2 plant species are considered either endangered, or threatened and vulnerable. One mammal and 100 plant species are extinct.

1.2.5 Land and water resources

Types, distribution and occupation of lands⁸

Recent historical evidence indicates that the vast areas of central Iran, which are now suffering aridity and desert-like-conditions had once been covered by valuable ranges and forests. Although environmental factors and climatic changes have undeniably contributed to the desertification processes, it is believed that they have, in most cases, been less destructive than human activities. The country's present land use categories may be classified as follows:

- Rangelands (90 million ha) make up 55% of Iran's territory;
- Forests (12,4 million ha) cover 7,4% of the country's land area;
- Deserts (34 million ha) occupy 21% of the country;
- Settlements, infrastructures and water bodies with an area of about 4 million ha, occupy 2,2% of the country's surface area;
- Agricultural lands considered globally (rain-fed and irrigated) exceed by far the forestland area. They are distributed over 23,6 million ha, thereby occupying 14,4% of the national territory.

Some 18,5 million ha of arable land have been brought under irrigated and rain-fed cultivation between 1991 and 2001. In the year 2000, only 16,7 million ha were cultivated (4,7 million ha rain-fed), due to severe drought. Approximately 4,5 million ha were put under fallow⁹.

Surface water and drainage systems¹⁰

The country is divided into 37 basins, 174 watersheds and 629 plains. A total of 3 450 permanent and/or seasonal rivers drain the country. There are 37 major river watersheds. The most important among these in terms of average annual flow (AAF) are:

- The Karoun River with an AAF of 14 619 billion m³ flowing towards the Persian Gulf;
- The Dez River with an AAF of 8 825 billion m³ flowing to the Persian Gulf;
- The Sefidrood flowing 6 491 billion m³ annually towards the Caspian Sea;
- The Aras River with an AAF of 2 317 billion m³ flowing towards the Caspian Sea;
- The Zayandehrood with an annual flow of 1 473 billion m³ towards the Markazi Basin;

⁸ Source: Newsletter 8th International Conference on Rainwater Catchment Systems: The Perspective of the I.R. of Iran concerning implementation of UNCCD Regional Annex for Asia, through the existing organization, the DESCONAP Program Office.

⁹ Source: Ministry of Jihad-e-Agriculture - Iranian Agriculture: Capabilities for development.

¹⁰ Source: Ministry of Jihad-e-Agriculture - Iranian Agriculture: Capabilities for development.

- The Atrak River with an AAF of 0.877 billion m³ flowing towards the Sarakhs Basin.

Taking into account the status of rainfall and vegetative cover, the renewable water resources are estimated at about 130 billion cubic meters (BCM) and the volume of harvestable water at 126 BCM. At present, 87,5 BCM are harvested, of which 83,5 BCM (94 %) are used by agriculture. From October 1996 to September 1997, the average precipitation for the country was 206,3 mm, equivalent to 330 billion m³ of surface water. Compared to the average of the last 28 years, the surface water equivalent of the last 2 years (2000 and 2001) decreased by about 19,1 % and 35,2 % respectively.

The Caspian Sea, Persian Gulf, Oman Sea, Urumieh Lake, Central basin, Hamoon and Sarakhs are the most important basins in the country (see table 3, annex 8). Their average harvestable surface water volume, which is about 105 BCM, is subject to large annual fluctuations. The index of fluctuation between 1989 and 1999 was 30,45 %. During the 1992-1993 water year, the total harvestable surface water was estimated at 164,6 BCM, while during 1998-1999 period, it was only 55,6 BCM. Fifty-two dams with a total annual capacity of about 32,3 BCM regulate surface waters.

Occurrence and characteristics of groundwater

Groundwater is discharged through deep and semi deep wells and springs. Statistical data indicate a discharge of 70 BCM of groundwater in 1996. Deep wells (28,9 BCM), and qanats (9,8 BCM), had the maximum and minimum share of groundwater discharge respectively. Groundwater resources are provided by: 275 300 semi-deep wells, 100 700 deep wells, 46 700 springs and 32 000 qanats.

1.3 Demographic and socio-economic characteristics

1.3.1 Population, demography

According to the latest national census (1996), the country recorded 60 055 488 inhabitants, with a density of 36,7 persons/km². The population is estimated to have reached 63,9 million in year 2000, bringing its density to 38,77 individuals/km². The latest growth rates as assessed by successive surveys were 3,1 %, 2,7 %, 3,9 %, 2,5 % and 1,5 % respectively for the 1956–1966, 1966-1976, 1976-1986, 1986-1991, and 1991-1996 periods. (Source: Statistical Centre I. R. of Iran).

Population parameters

Of the total population, 61,3% and 38,7% lived respectively in urban and rural areas. In 1996, the population was composed of 50,8 % males and 49,2 % females. Its distribution by age groups was: 1,70 % infants, 11,21 % children (1-5 years), 14,60 % school-age children (6-10 years), 11,99 % adolescents (11-14 years), 20,54 % adults (15-24 years), 35,58 % middle-aged (25-64 years) and 4,32 % aged (65 years and over). The literacy rate for the population 6 years of age and was 83 % (1999 estimate) of the literate population, 54 % were male and 46 % female.

The gender issue¹¹

Education has made Iranian women career-oriented and conscious that small family means a better quality of life for them and their children. Women, whose constitutional involvement in the nation's development process is not limited, are involved in social, economical, political and cultural spheres of life. Indeed, women's participation at executive and managerial levels has increased. In 1996, 46 % of women were employed in the service sector, 34,5 % in the industries and 17 % in agriculture.

The doors of higher education and other areas once dominated by men have been opened to Iranian women and gradual changes in their progress are taking place. The proportion of literate females among those aged 6 years and over has increased from 52 % in 1986 to 74,21 % in 1996. The average marriage age for women has risen to 22,4 years in 1996, from 19,9 years 10 years earlier.

Employment

According to the 1996 census, the economically active population 10 years of age and over amounted to 16 027 223 (26,68 % of total population), of whom 90,9 % were employed. Out of the 28 821 959 non-economically active-population, 43,8 % were schoolchildren, 45,8 % were housewives and 10,4 % were retirees.

The total manpower in the agricultural sector decreased from 27,5 % to 23,4 % from 1989 to 1999 as it amounted to 3,2 and 3,5 million during these respective dates¹². Agricultural development has enabled its manpower to diversify its income sources, stimulating demand and consumption in rural areas.

Rural women are for the most involved directly in farming activities, playing thereby, an important role in agricultural production. Cooperatives and networks established by rural women are on the increase, though they remain very modest in absolute figures. They lead nonetheless, to more opportunities for social and economic progress.

1.3.2 Economic features

Main agricultural production systems

There are four agricultural crop production systems:

- Intensive cash crop production system: They are mainly confined to the most fertile lands gained over forest and range area on plains and lowlands. Generally modern, these mainly irrigated intensive cropping systems result in increased agricultural production, despite a reduction in cultivated areas. Consequently, land clearing for intensive agricultural cash crop production is under control; it does not constitute currently a threat to forests and rangelands. However, the ongoing construction of some large dams, will lead to the conversion of mostly rangelands to intensively cultivated agricultural land in the near future. Cash crops include wheat, rice, sugar beet, cotton, tobacco, potatoes, oilseeds, sugar cane etc. Intensive forage production together with modern and intensive livestock breeding belong also to this production system.

¹¹ Source: UNFPA Activities in the Islamic republic of Iran, September 1998.

¹² Source: Ministry of Jihad-e-Agriculture – Iranian Agriculture: Capabilities for Development.

- Intensive and modern horticultural production systems produce a vast variety of sub-tropical, tropical and alpine crops. The vast potential and capacities built up within a wide range of development projects, have made Iran's horticulture a leading exporter of fresh and processed products (citrus, apples, grapes, dates, pomegranates, pistachio, almond, walnut, olive, tea etc.). The area under orchards is still growing, as is the modernization of the existing orchards
- Mixed subsistence production system: Based on subsistence crop cultivation and extensive livestock rearing, this generally rain-fed production system is performed on a permanent basis on small farms. Crop production being dependent on highly variable rainfall, it is livestock rearing that allows more subsistence security to farmers. Some annual fluctuations in surface area cultivated may be expected. Wheat, barley and vegetables are the basic crops; they are supplemented by extensive fruit production when sufficient land and water are available.
- Subsistence shifting cultivation mixed with extensive "free-grazing" livestock rearing is a very marginal, hardly productive subsistence agriculture that is carried out by rural communities living on and around forests and rangelands.

Main extensive animal husbandry systems¹³

Farahpour (2001) describes the situation of the extensive animal husbandry systems as follows:

- Nomadic animal husbandry: Rare in Iran, this is a form of husbandry, in which nomads generally do not own any specific land area and live at subsistence level, their products being mostly absorbed by the family. Its contribution to animal products in the market is small (De Ridder *et al.* 1982).
- Transhumant animal husbandry: This system is practiced predominantly in the Zagros Mountains. Some 200 000 pastoral households of several tribes¹⁴ move jointly back and forth, from summer rangelands located in the cold East and Northeast Zagros Mountains to the winter rangelands of the warmer south and southwest parts of the mountains. Most commonly, families move with their herds. However settled households might hire a herdsman or entrust their animals to other tribe members. Pastoralists on both sides of the mountain are granted a "grazing license" usually issued for the same land that was used by family ancestors, to prevent unnecessary conflicts. In this system, the stock includes 48 % sheep, 47 % goats, 3 % cattle and 2 % draught animals (Bagheri, 1994).
- Sedentary animal husbandry: Common in Iran, this system is practiced by 1 473 000 households, in a mixed farming scheme with animals in support of agricultural production. Herds are moved from the village to adjacent communal rangelands in the summer grazing season. Crop residues, weeds, wheat and barley complement the animal feed requirements. Sheep, goats, horses, donkeys and cattle constitute the herd. Cattle are mainly kept on farm or moved to plains adjacent to the village. Meat is the main output of this system; milk is consumed either directly or in processed form. Fifty percent of the herds include less than 20 animals.

¹³ Source: Ministry of Jihad-e-Keshavarzi – Forest & Range Organization: Introduction to Iran's Rangelands, April 2001.

¹⁴ For example, the Chahar Lang-e-Bakhtiary or Haft Lang-e-Bakhtiari tribes.

Status of agricultural sector in national economy¹⁵

Agriculture is one of the most important economic sectors in the I.R. of Iran. Value added in agriculture increased from Rls. 5 585,3 billion in 1989 to Rls. 8 395 billion in 1999, achieving an average annual growth of 4,9 % during the decade. The share of agriculture in total GDP has been variable, ranging from 19,4 % in 1989, to 16,2 % in 2000. Severe droughts resulting in production decline are the main cause to the periodical reduction of the sector's share in GDP. In terms of value added, the highest share within the sector occurred in farming, horticulture and animal husbandry. Forestry (table 4, annex 8) and fisheries experienced a constant trend between 1989 and 1998, which indicates the need to higher investments in these sub-sectors.

2. Forest range resources current status and management

2.1 Forest range and survey information

An important key to the economic development of the I.R. of Iran and to the simultaneous protection of its environment and its productive capacity is the ongoing assessment of the state of change in its rich array of land resources. Without such information, wise rational future planning will be less efficient.

2.1.1 Forest and range data and information systems

A detailed, authoritative statement describing Iran's range situation in quantitative terms is impossible. Agricultural census figures are unreliable and production estimates are incomplete. No cadastral survey has been completed to serve as a basis for nation-wide surveys. There is no agreement regarding the area regularly grazed by livestock¹⁶.

The Engineering Bureau is presently strengthening FRO's capacity to manage land resources at national and sub-national levels, by increasing the quality and widening the range of information available for planning and decision-making. It is preparing a statistical and information system to provide timely and reliable data. By the end of 2003, FRO should be in a position to have a unified and systematic methodology for classification and mapping of all agricultural land resource information, using remote sensing techniques. Likewise FRO should have the full capacity to operate and manipulate digitised geographic information for the preparation of digital land occupation maps at the scale required.

2.1.2 Forest and range surveys

The earliest forest inventory was carried out in the Caspian Forest in 1965. The latest forest survey carried out in 1995 focused on the forests of northern Iran, namely the Caspian and Central Zagros Forests. The survey periodicity for these productive forests has been set at 10

¹⁵ Source: Iranian Agriculture: Capabilities for Development – Ministry of Jihad-e-Agriculture, March 2002.

¹⁶ Source: Project document "Inventory and Monitoring of Renewable Natural Resources of Iran, through Remote Sensing" (UTF/IRA/024/IRA) May 1999.

years. Presently, the country's other forests and rangelands are in the process of being surveyed and mapped.

The present national forest and range inventory is undertaken based on a combination of satellite imagery, aerial photography and field data collection and verification. The Caspian and Central Zagros Forests are covered by a systematic sampling inventory, while the rest of the country is inventoried based on random sampling.

In 1999, satellite imagery (scale 1:250 000) was used to monitor and assess forests, rangelands and deserts. The maps being processed at various scales (1:25 000, 1:50 000, 1:100 000 and 1:250 000) are for the most analogue maps. Some digital maps are also being prepared. So far, 80% of the work has been achieved and the rest should be finished by mid 2003 (the survey would then be complete with regard to quantitative data). By this time, a statistical and information system would have been completed that provides timely and reliable data.

The land cover maps produced for each province at scale 1:250 000 include the following information:

- | | | |
|-------------------------------|------------------------------|-----------------------|
| * Dense forest | * Semi-dense forest | * Open forest |
| * Dense rangeland | * Semi-dense rangeland | * Clear rangeland |
| * Shrub land | * Forest plantation | * Bare land & outcrop |
| * Irrigated agricultural land | * Rain-fed agricultural land | * Urban areas |
| * Dune | * Sandy flats | * Clayey flat land |
| * River bed | * Lake | * Swamp |

FRO's Provincial Offices are undertaking local land use planning studies and producing maps at scale 1:50 000, which have so far covered about 20 million ha.

The next programme will concern quality assessment of forests and rangelands, in order to complete the national survey. By the time this objective is attained, land use and land cover type baseline information will be available for the whole country in a unified and systematic classification format, in map as well as in numerical form.

2.2 Features of country's forests and rangelands

2.2.1 Forests, and rangelands global estate

Prior to 1962, large-scale landlords owned most of Iran's forestlands, whose resources were sufficient to meet national and local demands for industrial as well domestic wood products. In 1962, however, all lands, including forestlands and forest resources were nationalized. Their management was handed over to the Forest and Range Organization. As a result of losing ownership and usufruct rights both the ex-owners and the traditional forest dwellers and users lost from then on their interest and sense of responsibility for the sustainable management and protection of the forests. These became henceforth seen as free public good and were used with less restraint to face the growing demands that followed the dramatic population growth that followed.

Forests¹⁷

Some 1,9 million ha of forests (Hyrcanian) representing 15 % of the country's total forest area, were considered to be potentially productive and commercial. At present, however, only 1,3 million ha are used commercially, the rest being too degraded to play a productive role of significance.

The other forests and woodlands of the country play a vital role in natural resources' protection. "The area of non-commercial forests and woodlands is estimated at 10,5 million ha, consisting of 5,5million ha in the west and Zagros, 2,5 million ha in the south and desert region, and 2,5 million ha in other regions" (Source: MoJA: Iranian Agriculture: Capabilities for Development. March 2002).

Rangelands

Aside from fallow lands, rangelands include lands located on mountains, hillsides or plains that are covered by natural vegetation during the grazing season and traditionally recognized as range (Source: M.P.B., 1998, Technical Office of Rangelands, 2000). According to this definition, Iran's rangelands comprise some 54,8% of the total land area of the country, covering more than 90 million ha (Fazilati & Hoseini Eraghi, 1984). Rangelands may consist of grasslands, shrub-lands and a combination of both. They play a significant role in soil and water conservation as well as in social and economic life. The condition of 16% of the rangelands is excellent, whereas 66% are in favourable to fair condition and 18% are in poor and degraded form.

2.2.2 Forests and range eradication and shift in vegetation cover

Deforestation and forest degradation

Though no comprehensive national forest survey has been carried out yet, there is some consensus among foresters that the area covered by forests nation-wide was 18 million ha (Table 5, annex 8) less than forty years ago, i.e., prior to forest and rangelands nationalization and to population's excessive expansion.

The rates of deforestation that have taken place since diverge because the estimated areas covered by each type of forest differ. The overall deforestation figure for the period 1958-1994 is however widely accepted as being equal to some 5,6 million ha (Table 5, annex 8). The rates of deforestation according to the widely accepted classification of forests in Iran are as follows.

- Caspian broadleaf deciduous forest: This rather narrow green belt bordering the Caspian Sea covers 1,9 million ha (1994 est.), whilst it occupied 3,4 million ha in 1958. Its yield capacity has been reduced from an estimated 300 tons/ha to about 100-110 tons/ha in less than 4 decades.
- Arasbaran broadleaf deciduous forests: These are very degraded forests of northwest Iran, with many endemic species. Some estimate that the original natural stands covered 500 000 before being reduced to a mere 60 000 ha today. A more conservative estimate puts the 1958 area at 300 000 ha and the present one at 200 000 ha.
- Zagros broadleaf deciduous forests: Located on the west side of the country, they consist, mainly of degraded natural stands of oak and pistachia species. Some figures

¹⁷ These data regarding the forest national estate have been used for the preparation of FRA 2000.

suppose that the Zagros deciduous forests cover 5,5 million ha and occupied 12 million ha 40 years ago. We have taken the most widely accepted figures of 3,5 million ha presently and 5,2 million ha in 1958 (area reduction of 1,7 million ha) The biomass production is thought to have been greatly reduced from 125 tons/ha five decades ago, to a mere 8 tons/ha nowadays.

- Central Irano-Touranian evergreen juniper forests: Most upland environments outside the deciduous forest areas were covered by *Juniperus polycarpus*¹⁸. Its area was estimated at 3,4 million ha and its biomass at 30 tons/ha 50 years ago. Currently, the most optimistic figures for juniper forests amount to 500 000 ha, with a biomass figure of 5 tons/ha. The Central forests as a whole covered 7,5 million ha in 1958 and have since lost about 2 million ha.
- Semi-savannah subtropical forests: These forests, which have declined from 1,6 million ha in 1958 to 1,3 million ha presently, occupy a narrow band on the west and a wider one on the south along the Persian Gulf and the Sea of Oman. Their biomass is currently estimated at 2 tons/ha.

Rangeland clearing and degradation

According to a recent census, the total area of rangelands has decreased by 10 million ha in the interval 1972-2000 (Source: FRO – Introduction to Iran’s Rangelands: By Technical office of Rangelands, April 2001). In terms of qualitative assessment, it appears that the ratios have changed to the worse since the area occupied by good rangelands dropped from 19 million ha to 9,3 million ha. It is however difficult to appreciate the changes without thoroughly monitoring and assessing the alterations taking place. While there is substantial rangeland improvement taking place under management schemes and livestock population control, there is also considerable degradation and clearing affecting the quality and surface area of natural rangeland and pastures.

Recent shift in forest vegetation cover

No assessment has been made with regard to the forest annual cover change between 1990 and 2000 as no exhaustive national forest inventories were carried out. The only information available to FRA 2000 is based on a national report dated 1999¹⁹, which provided no information on forest change. The assumption was then made: “Since plantations are reported to increase and assuming a small scale deforestation (FAO 1999), the overall change rate has been set at zero”. However, considering an average annual plantation rate of 63 000 ha, and acknowledging that at present deforestation, if any, occurs only at small scale, it is possible to consider that there may in fact be a very slight positive change in national vegetation cover.

2.2.3 Structure and relative importance of forests²⁰⁻²¹ and Trees Outside Forests

For a more detailed description of (1) natural and (2) man-made forests, refer to annex 10.

¹⁸ The Persian Juniper.

¹⁹ Source: The report in question is a country submission report to FRA 2000 by Mirsadeghi Mohammad Ali H. *et al.* 1999.

²⁰ Sources: I.R. of Iran – FRO: Report on Forestry in Iran; Agreement between the Government and FAO concerning technical assistance services for Zagros Mountains Forestry Development; Ministry of Jihad-e-Sazandegi – Education & Research Division – Research Institute of Forests & Rangelands: Four Articles on Forest: By Dr. M. Jafari (1997).

²¹ Source: FAO Forestry Information System, according to FRA 2000 classification. Original source: Natural Resource Study and Engineering Bureau and Forest Management Bureau (Forest and Range Organization).

Structure and relative importance of natural forests

Because forest inventories do not always make a distinction between natural and artificial stands, the natural forest area distribution according to the FRA 2 000 classification (table 6, annex 8) may include relatively modest areas of man-made forests. As already pointed out, and from a forestry point of view, there are 5 vegetation regions in the country:

- The Caspian or Hyrcanian region, whose broadleaved forests cover 1 905 000 ha within a 25 km-wide humid strip that extends 800 km along the Caspian coastline;
- The cold and humid Arasbaran region, whose high elevations make it possible to encounter the last expands of the Oak-Juniper forests (150 000 ha) of North Western Iran;
- The Irano-Touranian forest region that covers the Central Plateau is arid (100-250 mm rainfall) and includes four main forest types with an estimated area of 2 895 000 ha;
- The Zagrosian semi-arid and sub-humid vegetation region bears 5 050 000 ha of broadleaved as well as coniferous forests;
- The Persian Gulf and Sea of Oman vegetation region with average precipitations ranging from 100-300 mm is home to 2 400 000 ha of woodlands distributed between the warm Omani sub-region and the lesser warm Gulf territory.

Structure and relative importance of man-made forests

Because all lands belong to the State, the government is the main investor in the establishment of man-made forests. It does nonetheless promote private investment in afforestation schemes by providing a multiform assistance.

According to Mirsadeghi M.A. *et al.* by the end of 1999, the total area planted (all categories inclusive) countrywide amounted to 2 221 000 ha (see table 7 of annex 8). Jafari M. and Hossinzadeh A. (1997) indicated an annual afforestation rate of 63 200 ha between 1989 and 1992. Assuming a similar planting rate since, the total man-made forest area would be approximately 2 410 000 ha in 2002. Tree species planted are generally limited to indigenous and/or acclimatized exotic species. To ensure maximum success in tree-planting operations, most plantations are irrigated during 2-3 seasons and sometimes longer. Site preparation costs are high and irrigation facilities' establishment very expensive.

According to a 1992 inventory, 3 million m³ of pulp and industrial wood were produced by man-made forests particularly privately planted fast-growing species. Iran is thus relying increasingly on the cultivation of fast growing species, particularly poplar, to meet part of the country's industrial wood needs. Indeed, the new policy aims at achieving more wood production by targeting annual private planting programmes of 10 000 ha, and by granting substantial support (land facilities, long-term, low-interest loans, etc.) and incentives (seedling distribution, technical assistance, etc.). FRO completed a national inventory on private poplar plantations in 1992, according to which, the total area of poplar plantations was equal to 150 000 ha, of which 35% were young stands, and the minimum and maximum standing volumes were estimated at 21 539 826 m³ and 24 907 064 m³ respectively.

Structure and relative importance of Trees Outside Forests (TOFs)

It is only recently that TOFs began to be perceived in terms of their actual contribution to the well being of people and the environment and to be considered as a genuinely promising

resource. TOFs occur “in a kaleidoscope of situations²²”; they may be spontaneous or they may have been introduced and cared for by people. However, “in the overall picture of TOFs, we lack hard facts and figures beyond the obvious potential promise of the resource” (E. H. Sène). Indeed, because of the concept’s novelty, Trees Outside Forests have not yet figured in any of the traditional statistical data and information classifications. Moreover, the complexity and great diversity of TOFs and actors involved make it very intricate to gather exhaustive quantitative and qualitative data. This applies to the following information on TOFs in Iran, which is incomplete, as it relates only to government-initiated plantation programmes. To be reliable, it should include plantations initiated by communities, private holders and companies, which have not been assessed so far.

FAO definition - Adaptability to Iran’s context: For the sake of discussions to be held on TOFs during the LFCCs’ workshops, the following definition of “Trees Outside Forests” as formulated by FAO’s Forest Resource Assessment (FRA) Programme is given in box 1 below. It is indicative of the diversity of situations that may exist. It also gives an idea of how complex it is to gather comprehensive statistical data and information on TOFs, and to formulate integrated management plans for their sustainable use.

Box 1: Definition of Trees Outside Forests (TOF)

The term “Trees Outside Forests” includes forest and non-forest trees and shrubs on land not defined as forest or other wooded land. TOFs include among others:

- Trees on land that fulfils the requirements of forest and other wooded land, except that:
- The area is less than 0,5 ha;
- Trees are able to reach 5 m height at maturity in situ, but the crown cover remains below 5%;
- Trees that do not reach 5 m in height at maturity in situ, where the stocking level is below 10%;
- Trees in shelterbelts and river galleries of less than 20 m width and below 0,5 ha area;
- Scattered trees in permanent meadows and pastures;
- Permanent tree crops, orchards and “prés-vergers” such as industrial trees, coconut trees, palm trees;
- Trees of agroforestry systems such as coffee, cocoa, home gardens;
- Trees in urban settings (human settlements) and infrastructure environment such as parks and gardens, trees around buildings and in lines along streets, roads, railways, rivers, streams and canals.

The term tree refers to a woody perennial able to reach 5 m in height at maturity, with a single stem, or in the case of coppice, with several stems, having a more or less definite crown. This definition includes bamboos, palms and other woody plants meeting the above criterion. Shrubs and bushes are woody perennial plants, generally of more than 0,5 m and less than 5 m in height and without a definite crown.

Partial evaluation of TOFs in Iran: The present evaluation of TOFs in Iran is very incomplete as it does not include data and information on all private productive, ornamental, shade, etc. plantations, agroforestry and sylvo-pastoral tree plantings, other industrial forest and fruit tree plantations.

²² FAO “Trees Outside Forests: Towards rural and urban integrated resources management” – Contribution to the Forest Resources Assessment 2000 Report T. Rome 2001.

Areas under orchards: Thanks to the country's vast potential, Iran's horticulture is a leading exporter of fresh and processed products in the Middle East. Significant projects have been implemented for the development and modernization of orchards. The area under orchards increased by 38,8 % from 1990 to 2000 (table 8 of annex 8). Based on the 3,9 % average annual area increase (1990-2000) their surface area should be around 1, 807 690 ha, equivalent to 14,6% of the forest area of Iran.

Urban and peri-urban forestry²³: Collaborative efforts between FRO, municipalities, NGOs and citizens' groups have led to the establishment of a dense network of urban/peri-urban forests in Iran, whose status can be partly appreciated through data published by FRO in 1997 and synthesized in table 9 of annex 8.

Box 2: Teheran's exemplary urban and peri-urban forestry ./..

The urban and peri-urban forests of the capital city were initially established by FRO before being handed over to the municipality's Parks and Green Areas Organization for their management and expansion. The organization has since implemented numerous projects towards establishing a network of plantations, recreation parks, and green areas within and around the city. Its dynamic and innovative approach to confronting the many urban, social, mental and pollution related problems of the city, has allowed it to develop solid expertise and to be regarded as an exemplary model in the country and the region.

The objectives behind developing the network of urban and peri-urban forests and urban greens and parks in and around Teheran are the following:

- Protect the integrity of what is left of the environment;
- Create beautiful and accessible landscapes and outdoor recreation and sport facilities;
- Reinforce the harmonious relationship between man and nature;
- Supply the standard level of urban green etc.
- Expand the green belt around the Teheran to act as a natural boundary in order to prevent the city from inexpedient growth;
- Reduce the severe pollution and its negative spiritual, mental and physical effects;
- Control of flooding and soil erosion as the largest part of the city is constructed on the ridges and valleys of the Alborz Mountain.

Teheran's urban forestry, which counted 4 760 ha at the end of 1999, has reached 31, 760 ha by mid 2002. As a consequence, and despite the sharp increase of the city's population, the per capita green space has developed from 1 m² in 1987 to 18 m² in 2002. The objective is to attain 25 m² or urban green per capita in 2007. The parks inside the city have passed from 65 units in 1989 to 861 units presently.

A comprehensive greening plan has been prepared, which includes a green belt around Teheran. The objective is to achieve 116 000 ha of greenbelt plantations over the next 10 years, of which 41 000 on state-owned land and 75 000 ha on private land.

The Teheran Parks and Green Areas Organization employs 161 specialists. Private enterprises employing 14 000 workers and technicians are contracted for the extension and the maintenance activities related to parks and urban forestry in Teheran. Presently the municipality's organization assists other cities in designing their parks facilities and urban and peri-urban plantations.

²³ Ahmad Mehdipour Ataie: Urban and Peri-Urban Forestry in the Near-East – A case Study of Iran and its capital Teheran.

By the end of 1996, the Iran's urban/peri-urban forests covered to 530 288 ha. Considering that the annual planting rate of 3 760 ha achieved between 1994-1996 has been sustained during the period 1997-2002, one could infer that the total area of urban/peri-urban forests has increased to reach 552 848 ha. In fact, urban/peri-urban forestry is gaining momentum. Many provinces have developed their own urban forestry establishment programme. Large cities in particular are trying to deal with the necessity to limit urban development by setting up greenbelts and developing various forms of recreation parks and green areas following Teheran's example (box 2). Outside Teheran, urban/peri-urban forests are principally established and managed by the FRO²⁴. Municipalities also play an increasing role in managing green spaces, although they do not possess as many funds, equipment and expertise as the Capital city.

The private sector participates to the expansion of green spaces by planting trees along the streets of residential and commercial areas. Several governmental institutions (Environmental Department, Ministry of Education etc.) are also involved in urban/peri-urban forestry activities, under the assistance of the FRO. Finally, significant measures have been taken for the stabilization of sand dunes around villages, which resulted in vast areas planted, that play the same role as urban forests and should be listed as such, even if established in rural areas.

2.2.4 Structure and relative importance of rangelands

The classification of rangeland formations is not uniform; it varies according to sources. Following are two classification examples:

Classification according to National CBD Report for I.R. of Iran

Rangelands are categorized as follows:

- Summer rangelands: Occurring mainly in the humid and sub-humid zones of the Caspian Sea and the High Plateau of Azerbaijan, they cover an area of 14 million ha. Their annual biomass production is estimated to be 580 kg dry matter/ha;
- Winter rangelands: They are situated mainly in the Mediterranean and in the semi-arid zones in western Zagros and Alborz Mountains where they cover an area of 60 million ha. Their annual biomass production is estimated to be 184 kg dry matter/ha;
- Arid rangelands: cover 16 million ha, mainly around the central arid zones. Their annual dry matter production is estimated at 52,5 kg/ha. (Source: Biodiversity CRTIC: National CBD Report for Iran.).

Classification by the Technical Office of Rangelands

TOR, on the basis of grazing seasons, puts rangelands in 2 categories:

- Summer rangelands: Mountainous and upland summer grazing rangelands are characterized by their cool summers. They cover 23 million ha and produce 6,21 million tons of dry matter, equivalent to 3 415 million ton useable TDN²⁵. The grazing period

²⁴ Ahmad Mehdipour Ataie: Urban and Peri-Urban Forestry in the Near-East – A case Study of Iran and its capital Teheran.

²⁵ Total Digestible Nitrogen.

starts early spring and lasts until late summer. It is calculated that 54 million animal units could graze on these rangelands for 100 days annually.

- Winter and fall grazing rangelands: These are located mainly on plains and in lowlands, where they cover 67 million ha. Used principally in winter, these rangelands produce 4,5 million tons of dry matter equivalent to 2,47 million tons useable TDN.

2.3 Forest and range environmental significance

2.3.1 Biodiversity conservation

Despite the significant degradation and destruction processes that have affected natural resources, particularly forests and rangelands in the course of history and during the past decades, Iran remains endowed with a noteworthy environmental diversity. It possesses one of the world's richest collections of flora and fauna. Forests and rangelands are a major sanctuary to this remarkable biodiversity whose preservation is sought after by FRO through its forestry-range protection-development programmes.

In addition to FRO, the Department of Environment (DE) national authority in charge of safeguarding the environment provides full protection to major biodiversity sites. In 1999, it protected and managed 8 million ha, of which: (i) 1,1 million ha of national parks²⁶; (ii) 1,9 million ha of wildlife reserves²⁷; and (iii) 5 million ha of other protected areas. By 2002, the total area under management by the DE has reached 11 million ha (Source: Mr. Anoshivan Najafi – Deputy Head of the Department of Environment).

2.3.2 Other protective functions of forests, rangelands and TOFs

Forests, rangelands and Trees Outside Forests have numerous protective functions among which: Soils and water conservation; habitat preservation for wildlife, combating desertification and drought, shading, protection against winds, reducing sound as well as air pollution etc.

2.4 Economic and social significance of forests and rangelands

2.4.1 Populations depending on the forest & range socio-economic benefits and issues

Very large human and animal populations still depend on the forest and range estates for their livelihood. The human populations derive substantial socio-economic benefits from forests and rangelands, but face likewise increasingly important issues related to forest and range use.

Socio-economic significance of natural forests and rangelands

It is not unrealistic to claim that the supply of agricultural and livestock products in Iran is inextricably linked with the maintenance of viable forests, woodlands and rangelands. Local communities derive many benefits from forests and rangelands. These include, fodder, wood

²⁶ Ten national parks.

²⁷ Twenty five wildlife reserves.

and non-wood forest products, a rich diversity of range by-products, honey etc. all of which contribute to direct food security, employment and revenues.

Some 916 000 households including 200 000 transhumant families make regular use of rangelands and pastures (TOR-2000). Fifty per cent of the 1 473 000 sedentary livestock breeders depend partially on natural rangelands and pastures to meet their animal feed requests. The range dependence of the livestock population is a solid indicator of the socio-economic benefits provided by rangelands; it varies from 15,2 % for goats, to 20 % for native cattle and over 40 % for sheep (Table 7 of annex 8).

Besides fodder production, mining, fuel-wood collection etc. and a whole assortment of rangeland by-products (medicinal and edible plants, honey...) are also of substantial socio-economic significance.

Of its total 12,4 million ha forest area, Iran counts only 1,3 million ha of commercial forests with a potential annual commercial wood yield of 9 million m³ (mean annual increment of 7 m³/ha). However, due to the socio-economic conditions prevailing and the illegal exploitations and degradations taking place, it is estimated that the actual maximum mean annual increment does not exceed 3 m³/ha, which translates in a maximum annual harvest of 3,9 million m³ of commercial wood per year.

Prevailing socio-economic issues related to forests and rangelands' use

The prevailing socio-economic problems as described by the National Report on Forestry in Iran²⁸ are related to population density. The Hyrcanian and Zagrosian regions are more densely populated than the Irano-Touranian and the Persian Gulf and Ommaninan regions. Consequently, the socio-economic problems of the former regions referred to, are more intense, severe and complicated. The main problems of each of the above-mentioned regions are as follows:

- Hyrcanian (Caspian) Region: Some 464 000 people (78 000 families) living in 3 400 villages depend largely on forests and rangelands for their livelihood. The later is based chiefly on subsistence agriculture, livestock rearing (4,3 million cattle heads), and wood and non-wood forest products harvest for direct consumption and/or commercialisation, all achieved in breach of the law, through overgrazing, suppressing natural regeneration, conversion of forests to agricultural fields and rangeland, exploiting 4 million m³ of fuel-wood annually and producing charcoal²⁹.
- The Arasbaran Zone: Forestland conversion and fuel-wood cutting have resulted in severe degradation and decrease in area of the Arasbaran forests.
- Zagrosian Region: It is home to 200 000 transhumant households and their livestock that depends on winter and summer rangelands. It also accommodates sedentary livestock breeders that practice shifting cultivation on very steep slopes, as a way of securing a meagre subsistence, and at times, of claiming their right to the land they exploit. Poverty and living on the brink of deprivation and misery are the main socio-

²⁸ National Report on Forestry in Iran presented at the Fifteenth Session of the AFWC/EFC/NEFC Committee on Mediterranean Forestry Questions Silva-Mediterranea: FAO, Portugal, 16-20 March 1992.

²⁹ The production of charcoal in the Caspian forest has regressed gradually passing from 43 862 tons in 1979, to 9 139 tons in 2000. Source: Report on Forest Policies and Action Programmes in Iran – San Jose, Costa Rica 4-15 March 2002. By: Mostafa Abdollahpour and Madjid Saifollahian.

economic problem. The survival reflexes developed to subsist and endure the harsh conditions of the region are the main source of continuous forest and range degradation.

- **Irano-Touranian Region:** The human pressure in this region is less than in the former ones and the damage to the forests and rangelands is accordingly less important. However, poverty as a socio-economic issue compels local communities to make full use of natural resources, subsequently damaging them through overgrazing, change in vocational use, and cutting trees to satisfy energy and construction wood requirements. Except for some tapping operations carried out on *Pistachia atlantica* stands, the main role of these forests is not production or exploitation but rather soil and water conservation, sand dune stabilization and game accommodation and support.
- **Persian Gulf and Omani Region:** Here, the socio-economic problems of forest dwellers are of less importance in comparison with the other regions. Given the warm climate prevailing, the demand for fuel-wood is lower and tree cutting minimum. The animal population is not large, which explains the lesser damages caused by overgrazing. In terms of fodder utilisation, some species have a much higher significance, such as *Prosopis spicigera*. In terms of wood utilisation, *Acacia arabica* var. *nilotica* is commonly used in the barge-building industry.

Perhaps the most important socio-economic issue nationwide is related to the forests and rangelands' nationalization in 1962 that saw no subsequent successful state alternatives to the former traditional protection, management and utilization systems. This has created a void that still persists and as a result of which, survival instincts have prevailed. The "first come, first serve" concept became a predominant method of natural resources' utilization and misuse and mismanagement have resulted in even deeper socio-economic problems, giving rise to more poverty in rural areas.

2.4.2 Forests and rangelands: production capacity versus consumption requirements

Wood products: production capacity versus consumption requirements

The area of harvestable commercial forest with suitable potential is limited. Exploitation is carried out mainly at small scale, using advanced technology for maximum economic return. This unique combination has been made possible thanks to the knowledge and know-how accumulated in the Caspian region, and to the fact that the government has encouraged the constitution of numerous forest management and wood production cooperatives. As a result of severe forest conservation measures introduced, commercial wood production has decreased from 1,9 to 1,3 million m³ between 1990 and 2000, which amounts to a 9,1 % decline (Source: MoJA – Iranian Agriculture: Capabilities for Development, March 2002). However, illegal timber felling and other wood products' harvesting have not been assessed though they are believed to be important and play a substantial economic role by satisfying un-assessed consumption requirements.

Besides the fairly well documented production of commercial wood production, other wood products are either consumed directly or marketed locally without assessment. They represent significant products, particularly firewood and charcoal, which still often constitute major sources of domestic energy. Some official fuel-wood requirement' figures exist (table 10 of

annex 8) but they may be well underestimated, given that much domestic energy wood is consumed and/or marketed locally without appearing in statistic figures. This is particularly true of the remote highlands and plateaus of Iran, which endure very cold and long winters. The probability that the consumption levels are well above the production capacity of the natural forests seems evident, given the steady degradation of the resource.

Fodder: production capacity versus actual uptake

The livestock sub-sector operates through both modern enterprises and traditional farming systems. Based on the census issued by the Ministry of Jihad-e-Agriculture, the livestock population of the country in 2001 reached 133 million animal units³⁰ (see table 11, annex 8).

The maximum allowable production of the rangelands is estimated at 5,9 million tons useable TDN, enough for about 27 million head livestock. The actual fodder uptake, however, is about 15,2 million tons TDN, which illustrates the extreme level of over-exploitation the rangelands are enduring. (Source: MoJA - Iranian Agriculture: Capabilities for development, March 2002).

NWFPs: production capacity versus consumption requirements

The actual consumption and levels of exploitation of non-wood forest products and range by-products are not thoroughly known. They appear however, to be very important, given their popularity and prevalence in rural as well as in urban markets. There is, nonetheless, no doubt that the degradation, which has affected forests and rangelands, has likewise decreased the NWFPs and range by-products potential yields. The demand has conversely increased and the probability that uptake is substantially superior to production capacity is high. This justifies FRO's concern and its decision to manage of 2,2 million ha of forests for NWFPs countrywide. The main NWFPs are dye extracts, medicinal plants, and exudates. Others include aromatic plants and essential oils, honey and edible foods, particularly nuts. They may be classified as:

- Forest products comprise gum, almond, pistachio and walnuts, wild pear seeds, black gooseberry, *Quercus persica* Jaub, *Myrtus communis* etc.
- Walnut trees have traditionally been planted for their fruit and timber. The kernel is a common component of Persian food; it has an important place in the national nut production. The valuable nut of *Pistachia vera* is used as a food product and is appreciated for its medicinal properties.
- Range products include *gum tragacanth*, *galbarnum*, *Assa fætida*, *gum ammoniacum*, *Astragalus manna*, *giant asphodel*, *Ascalomina garlic*, *rotschyam thyme*, *bugloss*, *licorice*, *oriental salp* etc³¹.
- Medicinal, culinary, and aromatic herbs have traditionally been used in Iran for many generations and have always been regarded as an integral part of farming and agricultural practices. Currently, research on medicinal plants is stimulated by the government and carried out by universities, pharmaceutical institutes, experimental farms and research centres. A major exudate, *gum tragacanth* is an important commercial product extracted from several shrubs of the *genus Astracantha*.

³⁰ One animal unit (AU) is equivalent to a sheep of 35 kg.

³¹ Source: Forests and Range By-Products in Iran: Exploitation Principles: By Mostafa Abdollahpour and Jamal Latifi. Presented at the 14th session of the Near East Forestry Commission – Teheran 1-4 July 2000.

2.4.3 Forests & rangelands' contribution to the national economy

Wood products in national economy

Of the 1,3 million ha of potential commercial Hyrcanian forests, there remains only 856 443 ha of high quality productive stands, which are under intensive management, as they form the unique source of commercial wood. Their management is in the hands of State corporations (432 000 ha), forest cooperatives (126 000 ha) and private enterprises (315 000 ha).

The contribution of Iranian forests to the national economy is illustrated in table 12 (annexe 8), where the quantities of various wood or wood-derived products imported and produced locally are indicated. Given the same value in hard currency as that of imported products, the local wood production would be saving the state economy the equivalent of US \$ 437 048 000 annually.

Fodder contribution to national economy

According to TOR (2001), 218 000 MT of meat (31% of the Iran's annual production) are associated with rangelands, whose annual dry matter production is put at more than 10 million MT (Fazilati and Eraghi, 1984), enough to supply 39 % of the feed requirements of the national livestock population.

NWFPs and range by-products' contribution to national economy

The contribution of NWFPs and range by-products to the national economy is achieved in two ways, i.e. marketing at national and local levels and exportation. The internal marketing value of NWFPs and range by-products is difficult to assess. As to the commercial value of NWFPs it was estimated at US \$ 10 119 382 and US \$ 7 811 338 respectively for 1988 and 1999, as indicated in table 13 (annexe 8).

2.4.4 Forests & range contribution to food security, employment and revenue generation

Contribution of forests and rangelands to food security

The I.R. of Iran has pursued food security as a major priority, particularly in the Third Five-Year Development Plan, which places very high precedence on improving food security through enhancing domestic production, which accounts for more than 80 % of the country's total food supply.

The contribution of forests and rangelands, though undeniably very substantial in terms of meat, dairy products, edible non-wood forest products and range by-products etc. has yet to be assessed.

Contribution of forests and rangelands to employment and revenue generation

According to Mirsadeghi, M.A. and Attarod, P. (2002), over 5 million people living in forests and their vicinity have relations at various degrees with forests and their products. There are 7 453 permanent and 12 831 temporary jobs related to forestry activities, while 40 000 persons are employed in connection with wood industry. Some 452 000 persons derive a permanent

occupation from rangelands, while 2 500 individuals have a permanent employment and 2 122 others benefit from temporary jobs.

A report presented to the First Experts Group Meeting on Forest and Environment³² indicates that the exploitation of 28 items of NWFPs and range by-products has provided 12,8 billion Iranian Rials of revenues that could be equated to 3 months of wages provided to 25 108 households every year.

The mission was not able to document the revenues generated from forests and rangelands. However, it is unquestionable that aside from wages and salaries, substantial revenues are derived from the commercialisation of a multitude of forest wood products, forest non-wood products and rangeland by-products, which are still very common, not only in the rural world, but also in large cities.

2.5 Management, rehabilitation and extension objectives, achievements and perspectives

2.5.1 Forest management and extension objectives, achievements and perspectives

Forest management: Objectives/Formulation/Implementation/Perspectives

Given their high yielding potential, the Hyrcanian forests have long been at the heart of Iran's forestry. These management approaches targeted commercial wood production only. They were based on European silviculture and gave little consideration to the forest dwellers' socio-economic reality.

Out of the Caspian region, forests were penalized as they received little attention in terms of management and silviculture. It is only with the second Five-Year Development Plan (1994-1998) that the national forest policy began giving them some consideration. Socio-economic realities surrounding forests were increasingly given serious consideration and attempts at introducing integrated participatory approaches to forest rehabilitation and management were initiated.

Forest dwellers cooperatives have been constituted 15 years ago in the Caspian forests. At present, 17 such units are managing 138 000 ha commercial forests. They consist of 5 473 members (5 299 men and 138 women). Formerly managed by FRO staff; these cooperatives presently recruit their own managers, mainly among retired forestry personnel. This is a clear indication that management tends to develop into an authentic participatory exercise as planning and decision-making are put in the hands of the group.

By 1999, over 3,9 million ha, equivalent to 31,5 % of the national forest estate, were under management (Table 14, annex 8). The Hyrcanian forests (1,9 million ha) are all under management, including their non-productive stands (398 000 ha), which are managed with conservation objectives. The other main forest types of the country are being gradually brought under two major forms of management, i.e. conservation and multipurpose management. Conservation management, which concerns 569 000 ha, aims at the rehabilitation and enrichment of degraded natural forests. Multipurpose management involves

³² Report of the I.R. of Iran on Management and Conservation of Forests – Iran 27-29 July 1995.

1 440 440 ha; it seeks to enrich forestlands through multipurpose tree plantations aimed at providing employment and revenues to local forest dwellers. Some multipurpose management models have been prepared for the Zagros Mountain region and are being implemented following the participatory approach. The total areas put under management outside the Caspian Sea region are in decreasing order: 867 400 ha, 807 500 ha, 223 800 ha and 101 740 ha respectively for the Irano-Touranian, the Zagros, The Khalij-Omanian and the Arasbaran forests.

The perspectives with regard to additional management within the Country Vision 2020 are as follows: Management for conservation would concern an additional 350 000 ha of degraded Caspian forest³³ and 1 300 000 ha outside the Caspian region. As for multipurpose forest management, they will cover 300 000 ha of national forest land.

Forest extension: Objectives/Achievements/Perspectives

Forest plantings are established to compensate for the loss of natural forests and to extend the area of the global national forest estate. While the total planted area up to 1999 has been estimated to amount to 2 221 100 ha (table 7, annexe 8), it is not known whether it has contributed to increase the country's total forested area.

Afforestation perspectives for industrial wood for the period 2001-2005 concern 184 000 ha of saw-log/ veneer plantations and 320 000 ha of pulpwood plantations. Of these, 161 000 ha will be executed by the large-scale private sector, 200 000 ha by the small-scale private sector and 143 000 ha by the public sector. The long-term afforestation programme (see Forestry Development Country Vision 2020 in annex 14) aims at establishing 4 000 000 ha of plantations (1 900 000 ha for forest development, 730 000 for green spaces' development, 370 000 ha for wood production and 1 000 000 ha of multipurpose tree planting).

2.5.2 Range management/rehabilitation/extension objectives, achievements and perspectives

Range management: Objectives/Degree of formulation and implementation/Perspectives

Prior to 1995, some range management approaches had been formulated, but none implemented. FRO has since, formulated many range management plans and convinced the government to grant loans to help the plan holders implement them. FRO formulates these plans with the view of preserving the resource, while allowing livestock holders to secure maximum benefit from its utilization. The plan is the ground on which FRO establishes thirty-year legally binding contracts with grazing license holders. To the present day, the situation of the range management programme is as indicated in table 15 (annex 8).

The assessment of range management countrywide indicates clearly the positive effect it is having in terms of rehabilitating the productive capacity of the resource. The production of rangelands increased by a factor of 1,4 on rangeland initially in good condition, a factor of 2,15 for those initially in fair condition and a factor of 3 for rangelands that were initially in poor condition.

The projections for the future aim at managing substantially larger areas of rangelands and at implementing further the "Fodder-Livestock Equilibrium" Plan, establishing a balance between the animal population and the actual carrying capacity of rangelands and pastures.

³³ In all probability, these are forest previously managed for production purposes, which have been degraded to a point where they need new management objectives, namely, conservation.

Range rehabilitation and extension: Objectives/Achievements/Perspectives

As a major step towards range rehabilitation, grazing rights are granted to livestock breeders on their properly demarcated traditional grazing boundaries, by issuing them a grazing license. The latter indicates not only the acknowledged boundaries, but also specifies the name of the license holder, the allowed grazing periods and the number of animals authorized on the range.

As of now, 56,4 million ha of rangelands have been inventoried and grazing licenses issued to 689 000 households recognized as traditional users with nearly 55 million AU. According to the Faculty of Social Science (Teheran University), an average household leading a normal life on the basis of extensive animal husbandry needs 530 ha of pasture and range to be grazed by 229 AU during a period of 8 months. The present situation after granting grazing licenses shows that each household is granted on average 81 ha for an average herd size of 80 AU, which is at odd with household's requirements. According to the Faculty of Social Science grazing licenses should be granted to not more than 180 000 households over 56 million ha of rangelands.

To this day, range rehabilitation activities have concerned the following:

- Range inventory and land tenure assessment 56 400 000 ha
- Planting (inclusive shrub transplanting) 1 875 000 ha
- (Re)Conversion of abandoned rain-fed agricultural fields to rangeland 1 119 000 ha
- Fertilizing of rangelands 1 037 000 ha
- Establishment of enclosures for rangeland protection 6 128 000 ha

While most of the activities concerned protection and rehabilitation of degraded range tracts, some rangeland area extension did take place through the conversion of rain-fed agricultural land formerly used for cereal crop cultivation, to rangeland over some 1 119 000 ha.

2.6 Combating desertification in Iran

Before the beginning of the National Desertification Control Programme, Iran counted about 5 million ha of active sand dunes. Sand encroachment had become a matter of great public concern long before the severe drought of the early 1960s, as hundreds of villages had to be evacuated and large cities and communication infrastructures were under constant threat.

In 1965, following some successful sand dune fixation pilot projects, the government initiated the first National Desertification Control Programme and started implementing the first large scale sand dune fixation projects. Active dunes were stabilized using native and exotic tree and shrub species. The native *Haloxylon persicum* was and remains the mainstay of the sand dune stabilization programme. Presently, most of the programme is achieved through direct seeding of both woody and grass species. The achievements of the Desertification Control and Sand Dune Fixation Bureau (FRO) are as follows:

- Rehabilitation through direct seeding: 3 300 000 ha

- Fixation using petroleum mulch spray 130 000 ha
- Windbreak establishment 2 000 km

Thanks to the experience gained by FRO's staff, most rehabilitation activities are achieved with a high rate of success. In sand dune fixation, all surfaces treated have been protected following stabilization, after which, native vegetation achieved such good recovery by occupying the empty interspaces, that some areas have been since open to controlled grazing and cautious fuel-wood gathering.

2.7 Promoting participation in forest & range management: achievements

Promoting participation has become the foundation to sustainable natural resources management policy in Iran. Agricultural development (including forestry and range) requires strong rural community and farmer involvement. There are 3,2 million agriculture and livestock production holdings, 95 % of which are private. The implementation of any development, extension and supportive project cannot be done without the agreement, commitment and full involvement of the rural people and the private sector. This is in fact specified in Paragraph 8 of the Policies Section of the Second Five-Year Plan, which urges for serious attention to encouraging people's participation. The main achievements of the Ministry in promoting participation in agriculture up to 1999 are summarized as follows:

- Facilitating the establishment of cooperatives: Rural producer cooperatives numbered 767 in 1999, including rural cooperatives, unions, women's cooperatives etc. In forestry and range management, the organization of rural cooperatives has become a common procedure, by which rural communities are encouraged to participate to forest and range rehabilitation and sustainable management.
- Extension activities: There have been about 760 extension-research plans carried out. These have led to the transfer of information and know-how to 3,2 million farm holdings, and the promotion of technology through demonstration farms and orchards with farmers' participation. Participation is becoming increasingly referred to in the approach to forest and range management. It is in its infancy stage and requires intensive technical backstopping and training.
- Privatisation: While privatisation is not an objective in itself, there is room for it in paragraph 8 of the Policies Section of the Second Five-Year Plan. Privatisation has been pursued mainly in the agricultural areas of quanats' restoration, pesticide manufacturing, establishment of mechanization companies etc. In the forestry and range sector, privatisation is not excluded (Box 4), however, lease contracts are more common. They are proposed to farmers and livestock holders ready to participate in the rehabilitation and management of the natural resources. Privatisation has not yet been achieved on any major scale, even though there is room for such undertaking as illustrated in the following example (see Box No 3).
- Participatory approach to forest management: Management plans are prepared by the administration for specific forests that have been traditionally utilized by local families. The plans are implemented by the beneficiaries on a contractual basis with the objectives of:

- Reducing fuel-wood consumption by introducing alternative domestic energy sources;
- Encouraging forage cultivation inside the forest, in exchange for livestock removal from the forest to enhance natural regeneration;
- Enriching forest stands by seeding and planting (multipurpose native species) operations;
- Distribution of land outside the forest to the beneficiaries, with 30 years land tenure rights³⁴, as a compensation for the land they used to cultivate within the forest limits;
- Creating employment and revenue generation opportunities to improve people's livelihoods.

The beneficiaries organized into forest cooperatives receive inputs from FRO in exchange of which, they execute the prescribed operations as voluntary (unpaid) contribution to the management of the forest. The priority areas selected for this form of participatory forest management are those with potential for NWFPs that could provide additional revenue opportunities, while contributing to food security.

Box 3 : Participation in practise - rangeland management in Iran³⁵

The majority of rangelands in the country are in a state of advanced degradation and any further deterioration of this resource could cause a serious threat to the national food security. It has become clear that implementing sustainable rangeland management practices requires fundamental changes to land tenure. It has therefore been recognized that the main role of performing rangeland management must by right, become due to the legitimate livestock owners and land users.

The first step in the process is to carry out a cadastral survey and delineation by identifying the persons who have legal right of utilization of specified rangelands, and defining their boundaries. After completion of the cadastral survey and delineation process, the users' rights are then settled and assumed for all purposes. FRO delivers grazing licenses to them, in exchange of which they are expected to invest and participate in the rehabilitation and sustainable management and use of the area resources, by agreeing to the management plan formulated by the administration. The preparation of a socially acceptable, economically viable and environmentally sound range management plan, considers all likely existing opportunities to achieve the best possible level of production for a given site.

After the preparation of a mutually satisfactory management plan, the government leases the land to the new land tenant for a period of 30 years. An official contract is signed between the land user and the government represented by the local Range Office and the plan administrators. While the ownership of the land remains with the State, the lease act may be transferred from the land users to their heirs and the contract remains valid until evidence of an infringement. The benefits derived by the land tenant and his household and the observance of the terms of reference of the management plans and of the contract provisions are the basis for a sound government-land user partnership.

³⁴ Local communities hope rather for a full land privatisation for the benefit of those who participate to the implementation of the management plan.

³⁵ The Rangelands of Iran: Ministry of Jihad-e-Sazandegi, Forest and Range organization: Department of Range.

Box 4: Rangeland rehabilitation: Development activities leading to land Privatisation
Case study of Aberdaj Desertification Control Station, South of Teheran

Participatory land rehabilitation, in partnership with the State has been successfully attempted between FRO and a number of investors who agreed to set-up a private land development enterprise south of Teheran. The newly established venture, was allocated (on a very degraded arid rangeland area severely encroached by moving sands) a 2 500 ha plot of wasteland for rehabilitation and further integral development.

The Government provided continuous technical assistance as well as credit facilities through the agricultural bank. It also provided fertilizers, seeds and various other inputs. After fencing the plot, the enterprise undertook the following operations: digging of five deep-wells equipped with motor pumps; installation of water harvesting structures and a small dam reservoir; planting a windbreak network using native species such as *Populus nigra*; setting up a *Pistachia vera* orchard; establishing a 1000 ha *Atriplex* spp. plot and irrigated alfalfa parcels for intensive fodder and forage production, together with corn and barley crop cultivation to supplement livestock feed, introduction of 2000 sheep and 1000 camels, etc.

In view of the successes booked by the initial group of investors, new members joined up and the enterprise counts 200 members at present. It has created numerous temporary as well as permanent job opportunities, particularly for the inhabitants of a close-by village that was formerly abandoned following severe sand encroachment. New returnees are regularly recorded, that hope, and often find employment within the successful land rehabilitation and development private enterprise.

The outline agreement between FRO and the land development venture anticipates that following five years of successful rehabilitation and integrated development of the 2 500 ha tract, the land ownership will be definitely transferred to the enterprise.

3. The Forest and Range Institution

3.1 *Institutional framework of Forest and Range*

3.1.1 The Forest and Range Organisation

Forests and rangelands are administered according to the Forest and Range Nationalization Law (19.02.1963) and the Protection and Utilization of Forests and Ranges Law (21.08.1967). Operating under the Ministry of Jihad-e-Agriculture, the Forest and Range Organization (FRO) manages all public lands covered by the Forest and Range Nationalization Law³⁶. It is the governmental institution responsible for setting guidelines, planning, implementing and monitoring desertification control, forestry and range management and development, as well as urban and peri-urban forestry related programmes. FRO enforces policies, legislation and regulations pertaining to land use, forestry, conservation, range management, and desertification control.

³⁶ Source: Urban and peri-urban forestry in the Near East. A case study of Iran and its capital Teheran: By Ahmed Mehdipour Ataie, 1997.

FRO is headed by a Deputy Minister and advised by a “High Council for Forest, Range and Soil”. It employs 10 000 personnel, of whom 900 are active at headquarters³⁷. FRO’s central administration is composed of 5 Bureaus and 5 Departments headed each by a Deputy (annexes 4 & 13).

Projects and plans are prepared by the central bureaus and approved by the High Council for Forest, Range and Soil. They are then referred to the 30 FRO provincial institutions for implementation. These “Natural Resources General Directorates” are headed each by a General Director (see annex 5) assisted by 3 Deputies. They include 3 Central Offices (Legislation, Public Relations, Education, Extension and Public Participation).

Although the FRO has an adequate organizational structure, some functions such as resource inventory, long term planning and extension and participation need serious strengthening. With regard to extension and participation, the following observations have been made:

3.1.2 The Forests and Rangelands Extension and Participation³⁸

Agricultural extension is carried out through a network of 700 Agricultural Extension Services. Since its establishment in 1953, extension has basically been organized to assist farmers in obtaining production inputs, rather than to advise them on production techniques. In 1985, half of the original extension staff was transferred to concentrate on seed production. This has enabled the remaining Agricultural Extension Organization to start focussing on the central task of advising farmers on crop production. In 1991, the organization was upgraded to Deputy Ministerial level; it now includes Agricultural Education Training Departments.

FRO has an Extension and Participatory Bureau as a central department. In each of the 30 provinces, FRO has established an Extension and Participatory Office. The activities of these offices consist in:

- Increasing environmental awareness at different levels;
- Training local communities through technology transfer;
- Encouraging communities to participate in natural resources’ management and conservation and in tree planting. As part of this development, FRO has established 700 (rangeland, forests and wooded land) users’ cooperatives with 36 000 members in charge of the conservation of natural resources.

Recently, more emphasis has been put on participatory rural development. Efforts are made locally, particularly in the forestry sector to initiate participatory management. It appears, however, that participation is still understood as a counterpart effort requested of the “beneficiaries” to manage their resources as formulated by Local Forest Offices, following a top-down approach. No Rapid Rural Appraisal seems to be carried out as an inclusive research process to embrace the perspectives of all interest groups, including rural women and

³⁷ Source: Report of the I.R. of Iran on “Management and Conservation of Forests and Environment Protection” presented to the 1st expert group meeting on forest and environment, Iran July 1995.

³⁸ Source: Ministry of Jihad-e-Sazandegi, Forest and Range organization: Integrated Land Management Project of the Islamic Republic of Iran (Coffey MPW Pty Ltd and Kinseeds Pty Ltd. March 1993).

men, as a basic step to participatory planning and decision-making that would fully involve rural communities together with the administration's technical staff.

3.1.3 The Forests and Rangelands Research Institute

The Research Institute of Forests and Rangelands (RIFR) was founded in 1968 as a national institute with mandatory responsibilities to lead research activities on Iran's natural resources. The RIFR belongs to the Education and Research Division of the Ministry of Jihad-e-Agriculture. It has organized its administrative structure as follows:

- The institute's headquarters consist of eleven Research Divisions supported by an Administrative and Financial Department;
- Twenty eight Research Centres decentralized at province level; and
- Seventy-nine Research Stations distributed throughout the various ecological zones of the country.

The 1 131 scientific and administrative personnel of RIFR were distributed in 1997 as indicated in (table 16 of annex 8)³⁹.

The former strategy of the institute was founded principally on afforestation using fast growing exotic species. It is now more focused on such items as forest ecology, genetics, silviculture as well as afforestation using both native and acclimatized exotic. The distribution of the main tasks among the Research Divisions is detailed in annex 12.

Independent from the RIFR, the Soil Conservation and Watershed Management Research Centre (SCWMRC) belongs also to the Education and Research Division of the Ministry of Jihad-e-Agriculture. The most important activities relating to the Centre are carried out by the following Research Sections:

- Soil Conservation Section: It carries out research on soil erosion and evaluation of different models;
- Watershed Management Section: It undertakes research about integrated watershed management;
- River-Training and River-Engineering Section: It conducts research on methods of river-training;
- Floodwater Spreading and Utilization Section: It carries out research on traditional and modern methods of floodwater harnessing and utilization;
- Hydrology Section: It studies hydrological parameters of various size watersheds etc.

The facilities available to the SCWMRC consist of 28 Research Centres and 90 Research Stations for erosion assessment and watershed management in 25 provinces.

³⁹ Source: Research institute of Forests and Rangelands: "Four Articles on Forest" Technical publication No. 176-1997.

3.1.4 Forest and Range Training and Education Institutions⁴⁰

Academic level

Currently, more than 30 faculties, universities and high-level training centres with more than 10 000 students are running, animal husbandry, agriculture, desertification control and dry-land rehabilitation education programmes.

Forestry education dates back 60 years. Four faculties have provided higher forestry education for the last 30 years⁴¹. Mirsadeghi M.A. (1995) indicated⁴² that 114 scientists, of whom 104 professors, assistant professors and associate professors were in charge of forestry education provided to 436 students, whose distribution was as follows: 75 candidates for a post-diploma, 369 students for a BSc. degree, 65 candidates for and MSc. degree and 4 applicants for a PhD degree.

Wood technology has always had a strong position in Iran's forestry education system. In 1995, according to Mirsadeghi, students preparing a degree in wood technology numbered respectively 205 for the BSc. and 24 for the MSc. levels. Environmental education, which was launched in 1983, recorded 140 BSc. and 30 MSc. candidates in 1995. Rangeland and watershed management education is even more recent as it coincides with the establishment of the Range and Watershed Department. In 1995 the number of students preparing a BSc. degree in range management and watershed management amounted to 220. Those preparing MSc. degrees were 61 in range management and 40 in watershed management.

At present six Natural Resources Faculties provide training in Iran. Following is a succinct visit card of one of them: The Natural Resources Faculty of the Teheran University.

VISIT CARD

Natural Resources - Faculty Teheran University

Description:

- Number of Departments - Five: i) Rangeland and Desertification Control, ii) Forestry; iii) Wood Technology; iv) Environment; and v) Fisheries.
- Fifty professors in Faculty;
- Five hundred students, of whom, 350 BSc. 100 MSc. and 50 PhD;
- Infrastructures: Library, diverse laboratories, GIS remote sensing centre; various research stations etc.

Cooperation possibilities with LFCCs:

The faculty is willing to cooperate with LFCCs by providing various training programmes, and participating to capacity building for the benefit of these countries. Among others the following:

- Possibility of organizing Professors and students' exchange programmes;
- Possibility of organizing short-term courses (1-6 months) workshops, demonstrations for LFCC candidates;
- Possibility to provide a few scholarships (requires negotiations beforehand) etc.

⁴⁰ Source: Newsletter 8th Int. Conference on Rainwater Catchment Systems: The Perspective of the I.R. of Iran concerning implementation of UNCCD Regional Annex for Asia, through the existing organization, the DESCONAP Program Office.

⁴¹ Reference: Mirsadeghi, 1995.

⁴² Source: Report of the I.R. Iran on Management and Conservation of Forests and Environment Protection, presented to the First Experts Group Meeting on Forest and Environment – Iran, 27-19 July 1995.

Technical level

There are Natural Resources Training Complexes educating high school graduates during 2½ years (6 months field-work), to become forestry or rangeland management technicians. Their combined annual capacity is 230 candidates. The Kalok Natural Resources Training Complex (Teheran) is equipped with laboratories, a library and dormitories. It hosts 100 trainees, of whom 25% are FRO staff members. The School counts 25 lecturers with MSc. degrees teaching the following subject matters:

- In forestry: Silviculture, inventory, afforestation, forest policy, ecology, soil, roads and transportation, wood harvesting, nursery techniques, extension and communication methods;
- In rangeland management: Nursery techniques, range improvement, range management, range ecology, range monitoring and evaluation, topography, natural sciences, extension and communication methods.

While forest and range education performs highly in qualitative as well as quantitative terms at academic levels, it remains too modest (in quantitative terms) at intermediate and subordinate levels, considering the dire need for trained field technicians. The qualifications' pyramid is completely inverted in the forestry and range education system. Being out of proportion to the doers (technicians, protection agents, extensionists, artisans etc.), it may create more problems than it can solve.

3.2 Policy & strategy framework for forest and range

According to the Constitution (Art. 45), the government controls natural forests and rangelands.

3.2.1 Main guideline principles of the forest & range development policy

Following are six basic guideline principles (details in annex 13) of the forest, woodland and rangeland development policy:

1. Integrated approach to planning and development following natural resources' study and assessment;
2. Awareness-raising vis-à-vis the importance and value of natural resources;
3. Developing participatory approaches to resource management;
4. Securing the required support from the legislative, judiciary and executive bodies, to ensure full implementation of FRO's national development policy and programmes;
5. Taking measures towards institutional reform and capacity building;
6. Ensuring a continuous monitoring/evaluation of forestry policies and programmes' implementation.

3.2.2 Forest and rangeland long-term development policy⁴³

The main objective of the Iranian forest policy is the conservation, rehabilitation and sustainable use and development of natural resources (forests, woodlands, rangelands, soils and water resources). The policy has been translated into six major fields of involvement (details in annex 13) as described below:

1. Natural resources' comprehensive conservation;
2. "Green Revolution" National Forestry Action Plan formulation and implementation. The objective here is to achieve sustainable participatory development of forests and green areas through the rehabilitation and the development of the national tree resources;
3. Achieving the national objective of balancing the livestock population in harmony with the rangelands actual carrying capacity;
4. Settling scattered livestock owners and nomads, respectively outside commercial forests (Caspian area) and natural rangelands, by means of various alternative opportunities;
5. Settling land property disputes by thorough land ownership demarcation at national level;
6. Undertaking the implementation of the National Action Plan for Desertification Control.

3.2.3 Forest and range strategies⁴⁴

The steady population growth has imposed increasing demands for more agriculture and pasture land. This was worsened by the fact that forests and rangelands have been nationalized and are since perceived as common goods. This has given rise to uninhibited exploitation, uncontrolled industrial and urban expansion as well as unrestrained use of forests for farmland development, and conversion to rangeland.

To deal with this situation, the government is pursuing a strategy of multiple forest utilization, including community forestry, on one hand, and launching a vigorous national reforestation and afforestation programme on the other hand, to reclaim degraded forestlands and rangelands, protect watersheds and manage industrial forests on a sustained-yield basis.

The government aims to involve private enterprises by granting long-term concessions for large forest areas, with the objective of industrial utilization and sustained yield management. In the tree plantation programme, the objective is to move towards more people participation and involvement as several programmes are carried out on sub-contract basis with private enterprises.

The government also encourages the establishment of forest cooperative societies to fulfil the objectives of sustained timber production, on one hand, and afforestation, apiculture, fisheries

⁴³ Translated from the original text with the contribution of Mr. M. A. Haji Mirsadeghi.

⁴⁴ Source: Agreement between the Government of the I.R of Iran and the FAO concerning technical assistance services for Zagros Mountains Forestry Development February 1993.

and sericulture for the diversification of income generation on the other hand. This aims also at investing in reforestation and preventing forestland conversion to agricultural land.

3.3 Planning for forest & range

3.3.1 Forestry planning procedures

Annual development plans and budgets are prepared by the FRO of the Ministry of Jihad-e-Agriculture and proposed to the government. After approval by the Iranian Parliament, the plan and associated budgets are passed back to FRO for implementation.

3.3.2 The Third Five-Year Forest and Range Plan

The Third Five-Year Plan (1999-2003) attaches much importance to the following:

- Preparing a comprehensive Decree on soil conservation;
- Presenting a Decree on preservation and safeguarding of plant and animal genetic resources;
- Revising the Rural Cooperatives Act in order to recognize the rights of individuals within collective farms;
- Revising the existing legislation to enhance the conservation, and optimise the utilization of forests and rangelands, in particular through:
 - Provision of clear-cut definitions of the concepts pertaining to forests and rangelands;
 - Placing priority on conservation and rehabilitation of forests and ranges and developing effective regulations to optimise the utilization of these resources;
 - Lifting any Decrees and any other legal apparatus leaving room for overexploitation of natural resources by individuals; and
 - Speeding up the process of delineating the public domains, and issuing the official titles of such lands to the government;
- Promoting and increasing national commitment to conservation, rehabilitation and proper use of natural resources, through:
 - Establishing a balance between livestock numbers and rangelands' carrying capacity in 10 years;
 - Withdrawal of livestock from forests and resettlement of forest dwellers by the end of the Third Five-Year Plan;
 - Placing priority on provision and delivery of fossil fuels to remote areas and nomads;
- Promoting domestic feed supply, taking into consideration the carrying capacity of rangelands;
- Promoting Watershed management projects as a means to efficient use and conservation of soil and water resources;

- Promoting education, employment and participation of the youth and women in agriculture and water sectors;
- Encouraging the establishment of agricultural and rural credit associations;
- Enhancing people's participation in various stages, from policy making to production;
- Recognizing and supporting civil society organizations;
- Encouraging the establishment by small holders of cooperatives and other associations.

Additionally, Articles 106 of the Act of the Third Economic, Social and Cultural Plan states that the government is permitted to anticipate the required credits in its annual budget for the following activities, and to allocate such credits, through the relevant ministry, to the Agricultural Bank:

- Land and water development projects;
- Projects related to livestock and poultry breeding...natural resources, forests, rangelands and deserts, watershed management, sericulture etc.

The credits granted by the bank out of this budget may be regarded as donation whenever deemed necessary, provided they are used to implement projects specified hitherto.

3.4 Environmental protection strategies and legal framework

3.4.1 National Strategy for environmental protection⁴⁵

The D. E. assumes the protection of 8,2 million ha (5% of national territory) of land and ambitions to increase this proportion to 10 % of the country's land area. The DE manages five categories of protected areas as indicated below:

- National Parks: These include 11 sites (1,3 million ha – 0,79 % of country) that represent some of the most outstanding examples of geological, ecological, historical, archaeological and scenic features;
- Wildlife Refuges: There are 25 wildlife refuges, which currently cover 1,9 million ha, equivalent to 1,16 % of the country's land area;
- Protected Areas: 47 protected areas covering 5,3 million ha support representative ecosystems with nationally significant wildlife have been targeted for protection. It is proposed to formulate integrated management plans that harmonize local communities' needs, with the necessity to rehabilitate and conserve natural resources, by developing the potential for agriculture, silviculture and livestock rearing;
- National Nature Monuments: They are constituted by 5 small sites, with unusual phenomena of scientific, geological, historical and/or natural history interest;
- Biosphere Reserves: 9 such reserves covering 1,9 million ha have been established to preserve and generate natural and cultural values within the framework of UNESCO/MAB (Man and Biosphere) programme.

⁴⁵ Source: Biodiversity CRTIC: National CBD Report for the I.R. Iran (updated on 2 May 2002) <file:///C:/fhatami/bio-2.htm>

In addition the areas protected by the D E, the FRO manages 131 reserves totalling 111 000 ha. Of these, 19 are Natural Forests Parks, 91 are Forests Reserves, and 21 are Natural Parks.

A series of workshops⁴⁶ was held to incorporate the viewpoints of national and local stakeholders in the National Biodiversity Strategy, Action Plan (NBSAP). The latter is under the supervision of a Steering Committee that includes representatives of several departments and institutions⁴⁷. Following the Convention on Biological diversity, the NDSAP has changed protection priorities from species to ecosystems. Moreover, the new approach to the protected areas and conservation of biological diversity calls for the inclusion of environmental concerns in any national or regional development policy.

Four strategies are formulated for the future conservation of biodiversity. They are to be incorporated in the three National Socio-Economic Five-Year Plans from 2000 to 2015. They respectively aim at:

- The promotion of public participation;
- The establishment of biodiversity information and monitoring systems;
- The reorganization of institutional structures for sustainable use;
- The systematic management of biodiversity resources.

3.4.2 Legislative framework for environmental protection⁴⁸

According to the Constitutional Act No 50, all citizens are required to honour the conservation of nature and natural resources.

The Law for the Protection and Exploitation of Forest and Range

The first forest legislation enacted in 1924 was strongly oriented towards regulation and control of forest exploitation and management.

The laws that followed (Forest and Range Nationalization; and Protection and Exploitation of Forest and Range) mandated FRO to plan and implement desertification control and forest/range management and development and to enforce policies and regulations pertaining to the land use. The laws also include specific regulation relating to areas, which may be declared as forest parks.

The forest law has been amended three times before the revolution (1969, 1970 and 1975). Other amendments took place between 1978 and 2001, which attempted to limit the drawbacks of the Land Nationalization Law, by making room for better land tenure arrangements in forest and range protection, rehabilitation and management. The law as presently reviewed makes room for more community commitment through participation.

⁴⁶ Marine 04/99, Palaeontology 05/99, Forest 06/99, Soil 07/99, Deserts 08/99, MAB Sites 09/99, Arasbaran 05/2000, Urimieh 06/2000 and Strategies 07/2000.

⁴⁷ Environment; Administration and Planning; Energy; Biodiversity Sub-Committee; Teheran University; Association of Iranian Environmentalists; UNDP; Ministries of: Science, Technology and Research; Jihad-e-Agriculture; Oil; Interior; Foreign Affairs;.

⁴⁸ Source: Dalsgaard Sören – FAO Forestry Information System (FORIS) – Country profiles, Feb. 2000.

As other environmental laws, the Law for the Protection and Exploitation of Forest and Range is weakly enforced, particularly following the 1979 sudden relaxation of the former restrictions and stiff penalties for timber felling, grazing and fishing in forests (Anon, 1987). This has led since to widespread abuse.

The Environmental Protection and Enhancement Act

Enacted in 1974, it is the major law for environmental conservation in Iran. According to this Act, four categories of natural protected areas have been established in the country and are administered by the Department of Environment. They include national parks, wildlife refuges, protected areas and nature monuments. The legislation has declared many plant and animal species “protected”, but the actual enforcement of the regulations remains weak.

The Supreme Council of the Environment is a legislative body that enacts relevant regulations as well as the classification of protected areas.

The Game and Fish Law and Regulations

They were enacted in 1967 and amended in March 1975. It represents the basic legal control through which exploitation is curtailed, hunting and shooting are regulated and game species legally protected. With regard to game, the law clearly defines the concepts and legal aspects of both wildlife parks and protected areas. With regard to fish, two categories of protected sites are identified, which are: protected rivers and protected wetlands.

3.5 *Outside cooperation and assistance to forest and range*

3.5.1 *Multilateral/international assistance to the forestry/range sector*

Prior or ongoing assistance by UNDP/FAO to the forestry and watershed management sub-sector includes, among others, the following projects:

- In-service training in Watershed Management Techniques, IRA/86/004 (ended in Dec. 1992);
- Strengthening post-graduate Programme of Faculty of Natural Resources, Karadj, IRA/87/014;
- Caspian Model Forest Management Plan, IRA/89/014;
- Caspian Tree Seed Production and Improvement Centre, IRA/89/015;
- Walnut Improvement, Research and Plantation Programme Development, IRA/89/029;
- South Khorasan Rangeland Rehabilitation and Afghan Refugees Income-Generating Project in cooperation with UNHCR and IFAD and the financial participation of the Netherlands, Japan, the EEC, UNOCHA and UNHCR;
- Participatory Planning Management and Monitoring in Pilot Watersheds
- Zagros Mountains Forestry Development Project UTF/IRA/025/IRA.

3.5.2 International cooperation and adherence to international conventions (see annex 14)

Iran signatory member of the 1992 Earth Summit of Rio has taken several measures to enhance international environmental cooperation. It hosted the 1998 International Conference on Lagoons and Marine Birds in Ramsar. The country has cooperated with the Global Environment Facility and the Montreal Protocol to curb desertification and protect biodiversity. Iran is also engaged in regional cooperation through the Economic Cooperation and the Economic and Social Commission for Asia.

The I.R. Republic of Iran has accepted international legal responsibilities by adhering to a number the international conventions such as:

United Nations Desertification Control Convention (UNCCD)⁴⁹

The convention (UNCCD) has been signed by the government and ratified by the parliament. A National Committee for Combating Desertification (NCCD) has been established with the participation of representatives from relevant ministries and institutions. The NCCD has since adopted the national macro policies for combating desertification, prepared and submitted its national report to the Secretariat of the UNCCD. Several national and international workshops and meetings have been organized to address relevant matters. The government plays a leading role by accepting to host the Regional Network for Range Rehabilitation and Sand Dune Stabilization, under the UNCCD and to the Secretariat of the “Teheran Process” that deals with the requirements and needs of the Low Forest Cover Countries.

The Convention on Biodiversity

As member of the CBD, Iran has prepared a “National Biodiversity Action Plan” (NBSAP). Four strategies have been formulated for biodiversity conservation, which call for: the promotion of public participation, the development of biodiversity information and monitoring systems, the reorganization of institutional structures for sustainable use, and the systematic management of biodiversity resources. For their implementation, 80 Action Plans are under consideration and 35 are already being implemented.

The Convention on Wetlands (Ramsar)

In 1998, the I. R. of Iran has hosted an international conference on lagoons and marine birds in Ramsar, which is since, considered to be the birthplace of the “Ramsar Convention” that focuses on the conservation and wise use of wetlands’ habitats. There are more than 100 sizeable wetlands in Iran, 20 of which have been listed in the Ramsar Convention’s “List of Wetlands of International Importance”.

Other conventions of which Iran is a member are:

- United Nations Framework Convention on Climate Change (UNFCCC);
- World Heritage Convention (WHC);
- Convention on Control of Trans Boundary Movement of Hazardous Waste (Basle);

⁴⁹ Source: Pamphlet “Islamic Republic of Iran and the UNCCD”.

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Montreal Protocol on Ozone Layer Depletion Substances;
- Bio-Safety Protocol etc.

3.6 Country vision horizon 2020

3.6.1 Forestry Development Country Vision 2020

“Green Revolution” the country vision for forestry development up to the 2020 horizon consists of two major programmes.

The Forest rehabilitation and enrichment programme

Its objective is to manage about 1 650 000 ha of degraded to very degraded forests and enhance their rehabilitation and regeneration by way of livestock removal, assisted natural regeneration and enrichment through plantation of native tree species. The programme also stresses the sustainable management of non-wood forest products.

Forest estate extension programme

This programme aims at achieving 4 000 000 ha of new forest tree plantations in 20 years time (200 000 ha/year). The objective being to increase the national forest resource and bring the total forest area to 16 400 000 ha, equivalent to a country forest tree cover of 9,95 %. This programme includes irrigated industrial plantations of fast growing species as well as urban and peri-urban forestry, agroforestry, sylvopastoral plantations etc.

It is to hope that this obviously still top-down “blueprint” of the “Green Revolution” Programme, will be later devised at local scale, following a more appropriate participatory approach, to secure the full adhesion of local communities to its implementation. The details of the Forestry Development Country Vision 2020 are given in annex 15.

3.6.2 Range Development Country Vision⁵⁰

The future mid to long-term activities planned with regard to range development include the following:

- Range management operations
 - Introducing grazing management prescriptions over 23 million ha of summer rangelands;
 - Executing watershed management and range improvement activities on 2 million ha of rangelands;
- Conversion of low yielding cereal dry-land to intensive fodder and forage production fields over 1 million ha
 - Forage and fodder intensive cultivation;

⁵⁰ Source: Ministry of Jihad-e-Agriculture – FRO: Introduction to Iran’s rangelands, prepared by the Technical Office of Rangelands, April 2001.

- Pasture improvement;
- Balancing livestock numbers to rangeland carrying capacity through:
 - Early elimination (reduction) of 12,8 million AU equivalent of excess lamb numbers;
 - Elimination of 8,5 million AU equivalent of old livestock in excess numbers within summer rural pasture and transhumant rangelands;
 - Elimination of 20 million AU equivalent of small livestock (goats and sheep);
 - Substitution of 1,5 million heads of native cattle with hybrid cattle;
 - Reduction of the unihoofted animal population by 350 000 heads;
- Increase in forage production and supply;
 - Allocation of fertile agricultural land to irrigated farming in association with the cultivation of *Trifolium alexandrinum* that would increase the current forage production by 4 million tons TDN;
 - Supplying and marketing 4 million additional tons of hay;
- Promoting extension and participation in range rehabilitation and management;
- Promoting research on range management improvement.

4. Causes and effects of deforestation and forest and rangeland degradation

4.1 Indirect causes

4.1.1 Land and water tenure and users' rights and incentives

Incentives in agricultural production

Diverse incentives, granted to enhance agricultural crop production and export, have resulted in a large extension of cultivated areas at the expense of significant forest and rangeland estates, under State sponsorship.

“Incentives” in forest and rangeland exploitation

Products and incomes derived by local dwellers from exploiting forests and rangelands are exempt from taxes for the reason that no such measures exist and that local communities can usually not afford such expenses. This form of incentive encourages however various forms of over-exploitation and limits FRO's capacity to invest in more significant forestry and range conservation, rehabilitation and management activities.

Incentives in water extraction and utilization

Despite the county's aridity and lack of adequate surface water resources and groundwater reserves, the country's policy has consistently aimed at mobilizing more water for crop irrigation. With steadily more wells being dug and equipped, groundwater abstraction has become excessive, affecting its quality and accessibility, thereby impinging on the survival of a number of plant associations that require specific groundwater quality and depth.

Moreover, as greater irrigation water volumes are made available, more forests and rangelands are cleared and converted to cropland frequently submitted to excessive irrigation, inefficient

drainage and very high evaporation. This, results in severe degradation through waterlogging, secondary salinization etc. followed by agricultural field abandonment and unchecked water and wind erosion.

Forest and range tenure: land nationalization

The global forest and rangeland estate of Iran has declined drastically since land nationalization has materialized, alienating customary owners and users, and making people dependent on the government for access to, and utilization of their traditional lands and resources. A breakdown in the traditional systems of community forest and range management, coupled with the advent of cash-crop economy and population increase contributed to the collapse of large tracts of forests and range. The gradual disintegration of the forest and range resources persists, in view of the fact that no modern government initiated alternative to traditional management and production systems has been yet developed and put into operation.

Attitude considering forests and rangelands as free public goods

Being a state, thus a public property resource, forests and rangelands are to a large extent used privately, because traditional utilization and protection systems have been formally abandoned. Since forests and rangelands belong all together to nobody and to everybody, they are recklessly overexploited. What we have then is the government investing massively to rehabilitate, protect and manage on one hand, and communities inclined to misuse and degrade, to survive, on the other hand.

4.1.2 Poverty as foundation to deforestation & degradation

Unchecked population growth versus limited environmental resource base

The country's population has more than doubled in the last 20 years, resulting in a drastic increase in demand for agricultural and animal products, which inevitably resulted in extreme pressure exerted on the already limited natural resources available to the country.

Economic situation and investment patterns

Because the population is very young, pressure for employment opportunities is strong. Since in many areas, rural populations have expanded beyond the absorptive capacity of the rural economy, poverty is becoming a countryside phenomenon (see table 17, annex 8). Indeed, FAO (1993) estimated that 40 % of rural families in Iran live in poverty, relying on subsistence agriculture and livestock rearing for their livelihood. Increased poverty forces growing numbers into already crowded cities, while people remaining in rural areas attempt to maintain living standards by increasing livestock numbers on the already overcrowded rangelands and forests. The lack of investments on off-farm job and revenue opportunities compels more people to be dependent on additional agricultural production on marginal lands gained on forests and rangelands.

Furthermore, the growing influence of the market economy on the rural world is leading to new consumption trends and requirements that often result in the conversion of sustainable subsistence production systems, into more cash-crop unsustainable production ones. Such sudden and inadequate metamorphosis of production methods results in rapid loss of soil fertility, leading in most cases to the spiralling process of land abandonment, increased soil erosion, more poverty and additional search for marginal lands to put under yet more unsustainable agricultural exploitation. Tragically, if no new off-farm job and revenue

opportunities are created, rural households will tend to move persistently from a subsistence livelihood to a market dependent one, until no other alternative than migration is left.

4.1.3 Capacity to respond on timely basis to misuse issues responsible for deforestation and degradation

Environmental assessment and monitoring systems

While commendable efforts are deployed towards improving the quality and widening the range of information available for planning and decision-making, the FRO has not yet fully developed its environmental assessment and monitoring network to provide timely and reliable data and information on the status of natural resources. Chronological and sequential qualitative and quantitative information about deforestation, rangeland deterioration, agricultural land abandonment, soil erosion and desertification remains inadequate. The same applies to information on intensity, trends, and immediate effects and impacts of current resources' utilization and natural catastrophes. All of what precedes makes it difficult if not impossible to react on a timely basis to sudden potentially serious impacts due to misuse and/or calamities.

Degree of community involvement

FRO is trying to involve communities and individuals alike in the process of forest and rangeland rehabilitation and management. The approach adopted remains however strictly top-down. Even though tenure rights and technical and material support are granted, they do not set in motion the profound sense of ownership of, and responsibility for the resource, which is necessary for achieving long-term sustainable conservation and development of forests and rangelands.

Gaps in knowledge

Existing gaps in knowledge, such as detailed hereafter, constitute an indirect threat to natural resources, their environment and its biodiversity:

- Inadequate general knowledge of natural resources and on the environment and biodiversity;
- Lack of accessible and timely information about the country's natural resources and environmental condition;
- Insufficient expertise in awareness improvement and people's participation promotion.

4.1.4 Policy, legislative and regulatory issues

Legal and customary regulatory tools

Since land nationalization took place in 1962, customary laws have been discarded, albeit the production and utilization systems have somewhat survived, particularly with regard to defining the territories traditionally exploited by rural communities and households. Because they did not incorporate the human dimension, the diverse forest, range and environmental laws did not succeed in promoting protection and sustainable management of land resources. Being weakly enforced, legal systems leave much freedom for local communities to use resources as they think fit, to meet their rising requirements and needs.

Until FRO decided to promote people's participation in managing the resource, deforestation and forest and range degradation took place persistently. Despite the government's commitment to promote more community involvement in environmental and forestry affairs, there is still a need to review the present laws and incorporate all elements that will lead to true community participation and partnership.

Policy perception of forests and rangelands' roles and significance

The perception of forests and rangelands is still very much that of an estate that belongs to the government. As such the latter devolves the responsibility for its administration and management to the conservative corps of forestry civil servants. This form of conservatism towards natural resources and the accountability over them remains strong in the forestry sector, making it difficult to delegate the responsibility to manage, sustain and administer this wealth, to its traditional users.

Degree of government commitment to sustainable natural resource management

The government has in principle constantly been committed to sustainable resource management. However, faced with the task of providing food for an exponentially increasing population, the I. R. of Iran could hardly adopt and promote environmentally sound agricultural production systems. As many others, Iran, caught in the straightjacket of present economic issues, and faced with the task of national development, had little other choice, than to pursue accelerated exploitation of its natural resources to keep up decent livelihood levels. Circumstances are now, riper for the promotion of more environment and people friendly approaches to the management of natural resources. The commitment exists but it needs to be backed up by better policy and legislation, together with improved capacity in such fields of expertise as environmental assessment and monitoring, data and information systems, participatory approach etc.

4.2 Direct causes

4.2.1 Natural causes

Climatic conditions

According to the climatic classification of Iran, aridity affects 92,5 % of the country with more than 76 % of its area being arid and hyper-arid territory. Harsh climatic conditions prevail, particularly in the Central Plateau (very high evapotranspiration, low and erratic rainfall, very cold winters, excessively hot summers etc.) These factors contribute to make plant establishment, growth, survival and regeneration quite restraining. Such conditions diminish also the resistance of plant species to various forms of abuse and limit natural vegetation's resilience. The effect of severe drought is evident all over the Irano-Touranian, the Zagros and the Khalijo-Omanian regions, which have undergone substantial loss of vegetative cover.

Topography

More than sixty percent of Iran's surface area is mountainous, with elevations above sea level exceeding 1 000 meters. The Alborz and Zagros mountain ranges with their high elevations and steep slopes constitute favourable site conditions to trigger acute erosion and degradation processes, particularly in combination with excessive pressure.

Properties of soils

Soils in the Central Plateau and in most arid regions of the country are generally deprived in organic matter and have a poor structure, as a result of which, erosion is very prevalent and severe. In addition, most arid and semi-arid regions are characterized by heavy-textured soils, which, given the limited moisture (in all forms) available, hampers the emergence of natural regeneration and hinders forest and rangeland rehabilitation efforts.

Natural calamities (fires, floods, pests, etc.)

In operation since 1993, FRO's Office of Protection and Conservation is faced with many problems affecting the forests and rangelands. These embrace natural phenomena such as earthquakes, floods, winds, temperature and drought extremes etc.

There are some serious insect pest problems affecting forests and trees in the I. R. of Iran, including the Dutch elm disease north of Teheran. Other serious pests include the European gypsy moth (*Lymantria dispar*), with the last outbreak recorded in 1992, and *Tortix viridens*, a present day problem in the northern forests causing complete defoliation of *Fagus spp.* over large areas. Poplar defoliation caused by a larva has been observed during the mission over substantial areas in the province of Kermanshah.

4.2.2 Causes linked to human activity

Historical evidence shows that however important environmental and climatic change factors may have been in the degradation and desertification processes that have affected the country, their role was as a rule less destructive than the changes induced by man. Land degradation, soil erosion and loss of vegetative cover in the Central Plateau for instance, have been closely associated with human settlements and activities and there is much indication to prove this relationship during the past centuries. Forest and rangeland degradation and desertification processes have been accelerated during the past century, particularly during the last 25 years.

Allocation of forest and rangeland for agricultural & urban development

As a result of a huge increase in demand for agricultural products and housing over the last decades, sizeable tracts of forests and rangelands have been legally cleared and converted to cropland as well as rural and urban settlements.

Misuse of natural resources

- Forest resources: Forest resources are used by local dwellers for construction and energy. Despite the fact that the I. R. of Iran is a rich country in oil, most villages did not benefit from petroleum energy before the Islamic Revolution of 1979. Notwithstanding the progress recorded since, not all villagers have alternative sources of domestic energy at their disposal. Many still depend exclusively on fuel-wood gathering to meet their cooking and oftentimes, enormous heating requirements. With time, and following drastic reductions in vegetative cover resulting from combined abuses, all available plant species are used, regardless of their calorific value and of their fodder quality, adding to the unbearable pressure already exerted through overgrazing and browsing.
- Rangeland resources: Sharply growing demands for dairy and meat products in recent decades has brought about an abrupt and very large increase in livestock numbers, giving rise to more extensive livestock husbandry practices both in rangelands and in

forests. In addition to severe overgrazing, most forests and rangelands have been confronted with untimely grazing in the form of abusive late and/or early grazing practices, which hinder and suppress natural regeneration.

Inadequate agricultural practices and land abandonment

Improper agricultural management is largely to blame for the reduction of the soil's organic content that has led to greater soil erosion and increased soil salinity and alkalinity. The widespread availability of easily accessible imported farm machinery that is unsuitable for the arid and semi-arid conditions of Iran facilitates forest and rangeland clearing on one hand and generalization of harmful inappropriate cultivation practices.

The steadiness of inadequate agricultural practices leads to the abandonment of large tracts of cultivated lands, swiftly replaced by newly cleared marginal forest and pasturelands. This spiralling process is still common practice, particularly in the Zagros Mountains where subsistence shifting cultivation combined with "free grazing" is a rather widespread type of farming taking place along very steep slopes. It is a major cause of forest/range clearing and degradation that prevents grass, shrub and tree regeneration and triggers devastating runoff and intense water erosion and soil degradation.

FRO's capacity to manage these lands and re-convert them to productive rangelands being limited, vast areas remain uncovered, at the mercy of climatic factors that trigger severe erosion and loss of soil.

Infrastructure Construction

Construction of such infrastructure as roads and pipelines without full consideration of the likely environmental impacts is responsible for severe and extensive erosion and land destruction processes, particularly in Iran's western mountain regions. Though their environmental and financial impacts are not fully monitored and assessed, the government is formulating regulations holding the damage perpetrators responsible for the necessary repairs.

Man-made catastrophes

- **Fires:** An FAO/ECE/ILO publication⁵¹ identifies several fire causes, which include land conversion, conflicting situations leading to deliberate fires, carelessness of hunters and other forest users, cigarettes, matches, cooking at picnic, burning of farm residues, artillery fire, movement of refugees burning fires for cooking and heating, land mine explosions, illegal smuggling of opium and oil, border conflicts and wars, and disgruntled communities who may start fires.

The most frequent fires are mainly pasture fires, which affect grazing for some time and sometimes spread to forest areas. Fires starting in or around forests are mainly ground fires whose suppression is difficult due to high winds and temperatures and extremely dry conditions. A national study indicates that 439 forest fires were recorded in 1996, which affected a total area of 5 829 ha (Source: National CBD Report for the I. R. of Iran).

According to the ECE/FAO database on forest fires in Iran, the average annual number of fires is 130 and the average area burned per year is 5 400 ha with a maximum of 33 000 ha recorded in 1993. The number of fires seems to be increasing (Source: Alexandrian & Esnault, 1998).

⁵¹ In Forest Fire News about the "Fire Situation in the I. R. of Iran"

- **War:** The long war with bordering Iraq is said to have caused the degradation and desertification of over 1 million ha of natural resources, particularly in the south-western part of Iran, where large areas of formerly stable vegetated sand dunes have become active following severe vegetation cover reduction.
- **Refugees:** By the end of 1989, some 2,8 million Afghan refugees had settled in Iran, in the wake of Afghanistan's 1979 political and military upheaval. The influx of such numbers of refugees caused acute damage to large tracts of rangelands in the Khorazan and Sistan-Baluchistan provinces. One million hectares of rangelands have been degraded in the process of providing for domestic cooking and heating energy, in addition to undergoing severe overgrazing by the large flocks brought in by the refugees.

4.3 Effects of deforestation and forest and range degradation

The total annual costs of land degradation in Iran are estimated at US \$ 2 billion. Soil erosion, decline in fertility and productivity of rangelands, forests, and arable lands, dam sedimentation, floods etc. are believed to have quadrupled in the last forty years. Together with the destruction of natural habitats these are the main components of the estimated losses (Source: Biodiversity CRTIC: National CBD Report for the I.R. Iran – <file://C:\fhatam\bio-5.htm>).

4.3.1 Loss of land productivity

Decline in biomass, species diversity and genetic resource

Local studies indicate clearly the effect of excessive pressure and misuse on the reduction of species' diversity and genetic resources.

The extent of rangeland degradation can also be evaluated through the rangelands' total annual biomass production expressed in dry matter (usable dry matter) yield, which is estimated to have decreased from 13,98 million tons in 1972, to 10,7 million tons nowadays. Rangelands' mean annual productivity has also decreased from 0,140 ton dry matter/ha to a mere 0,119 ton dry matter/ha during the same period (Source: FRO–Introduction to Iran's rangelands: TOR, April 2001). Rangelands are still being degraded and their productivity reduced by up to 1,5% per year (Source: National CBD Report for the I. R. of Iran).

Decline in habitat

Non-protected areas are under severe pressure, leading to much habitat destruction. There are demonstrable declines in the quality and quantity of habitats over vast areas. They are caused by either or a combination of the following: loss of vegetative cover, erosion, salinization, waterlogging, lowering of water tables etc.

4.3.2 Soil erosion increase

Major factors threatening soils are scant rainfall, reduction in the content of organic matter, increased salinity and alkalinity, changes in land use etc. Soil erosion in Iran is estimated to be equal to 20 tons/ha, up from 10 tons/ha only 10 years ago. The total soil erosion is estimated to be 1-2 billion m³/year.

4.3.3 Poverty expansion

Population groups adversely affected by deforestation and degradation

Poverty is spreading beyond the “traditional” groups who for historical reasons or social contexts and customs were economically marginalized. Besides the traditional “underclass” often identified among forest and rangeland dwellers depending quasi-exclusively on meagre natural resources for their subsistence, the new population groups affected by poverty are the rural-to-urban migrants, the landless and near landless, the disabled, the rural female group, particularly those heading households and farm activities.

Rural people (38,7 % of the Iranian population) are the most directly affected by deforestation, natural resources’ degradation and desertification. Except for those with large holdings and/or diversified sources of income, most rural people suffer from the decline in amount and quality of soil, water, fuel-wood, range, woodland resources etc. Subsistence farmers and herders cannot produce enough to meet their basic needs and have to pay increasingly more to provide food and clothing from the market.

The people most heavily affected by environmental degradation problems in towns and cities, belong to those who have already been victimized by natural resources’ degradation in their rural areas of origin. They belong to the poorer segments that live without protection.

Poverty expansion & rural/urban migration

In a social sense, the collapse of various production systems, which are no more economically viable, will force yet more rural population to migrate to cities, which are already suffering from overcrowding in relation to existing services and employment opportunities. The option of work abroad and remittances constitutes at present a distant perspective. Unless solidarity responses are revived and participatory development approaches developed, poverty in the rural world may well be on the rise, affecting larger groups than ever before.

4.4 *Extent of deforestation and forest, woodland and rangeland degradation*

Because there is no environmental assessment system, the precise levels of deforestation and of forest and rangeland degradation have not been fully assessed at country level. Following are estimations give an idea of the extent of the damages sustained by forests and rangelands within given periods of time:

Extent of deforestation

Clearing forestland for agricultural use, forage production and grazing as well as for firewood collection and charcoal production has reduced forests by 30 % over the last 40 years (Source: National CBD Report for the I. R. of Iran)

Extent of rangeland degradation

According to the TOR, the country’s range area has decreased from an estimated 100 million ha in 1972 to 90 million ha at present (Source: FRO – Introduction to Iran’s rangelands: by TOR, April 2001). The conversions of rangelands into agricultural lands have caused the destruction of up to 43 % of pastures (Source: National CBD Report for the I. R. of Iran).

5. Status of knowledge

5.1 *Lessons learned*

Following the mission' field observations and exchanges with technicians and communities, a number of lessons learned have been brought to the surface, which relate to the following:

5.1.1 Development choices and issues

Presented below, are some of the lessons learned with regard to development issues, which require to be addressed rapidly:

Isolated rehabilitation efforts versus integrated participatory resource management

Planting operations designed to rehabilitate degraded forests and rangelands are for the most, planned and executed without insight into the future and in isolation of their socio-economic context. Such interventions ought to be integrated in a broader planning context, within a commissioned, pre-designed participatory management plan aiming not only at the rehabilitation, conservation and development of natural resources but also, and concurrently at ensuring people's sustainable well being within the community's territory.

Successful integrated management calls for poverty alleviation, which is quite impossible to achieve, based on the lone rehabilitation of degraded natural resources. Additional prospects need to be worked out within each given context to ensure sufficient and durable job and revenue opportunities that will uphold the community's commitment and participation. Local communities engaging in participatory natural resources' rehabilitation and development with FRO are therefore entitled to technical, material and financial assistance to pave the way to authentic sustainable development.

Except for some rare cases, authentic people's participation from planning to decision-making and implementation is not performed as of today. Foresters supposed to introduce and implement this method in their projects, seem to have little faith in the approach. This is chiefly due to their unawareness of the procedure as well as to the weakness of national capacities with regard to participatory approaches in natural resources management and development.

Traditional knowledge and know-how

It has become evident that any form of rural development must consider making the best use of the existing traditional knowledge and know-how, as these are often socially acceptable, environmentally friendly and economically more sustainable than some of the introduced modern technologies proposed. Scientific research needs therefore to be integrated with traditional knowledge and know-how.

Arid, semi-arid and tropical silviculture and management models

No specific silviculture technology has been developed for either natural or artificial forest stands outside the Caspian region. Arid, semi-arid and tropical silviculture treatments need to be urgently made available and accessible to local technicians to improve the longevity and productivity of the natural and man-made forest, woodland and shrub stands. It is also

necessary to develop specific silvicultural treatments in each of these regions, according to the species composition and the production objectives as defined by the management plan. Fodder tree species (*Prosopis cineraria*, *P. juliflora*, *Ziziphus spina-christi*, *Acacia Victoria* etc.) introduced for the rehabilitation of rangelands require to be treated for fodder production; they must also be periodically rejuvenated to increase their vigour and prolong their longevity.

Environmental information systems

There is a strong need to improve the existing environmental information systems and to establish a common network in order to achieve better planning and sustainable development of natural resources.

Urban and peri-urban forestry

A vast network of urban and peri-urban forests has been established often at very high costs, with long-term dependency on irrigation. It is becoming evident that future domestic and industrial water requirements will eventually prevail over irrigation needs of these plantations and that, as witnessed in parts of the Teheran urban forests, some stands will face serious shortages in water that could eventually jeopardize their survival. Moreover, while high capacities have been developed for gardens, parks and urban forests' design, establishment and maintenance, the silvicultural aspects that aim at improving the vigour, health and longevity of the stands, and at achieving specific regeneration and production objectives have been somewhat set aside.

5.1.2 Institutional and legislative aspects

Valuable observations have been made in connection with the administrative and legislative circumstances that prevail in the forestry sector. The following are among those that call for imminent attention:

Decentralization

Programme planning and decision-making functions are highly centralized. Little initiative is left to the provincial FRO offices in terms of programme formulation, project and budget planning and above all, decision making to be able to meet head-on the constantly upcoming issues that go together with performing participatory, integrated management and development.

Legislation

The laws and regulations pertaining to natural resources protection and development are insufficiently enforced to ensure strict and adequate protection. Moreover, they are totally ineffective when it comes to promoting decentralized planning and decision-making or supporting and facilitating community participatory and private sector involvement in natural resources' development.

Regional cooperation between LFCCs

The need for promoting cooperation and exchanges between LFCCs has often been highlighted by FRO's central and local staff alike. Also the limited international contact opportunities for field technical staff and officers is clearly demonstrated in that they express a strong desire for advice over their achievements and a strong drive to learn about similar successful experiences accomplished elsewhere in the world.

Coordination

There is little inter and intra-sectoral coordination of the development activities initiated by FRO. Yet, these require multidisciplinary and thus multi-sectoral interventions, which cannot be achieved without proper coordination.

5.2 Gaps in knowledge (see annex 16 for details)

5.2.1 Extent of deforestation and of natural resources degradation

Misuse of rangeland resources

It is a major cause of degradation about, which little is known in terms of actual pressure exerted and effects (fully monitored and documented). It would therefore be illusory to want to determine and justify priority interventions and priority intervention areas for the country, based on fully documented overgrazing and degradation of rangelands effects, when these are neither comprehensively investigated nor assessed.

Misuse of forests and woodland resources

The information about misuse of forests and woodlands is repetitive, outdated and too sketchy. Whether qualitative or quantitative, it should refer to all processes at stake, including the socio-economic contexts and the dynamics affecting the ecosystems. The information should be updated and useful for devising appropriate, well targeted, and timely responses approaches.

5.2.2 Consequences of deforestation and natural resources' degradation

The social, economic and environmental damage incurred following decades of misuse have yet to be assessed, to understand the full consequences of deforestation and natural resources' degradation. A number of questions (detailed in annex 16) need to be answered if we are to shift forest and rangeland development policies towards the revival of more productive and environmentally friendly participatory production systems capable of supporting farmers and herders in achieving a productive, fruitful and sustainable livelihood.

5.2.3 Capturing farmers' experience, technical and managerial skills

The agricultural research system, preoccupied with improving the production capacity of the better-off farmers, has yet to reach the point where it can capture farmers' experience and technical and managerial skills, by developing consequent on-farm research and experimentation projects and approaches.

5.2.4 Initiating full participation partnership in rural communities development

Participation in the forestry sector is still carried out following a top-down approach that considers local communities as "assisted beneficiaries" rather than as responsible partners in

development. The ideas and plans are those of the administration, which provides incentives for their implementation.

Extension and participation are not yet based on intensive long-term iterative communication and direct involvement of communities in planning and decision-making. There remains a major gap on how to bring from the initial stage, stakeholders and grass roots organizations to combine efforts and set-up viable socio-economic and environmentally friendly local sustainable approaches to participatory development.

5.2.5 Establishing common networks of statistical planning databases

Various institutions attempting to establish environmental information systems are confronted with expertise and equipment shortages and their inability to combine efforts and establish a common environmental information system network. Institutions need also to upgrade their capacity to undertake periodic inventories, collect and analyse data and information in order to provide timely and reliable tools for decision-making.

5.2.6 Awareness raising, of environmental degradation & desertification

Public awareness of environmental degradation and its implications is fragmentary, as it is not founded on comprehensive information on ecosystems and land use methods. Land users may clearly observe the effect of degradation, but they understand neither the causes and the processes involved, nor the seriousness of the problems.

5.3 *Experience gained and capability developed*

The forestry and range sector has been very active in developing suitable approaches and technologies to confront the diverse issues its estate is faced with. Iran has also developed a very extensive network of urban and peri-urban ornamental and forest plantations, parks, gardens and outdoor recreation facilities and gained substantial experience, knowledge and know-how in their maintenance and management. Among the many experiences and capabilities developed, the following may be of interest to other LFCCs of the region:

- Sand dune fixation in arid, semi-arid and tropical ecosystems;
- Mangrove regeneration through seeding and seedling plantation in the southern coastal regions of Iran;
- Selection and plantation wood-producing poplar clones for the satisfaction of community needs and of wood and pulp and paper industries;
- Exotic and native tree and shrub species' seedling production and plantation techniques developed for arid, semi-arid and tropical conditions;
- Development of forms of participatory rangeland rehabilitation and management; particularly with reference to land tenure improvement;
- Management, exploitation and exportation of Non-Wood Forest Products etc.

5.4 Shortcomings

While it is on record that the natural resources' sector has achieved much through FRO and others, it faces even so some shortcomings of which, the following:

Training

Forest and range education appears to be aiming mainly at attaining high academic results, as the capacity for training at BSc., MSc. and PHD levels is very high, probably, well above the present absorbing capacity of state institutions such as FRO and DE. Training at intermediate level has remained particularly modest. Yet, the need for field technicians is very high, in view of the very ambitious future forest and range rehabilitation, management and development programmes. The qualifications' pyramid is totally inverted as the number of academic level graduates exceeds by far that of technicians. It is also undeniable that many among the forestry and range officers operating in the Natural Resources' Offices, lack experience and training in silviculture, afforestation, management, participation etc. and would welcome benefiting from additional training.

Moreover, while the country is endowed with valuable temperate broadleaved forests and pastures, it is important to not forget that there exist also significant arid, semi-arid and tropical woodlands, shrub-lands, and rangelands that require equal attention at various training levels. It is also imperative to note that The Zagros Mountain forests and woodlands, have not yet received enough attention for their rehabilitation and management. While the need for timber and round-wood is well above the capacity of the Caspian forests, the potential of the Zagros Mountain forests for such productions has not yet been fully assessed to appreciate its capacity to help reduce the current deficit in wood production. Training should therefore aim at preparing forestry and range technicians and officers to face the socio-economic and environmental challenges of all ecological regions, including the arid, semi-arid and tropical zones.

Land nationalization

It appears through various reports and studies undertaken in connection with natural resources' degradation, that land nationalization has constituted a powerful factor of misuse of the natural resources. Traditional land users being deprived of their former tenure security and usufruct rights, consider forests and rangelands as common resources to be used on the basis of "first come first serve" concept, which leads to overexploitation and degradation. With a better land tenure security provided through participatory management schemes, the situation is gradually improving.

6. Conclusions

The mission has come to a number of conclusions presented hereafter:

6.1 Development choices and issues

Forest development

While FRO's approach to rangeland rehabilitation and management has yielded some substantial positive results owing to its social acceptability and economic viability, the approach

to forests and wooded lands rehabilitation seems to drag behind, for lack of global vision, and integrated multidisciplinary approach. Moreover, rehabilitation efforts ignore the very substantial potential of these ecosystems for industrial wood production, which would not only reduce the national wood production deficit, but would also provide significant sustainable revenues to the local communities.

Forest management

Forest management and silviculture have targeted primarily the temperate broadleaved forests, overlooking the important arid, semi-arid and tropical woodland formations, for which no specific silviculture or management models have been developed.

Forest and range rehabilitation

It is fair to say that deforestation and rangeland degradation have increased significantly and that rehabilitation interventions are planned and implemented only after the natural resource has been destroyed and lands have been exhausted through various abuses.

Zagros natural resources' development issue

The Zagros mountain ranges are rightly considered as the major water tower of the country. Yet their natural resources are steadily confronted with excessive pressure and misuse (overgrazing, illegal cutting for fuel-wood, development of shifting rain-fed slope agriculture...) and undergo continuous degradation.

Urban and peri-urban forestry

In the field of urban and peri-urban forestry, Iran has committed large investments in establishing extensive networks of ornamental and forest plantations, parks, gardens, recreation areas etc. It has also developed high capacities for urban and peri-urban forestry and asserts great ambitions for their further development throughout the country.

Land tenure

Land nationalization has constituted a powerful factor of natural resources' misuse after having deprived land users of their traditional land tenure security and usufruct rights. Land and crop ownership issues are omnipresent and request full institutional and legal attention.

Forest and range data information systems

Census figures are unreliable, production estimates are incomplete, and no comprehensive resource inventory has been completed to serve as a basis for nation-wide surveys.

Poverty alleviation

The ambitious forest and range rehabilitation programmes initiated by FRO have not significantly and sustainably contributed to poverty alleviation in the rural world, particularly among forest and rangeland dwellers. The reason resides in all likelihood in that participation, still at an infancy stage remains a top-down approach. People are considered more as "assisted beneficiaries" serving the purpose of the State, rather than their own community and resources' development. Not much attention is given to the communities' own priorities and little use is made of their traditional knowledge and know-how. In addition, land nationalization has boosted up deforestation and forest and rangeland degradation as a result of the conflicts between national and individual or community interests. The present attempts at improving land tenure security are having some positive impact, though they do not satisfy entirely land users who keep hoping for a full land privatisation.

6.2 International and legislative aspects

Decentralization

Planning and decision-making are highly centralized, leaving little space to local and provincial initiatives in terms of programme/project formulation, planning and decision-making.

Training and research

It is essential to re-assess the country's actual training needs for environmental protection as well as for participatory forest and range rehabilitation, management and development. It is also indispensable and urgent to take all adequate measures that would help the country be better prepared to face the remarkable challenges that lie ahead.

Coordination and cooperation between research centres and stations, and the provincial FRO offices is quasi inexistent, despite the fact that there is room for it. This is particularly true for thematic research dealing with issues confronting technicians and local communities in the fields of natural resources' conservation, utilization, rehabilitation, management and development. Research needs to focus on integrated agroforestry, community forestry and smallholder forestry. It should furthermore be better prepared for the dissemination of its results in terms of approaches and technologies developed.

Legislation

The legislation dealing with natural resources is not adequate as it does not spell out with force the need for their protection and for the adoption of decentralized and participatory planning and decision-making tools for their development. Also, law enforcement regulations need to be strengthened, as need to be enhanced the capacity to enforce them. It is hence crucial to increase FRO's field personnel and provide communities with more self-regulating and supervising authority to manage the resources.

Regional cooperation

The I.R. of Iran has engaged in important regional cooperation programmes in the realm of desertification control. Furthermore, the country hosts the Secretariat of the Low Forest Cover Countries and as such, intends to enhance and encourage regional cooperation. This has been reiterated by all officials met, who confirmed the readiness of their respective institutions to engage in cooperation and exchanges, and their willingness enhance LFCCs' capacity building by providing assistance in the fields where they have developed experience and expertise.

Coordination

Inter and intra-sectoral coordination is inadequate in view of the requirements of integrated, multidisciplinary and participatory approaches to forest and range development. Coordination within the FRO institutions and with other stakeholder bodies and organizations is weak, little use being made of respective qualifications and competence to improve the quality and durability of interventions as illustrated by the following examples:

- The Environment Department and FRO work often in parallel with little or no coordination as they both manage their respective protected areas, parks and forest stands;

- Within FRO, the Natural Resources General Directorates are compelled to implement soil conservation and watershed management techniques, without the necessary skills and know-how, as they have so far not been successful in involving the Watershed Management Department Offices, which have the expertise and experience needed for the job.

6.3 *Natural resources and resource use & management*

Socio-economic significance of forest and rangelands

More than 5 million people live in forests or in their vicinity, while 450 000 persons derive a permanent occupation from rangelands. Besides forests and rangelands' significant contribution in wood products, forage and fodder, the exploitation of some 28 NWFP items extracted from forests and rangelands, provide substantial revenues to the country.

Role of planted forests and of TOFs

Vast areas of man-made forests have been established. They are, however often isolated from the wider context within which they are initiated. These interventions are seldom conceived in an integrated and multidisciplinary approach. Plantations are established without any preconceived idea of their future sustainable use and regeneration, within their particular social, environmental and economic context. As a result, maintenance efforts are discontinued after a few years for lack of budget, and valuable wood and fodder products are not harvested at least, not within a prescribed carefully formulated management.

Though undoubtedly very important, Trees Outside Forests have not yet figured in any of the usual statistical data and information categories. Given the complexity and great diversity of TOFs and actors involved in their development and management, it is even more problematic to gather exhaustive data and information. TOFs are not yet well perceived in terms of their actual or potential contribution to the national economy and to the well being of people and their environment.

6.4 *General conclusion*

The current situation of Iran's natural resources is a reflection of its past and present social, ecological, technological, economic, political and administrative events and measures. Technology, particularly forestry alone cannot provide a solution to the complex situation as it addresses the symptoms, rather than the underlying causes. Technical or engineering solutions are not enough; they need to take into account the needs, priorities and aspirations of the rural poor.

7. Recommendations

The mission has formulated the following recommendations:

7.1 *Development choices and issues*

With regard to development choices and issues, the mission makes the following recommendations:

Biodiversity conservation

The protected areas and reserves provide the core sites for biodiversity conservation. Such systems are however, not sufficient in themselves for long-term conservation. It is recommended to adopt also participatory planning and resource management approaches to sustainable forest resources' management, with due regard for biodiversity conservation.

Assessing and monitoring of ecosystems

It is recommended to finalize the establishment of a national natural resource assessment and monitoring system by providing funds, staff and equipment for the full implementation of the UTF/IRA/024/IRA project⁵² formulated in May 1999.

It is also recommended to engage, with other environmental institutions, in setting up an environmental information network built on their respective systems and thereafter to proceed with regular exchanges of data and information to improve their global efficiency and cost effectiveness.

It is highly recommended to thoroughly assess environmental impacts of land nationalization particularly with regard to deforestation and forest and rangeland degradation. Further, the mission recommends that the significance and impact of the land lease and land privatisation operations initiated, by FRO be fully assessed to determine ways to improve them. Finally it is recommended to complete the ongoing assessment of all forests and rangelands' services and wood and non-wood products and by-products as well as the environmental conservation functions of forests and rangelands.

Popular participation

It is recommended that participatory planning and management become a standard iterative and bottom-up approach to comprehend, acknowledge and take into consideration the needs and aspirations of communities and individual households, to contribute in those matters that directly impact upon the environment and their sustainable livelihoods. Participation should allow communities to contribute to decision-making regarding all matters that concern them, in partnership with representative government institutions.

It is recommended to provide intensive training in communication and Rapid Rural Appraisal (RRA) and to set the foundation for partnership mechanisms between the State and the communities engaged in decentralized, participatory rural development. To this avail, a training cooperation programme with FAO should be established to instruct FRO's extension

⁵² "Inventory and Monitoring of Renewable Natural Resources of Iran, through Remote Sensing" project

staff and field technicians and officers on the objectives of participation and the means to achieve them.

Tenure rights

It is recommended to develop and activate a modern, government initiated and people oriented policy, planning and technical support system as a viable alternative to traditional planning, management and production practices. In this regard, the new forms of land tenure security being introduced should be pursued, monitored, assessed and improved. Land privatisation should also be promoted under acceptable conditions to both the tenants and the State in order to encourage private investment in forest and range rehabilitation, management and development.

Poverty alleviation and support to local communities

It is necessary to enhance and promote long term employment and revenue opportunities among forest and rangeland dwellers by strengthening stakeholders' interest and investments in sustainable resources management for the benefit of the concerned communities.

It is recommended to develop legal forms of support to local community development, including material and financial support to NGOs and to enhance technical, material and financial assistance to households and communities engaged in participatory development interventions in partnership with FRO.

Development and widespread distribution of alternative domestic energy

Despite its being a rich oil producing country, the I. R. of Iran, which subsidises substantially the cost of petrol (gasoline) has not been able to cover the entire country with alternative domestic energy sources (gas and petrol). Many, particularly in the remote, elevated and cold areas still depend exclusively on fuel-wood gathering for their oftentimes enormous cooking and heating energy requirements. It is therefore strongly recommended to provide urgent alternative domestic energy sources to cover the entire rural countryside.

7.2 *Insitutional and legislative improvements*

7.2.1 Legislative and institutional improvements

Need for a better adapted legislation

It is crucial to review forest and environmental legislation and regulations and incorporate, through acts, directives, regulations... to be developed and promulgated, the human dimension to forest and range conservation and development, and recognize the right of traditional land users to access and share planning, decision-making and management over the resources. Legislation needs therefore to spell out clearly communities' rights for self-regulating and supervising of land resources in partnership with the State. It should put in writing the conditions to promote and secure private investment, particularly those related to land and usufruct security.

The State should enhance the capacity of FRO and environmental conservation institutions to enforce regulations by increasing their capacity to do so.

Need for decentralization

To ensure genuine participation and community commitment as expressed in the recently formulated forest policies and strategies, more decentralization at planning as well as at decision-making levels is recommended. Concurrently NGOs must undergo a profound decentralization process and ensure that their role and presence amongst rural communities is improved and enhanced.

Cross-sectoral coordination and co-operation

The mission recommends establishing national and provincial cross-sectoral coordination and co-operation mechanisms involving all institutions and organizations concerned with rural development in general and natural resources rehabilitation, conservation and development in particular.

Regarding coordination within the Ministry of Jihad-e-Agriculture, the Natural Resources' Council is advised to set-up internal mechanisms and to formulate guidelines for better coordination not only of policies and strategies, but also of field programmes and interventions. Within FRO, the High Council for Forest and Range and Soil should coordinate more effectively the formulation and implementation of projects, drawing on all institutions and skills available.

Regional cooperation between LFC countries

The mission recommends the I. R. of Iran to do its utmost to promote cooperation with other LFCCs making the best of the large capacities and experience developed in various domains, which require assessment for cooperation programme establishment.

In the course of this mission several institutions visited have expressed their capacity and willingness to support cooperation exchanges and capacity building efforts for the benefit of LFCCs. The mission strongly recommends the Secretariat of the LFCCs to engage in a systematic follow up schedule, to ensure that the proposals detailed in annex17 are materialized in the nearest future possible:

Training and research

With regard to training and research, the mission recommends to:

1. Review the forestry, range and environmental protection training and research needs and priorities;
2. Adjust and normalize the qualifications balance between graduates and trained technicians;
3. Diversify the training curricula and research topics to include tropical semi-arid, and arid environment protection and forest and range rehabilitation, management and development;
4. Use the national training capability to help the neighbouring Low Forest Cover Countries; and
5. Develop training curricula-research topics in participatory planning/management and get research to concern itself more directly with the socio-economic issues faced by forest and range communities.

7.3 Changes on resource use and management

Zagros natural resources' rehabilitation and management

The mission recommends reviewing the strategy and objectives of the forest rehabilitation and management programmes in the Zagros region by considering the need:

1. For integration of forestry matters with soil conservation, watershed management and socio-economic development;
2. To enhance the potential for wood production by promoting fast growing species on specific sites;
3. To acknowledge that the main intervention in the Zagros mountain ranges should concern rehabilitation and re-establishment of natural indigenous stands and species;
4. To provide rural communities with alternative sources of energy.

Improved agricultural production systems

It is recommended to promote in the future, more environment and people friendly approaches to agricultural development and expansion, by adopting efficient and non-destructive production systems, particularly in mountain areas, and rehabilitating lands that have been exhausted of their productive potential, to their initial land-use choice.

Land productivity improvement

Restore and improve land productivity and soil fertility in rehabilitation of degraded lands, including by incorporating trees and planted forests in the landscape.

7.4 Enhancing the role of planted trees and Trees Outside Forests

It is highly recommended to value all natural forests and rangelands and manage their remnant resources sustainably whilst developing new-planted resources.

7.4.1 Enhancing the role of planted forests

With respect to enhancing the role of planted forests in sustainable forest management the mission recommends to:

1. Integrate planted forests in a broader land-use, social economic and environmental context in an attempt to respond to the priority needs and aspirations of people;
2. Maintain or increase the present rate of forestation/reforestation and bring about cost reductions, particularly in relation to irrigation;
3. Prepare (FRO and RIFR) arid, semi-arid and tropical silvicultural and management models as well as guidelines for the rehabilitation, silvicultural treatment, management of mangroves, fodder tree plantations, and *Haloxylon persicum* stands developed through plantations and seeding;

4. Arrange a short training course on the silvicultural treatments and management of mangroves.

7.4.2 Enhancing the role of Trees Outside Forests

With respect to enhancing the role of Trees Outside Forests, the mission recommends to:

1. Recognize TOFs as a valuable resource and introduce their concept and issues as points of discussion for the coming LFCC workshops;
2. Grant more support to farmers to maintain and expand poplar and fast growing species' plantings for shade, shelter, wood production and other uses;
3. Promote TOFs in private holdings, particularly in agroforestry where trees support agriculture and livelihoods;
4. Develop and adapted silviculture for the specific needs of urban/peri-urban forests and publish silvicultural guidelines for various species in different ecological contexts;
5. Consider the productive capacity of urban and peri-urban forests and prepare management plans accordingly;
6. Promote the planting of Trees Outside Forests, particularly fodder trees in sylvo-pastoral systems;
7. Arrange a short training course on the silvicultural treatments of fodder tree and shrub species and on sylvo-pastoral management of recently rehabilitated wooded rangelands.

References

- Abdollahpour, M.**, 2000. Report on Forest Policy in Iran.
- Abdollahpour, M., Saif A.**, 2002. Report on Forest Policies and Action Programmes in Iran. Forest and Range Organization, Ministry of Jihad-e- Agriculture.
- Ekrami, H.**, 1994. Caspian Tree Seed Production and Improvement Centre. Afforestation and Parks Bureau: Forest and Range Organization - Ministry of Jihad-e- Agriculture.
- FAO**, 2000. FRA - Forest Resources Assessment: Food and Agriculture Organization.
- FAO & I.R. of Iran**. Agreement between the Government of I.R. of Iran and FAO Concerning technical Assistance Services for Zagros Mountains Development.
- FAO & I.R. of Iran**, 1999. FAO/Government of The I.R. of Iran Cooperative Programme, Project of the Government of the I.R. of Iran.
- Fathi, H.**, 2002. Iranian Agriculture: Capabilities for Development - Agricultural Planning and Economic Research Institute, Department of Planning and Economy - Ministry of Jihad-e- Agriculture
- FRO**, 2002. Land Cover Map Production Project Through Remote Sensing, & GIS (Geographical Information System): Engineering Bureau of Forest and Range Organization: Ministry of Jihad-e- Agriculture.
- FRO**, 2001a. Introduction to Iran's Rangelands - Technical Office of Rangelands, Forest and Range Organization: Ministry of Jihad-e- Agriculture.
- FRO**, 2001b. The Desertification of Iran - Forestry and Range Organization: Ministry of Jihad-e- Agriculture.
- FRO**, 2000. Report on Forestry in Iran - Forest and Range Organization, Ministry of Jihad-e- Agriculture.
- FRO**, 1997. Summary about Noor Forest Park - Bureau of Afforestation and Parks, Forest and Range Organization, Ministry of Jihad-e- Agriculture.
- FRO**, 1992. National Report on Forestry in Iran - Fifteenth Session of The AFWC/EFC/NEFC Committee on Mediterranean Forestry Questions Silva Mediterranean. Forest and Range Organization, Ministry of Jihad-e- Agriculture.
- FRO**, 1977. Iran Changing the Past Into A Future - Forestry and Range Organization, Ministry of Agriculture and Rural development.
- Institutional and Government Organization - Integrated Land Management Project 1993 Ministry of Jihad-e- Agriculture.
- Jafari, M.**, 1997. Four articles on Forest - Ministry of Jihad-e- Agriculture.
- Jafari, M.**, 1997. Research Institute of Forests and Rangelands. An Overview. Education and research Division, Ministry of Jihad-e- Agriculture.
- LFCCs**, 1999. Low Forest Cover Countries Background Paper - Forestry and Range Organization, Ministry of Jihad-e- Agriculture.
- Moienaddin, H. & Nazari, P.**, 1993. The Rangelands Of Iran - Department of Range Organization, Ministry of Jihad-e- Agriculture.

- Pahlavi. M.R.**, 1977. Conservation: In Iran - Forestry and Range Organization, Ministry of Agriculture and Rural Development.
- Rahgoshai, B.**, 2000. Conservation of Asiatic Cheetah, its Natural Habitat and Associated Biota Project (CAAP) - SCI. 2000 Iran Statistical Yearbook: Statistical Centre of Iran.
- SCI**, 2000. A Glance At Iran - Statistical Centre of Iran.
- UNFPA** (Office in I.R. of Iran), 1998. UNFPA Activities in The Islamic Republic of Iran.
- Wetland Project Secretariat**, 2001. Description of the Iranian Wetlands Conservation Project: How to Conserve Iranian Wetlands.
- UNDP/FAO/Government of I. R. of Iran**: Caspian Model Management – Report for the Lirehsar Forest Management Plan.

Annexes

ANNEX 1: TERMS OF REFERENCE OF THE MISSION

International Consultant Services for Case Study Preparation in Tunisia, Oman and Iran in the Near East Region

Background: It is proposed that country case studies will be prepared in the Near East region in Iran, Tunisia (North African Mediterranean) and Oman (Gulf States) in readiness for the Regional Workshop for the Near East to be held in Iran in August/September, 2002. These case studies will outline the causes and effects of deforestation and forest degradation; lessons learned and priority needs strategies and methodologies to enhance the role of planted forests, trees outside forests in integrated landscape management and economic significance of NWFPs. The country study reports will be published in English/Arabic in advance of the International Workshop together with guidelines for each participating country to prepare their inputs. The consultant will also assist in providing technical advice in preparation and conducting the workshops and co-ordinating and reporting outputs.

Tasks to be Undertaken: With respect to enhancing the role of planted forests and trees outside forests for production of wood and non-wood forest products (including fuel-wood, wood products, food, livestock fodder, medicines, protection of soil and water values, shelter, shade etc) in individual country case studies, the international consultant, assisted by a national consultant, under the supervision of task managers will consult stakeholders widely to evaluate and detail for each country case study:

1. Background highlights with direct or indirect impacts upon the forestry sector, including population pressure, food security, land access, land-use rights, availability of credits, market access, forest resources (natural and planted), deforestation, forest degradation, desertification, afforestation and other key indicators of the significance and state of the forestry sector;
2. Policy, legal, planning and institutional frameworks outlining the vision and commitment of the Government, detailing strengths and weaknesses in capacity and capability (technical, technology and financial) and awareness of the environmental, economic, social and cultural value of these forest resources and ecosystems for the livelihoods rural populations;
3. Related to 1 above, inter-sectoral linkages, conflicts in land-use policy and practice, incentives and subsidies which impact upon the forestry sector;
4. Appropriateness of current policies as reflected in alternative mechanisms and practices, programmes and projects for achievement of sustainable forest management;
5. Information, data and reports on the extent (quantity and quality) of planted forest resources (forest plantations - rain-irrigated and/or with treated waste water and trees outside forests) and production of the main wood and non-wood forest products and their respective roles in provision of goods and services;

6. Meet with all stakeholders (line ministries, Municipal Affairs; communities, rural families, NGOs, private sector, research and academic institutions and international agencies etc) to discuss and report the perceived appropriateness of current policies and priorities in planning and soundness of alternative mechanisms, practices, programmes and projects in achieving sustainable forest management and equitable sharing of opportunities, risks, costs and benefits; and
7. Formulate a list of the key issues, constraints, opportunities, lessons learned, success stories and recommended development proposals within the capacity and capability of each country to be presented as case studies at the regional workshops to represent different ecological zones, institutional and stakeholder circumstances.

The case study reports are to be prepared and presented to FAO in English within 1 month of completion of the fieldwork to allow time for review, translation to Arabic and dissemination to country participants prior to the regional workshops. A guide will be prepared for the format and content of the country case studies.

The consultant will support the FAO task managers with technical advice and recommendations on the format, content, activities and outputs from the regional workshops, with potential (to be confirmed) to attend as facilitators for the working groups. The workshop will be conducted in English and the proceedings and outputs will be presented in English and Arabic.

Duration: 3 person months, between February - April 2002

Locations: Iran, Tunisia and Oman, brief and debrief for case studies in Rome prior to and after completion of field missions

Task Managers: Hassan Abdul Nour, Near East Regional Office, FAO supported by Jim Carle and Syaka Sadio, Forest Resources Division, FAO, HQ, Rome Italy and FAO representations in the instances of Tunisia and Iran.

ANNEX 2: ITINERARY OF THE MISSION

Date	Time - Main activity - Detailed activities
<u>23.04.2001</u>	Arrival of international consultant S. Rouchiche in Teheran
<u>24.04.2001</u>	Briefing sessions Briefing session at FAO with Dr. Abdur Rashid, FAO representative and Dr. Ali Y. Hakimi, FAO Programme Officer Security briefing at UNDP with Mr. Mohamed Ragaey Reviewing programme of visits
<u>25.04.2001</u>	Review report table of contents – Information and documentation research
<u>26.04.2001</u>	Holiday: Reviewing documentation at hotel
<u>27.04.2001</u>	- 9.00: Visit at Forest and Range Organization (FRO): Briefing with: Head of the High Council for Forest and Range Mr. Shariat Nejjhad; Mr Eng Nossrati and Mr. Bahrami (Deputies) - 14.00: Meeting with Mr. Aghazamani, GD of Forest Management outside Northern Iran (also in charge of tree planting outside Northern Iran)
<u>28-29.04.2001</u>	Documentation review/report writing
<u>30.04.2001</u>	- Morning: Meeting at the Forest & Range Research institution with: Forest Research Division Non Wood Forest Products and Medical Plants Division Poplar & Fast Growing Species Division - Afternoon: Meeting with the Deputy of Environmental Protection Organization
<u>1.05.2001</u>	- Morning: Meeting with the Municipal Affairs (Park Organization of Teheran City) - Afternoon: Visit of Teheran's urban and peri-urban plantations
<u>2.05.2001</u>	Office work (at LFCC Secretariat) Information analysis & report writing
<u>3.05.2001</u>	Hotel work - Documentation review & report writing
<u>4-7.05.2001</u>	Field visits Participatory oak forest management ? Kermanshah Province Participatory management of <i>Pistachia mutica</i> natural stands for NWFP (gum production) ? Kermanshah Province Participatory Range management ? Kordistan Province Visit to irrigated private poplar plantations ? Kermanshah & Kordistan Provinces

Visit to participatory agroforestry (TOFs) ? Kermanshah & Kordistan Provinces

- 8-9.05.2001 Review and visits
Review and analysis of all data and information collected during the successive visits, report writing
Visit to a sand dune stabilization project near Teheran
- 10.05.2001 Hotel documentation and typing
- 11.05.2001 - Morning: Meeting with academic staff of the Natural Resources Faculty (Karaj); Teheran University (Review training capacity for nationals and for foreign candidates from the neighbouring LFCCs
- Afternoon: Information review & report writing
- 12.05.2001 - Morning: Meeting with staff of the Extension & Participation Bureau of FRO and with representatives of National NGOs to discuss participation Issues on forest management, agroforestry & range management & Desertification control
- Afternoon: Briefing FAO & UNDP on mission advancement
- 13-14.05.2001 Hormozgan Province:
Visit to *Acacia sp.* *Prosopis sp.* and *Avicennia sp.* plantations
Meeting with the GD of Natural Resources, Hormozgan Province
- 5-16.05.2001 Khuzestan Province:
Visit to irrigated *Eucalyptus* plantations
Visit to non-irrigated *Prosopis juliflora* and *Acacia Victoria* plantations
Visit to participatory plantations for afforestation and desertification control
Meeting with the GD of Natural Resources and colleagues of the province
- 17.05.2001 Holiday
- 18.05.2001 Report writing at LFCC's secretariat
- 19.05.2001 - Morning: Report writing; debriefing preparation
- Afternoon: Debriefing with FAO and FRO on mission's outcome
- 20.05.2001 Report finalization; Response to debriefing session comments
- 21.05.2001 Departure of international consultant for Rome

ANNEX 3: PERSONS MET

Following are the persons met during the mission, presented in alphabetical order:

Abdipour Mahmood (Mr.)	FRO – Kordistan
Abdur Rashid (Dr.)	FAO Representative, FAOR – Iran
Aghazamani (Mr.)	General Director of Forest Management Outside North (FRO)
Ahmadi (Mr.)	FRO – Kordistan, Head Natural Resources Office at Kanyaran
Ahmadi H. (Dr.)	Faculty Natural Resources Karaj – University of Teheran
Ashtari A.	Managing Director of ONG Preserve the Mountains ⁵³
Attarod Pedram	Forest Engineer (accompanied the mission)
Bahmanyar (Mr.)	FRO – Hormozgan, Deputy Gen. Dir. Land Affairs
Bahrami (Mr.)	Deputy Forest & Range Organization
Baizidi (Mr.)	FRO – Kordistan, Head of Forest Conservation
Bakhsh Ziad (Mr.)	Head Participation Group – Ext. Participation Bureau (FRO)
Bakhtiari (Mr.)	FRO – Kordistan, Planning and Budget Expert
Baladi (Mr.)	FRO – Kordistan, Ex Assistant Gen. Director
Biglorbaigi (Mr.)	Member of High Council for Forest, Range & Soil (FRO)
Chanan Ali (Mr.)	Gen. Dir. Natural Resources Kordistan Province (FRO)
Danai (Mr.)	General Director Natural Resources Khuzestan Province (FRO)
Faiznia (Prof.)	Deputy Dean Faculty Natural Resources Teheran University
Farahani (Mr.)	FRO – Teheran, Deputy Gen. Dir. Natural Resources Teheran
Farhangdoust (Mr.)	FRO – Hormozgan, Head Range Management Office
Ghaibi (Mr.)	Forest Management Outside North Bureau (FRO)
Ghozami (Mr.)	Forest Management Outside North Bureau (FRO)
Hakimi Ali Y. (Dr.)	Programme Officer, FAOR – Iran
Hatam Fatema (Miss)	Forest Engineer (assisted the mission)
Iqlidor (Mr.)	FRO – Khuzestan, Head of Extension & Participation Office
Jaafari (Mr.)	Deputy Dean Faculty Natural Resources Teheran University
Jalili A. (PhD)	Director - Research Institute of Forests and Range
Jamshidi Iman (Mr.)	Gen. Dir. Natural Resources Kermanshah Province (FRO)
Jawahiri (Mr.)	FRO – Hormozgan, Head of Forestation Office
Karami (Mr.)	FRO – Kordistan, Head of Conservation Office
Karimi (Mr.)	FRO – Kermanshah, Head Natural Resource Office, Paveh
Karimi A. (Assist. Prof.)	Faculty Natural Resources Karaj – University of Teheran
Kazerouni (Mr.)	FRO – Khuzestan, Expert Sand Dune Fixation
Khamegi (Mr.)	FRO – Khuzestan, Head of Chouch Natural resources' Office
Khorassani (Mr.)	Dept. Fisheries, Faculty Natural Resources Teheran University
Kochakpour (Mr.)	FRO – Kermanshah, Deputy Land Affairs & Conservation

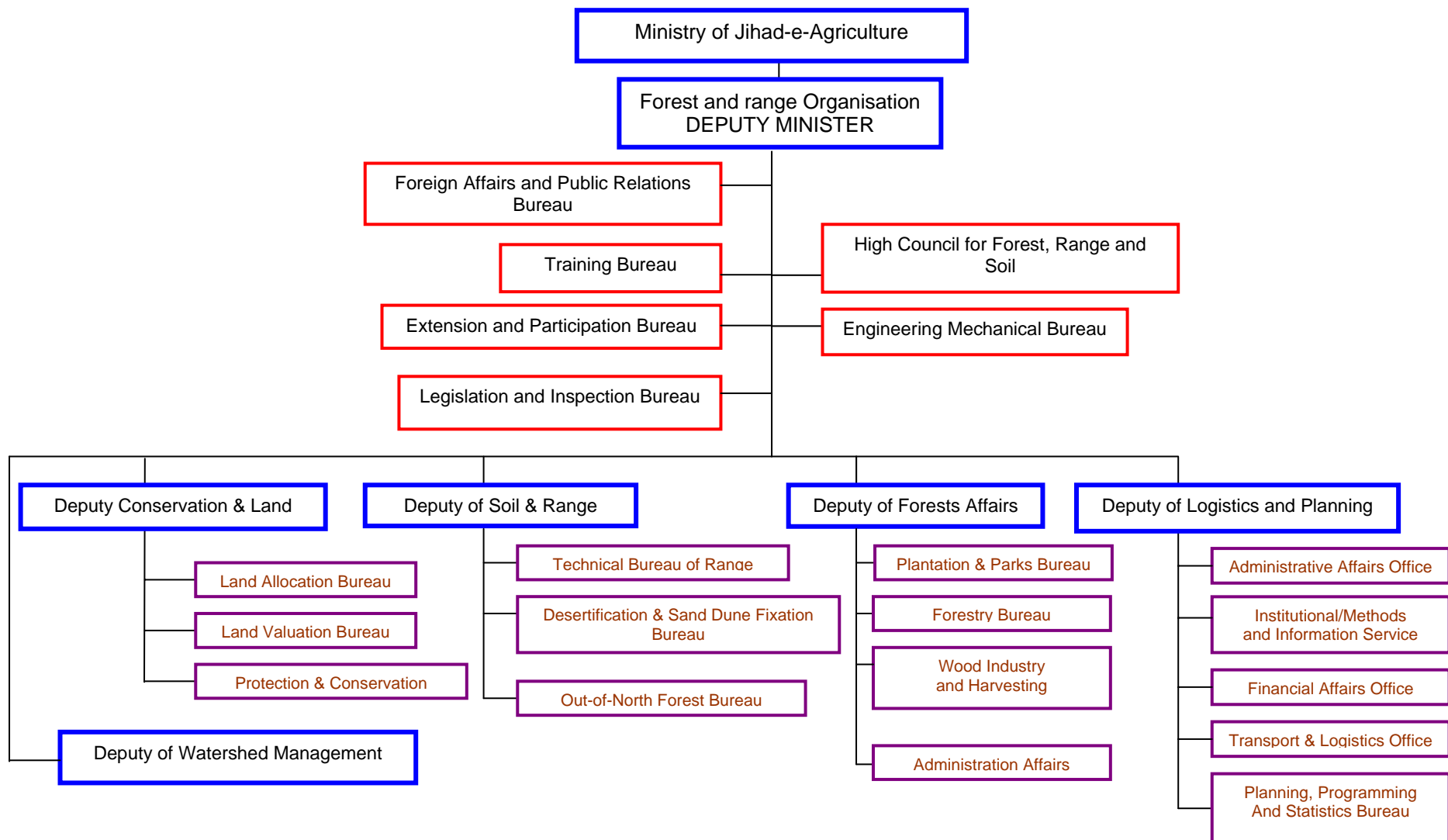
⁵³ Secretary Network of Environmental NGOs

Kohan M.E. Fallah	Deputy Director General Forest & Range Organization
Kouchbideh (Mr.)	FRO – Hormozgan, Head Office Planning Budget
Mirzapour (Mr.)	FRO – Kordistan, Head of Rangeland Office
Mohamedi Nasser (Mr.)	FRO – Kordistan
Mohammadi (Mr.)	FRO – Kordistan, Head Natural Resources Office at Marivan
Mokhtari Ali Mohamed	General Manager of Teheran Parks and Green Areas Organization
Najafi Anoshirvan	Department of the Environment 54
Najat Abdi (Mr.)	FRO, General Director Natural resources Teheran Province
Nasouri Mohammad	Dir. Gen. Natural Resources Province Hormozgan – FRO
Nejhad Shariat	Head of the High Council for Forest, Range & Soil (FRO)
Niah Wahid (Mr.)	FRO - Teheran, Head Nat. Resources Office at Warami
Norsati (Mr.)	FRO – Khuzestan, Expert Desertification Control – Chouch Office
Parsapajouh (Prof.)	Wood Processing, Faculty Natural Resources Teheran University
Ragaey Mohamed	UNDP Teheran
Rashidi (Mr.)	Manager West Paper Industry – Kermanshah Province
Rashidian (Mr.)	FRO – Khuzestan, Planning & Budget
Rashnov (Mr.)	FRO – Khuzestan, Deputy Natural Resources Office Chouch
Rezza Chaker (Mr.)	FRO – Hormozgan, Head Utilization & Exploitation Department
Roobahani M. Soleymani	Secretary International Affairs of ONG Green Front of Iran
Roshandel (Mr.)	FRO – Khuzestan, Deputy Afforestation Office
Sagheb -Talebi Kh. (PhD)	Research Institute of Forests and Range 55
Sangar (Mr.)	FRO – Hormozgan, Head Engineering & Studies Office
Sanie (Mr.)	FRO – Kermanshah, Head Public Relations Affairs
Shadan (Mr.)	FRO – Kordistan, Extension & People Participation
Shafii (Mr.)	FRO – Khuzestan Province, Desertification Control Expert
Shaheri (Dr.)	General Director Extension & Participation Bureau (FRO)
Shamekhi Taghi (Ass. Prof.)	Faculty Natural Resources Karaj – University of Teheran
Sharifian (Mr.)	Director of Dr. Jamanshir Training Complex Teheran
Soleymani (Mr.)	FRO – Kermanshah, Deputy Technical Affairs
Soufi Behrad S. (Ms.)	Administrative assistant, FAOR – Iran
Tamhidi (Mr.)	FRO – Kordistan, Senior expert in Rangeland management
Yacoubi (Mr.)	International Affairs (FRO)
Yazdani Sh. (B. Sc)	Secretary - Research Institute of Forests and Range
Zadeh Bashgard (Mr.)	FRO – Hormozgan, Head Desertification Control Office
Zoubeiri (Mr.)	Inventory-Remote Sensing, Fac. Nat. Res. Teheran University

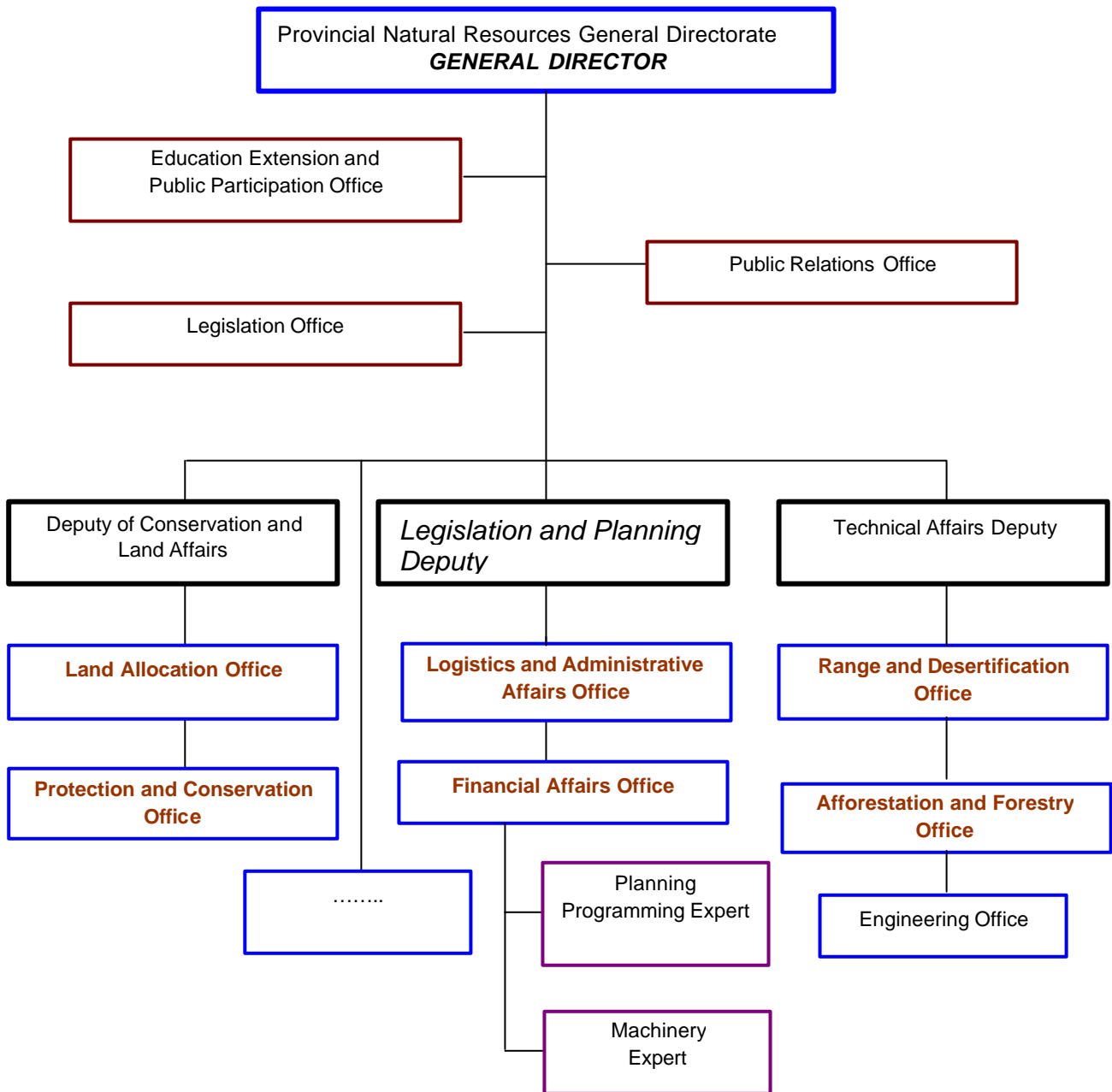
⁵⁴ Deputy Head of the Department for Natural Environment and Biodiversity.

⁵⁵ Head, Forest Research Division.

ANNEX 4: ORGANIZATIONAL CHART OF THE FOREST AND RANGE ORGANISATION



ANNEX 5: PROVINCIAL NATURAL RESOURCES GENERAL DIRECTORATE



ANNEX 6: SOME FORESTRY DEFINITIONS USED IN TEXT

Following are some national forest cover definitions as used in this report as they provided by Mirsadeghi Mohammad Ali H. *et al.* to the country submission to FRA 2000.

Closed forests: Formations where trees in various storeys and the undergrowth, cover a high proportion (> 40 %) of the ground and do not have a continuous dense grass layer (cf. the following definition). They are either managed or unmanaged forests, primary or in advanced state of reconstitution and may have been logged-over one or more times, having kept their characteristics of forest stands, possibly with modified structure and composition. Typical examples of closed forest formations include tropical rainforest and mangrove forest.

Forest fallow: Refers to all complexes of woody vegetation deriving from the clearing of natural forest for shifting cultivation agriculture. It consists of a mosaic of various reconstitution phases and includes patches of non-cleared forest and agricultural fields, which cannot be realistically segregated and accounted for, area-wise, especially from satellite imagery. Forest fallow systems are an intermediate class between forest and non-forest land uses. Part of the area may have the appearance of secondary forest. Even the parts under cultivation may appear as forested due to the presence of some tree cover. Accurate segregation between forest and forest fallow may not always be possible.

Open forests: Refers to formations with a discontinuous tree layer, but with a soil coverage comprised between 10-40 %. There is generally a continuous grass layer allowing grazing and spreading of fires.

Shrubs: Refers to vegetation types in which the dominant woody elements are shrubs i.e. woody perennial plants, generally of more than 0,5 m and less than 5 m in height at maturity and without a definite crown. The height limits for trees and shrubs should be interpreted with flexibility, particularly the minimum tree and shrub heights, which may vary between 5 and 7 meters approximately.

ANNEX 7: MAP OF THE ISLAMIC REPUBLIC OF IRAN



ANNEX 8: TABLES

Table 1: Land elevations in Iran, as estimated from planimetric measurements at map scale 1:2 500 000

Description	Area in km ²	Proportion of country area
Lands over 2 000 m elevation above sea level	260 000	15,7 %
Lands between 1 000 – 2 000 m above sea level	879 000	53,3 %
Lands between 500 – 1 000 m above sea level	154 000	9,3 %
Lands below 500 m above sea level	332 000	20,1 %
Caspian Sea coasts situated below sea level	11 000	0,7 %
Inland lakes and water bodies	14 000	0,9 %
Total country area	1 650 000	100 %

Source: Report of the I.R. of Iran presented to the First Experts Group on Forest and Environment: Iran 27-29/7/95

Table 2: Climatic classification of Iran

Climate Class	Area covered Km ²	% of country area	Rainfall range in mm	Mean annual rainfall	Annual Pan Evapo-transpiration
Hyper arid	62 264 000	38,0 %	0 – 150	-	2 700 – 3 000
Arid	64 107 000	38,9 %	150 – 350	185 mm	2 000 – 2 700
Semi-arid	25 709 000	15,6 %	350 – 550	350 mm	1 700 – 2 000
Sub-humid	6 098 000	3,7 %	550 – 700	620 mm	1 200 – 1 400
Humid (type A)	5 603 000	3,4 %	700 – 1 000	740 mm	1 000 – 1 200
Humid (Type B)	659 000	0,4 %	> 1 000	1 100 mm	800 - 1 000

Source: Ministry of Jihad-e-Agriculture - Iranian Agriculture: Capabilities for development⁵⁶

⁵⁶ The original table has been slightly adapted by regrouping the “Dry” and “Semi-dry” classes into one “Arid” class and the “Mediterranean” and “Semi-arid” classes into one semi-arid class. The “Humid” class has been identified as the sub-humid class and the rest as “Humid” instead of “Very Humid” classes Types A and B.

Table 3: Surface water resources of major basins in billions cubic meters

Water year	Surface water resources of main basins (in billion cubic meters)					
	Caspian Sea	Persian Gulf & Oman Sea	Urmieh Lake	Central Basin	Hamoon & Sarakhs	Total Country
1989-1990	13,26	52,92	4,66	13,53	4,79	89,16
1990-1991	13,07	40,05	3,51	13,17	9,74	79,54
1991-1992	26,73	79,5	8,71	21,99	6,27	143,19
1992-1993	20,59	101,27	7,82	28,79	6,15	164,62
1993-1994	27,4	46,27	9,48	15,24	2,66	100,69
1994-1995	23,04	74,03	7,53	20,53	3,12	128,52
1995-1996	19,36	59,89	4,77	22,20	3,34	109,56
1996-1997	11,59	39,36	4,26	11,45	2,72	63,38
1997-1998	17,54	53,59	5,41	19,61	6,19	112,34
1998-1999	7,34	33,11	1,56	11,11	2,43	55,56
<i>Minimum</i>	<i>7,34</i>	<i>33,11</i>	<i>1,56</i>	<i>11,11</i>	<i>2,43</i>	<i>55,56</i>
<i>Maximum</i>	<i>27,04</i>	<i>101,27</i>	<i>9,48</i>	<i>28,79</i>	<i>9,74</i>	<i>164,62</i>
Average	17,96	58	5,77	17,76	4,74	105,26
Range	19,70	68,16	7,92	17,68	7,31	109,06
Variation Coefficient	34,94%	34,77%	41,44%	30,82%	47,05%	30,45%

Source: Ministry of Jihad-e-Agriculture - Iranian Agriculture: Capabilities for development.

Table 4: Share of the forestry sub-sector's value added in the overall agricultural sector

Year	Total V.A. ⁵⁷ of agricultural Sector	V. A. of the forestry sub-sector	V.A of forestry as % of the total agriculture V.A.
1989	5585,3	67,0	1,2 %
1990	6084,5	65,0	1,1 %
1991	6573,2	72,7	1,1 %
1992	7020,9	74,5	1,1 %
1993	7170,0	70,6	1,0 %
1994	7483,2	102,0	1,4 %
1995	7702,4	80,5	1,0 %
1996	7783,6	86,1	1,1 %
1997	7981,0	81,6	1,0 %
1998	8574,6	89,9	1,0 %
1999	8091,0	91,4	1,1 %
Av. annual growth	3,8 %	3,2 %	

Source: Iranian Agriculture: Capabilities for Development – Ministry of Jihad-e-Agriculture, March 2002

⁵⁷ V.A. = Value Added in Rls. billions.

Table 5: Different forest types and evolution in 36 years between 1958-1994

Forest type	Location	Area in ha		Area lost in ha	% Country area	
		1958	1994		1958	1994
Caspian Forests	North	3 400 000	1 900 000	1 500 000	2,06 %	1,15 %
Arasbaran forests	Northwest	300 000	200 000	100 000	0,18 %	0,12 %
Zagros forests	West	5 200 000	3 500 000	1 700 000	3,15 %	2,12 %
Central forests	Centre	7 500 000	5 500 000	2 000 000	4,54 %	3,33 %
Subtropical forests	South	1 600 000	1 300 000	300 000	0,96 %	0,78 %
Total forests	-	18 000 000	12 400 000	5 600 000	10,90	7,51 %

Source: Bio Diversity CRTIC: National CBD Report for the I.R Iran file://C:\fhatami\bio-5.htm

Table 6: Area of natural forests and other wooded land, according to FRA 2000 classification (reference year 1995)

Name of geographic forest unit	Natural forests (NF) in ha			Other wooded lands (OWL) in ha		
	Closed forests	Open forests	Total NF	Shrubs	For. fallow	Total OWL
1- Caspian forest	1 905 000	-	1 905 000	-	-	-
2- Arasbaran forest	37 500	60 000	97 500	-	52 500	52 500
3- Zagros forest	505 000	2 020 000	2 525 000	-	2 525 000	2 525 000
4- Irano-Touranian forest	-	447 000	447 000	500 000	1 948 000	2 448 000
5- Khalij-Omanian forest	40 000	-	40 000	1 260 000	1 100 000	2 360 000
Total country forest s	2 487 500	2 527 000	5 014 500	1 760 000	5 625 500	7 385 500

Source: Natural Resource Study and Engineering Bureau and Forest Management Bureau (FRO).

Table 7: Total reported area of forest plantations reference year 1999

Plantation objective	Ownership	Reported area
Industrial round-wood production	Public sector	204 000 ha
<i>Total industrial round-wood plantations</i>		<i>204 000 ha</i>
Fuel-wood and poles production	Large scale ⁵⁸ private sector	4 000 ha
	Small scale private sector	71 000 ha
	Large scale public sector	26 000 ha
<i>Total fuel-wood and poles plantations</i>		<i>101 000 ha</i>
Environmental and other purposes ⁵⁹	Large scale private sector	30 000 ha
	Small scale private sector	21 000 ha
	Large scale public sector	1 865 000 ha
<i>Total environmental purposes plantations</i>		<i>1 916 100 ha</i>
Grand total, all forest plantations		2 221 100 ha

Source: Official document from the Planning and Budget Bureau (FRO).

Table 8: Increase in nursery and orchard areas between 1990-2000

Year	Nurseries area	Orchards area
1990	198 000 ha	1 228 000 ha
1991	207 000 ha	1 308 000 ha
1992	220 000 ha	1 311 000 ha
1993	220 000 ha	1 345 000 ha
1994	225 000 ha	1 397 000 ha
1995	251 000 ha	1 454 000 ha
1996	286 000 ha	1 509 000 ha
1997	313 000 ha	1 687 000 ha
1998	336 000 ha	1 630 000 ha
1999	355 000 ha	1 647 000 ha
2000	383 700 ha	1 703 923 ha
Increase in area	93,9 %	38,8%
Average annual growth	6,8 %	3,3 %

Source: Ministry of Jihad-e-Agriculture;
Iranian Agriculture: Capabilities for Development.

⁵⁸ Small scale refers to small plantation areas under one or more owners of less than 20 ha. Large-scale holdings exceed 20 ha.

⁵⁹ The category "environmental and other purposes" plantations, includes public plantations for sand dune stabilization and desertification control established over 1,865,000 ha, using *Haloxylon persicum*, *Tamarix spp.* *Prosopis spp.* etc. species.

Table 9: Status of Iran's urban and peri-urban forest areas, as of end 1996

Period	Urban/Peri-Urban forest areas		
	North of Iran	Rest of Iran	Total Iran *
Before the Islamic Revolution of 1979	29 400 ha	13 981 ha	43 381 ha
1979 – 1994	159 630 ha	252 074 ha	411 704 ha
1994 1996	20 970 ha	54 233 ha	75 203 ha
Total till end 1996	210 000 ha	320 288 ha	530 288 ha

Source: Forest and Range Organization of Iran, 1997.

* Not included the very substantial greenbelt areas established around villages encroached by moving dunes.

Table 10: Wood products requirements

Item	Wood products Requirements
1- Sawn-wood	233 400 m ³
2- Wood-based panels	464 400 m ³
3- Pulpwood	39 000 Mt
4- Paper & paperboard	621 800 Mt
5- Round-wood	1 124 000 m ³
6- Industrial round-wood	1 068 400 m ³
7- Fuel-wood	54 000 m ³
8- Other fibre pulp	80 000 Mt

Source: Padovani, Felice: FAO Forestry Information System (FORIS) – Country profiles – Aug. 2000.

Table 11: Livestock population and its dependence on range according to origin

Animal type	Number (AU)	% of Total	Range dependence	
			Rural	Pastoralists
Sheep	54 000 000	40,6	54 %	75 %
Goats	20 250 000	15,2	65 %	80 %
Native cattle	26 885 000	20,2	26 %	70 %
Hybrid cattle	12 642 000	9,5	70 %	20 %
Pure breed cattle	7 455 000	5,6	0 %	0 %
Camels	1 010 000	0,8	90 %	90 %
Buffalo	3 924 000	2,9	75 %	60 %
Solipeds	6 908 000	5,2	75 %	75 %
Total	133 075 000	100		

Source: MOJA – 15,2FRO: Introduction to Iran's Rangelands: By the Technical Office of Rangelands, April 200.

Table 12: Wood products production and imports value equivalence in US \$

Item	Unit	Unit price US \$	Import		Production	
			Quantity	Value US \$	Quantity	Value US \$
Sawn-wood	M ³	187,00	127 400 m ³	23 814 000	106 000 m ³	19 822 000
Wood-based panels	M ³	262,00	50 400 m ³	13 194 000	414 000 m ³	108 468 000
Pulp wood	Mt	833,00	39 000 Mt	32 492 000	-	-
Paper & paperboard	Mt	710,00	575 800 Mt	409 088 000	46 000 Mt	32 660 000
Round-wood	M ³	127,00	8 400 m ³	1 064 000	1 114 000 m ³	141 478 000
Industrial round-wood	M ³	127,00	8 400 m ³	1 064 000	1 060 000 m ³	134 620 000
Fuel-wood	m ³	-	-	-	54 000 m ³	
Total Value				480 716 000		437 048 000

Source: Padovani, Felice – FAO Forestry Information System (FORIS) – Country profiles, Aug. 2000.

Table 13: Comparison of 1998 and 1999 exports of medicinal plants, resins, etc.

Product	1998			1999		
	Weight (Tons)	Value 1000 Rials	Value US \$	Weight (Tons)	Value 1000 Rials	Value US \$
Gum tragacanth	238,8 T	319 261	181 915	330,8 T	580 356	330 687
Resins	1821,9 T	1 194 310	1 076 757	1 103,1 T	874 369	498 216
Liquorice essence & powder	2348,4 T	7 228 887	4 119 024	1 915,1 T	5 272 738	3 004 409
Liquorice root	3 697,1 T	2 234 557	1 273 252	3 498,8 T	2 068 683	1 178 737
Medicinal & industrial plants	7 104,1 T	4 888 067	2 785 323	5 920,6 T	3 606 500	2 054 986
Henna & <i>Z. spina-christi</i>	1 901,8 T	1 194 446	680 596	2 058 T	1 302 553	742 195
Fix weed seeds	3,0 T	4 414	2 515	1 852,6 T	3 699	2 108
Total	17 115,1 T	17 063 942	10 119 382	14 829 T	13 708 898	7 811 338

Source: Islamic Republic of Iran Customs, cited by Mostafa Abdollahpour & Jamal Latifi, July 2000.

Table 14: Area of forest under management (reference year 1999)

Forest type, using country classification	Total area in ha	Area under management in ha/Purpose				
		Production	Conservation	Other	Total	%
Caspian Forest	1 905 000 ha	1 502 000 ha	398 000 ha	5 000 ha	1 905 000 ha	100 %
Arasbaran Forest	150 000 ha	-	60 000 ha	41 740 ha	101 740 ha	67,8 %
Zagros Forest	5 050 000 ha	-	100 000 ha	707 500 ha	807 500 ha	16 %
Irano-Touranian Forest	2 895 000 ha	-	399 000 ha	468 400 ha	867 400 ha	30 %
Khalij-Omanian Forest	2 400 000 ha	-	10 000 ha	213 800 ha	223 800 ha	9,3 %
Total under managt.	12 400 000 ha	1 502 000 ha	967 000 ha	1 445 040 ha	3 905 440 ha	31,5 %

Source: Forest and Range Organization

Table 15: Situation of the range management plans and land areas allocated

Situation of the range management plans		Total area (million ha)
Action	Number	
Directed	6 893	16,4
Ratified	5 065	12,8
Allocated	3 815	10,0
Implemented	3 838	8,8
Total area concerned		48,0

Source: Introduction to Iran's rangelands, by TOR April 2001.

Table 16: Scientific and administrative personnel of RIRF (1997)

Degree	Ph.D.	M.Sc.	B.Sc.	College	Diploma	Others	Total
Headquarters	42	72	64	16	85	311	590
Research Centres	5	98	266	31	64	83	541
Total	47	170	330	47	149	344	1 131

Table 17: Average income and actual annual urban and rural household expenditure in Iranian Rials (year 2000)

Item	Urban household	Rural household
Average income	22 387 725 Rls.	13 047 411 Rls.
Total annual expenditure/household	24 175 000 Rls.	15 673 000 Rls.
Expenditures on non-food commodities	17 365 000 Rls.	9 040 000 Rls.
Expenditures of food, beverages, tobacco	6 810 000 Rls.	6 633 000 Rls.

Source: Statistical Centre in Iran

ANNEX 9: CLIMATE OF IRAN⁶⁰

Owing to its highly contrasted topography, Iran displays a variety of climates, mostly of continental type. Temperatures, which vary considerably, observe a certain pattern throughout the country, decreasing from south to north and from east to west. The interior deserts of the Republic are among the hottest in the world. The average temperature estimated for the country as a whole amounts to 18 °C. Areas with absolute maximum temperatures of 50 °C are common in the interior and southern deserts and lowlands, while absolute minimum temperatures of – 30 °C are recorded in the northern and northwestern mountain ranges.

With a mean annual rainfall of 253 mm⁶¹, Iran is seen as a drought-prone region. The broad pattern for the country as a whole is that of decreasing rainfall from north to south and from west to east. Except for the Caspian Sea littoral and the Zagros Mountains, rainfall is rather unpredictable and scanty, with high annual variations. This particularly true of the Central Plateau, where rainfall produced by Mediterranean winter depressions is limited to the cold months of the year. Higher grounds and windward slopes facing moisture-bearing winds receive more precipitation than low-plains, depressions and deserts.

Iran features three main climatic zones, which are:

- The hyper arid and arid regions of the central and eastern parts of Iran, which are characterized by long, warm and dry periods, lasting sometimes over seven months. The Persian Gulf littoral is affected by hot, but moist climate with low rainfall. Covering about 77 % of the country, these regions display mean annual precipitations ranging between 0 and 350 mm (table 2, annex 8);
- The Mediterranean semi-arid and sub-humid regions of the western Zagros Mountains, the high plateau of Azerbaijan and the Alborz Mountain characterized by warm, dry summers and cold, rainy winters, with mean annual precipitations ranging between 350 and 700 mm. The area concerned by these climatic condition covers about 19 % of the national territory;
- The humid regions mainly in the Caspian coastal area, west Azerbaijan and southwest Zagros, with mean annual rainfall ranging from 700 to 2 000 mm, cover less than 5 % of the land surface. The Caspian coastal area enjoys a temperate climate with moderate temperatures and regimes of high and well-distributed rainfall.

Teheran, which lies at the foot of the Alborz Mountain, receives an average of 250 mm of rain a year, but the deserts to the south and east average only about 50 mm annual precipitations. Abadan on the Persian Gulf receives less than 200 mm annual rainfall.

⁶⁰ Source: Iran Today: Prepared and published by Gita Shenasi, 2001.

⁶¹ Estimation made over records of the last 29 years.

ANNEX 10: STRUCTURE AND RELATIVE IMPORTANCE OF NATURAL AND MAN MADE FORESTS

Structure and relative importance of natural forests

Forest inventories do not always distinguish between natural and artificial stands. As a result, most statistics related to natural forests, run the risk of including relatively important areas of forest plantations. The following data related to Iran's natural forests probably include, relatively modest areas of man-made forests. The forest area distribution according to the FRA 2000 classification is given in table 6 of annex 8. From a forestry point of view, Iran is divided into five vegetation regions as follows:

The Caspian or Hyrcanian Region: The region extends throughout the south coast of the Caspian Sea and the northern slopes of the Alborz mountain ranges. The Hyrcanian forests extend over 800 km along the Caspian coast and about 25 km in width. They cover an area of 1 905 000 ha, extending from sea level to 2 500 m altitude. The mean annual precipitations range from 1 000 – 1 500 mm with recorded maximum and minimum of respectively 2 000 mm and 600 mm.

The principal species are broadleaved and include the following: Maple (*Acer insigne*, *A. laetum*, *A. platanoides*), Alder (*Alnus glutinosa*, *A. subcordata*), Boxwood (*Buxus sempervirens*), Hornbeam (*Carpinus betulus*), Beech (*Fagus orientalis*), Ash (*Fraxinus excelsior*), Ironwood (*Parrotia persica*), Oak (*Quercus castaneifolia*, *Q. macranthera*) and Elm (*Ulmus carpiniifolia*, *U. glabra*).

The Arasbaran Zone: The forests of this region are located in the extreme western corner of the Caspian forest zone. The elevations make it possible to encounter the last expands of the Oak-Juniper forests on some 150 000 ha of North Western Iran. The humidity is less than in the Hyrcanian region, but the weather is colder. Due to the high diversity of the flora, the region has become a “biosphere reserve”.

The principal species found are: *Quercus macranthera*, *Carpinus betulus*, *C. schuschaensis*, *C. orientalis*, *Acer campestre*, *A. monspessulanum*, *fraxinus rotundifolia*, *Ulmus spp.* Other species found are *Amygdalus sp.*, *Berberis vulagris*, *Cornus mas*, *Celtis australis*, *C. caucasia*, *Corylus avellan* etc.

Irano-Touranian Region: This is a vast and generally arid vegetation region covering the Central Plateau of the country. Mean annual rainfall ranges from 100-250 mm, rarely exceeding 250 mm. The total area of natural forests is estimated at 2 895 000 ha. The main forest types of the region are:

- *Juniperus* forests, covering about 1,2 million ha;
- *Pistachia atlantica* forests covering approximately 1,4 million ha;
- *Tamarix sp.* and natural *Haloxylon sp.*;
- Various mixed types of *Quercus species* are found in alliance communities, such as *Q. persica*, *Q. infectoria*, *Q. libani* mainly found at altitudes between 1 000 and 2 300 m above sea level.

Zagrosian Region: The region extends 1 600 km throughout the Zagros Mountain ranges. The average annual rainfall ranges between 400-700 mm, rarely exceeding 700 mm. Precipitations are unevenly distributed and occur mostly after the growing season is over. The dry season is

long over most parts of the region. The Zagrosian forests covers an area of 5 050 000 ha. The main forest species are:

- Almonds: *Amygdalus scoparia*, *A. eleagnifolia*, *A. lycioides*, *A. orientalis*, *Pistachia atlantica*;
- *Pistachia atlantica* with the sub-species *Kurdica*, *Cabulica* and *mutica*;
- *Juniperus polycarpus*, which is usually found at higher altitudes, generally above 2 300 m, especially the pure communities of the species;
- *Cupressus sempervirens* var. *horizontalis* usually grown in small parts of the northern areas.

Persian Gulf and Sea of Oman Region: This region of Iran extends throughout the southern parts of the Zagrosian Mountain ranges and the coast of the Persian Gulf and Oman Sea and spreads in a strip of forests from Quarsh-Shireen in the west, to the Pakistani border to the east. The region is divided in the warm Omani sub-region, and the lesser warm Gulf territory. The mean annual rainfall ranges between 100 – 300 mm. The total forest area is estimated at 2 400 000 ha.

The main tree species encountered in the Gulf territory is *Prosopis stephaniana*. The main tree and shrub species of the Omani sub-region are:

- *Acacia* species, which form vast communities in the region; they include: *Acacia nubica*, *A. ehrenbergiana*, *A. tortilis*;
- *Nanorhops ritichiana*, which is found exclusively in the Baluchestan territory and in Oman;
- *Prosopis specigera* (*cineraria*) and *Acacia arabica* var. *nilotica* are 2 most valuable species of the region;
- Mangrove communities consisting of *Avicennia officinalis* and locally of the introduced *Rhizophora mucronata* found along the coastline and along delta riverbanks.

Structure and relative importance of Man-made forests

Afforestation was initiated in Iran in 1960 with the establishment of recreational parks and protective forests in bare lands and suitable areas. Since 1965, afforestation has undergone progress by challenging active sand dunes to protect desert fringe rural agricultural areas and infrastructures from encroachment by moving sands. Before the mid 1970s, there was little experience in establishing plantations with forest production objectives, or man-made forests.

In the last 25 years, programmes were initiated to establish irrigated and rain-fed plantations to meet local needs for timber and environmental requirements. Because all lands belong to the State, the government of Iran is the main investor in the establishment of man-made forests. It does, however, encourage private investment by private smallholders and companies, by providing assistance in various forms, particularly free seedling distribution, to promote industrial round wood and multipurpose tree plantations on private land. Despite tenure issues that have resulted from land nationalization, the private sector still contributes to the national afforestation effort and private man-made forests amount so far to 126 000 ha (table 7 of annex 8). This effort will be enhanced in the future according to the projections of the “Forestry Development Country Vision 2020”. The contribution of communities, private landholders, and companies, will be concern green spaces’ development programmes, soil conservation and watershed management, intensive culture of fast-growing species, shelterbelts and windbreaks around farms, sylvo-pastoral plantations, and multipurpose tree species plantings.

Mirsadeghi M.A. *et al.* (1999), reported in the FRA Country report for Iran, a total plantation area of 2 221 100 ha (table 7 of annex 8). Jafari M. and Hossinzadeh A. (1997) reported the plantation area established during 1989-1992, indicating an annual planting rate of 63 200 ha. Assuming a similar plantation establishment rate for the period 1990-2002, the total man-made forest area would be of approximately 2 410 100 ha in 2002.

Tree species planted are generally limited to indigenous or acclimatized exotic species. In south Iran the most commonly planted species are: Acer negundo, Cupressus arizonica, Fraxinus rotundifolia, Pinus eldarica, Robinia pseudoacacia, Eucalyptus camaldulensis, Ailanthus glandulosa, Prosopis juliflora, Albizzia lebbek, Terminalia spp. Melia azedarach, Parkinsonia aculeata, Ficus benghalensis etc.

Species such as Haloxylon persicum, Tamarix spp. Zygophyllum spp. etc. are planted in arid and semi-arid areas, while species such as Pinus nigra, P. sylvestris, P. brutia, P. elliotii, Cryptomeria japonica, Cedrus atlantica, C. libani, Cupressus arizonica, Abies nordmanniana, Larix europea, Taxidium distichum and Pseudotsuga spp. are used in the Caspian region.

To ensure maximum success in tree planting operations, most plantations are irrigated during 2-3 seasons. In this case, water shortages become a major constraint to tree planting, particularly in the more arid zones. Site preparation costs are high, and irrigation facilities establishment very expensive.

Fast growing species and poplar plantations: Because of its limited forest resources on one hand, and the steadily increasing requirements for wood resources on the other hand, Iran is increasingly relying on the cultivation of fast growing tree species, particularly poplar, to meet part of the country's industrial wood needs. Indeed, the new government policy aims at achieving more wood production through a substantial increase of tree plantations outside forests. To this avail, it grants substantial support (land facilities, long-term low interest loans...) and incentives (free seedling distribution, technical assistance...) to farmers in order to develop poplar and other fast growing species plantations, with the objective of achieving 10 000 ha yearly. According to a 1992 inventory, some 3 million m³ of industrial wood and pulp and paper wood were produced through man-made forest plantation, particularly of poplar and other fast growing species. The main species distributed are: *Populus alba*, *P. nigra*, *P. euroamericana*, *P. deltoides*, *P. euphratica*, *Eucalyptus camaldulensis*, *Pinus eldarica*, *Acacia nilotica*, *Alnus cordata*, *Dalbergia sisso* etc. In addition to this, the National Research Institute has investigated 150 clones of 15 exotic and 4 indigenous poplar species in 15 stations distributed within the country. Of these 14 exotic improved clones have been selected for afforestation schemes in the lowlands of the Caspian region.

FRO has completed a national inventory on private poplar plantations in 1992, according to which:

- The total surface area of poplar plantations was equal to 150 000 ha, of which 35% were young stands;
- The minimum and maximum standing volumes were estimated at 21 539 826 m³ and 24 907 064 m³ respectively.

It is important to mention that during the last decade (1992-2002) the tendency has been unfavourable to poplar plantations. As a result of significant increases in agricultural products prices as compared to those of poplar wood, farmers converted their poplar plantations to more profitable agricultural production activities.

ANNEX 11: THE FOREST AND RANGE ORGANISATION

Forests and rangelands are administered according to the Forest and Range Nationalization Law (19 February 1963) and the Protection and Utilization of Forests and Ranges Law (21 August 1967). Operating under the Ministry of Jihad-e-Agriculture, the Forest and Range Organization (FRO) manages all public lands covered by the Forest and Range Nationalization Law⁶². It is the governmental institution responsible for setting guidelines, planning, implementing and monitoring desertification control, forestry and range management and development, as well as urban and peri-urban forestry related programmes. FRO enforces policies, legislation and regulations pertaining to land use, forestry, conservation, range management, and desertification control.

FRO is headed by a Deputy Minister and advised by a “High Council for Forest, Range and Soil”. It employs 10 000 personnel, of whom 900 are active at headquarters⁶³. FRO’s central administration is composed of 5 Bureaus and 5 Departments headed each by a Deputy (see Annex 4). These are:

- Deputy of Conservation and Land Affairs with three bureaus (Land Allocation, Land Valuation, and Protection and Production);
- Deputy of Soil and Range Affairs with three bureaus (Range, Desertification, and Out-of-North Forests);
- Deputy of Forests Affairs with four subdivisions (Plantation and Parks, Forestry, Wood Industry and Harvesting, and Administration);
- Deputy of Watershed Management recently incorporated within FRO.
- Deputy of Logistics and Planning with the following:
 - Planning, Programming and Statistics Bureau;
 - Three Offices (Administration, Finance, and Transports and Logistics);
 - Institutional, Method and Information Service;

Projects and plans are prepared by the central bureaus and approved by the High Council for Forest, Range and Soil. They are then referred to the 30 FRO provincial institutions for implementation. These “Natural Resources General Directorates” are headed each by a General Director (see annex 5). They include 3 Central Offices (Legislation, Public Relations, and Education, Extension and Public Participation). The Director General is assisted by, 3 Deputies, namely for:

- Conservation and Land Affairs, with two Offices (Land Allocation, Protection and Conservation);
- Legislation and Planning with two Offices (Logistics and Administration, Finance);
- Technical Affairs with three Offices (Range and Desertification, Afforestation and Forestry, and Engineering);
- Although the FRO has an adequate organizational structure, some functions such as resource inventory, long term planning and extension and participation need serious strengthening.

⁶² Source: Urban and peri-urban forestry in the Near East. A case study of Iran and its capital Teheran: By Ahmed Mehdipour Ataie, 1997.

⁶³ Source: Report of the I.R. of Iran on “Management and Conservation of Forests and Environment Protection” presented to the 1st expert group meeting on forest and environment, Iran July 1995.

ANNEX 12: THE FOREST AND RANGELANDS RESEARCH INSTITUTE

The Research Institute of Forests and Rangelands (RIFR) was founded in 1968 as a national institute with mandatory responsibilities to lead research activities on the natural resources of Iran. The RIFR belongs to the Education and Research Division of the Ministry of Jihad-e-Agriculture. It has organized its administrative structure as follows:

- The institute's headquarters consist of eleven Research Divisions supported by an Administrative and Financial Department;
- Twenty eight Research Centres decentralized at province level; and
- Seventy-nine Research Stations distributed throughout the various ecological zones of the country.

The scientific and administrative personnel of RIFR were distributed in 1997 as indicated in (table 16, annex 8)⁶⁴.

The former strategy of the institute was founded on afforestation using exotic and fast growing species. It is now more focused on forest ecology and genetics, silviculture and afforestation by native and exotic species consistent with the following:

The Forest Research Division (FRD) carries out its research activities in 9 stations and 12 bases. Its programmes are classified under the following research groups: 1) forest plantation and genetics; 2) silviculture; 3) forest management; 4) forest products' harvesting; 5) forest policy; and 6) biotechnology.

The Poplar and Fast-Growing Species research Division carries out research on various fast-growing species, especially poplars with an appropriate degree of adaptability and high production capacity.

The Wood and Paper Research Division, which has training facilities and capacities, aims at applying different techniques to improve the industrial utilization of wood and non-wood forest raw material. It includes the: 1) wood anatomy and paper science research group; 2) wood mechanics research group; 3) timber drying and wood preservation research group; and 4) chemistry, pulp and paper research group.

The Rangeland Research Division participates to the development of range management tools. Its activities are organized and divided into four categories as follows: 1) range ecology; 2) range management; 3) range agronomy; and 4) range plant breeding and improvement. It participates actively to the development of more intensive livestock husbandry with less dependence on free grazing, as well as on planning, evaluation and monitoring of the development of rangelands and livestock.

The Botany Research Division, which is the main centre for taxonomical and ecological research in the country, is equipped with a national botanical garden and a central herbarium. It undertakes studies on phytosociology, flora, as well as rare and endangered species.

⁶⁴ Source: Research institute of Forests and Rangelands: "Four Articles on Forest" Technical publication No. 176-1997.

The Desert Research Division focuses its research activities mainly on desertification and its control, together with other relevant aspects of the dry-land regions of Iran.

The Medicinal plants and By-Products Research Division includes the following research groups: 1) medicinal plants' collection and identification; 2) medicinal plants cultivation and domestication; and 3) phytochemistry.

The Genetic and Plant Physiology Research Division carries out research on forest and rangeland species' genetics and breeding in the next sections: Plant breeding, tissue culture; molecular biology and plant physiology.

The Forest and Range Protection Research Division is active in the fields of protection from overgrazing, fire, pests, diseases, weeds and other biotic factors that have a significant role in the destruction of natural resources.

The Mechanization & Natural Resources Machinery Division aims at selecting and designing machinery and equipment for the harvest of forest products, and formulates measures for appropriate utilization of harvesting machinery.

The Natural Resources Seed Bank aims at collecting, identifying and preserving plant species, particularly those threatened by environmental hazards and human activities.

Independent from the RIFR, the Soil Conservation and Watershed Management Research Centre (SCWMRC) belongs also to the Education and Research Division of the Ministry of Jihad-e-Agriculture. The most important activities relating to the Centre are carried out by the following Research Sections:

The Soil Conservation Research Section carries out research on soil erosion and evaluation of different models.

The Watershed Management Research Section undertakes research concerning integrated watershed management.

The River-Training and River-Engineering Research Section conducts research on methods of river-training.

The Floodwater Spreading and Utilization Research Section carries out research on traditional and modern methods of floodwater harnessing and utilization.

The Hydrology Research Section studies hydrological parameters of various size watersheds etc.

The facilities available consist of 28 Research Centres and 90 Research Stations for erosion assessment and watershed management in 25 provinces.

ANNEX 13: POLICY FRAMEWORK FOR FOREST AND RANGE

Guidelines Principles of the Forest and Range Development Policy

Following are six guideline principles of the forest, woodland and rangeland development policy:

1. Integrated approach to planning and development following natural resources' study and assessment:
 - Assessing natural resources at national level;
 - Devising integrated approaches to natural resources' management through:
 - Identification of natural resources potentialities and capacities;
 - Preparing a vegetation map of the country;
 - Preparing and Implementing the National Action Plan for Desertification Control.

2. Awareness-raising vis-à-vis the importance and value of natural resources through:
 - Targeting the general public;
 - Targeting the decision-makers;
 - Training rural communities, nomads and natural resources users, in conservation and sustainable utilization of forests, woodlands and rangelands;
 - Promoting participation of stakeholders and giving priority to transferring management and utilization rights to the direct users of the resources.

3. Developing participatory approaches to resource management by:
 - Promoting the cooperation and assistance of the civil society, to development efforts;
 - Organizing economic interest groups (forestry, livestock husbandry etc.) into cooperatives and associations benefiting from a legal status;
 - Promoting the cooperation and participation of other stakeholder organizations.

4. Securing the required support from the legislative, judiciary and executive bodies, to ensure full implementation of FRO's national development policy and programmes by:
 - Enforcing laws and regulations combating illegal cutting, grazing operations and all forms of forest, woodland and rangeland destruction;
 - Reviewing national natural resources' law and regulations;
 - Allocating the necessary funds for the implementation of the natural resources' development policies and programmes.

5. Taking measures towards institutional reform and capacity building by ensuring:
 - The development of human resources;
 - The improvement of institutional procedures and regulations;
 - The development of a natural resources' participatory management framework.

6. Ensuring the continuous monitoring and evaluation of forestry policies and of the implementation of programmers' through:

- Assessing the progress in the implementation of projects and programmes;
- Controlling the effective application of the recommended technical principles and guidelines in managing the resource;
- Evaluating the level and efficiency of action.

Forest and Rangeland Long-Term Development Policy⁶⁵

The main objective of the Iranian forest policy is the conservation, rehabilitation and sustainable use and development of natural resources (forests, woodlands, rangelands, soils and water resources). The policy has been translated into six major fields of involvement as described below:

1. Natural resources' comprehensive conservation, which encompasses:
 - Controlling degradation factors;
 - Putting conservation principles into operation, within all management and development schemes, projects and programmes;
 - Making use of advanced technologies in the fields of conservation, fire prevention and protection, and in pests and disease control;

2. "Green Revolution" National Forestry Action Plan formulation and implementation. The objective here is to achieve sustainable participatory development of forests and green areas through the rehabilitation and the development of the national tree resources as follows:
 - Rehabilitation and development of the commercial productive forests in the Caspian region;
 - Development of green areas and expansion of the national tree resource base;
 - Development of multipurpose-fruit-bearing tree plantations to satisfy the national demand on one hand, and enhance national exports of walnuts, hazelnuts, pistachio nuts, almonds, olives etc.
 - Extending the plantation of fast-growing species (clonal forestry) in suitable areas, to produce the required timbers and industrial wood within short and mid-term rotations.

3. Achieving the national objective of balancing the livestock population in harmony with the rangelands actual carrying capacity, through:
 - Decreasing the present livestock population depending on natural rangelands;
 - Extending range management to all natural rangelands of the country (90 million ha);
 - Converting traditional livestock rearing into industrial animal husbandry to reduce the pressure on natural rangelands and satisfy the demand for meat and milk products;
 - Converting abandoned and unproductive rain-fed agricultural lands into productive rangelands.

⁶⁵ Translated from the original text with the contribution of Mr. M. A. Haji Mirsadeghi.

4. Settling scattered livestock owners and nomads, respectively outside commercial forests (Caspian area) and natural rangelands, by means of various alternative opportunities;
5. Settling land property disputes by thorough land ownership demarcation at national level;
6. Undertaking the implementation of the National Action Plan for Desertification Control, through:
 - The formulation and implementation of desertification control projects;
 - The management, through water-harvesting, of runoff water in arid zones;
 - Controlling wind erosion in critical areas.

ANNEX 14: INTERNATIONAL COOPERATION AND ADHESION TO INTERNATIONAL CONVENTIONS

Iran has taken several measures to enhance international cooperation with relation to environmental affairs. In 1998, it hosted the International Conference on Lagoons and Marine Birds in Ramsar. Iran is a signatory member of the 1992 Earth Summit of Rio. The country has implemented numerous projects in cooperation with international agencies. It has cooperated with the Global Environment Facility and the Montreal Protocol to curb desertification and protect biodiversity.

Iran is also engaged in regional cooperation through its membership in the Economic Cooperation (OCO) and the Economic and Social Commission for Asia (ESCAP). Cooperation at this level is mostly conducted through workshops, short-term training courses, seminars and conferences.

The I.R. Republic of Iran has accepted international legal responsibilities by adhering to a number the international conventions such as:

United Nations Desertification Control Convention (UNCCD)⁶⁶

In view of the serious destructive effects and impacts of desertification on natural resources, agriculture, infrastructures and people' livelihoods, extensive efforts have been undertaken and significant amounts of resources devoted by the country to combat desertification since 1963. These include, among others the establishment of 140 desertification control stations across the nation. After about forty years of concerted efforts, the “ desertification process in one fifth of 33 million hectares of seriously affected lands is controlled and such arid lands are now transformed into productive lands” (Source: Islamic Republic of Iran and the UNCCD).

The convention (UNCCD) has been signed by the government and ratified by the parliament. A National Committee for Combating Desertification (NCCD) has been established with the participation of representatives from relevant ministries and institutions. The NCCD has since adopted the national macro policies for combating desertification, prepared and submitted its national report to the Secretariat of the UNCCD. Several national and international workshops and meetings have been organized to address such matters as: i) Capacity building for the implementation of National Action Programmes; ii) Modern technologies for combating desertification; iii) Coexistence with deserts; iv) celebration of World Day of Combating Desertification etc. More important, The Government of the Islamic Republic of Iran has accepted to play a leading role in hosting and establishing a Regional Network for Range Rehabilitation and Sand Dune Stabilization, under the UNCCD. Likewise, Iran is hosting the Secretariat of the “Teheran Process” that deals with the requirements and needs of the Low Forest Cover Countries.

The Convention on Biodiversity (CBD)

Iran is a member of the CBD and has under this convention developed a “National Biodiversity Action Plan” (NBSAP). A series of workshops held in 1999 and 2000 (Marine, Palaeontology, Forest, Soil, Deserts, MAB Sites, Arasbaran, Uroomieh and Strategies) was held to incorporate the viewpoints of national and local stakeholders. The results of these workshops were then used in the preparation of the NBSAP and some project drafts.

⁶⁶ Source: Pamphlet “Islamic Republic of Iran and the UNCCD”.

Four strategies have been formulated for biodiversity conservation, which call for: the promotion of public participation, the development of biodiversity information and monitoring systems, reorganization of institutional structures for sustainable use, and systematic management of biodiversity resources. For their implementation, 80 ACTION plans are under consideration and 35 are already being implemented.

The Convention on Wetlands (Ramsar)

In 1998, the I. R. of Iran has hosted an international conference on lagoons and marine birds in Ramsar that cleared the way for international studies on Anzali lagoon, considered to be one of the most important lagoon ecosystems of the world. Ramsar is since considered as the birthplace of the “Ramsar Convention”, which focuses on the conservation and wise use of wetlands’ habitats. There are more than 100 sizeable wetlands in Iran, 20 of which have been listed in the Ramsar Convention’s “List of Wetlands of International Importance”.

Other conventions of which Iran is a member are:

- The United Nations Framework Convention on Climate Change (UNFCCC);
- The World Heritage Convention (WHC);
- The Convention on Control of Trans Boundary Movement of Hazardous Waste (Basle);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- The Montreal Protocol on Ozone Layer Depletion Substances;
- The Bio-Safety Protocol etc.

ANNEX 15: FORESTRY DEVELOPMENT COUNTRY VISION 2020

Green Revolution to be carried out from 2000 to 2020 over 5 650 000 ha. for Afforestation and Enrichment	Natural forests rehabilitation & enrichment over a total area of 1 650 000 ha		† Rehabilitation of Caspian forests over a total area of 350 000 ha † Enrichment of forests outside Caspian region over an area of 1 300 000 ha
	Afforestation	a) Forest development 1 900 000 ha	† Afforestation in Caspian region: 300 000 ha † Afforestation of temperate sub-humid regions over 300 000 ha † Afforestation of southern tropical regions 300 000 ha † Biological fixation of critical active sand dune regions over 1 000 000 ha
		b) Green spaces development over 730 000 ha	† Greenery over 300 000 ha † Forest parks over 40 000 ha † Greenbelts around cities 60 000 ha ⁶⁷ † Roadside plantations 30 000 ha † Soil conservation & watershed management around cities over 300 000 ha
		c) Production and protection plantings over 370 000 ha	† Intensive culture of fast-growing tree species over a total of 150 000 ha † Shelterbelts & windbreaks in & around farms 50 000 ha equivalent † Sylvo-pastoral plantations in range-lands over a total area of 170 000 ha
		d) Multipurpose tree species plantings over 1 000 000 ha	† On national forest lands - 250 000 ha afforestation - 50 000 ha agroforestry † On national non-forest lands - Afforestation of 550 000 ha † On private lands - Tree planting 150 000 ha

⁶⁷ This figure does in all probability not include the greenbelt planned around Teheran, which is supposed to reach 116,000 ha by itself.

ANNEX 16: GAPS IN KNOWLEDGE

Extent of Deforestation and Natural Resources Degradation

Misuse of Rangeland Resources

Overgrazing of rangelands is regularly cited as a major cause of degradation. Yet little is really known about the actual grazing pressure exerted on individual rangelands. It would presently be illusory to determine priority intervention areas for the country, based on fully documented effects of overgrazing. To what extent overgrazing has caused or is contributing to the degradation of rangelands is generally not comprehensively and regularly monitored and investigated; it is based on scarce estimations often made at macro-level. Rangelands have been, and continue to be, affected by very severe degradation processes whose extent needs to be urgently evaluated to determine high priority intervention areas on which to base future Five-Year Plans.

Misuse of Forests and Woodland Resources

The information on the extent of deforestation is often repetitive, based on outdated estimations regularly quoted in most reports dealing with forestry in Iran. It is too sketchy, and refers seldom to the source of information. There is also little information on the processes at stake, particularly the socio-economic evolution context and the fragility of ecosystems. There is little useful information on the aspects and dynamics of deforestation and forest degradation. The causes are often described in such commonplace terms, that they can be of no help in devising appropriate, timely and well-targeted response approaches and activities.

Consequences of Deforestation and Natural Resources Degradation

The cumulative effect of years and perhaps decades of misuse of forests, woodlands and rangelands cannot be offset in a short-term approach. The social, economic and environmental damage incurred have yet to be assessed, to have an idea of the full consequences of deforestation and natural resources' degradation. There is, however increasing recognition of the overriding significance of deforestation, natural resources' degradation and desertification in the future of Iran's productive base.

The question is, how can forest and rangeland development policies shift from massive curative actions to the revival of more environmentally friendly participatory production systems that will support rural farmers and livestock breeders achieve long-term sustainable production and livelihood within rehabilitated and stable ecosystems. Some questions have yet to be answered first, such as:

- What are the criteria for the determination of priority intervention areas and priority action?
- What type of participatory approach to choose and on what criteria and indicators to base the communities, groups and individuals to be targeted?
- To what extent and under which conditions would the State be ready to grant land ownership to those who achieve environmental friendly long-term sustainable production within rehabilitated ecosystems?
- May rehabilitation actions be formulated in the future, outside of pre-established development and management plans?
- How can we reduce the rehabilitation and curative expenses?

- To what extent and under which conditions is it possible to rely on nature's resilience to achieve rehabilitation?
- How ambitious can rehabilitation programmes be, without jeopardizing the huge efforts and expenses they require, for lack of adequate follow-up and management etc.?

Capturing Farmers' Experience, Technical and Managerial Skills

As in many countries facing significant food security challenges, Iran's agricultural research system is oriented towards raising production of the better-off farmers and has difficulties reacting to the growing problems of small farmers and unsustainable land use practices, particularly emanating from forests and rangeland's dwellers. The innovations introduced in the sector's policies, which aim at mobilizing farmers' self-help capacities, by introducing participatory approaches have not yet yielded the results hoped for, mainly due to deficiencies in training and awareness rising. The agricultural research system has yet to reach the point where it can capture farmers' experience, technical and managerial skills, and above all conciliate farmers' innovation capacity with research's scientific approach, by developing consequent on-farm research and experimentation projects and approaches.

Initiating full participation Partnership in Rural Communities Development

Participation in the forestry sector is still carried out following a top-down approach within, which rural communities are seen more as beneficiaries than responsible partners in development. The management ideas and plans are those of the administration, extension aiming basically at convincing people of their flawlessness and providing them incentives to secure their implementation. Extension and participation are not yet based on intensive and long-term iterative communication, rapid rural appraisals and direct involvement of rural communities in planning and decision-making with regard to the managements proposed.

“The importance of participation in effective delivery of local public goods is well recognized, and it is central to community provision of services⁶⁸”. While this is increasingly being recognized, there remains a major gap in knowledge of how to initiate full participation and partnership of rural communities in development. How to bring from the initial stage various stakeholders and donors with perhaps different, but nevertheless complementary sectoral interests and approaches, together with grass-roots organizations, to combine efforts within a specific zone and satisfy the complementary short and long-term needs/requirements of “beneficiary” groups within sustainable local approaches to development?

Establishing Common Networks of Statistical Planning Databases

While several institutions (Natural Resources Faculty of Teheran University, Engineering Bureau of FRO etc.) are attempting to establish environmental information systems for the assessment and monitoring on a timely basis of natural resources conservation and use, they all are afflicted by a lack of expertise and equipment and by their inability to combine efforts and means and establish a common environmental information system network. Furthermore, the vital ground data, which is essential to an information system, is not available to some institutions. Other institutions such as FRO need to upgrade their capacity to undertake periodic inventories, collect and analyse ground data in order to provide timely and reliable data and information for decision-making.

⁶⁸ Source: Beyond Markets and Infrastructure, in World Development Report, World Bank, 1994, p. 76.

Awareness Rising on Environmental Degradation and Desertification

There is a lack of qualitative and quantitative data and information pertaining to the state of natural resources, at local, regional and even national level. Consequently public awareness of environmental degradation and its implications is fragmentary and often times simplistic; it is not founded on comprehensive information on ecosystems and land use methods. While land users may clearly observe the effects that depletion of natural and land resources has on crop and animal production, neither the seriousness of the problem nor the causes and processes involved are well understood. The importance of biodiversity conservation and the way one element of it can affect the well-being and the productivity of the ecosystem as a whole are not well understood.

Nevertheless, environmental awareness is growing among the public, thanks in part to the efforts carried out by FRP and the Environmental Department, which target a wide public. Perhaps the most important group that has yet to be seriously targeted in terms of need for environmental protection and ways to achieve it, is composed of the following:

- Government planners and decision-makers who need to understand that environmental protection, rehabilitation and development is a long painstaking, costly process that requires substantial and regular funding;
- The central and field technicians and officers in charge of addressing environmental and desertification issues. The message to pass through is how and why achieve participation in rehabilitating natural resources, beyond the plain curative intervention, and within a pre-conceived long-term integrated, participatory management and development programme.

ANNEX 17: PROPOSALS FOR COOPERATION WITH LFFCS OF THE REGION

In the course of this mission several institutions visited have expressed their capacity and willingness to support cooperation exchanges and capacity building efforts for the benefit of LCC countries of the region. The mission strongly recommends the Secretariat of the LFCCs to engage in a systematic follow up schedule, to ensure that the proposals detailed below are materialized in the nearest future possible:

Urban and peri-urban forestry and outdoor recreation: The Park and Green Areas Organization (PGAO) of Teheran's Municipality is willing to share its experience and expertise, and assist LFCCs in developing urban forestry and greenery plans. It is also prepared to train specialists from these countries either in Iran or in their respective countries. The mission recommends the LFCC Secretariat to contact Teheran's Municipality Parks and Green Areas Organization (PGAO) to:

- Arrange (as suggested by its Head Manager) one day presentation and organized visit to Teheran's urban and peri-urban forests, parks, gardens and recreation areas for the benefit of the LFCC representatives invited at the October 2002 workshop to be held in Teheran;
- Coordinate with the PGAO of Teheran's Municipality, the organization under PGAO's sponsorship of a workshop on urban/peri-urban forestry, parks and gardens, for the benefit of LFC countries. One output of the workshop would be the establishment of exchange and coordination mechanisms between LFC countries, with eventually periodic meetings to assess progress and analyse the remaining issues.

The Karadj Natural Resources Faculty: The University of Teheran, represented by its Natural Resources' Faculty has expressed its readiness to organize:

- Exchanges with students and teachers from LFCCs;
- Short courses (6 months), workshops, demonstrations and;
- Eventually grant under some conditions scholarships to candidate students from LFCCs.

The FRO Training General Directorate: has stated its readiness to host short-term as well as long-term training courses in forestry and range rehabilitation and management for the benefit of LFCC technical staff in its two Natural Resources Training Centres of Kellarabad and Kelak.

The Engineering Technical Bureau of FRO: At the request of the mission the Bureau is willing to organize a visit for the LFCC workshop participants and share its experience and know-how with regard to surveying national resources, using GIS and remote sensing techniques to produce analogue and digital maps. The Bureau has furthermore stated its availability and willingness to proceed to a capability and technology transfer towards all interested LFCCs of the region. It is recommended to organize the details of a possible programme of exchanges and transfer of experience and know-how that could be discussed with country representatives outside the working sessions of the September workshop.

The Natural Resources G Ds of Hormozgan and Khuzestan: these two provincial FRO institutions have expressed their readiness to host study tours and train LFCC technical staff respectively in:

- Mangrove rehabilitation through direct seeding (*Rhizophorum mucronatum*) and planting of seedlings of *Avicennia marina*
- Sand dune mechanical fixation using petroleum mulch and biological stabilization using native and exotic arid, semi-arid and tropical fodder species.

Given its capacity, its experience and its leading role in the Teheran Process, Iran can and should become a “Centre of Excellence” for forestry, range management, desertification control and environmental protection matters. Such a Centre of Excellence nearby the Secretariat of the Teheran Process would trigger educational and capacity building cooperation programmes. These would benefit several LFCCs and give more credibility to the Secretariat vis-à-vis the international and donor communities as it would take the lead in implementing the LFCC Agenda, making the best of Iran’s expertise and commitment to the Process. Iran can also become a centre for regional activities that would benefit countries of the region such as Yemen, Oman etc. The mission recommends the Secretariat of the Teheran Process, in cooperation with FRO, the Environment Department, National Education and Research Institutions etc. to formulate a regional programme to be proposed to the LFCC members of the region that would aim at enhancing the role of man-made forests and trees outside forests.

PUBLICATIONS AVAILABLE ON FOREST PLANTATIONS

Forest Plantation Working Papers: Thematic Paper Series

- Working Paper FP/1 *Mean Annual Volume Increment of Selected Industrial Species.*
Ugalde L. and Perez O. April 2001.
<http://www.fao.org/DOCREP/004/AC121E/AC121E00.HTM>
- Working Paper FP/2 *Biological Sustainability of Productivity in Successive Rotations.*
Evans J. March 2001.
<http://www.fao.org/DOCREP/004/AC122E/AC122E00.HTM>
- Working Paper FP/3 *Plantation Productivity.* Libby W.J. March 2001.
<http://www.fao.org/DOCREP/005/AC601E/AC601E00.HTM>.
- Working Paper FP/4 *Promotion of Valuable Hardwood Plantations in the Tropics.*
A Global Overview. Odum F.K. March 2001.
<http://www.fao.org/DOCREP/004/AC124E/AC124E00.HTM>
- Working Paper FP/5 *Plantations and Wood Energy.* Mead D.J. March 2001.
<http://www.fao.org/DOCREP/004/AC125E/AC125E00.HTM>
- Working Paper FP/6 *Non-Forest Tree Plantations.* Killmann W. March 2001.
<http://www.fao.org/DOCREP/004/AC126E/AC126E00.HTM>
- Working Paper FP/7 *Role of Plantations as Substitutes for Natural Forests in Wood Supply – Lessons learned from the Asia-Pacific Region.*
Waggener T. March 2001.
<http://www.fao.org/DOCREP/004/AC127E/AC127E00.HTM>
- Working Paper FP/8 *Financial and Other Incentives for Plantation Establishment.*
Williams J. March 2001.
<http://www.fao.org/DOCREP/004/AC128E/AC128E00.HTM>
- Working Paper FP/9 *The Impact of Forest Policies and Legislation on Forest Plantations.* Perley C.J.K. March 2001.
<http://www.fao.org/DOCREP/004/AC129/AC129E00.htm>
- Working Paper FP/10 *Protecting Plantations from Pests and Diseases.* Ciesla W.M. March 2001.
<http://www.fao.org/DOCREP/004/AC131E/AC131E00.HTM>
- Working Paper FP/11 *Forestry Out-Grower Schemes: A Global View.* Race D. and Desmond H. March 2001.
<http://www.fao.org/DOCREP/004/AC131E/AC131E00.HTM>
- Working Paper FP/12 *Plantations and Greenhouse Gas Mitigation: A Short Review.*
Moura-Costa P. and Auckland L. March 2001.
<http://www.fao.org/DOCREP/004/AC132E/AC132E00.HTM>
- Working Paper FP/13 *Future Production from Forest Plantations.* Brown C. March 2001.
<http://www.fao.org/DOCREP/004/AC133E/AC133E00.HTM>

- Working Paper FP/14 *Forest Plantation Resources, FAO Data Sets 1980, 1990, 1995 and 2000.* Del Lungo, A. December 2001.
<http://www.fao.org/DOCREP/004/AC134E/AC134E00.HTM>
- Working Paper FP/15 *Global Forest Plantation Development: Review for FRA 2000.* Vuorinen A.P. and Carle, J.B. April 2002.
- Working Paper FP/16S *Bibliografía Anotada Sobre los Efectos Ambientales, Sociales y Económicos de los Eucaliptos.* Compilación de documentos elaborados en inglés, francés y español entre 1985 y 1994. Marzo de 2002.
<http://www.fao.org/DOCREP/005/Y4016S/Y4016S00.HTM>
- Working Paper FP/16E *Annotated Bibliography on Environmental, Social and Economic Impacts of Eucalyptus.* Compilation from English, French and Spanish Literature, 1985 to 1994. Revised (Combined) Edition, March 2002.
- Working Paper FP/17S *Bibliografía Anotada Sobre los Efectos Ambientales, Sociales y Económicos de los Eucaliptos.* Compilación de documentos elaborados en inglés, francés y español entre 1995 y 1999. Palmberg C. Marzo de 2002.
<http://www.fao.org/DOCREP/005/Y7605S/Y7605S00.HTM>
- Working Paper FP/17E *Annotated Bibliography on Environmental, Social and Economic Impacts of Eucalyptus.* Compilation from English, French and Spanish Literature, 1995 to 1999. Palmberg C. March 2002.
- Working Paper FP/18 *Tropical forest plantation areas 1995 data set.* Pandey D. May 2002.
<http://www.fao.org/DOCREP/005/Y7204E/Y7204E00.HTM>
- Working Paper FP/19 *Teak (Tectona grandis) in Central America.* De Camino, R.V., Alfaro, M.M. and Sage, L.F.M. May 2002.
<http://www.fao.org/DOCREP/005/Y7205E/Y7205E00.HTM>
- Working Paper FP/20 *Melina (Gmelina arborea) in Central America.* Alfaro, M.M. and De Camino, R.V. May 2002.
<http://www.fao.org/DOCREP/005/Y7206E/Y7206E00.HTM>
- Working Paper FP/21 *Case study of hardwood programmes in Fiji, Solomon Islands and Papua New Guinea.* Hammond, D. May 2002.
<http://www.fao.org/DOCREP/005/Y7207E/Y7207E00.HTM>
- Working Paper FP/22 *Case study of long rotation eucalypt plantations in New South Wales.* Heathcote, R. June 2002.
<http://www.fao.org/DOCREP/005/Y7208E/Y7208E00.HTM>
- Working Paper FP/23 *Case study of the tropical forest plantations of Malaysia.* Krishnapillay, D.B. June 2002.
<http://www.fao.org/DOCREP/005/Y7209E/Y7209E00.HTM>

- Working Paper FP/24 *Hardwood plantations in Ghana*. Odoom, F. June 2002.
<http://www.fao.org/DOCREP/005/Y7210E/Y7210E00.HTM>
- Working Paper FP/25 *Planted Forests Database (PFDB): Structure and Contents*. Varmola, M. and Del Lungo, A. July 2003.
- Working Paper FP/26 *Planted Forests Database: Analysis of Annual Planting Trends and Silvicultural Parameters for Commonly Planted Species*. Del Lungo, A. September 2003.
- Working Paper FP/27E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Tunisia - Country Case Study*. Rouchiche, S. and Abid, H. October 2003.
- Working Paper FP/27F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Tunisie – Rapport par pays*. Rouchiche, S. et Abid, H. Décembre 2003.
- Working Paper FP/28E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Mali - Country Case Study*. Thomas, I. and Samassekou, S. October 2003.
- Working Paper FP/28F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Mali - Rapport par pays*. Thomas, I. et Samassekou, S. Décembre 2003.
- Working Paper FP/29E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Ethiopia - Country Case Study*. Thomas, I. and Bekele, M. October 2003.
- Working Paper FP/29F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République d'Ethiopie - Rapport par pays*. Thomas, I. et Bekele, M. Décembre 2003.
- Working Paper FP/30E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Namibia - Country Case Study*. Thomas, I. and Chakanga, M. October 2003.
- Working Paper FP/30F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Namibie - Rapport par pays*. Thomas, I. et Chakanga, M. Décembre 2003.
- Working Paper FP/31E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Sultanate of Oman - Country Case Study*. Rouchiche, S. October 2003.
- Working Paper FP/31F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: Sultanat d'Oman - Rapport par pays*. Rouchiche, S. Décembre 2003.
- Working Paper FP/32E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Islamic Republic of Iran - Country Case Study*. Rouchiche, S. and Haji Mirsadeghi, M. A. October 2003.

Working Paper FP/32F

Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République Islamique d'Iran - Rapport par pays. Rouchiche, S. et Haji Mirsadeghi, M. A. Décembre 2003.

International Poplar Commission - FAO Statutory Body (English, French, Spanish)

(<http://www.fao.org/forestry/FO/STATBOD/Technical/Ipcc/ipc-e.stm>)

Report on the 21st Session of the International Poplar Commission and the 40th Session of the Executive Committee, Portland, Oregon, USA, 24-28 September, 2000.

Report on the 41st Session of the Executive Committee of the International Poplar Commission, Rome, Italy, 2 September, 2002

Information Notes (English, French, Spanish)

Forest Plantations (<http://www.fao.org/forestry/FODA/Infonote/en/t-plantations-e-2000.stm>)

International Poplar Commission (<http://www.fao.org/forestry/FODA/Infonote/en/t-ipc-e.stm>)

See also: FRA Working Paper No.18