Forestry Policy and Institutions Working Paper 20

The status and trends of forests and forestry in West Asia

Subregional report of the Forestry Outlook Study for West and Central Asia

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME, 2008

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For quotation:

FAO. 2008. *The status and trends of forests and forestry in West Asia. Subregional report of the Forestry Outlook Study for West and Central Asia,* by Q.Ma. Forestry Policy and Institutions Working Paper No. 20. Rome.

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FOREWORD

Forests and forestry all over the world are being affected directly and indirectly by larger social, economic, policy, institutional and environmental changes. Understanding the broad direction of future developments in the forest sector is critical with a view to improving the responses, and especially dealing with emerging opportunities and challenges. It is in this context that FAO, in partnership with the countries of West and Central Asia, undertook the Forestry Outlook Study for West and Central Asia (FOWECA). The main report outlining the long-term outlook for the sector was published in March 2007. Although substantial information on forest and tree resources and their management was provided in the country outlook papers, it could not all be incorporated into the main report. In view of the usefulness of making the information available to everybody, it was decided to prepare two separate reports for the West Asia and the Central Asia and Caucasus subregions, and the present report thus provides an overview of the current status and trends in the forest sector in the 15 West Asian countries.

The report focuses on some of the key forest issues in West Asia, for example the features and management of forest and tree resources, the interaction between arable land, rangeland and forests, and forest services and products and their contribution to the rural economy. It also outlines the current state of forest policies and institutions, identifying strengths and weaknesses. It has brought together information from a range of sources, especially that provided by the countries in question. By providing a larger picture of forests and forestry in the subregion, it is hoped that it will be helpful in terms of sharing information and experience, especially among policy-makers and planners dealing with the forest sector in the countries of West Asia.

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ACKNOWLEDGEMENTS

This report, prepared as part of the Forestry Outlook Study for West and Central Asia (FOWECA), is based on the 12 country outlook papers, a number of thematic studies, information gathered during visits to some of the countries and discussions during various subregional and regional meetings and seminars. FAO is grateful to all those who have directly or indirectly helped in preparation of the report, and in particular wishes to thank Abdel Wali Modaqiq and Abdul Ghani Ghuriani (Afghanistan), Alexandros Christodoulou (Cyprus), Shamsollah Shariatnejad and Majid Seifollahian (Iran), Sabah Saleim Al-Kawaz (Iraq), Muhammad A. Ali Al-Daqhesh (Jordan), Ghattas Akl and Fady Asmar (Lebanon), Mohamed Salim Al-Mashikhi (Oman), Abdu Al Assiri (Saudi Arabia), Ziad Al-Jibawi and Ali Dawood (Syria), Tamer Otrackcier (Turkey), Abdullah Bin Rashed Al Moalla (United Arab Emirates), and Jameel Al-Emad and Mohamed H. Moqbil (Yemen), who were national focal points in coordinating preparation of the country outlook papers. Thanks also go to Ulrika Akerlund (urban forestry), Lama Bashour (forest policy and institutions) and Axelle Boulay (forest-related environmental issues) for the thematic reports they prepared, which provided substantial information for this overview report.

The support provided by a number of FAO staff, in particular Gillian Allard, Anne Branthomme, René Czudek, Carlos D'Ricco, Wulf Killmann, Arvydas Lebedys, Michel Malagnoux, Lars Gunnar Marlund, Michael Martin, Eva Müller and Mohamed Saket from the Forestry Department, Stefano Burchi and Elisa Morgera from the Legal Office, and Abdou Dyaa, Ahmad Mahmood and Saade Maurice from the Regional Office for the Near East, is gratefully acknowledged.

Thanks are due to the FOWECA team, C.T.S. Nair, Jean-Louis Blanchez and Makiko Uemoto of the Forestry Department and Hassan Abdel Nour (former Senior Forestry Officer) and Pape Djiby Kone of the Regional Office for the Near East, for their support in preparing this report. Andrea Perlis coordinated finalization of the publication, in collaboration with Leslie Wearne (editing), Susy Tafuro (formatting and layout) and Gabriele Marcelli (cover design).

LIST OF ABBREVIATIONS

CBD	United Nations Convention on Biological Diversity
CCD	United Nations Convention to Combat Desertification
CDM	Clean Development Mechanizm
FCCC	United Nations Framework Convention on Climate Change
FRA 2005	*Global Forest Resources Assessment 2005*. FAO, 2006
GDP	Gross Domestic Product
IUCN	International Union for Conservation of Nature and Natural Resources
MDF	Medium-Density Fibreboard
NGO	Non-governmental Organization
NWFP	Non-Wood Forest Product
UAE	United Arab Emirates
UNEP	United Nations Environment Programme

EXECUTIVE SUMMARY

The subregional report on the status and trends of forests and forestry in West Asia provides more detailed information and in-depth analysis on this subject in the context of the overall social, economic, environmental and institutional background. Together with the regional report for West and Central Asia and the subregional report for Central Asia and the Caucasus, it is the main output of the Forestry Outlook Study for West and Central Asia. The West Asia subregion covers 15 countries – Afghanistan, Bahrain, Cyprus, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates and Yemen – lying in mainly tropical and subtropical zones and encompassing subtropical humid forest, dry forest, steppe, desert and mountain systems. More than half the subregion is covered by tropical and subtropical desert.

West Asia has a total forest area of only 4 percent of the subregion's land area, accounting for only 1 percent of the world's forests, with an average of 0.12 ha per capita. The forest area is also unevenly distributed, with Turkey, Iran, Saudi Arabia, Afghanistan and Iraq together accounting for 88 percent of the subregion's forests. Moreover, West Asia has more "other wooded land" than "forests" – 54.2 million ha as against 27.4 million ha – and accounts for 7 percent of the world's total wooded land. The unfavourable environmental conditions and the resulting composition in terms of species have contributed to the low productivity of forests and wooded land. The average growing stock is estimated at 42 m^3 per hectare, or less than half the world average of 110 m^3. Wood supplies are therefore extremely limited. Forest cover has been relatively stable, increasing slightly, while wooded land decreased slightly between 1990 and 2005. The increase in forest area mainly reflects afforestation and reforestation activities, and forest plantations account for about 14 percent of the total forests.

The main forest issues in West Asia can be summarized as below:

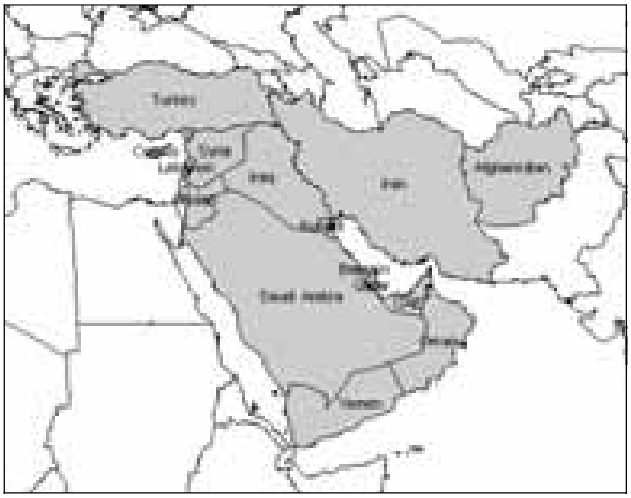
- Land degradation and desertification are widespread and are the most critical challenges facing West Asian countries. Apart from extreme climate conditions, land degradation and desertification are mainly caused by human intervention regarding land use and the poor management of agricultural land and rangelands.
- West Asia's generally low forest cover and low forest productivity limit its production of industrial roundwood and wood products. West Asia has shown increasing dependence on imports of wood products driven by a rising demand.
- Environmental improvement is a major objective of reforestation and afforestation programmes in most countries. However, the dry climate and sandy soil limit any significant progress in increasing the scale of reforestation and afforestation.
- Agroforestry, mostly managed by private farmers, is practised widely in many countries in the subregion. Its main form is as green shelterbelts to protect crops from desiccating winds and as fruit orchards to produce fruit and provide environmental services. Agroforestry also contributes to domestic wood supplies.
- Urban forestry has received increasing attention in many countries with the process of urbanization. Urban and peri-urban forests are playing an important role in protecting cities form sand and dust storms and for recreational and other amenities.
- Increased attention is being given to the development of forest-based ecotourism in many countries in the subregion, combined with increasing stress on managing protected areas and national parks. It is considered to have great potential in many countries.

- Fuelwood and charcoal are mainly used by rural people for cooking and heating. NWFPs are another important source of rural livelihoods and income.
- Forest policies and legislative frameworks are not in general comprehensive and systematic, since forest issues have been addressed within agricultural or environmental policies and laws in many countries. The lack of a coherent policy framework, appropriate, complementary legislation and a well-defined institutional structure are recognized as the most important factors leading to forest degradation.
- The administration and management of the forest sector in West Asia is considered to be centralized, with top-down approach to planning and decision-making processes. The private sector's involvement in forest management is very limited, largely because of the predominantly public ownership of forests and the economic unfeasibility of forest management.
- The participation of NGOs and rural communities in forest management and activities is increasing in West Asia, driven by growing concern for environmental protection and rural development.

INTRODUCTION

Within the general framework of the Forestry Outlook Study for West and Central Asia, the present subregional report provides more detailed information and in-depth analysis on the status and trends of forests and forestry in West Asia within an overall social, economic, environmental and institutional context. The West Asian subregion covers a vast area, stretching from Turkey in the northwest to Yemen in the south and Afghanistan in the east, and encompassing 15 countries: Afghanistan, Bahrain, Cyprus, the Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates and Yemen (Figure 1).

Figure 1 West Asian countries



This subregional report includes eight chapters. Chapter 1 describes the characteristics of the forest and tree resources, including the ecological characteristics and the extent and changes of forests and woodlands. The management and its trend in forests and trees development, including forest tenure and forestry activities, are provided in Chapter 2. Chapter 3 discusses the inter-relationship between agriculture, rangeland and forests. Chapter 4 and Chapter 5 describe the significant services and products that forests and trees provide. The contribution of forests and trees to rural people and rural development has been assessed in Chapter 6. Chapter 7 discusses status and trends of forest policies and institutions, including developments of governmental forestry institutions, NGOs, local communities and the private sector. Chapter 8 summarizes the key forestry issues in the subregion.

Demographic and economic background

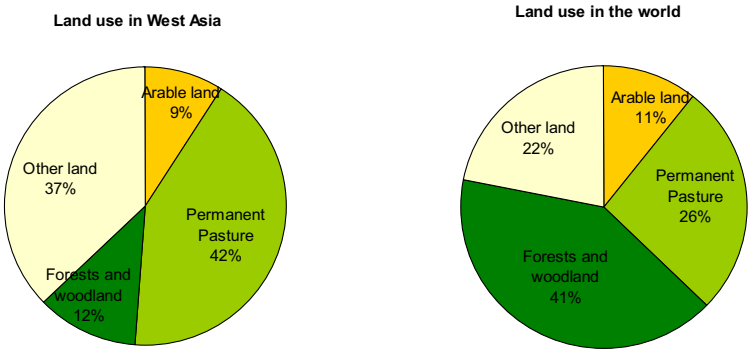
The combined population of West Asia was about 287 million in 2005, accounting for 4.4 percent of the world population. National population size varies greatly, with just seven countries having populations of 20 million or over and accounting for 266 million of the total. West Asia has the fastest growing population in the world, with an average annual growth rate of 3.8 percent in the period 1980-2004, although population increases have varied considerably depending on country. The subregion has become highly urbanized. Of the 15 countries, 13 have urban populations of over 50 percent.

West Asia encompasses most of the developing oil producing and exporting nations in the world, with 10 of the 15 countries being oil exporters. Fluctuating economic growth mainly reflects movements in the oil market. The various national economies [1] have been following similar growth patterns, with agriculture slowly declining in importance over the past 15 years. The service sector now accounts for the largest share of GDP and grew from 45 to 49 percent over the period 1990–2004. The boom in oil prices in recent years accelerated GDP growth among oil exporters. There have also been positive spillovers in the form of tourism revenue, with Gulf visitors taking advantages of tourism opportunities. Meanwhile, the slow-down in GDP growth of many oil-importing countries can be attributed to the subsidizing of petroleum prices (notably in Jordan), the reduced demand in Europe, which is the main destination of non-oil exports from West Asia, and a loss of competitiveness on world commodity markets.

Combined GDP of the 15 West Asian countries was US$869.2 billion in 2003, accounting for 2.4 percent of world GDP. Over the period 1990-2004, West Asia achieved a real annual growth of 3.9 percent, slightly higher than the world average of 2.8 percent. However, annual population growth in the same period was 2.2 percent, much higher than the world average of 1.4 percent, so that real per capita income grew very slowly – by about 1 percent per year – indicating a relative deterioration in the average standard of living in the subregion compared with the rest of the world (1.3 percent). Subregional averages mask sharp differences among countries, with per capita annual income ranging from more than US$8 000 to less than US$1 000.

Land use

The West Asian subregion covers an area of 689 million ha, encompassing a wide range of environments. However, arid and semiarid environments with low and variable rainfall predominate, which has resulted in vast expanses of desert. Land suitable for agriculture and forests is below the world average, although the per capita land area is slightly above the average. The proportion of forests and woodlands is less than one-third of the world average, although permanent pastures account for 42 percent of the land area, which is much higher than the world average. The long history of human settlement and increasing urbanization has led to serious degradation of land and forest resources in much of the subregion.



Source: FAO STAT 2006, FRA 2005.

[1] Afghanistan, Bahrain, Cyprus, Iraq, Lebanon, Kuwait and Qatar are excluded here for lack of data.

Pastoral farming

Pastoralism is practised in most of the countries in the subregion, with annual rainfall of less than 150 mm limiting potential. Pastoralists keep mainly sheep, cattle, goats and camels, and the system is based on the mobility of herds and flocks, which move with the availability of water and rainfall-related seasonal grazing. In the past, water was only obtainable from fixed water storage systems, but the use of mobile water tankers has enabled livestock owners to travel larger distances seasonally.

Pastoral systems will remain important because of the constantly increasing demand for meat, primarily in urban areas. Desertification is the main long-term problem for pastoralists throughout the subregion, and resource degradation is causing a steady decline in pastoral incomes. Rainfall, or its lack, is the main limiting factor in dry rangelands. Drought diminishes rangeland productivity and adversely affects feed quality and species diversity. However, heavy grazing by livestock is believed to be the most widespread cause of vegetation and land degradation throughout the subregion. In arid and semiarid zones, livestock density is above the carrying capacity for most of the year, and these are the areas where most of the desertification takes place.

Rain-fed farming

Rain-fed farming is the most widespread agricultural system in the subregion and is dominated by cereals and legumes, with tree crops, fruit, olives and vines on terraces. Natural resource degradation is a serious problem in this system. For example, inadequate maintenance of terraces has led to increasing water erosion, in turn reducing productivity. Where livestock are present, overgrazing close to settlements and water points has further contributed to soil degradation. The development of higher-value crops, such as fruit and vegetables, is limited by low rainfall. Often the integration of cropping and livestock systems has been inadequate.

Irrigated farming

Irrigated farming is found throughout the subregion. Given the predominantly arid or semiarid environment, this system has always been crucial in generating much of its agricultural output. The system encompasses large-scale irrigation schemes, common in Iraq, Syria and Turkey, and small-scale schemes, found scattered throughout Yemen, Oman, Syria and Turkey. Large-scale schemes are usually found along the major river systems, downstream of dams. The system is dominated by intensive year-round cropping by owner-occupiers or tenants, and cash crops, vegetables and other high-value crops and fodder are all common, while some areas support significant numbers of livestock. Many areas suffer from poor water management, resulting in salinity, sodicity, water logging, and consequent decline in productivity. Small-scale schemes are often found in isolated areas and provide food and other products primarily for local markets. Holdings usually contain fruit trees and intensively grown vegetables. Fluctuating and uncertain water supplies remain a major problem for small scale cultivators.

Overall, much of the stress in agricultural development in West Asia has been on improving irrigation by exploiting underground water and building reservoirs, while most of the larger river systems have been harnessed to support agricultural development. Meanwhile, livestock production has expanded enormously, driven by the increasing demand for meat and other

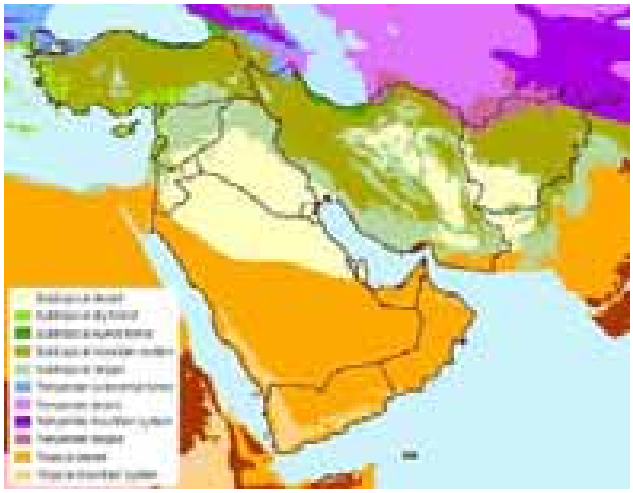
live stock products. Unsustainable agricultural practices and overgrazing combined with unfavourable natural factors have exacerbated land degradation and desertification.

1 CHARACTERISTICS OF FOREST AND TREE RESOURCES

1.1 Ecological characteristics and forest distribution

The main ecological feature of West Asia is the large extent of dry zones, both desert and subdesert, with sparse or no vegetation. Mountains are also extensive and most forests in the subregion are confined to such areas. Steppe vegetation dominated by grass and shrubs covers the drier mountain zones.

The subregion covers mainly tropical and subtropical zones, encompassing subtropical humid forest, dry forest, steppe, desert and mountain systems (Figure on the right). More than half the subregion is covered by tropical and subtropical deserts, with climates characterized by very low rainfall (less than 200 mm annually), hot summers and cool winters. Vegetation is dominated by low, thorny shrubs, providing sparse coverage, but large areas are bare sand with no vegetation.



Source: FRA 2000, FAO

1.1.1 Subtropical humid forests

The climate of the coastal plains and lowlands bordering the south of the Black Sea and the Caspian Sea is warm-temperate with an average annual temperature of about 15°C and rainfall of between 1 500 and 2 000 mm, and altitudes ranging up to 600 m. Although this zone accounts for less than 1 percent of the total land area of West Asia, and despite the relatively small extent of these forests (only about 15 percent of the total forest area of the subregion), they are highly significant inasmuch as they present the most diverse and productive forests in the subregion.

The vegetation consists of mixed deciduous broad-leaved species with varying composition and structure, sometimes with an evergreen under-storey. These forests are rich in endemic and tertiary relic species. The forest canopy consists of various species of oak (*Quercus aegilops, Q. castaneifolia, Q. infectoria, Q. libani* and, in the Caucasus lowlands, endemic species such as *Q. imeretina* and *Q. hartwissiana*), together with *Castanea sativa*, *Pterocarya pterocarpa, Diospyros lotus* and *Fagus sylvatica* subsp. *orientalis*, while *Zelkova carpinifolia, Carpinus betulus* and some *Acer* species are present in the subcanopy layer. At higher altitudes mixed hornbeam and oak forests (*Quercus iberica, Carpinus orientalis, Fagus sylvatica* subsp. *orientalis* and *Castanea sativa*) replace this vegetation. Small areas of swamp and fen forests (*Alnus barbata, A. subcordata* and *Pterocarya pterocarpa*) occur along riverbanks and estuaries.

1.1.2 Subtropical dry forests

The zone comprising the coastal plain along the Mediterranean Sea and low hills running parallel to the coast has a Mediterranean climate, with mild, humid winters and dry, moderately hot summers. Annual rainfall ranges from 400 to 800 mm. Although it covers

only about 2 percent of the total land area, its forests account for about 25 percent of the forest area of the subregion.

Various types of pine forest are found, with *Pinus pinea* and various species of pine from the *Pinus halepensis* group such as *P. brutia* and *P. eldarica* as the dominant species. Otherwise, Mediterranean woody maquis vegetation predominates in this zone: *Ceratonia* and *Pistacia lentiscus* maquis is predominant in coastal plains up to about 200 m, while *Quercus calliprinos*, *Pistacia palaestina* and *P. terebinthus* maquis is the main vegetation from 200 to 1 200 m. Important tree species include *Quercus infectoria*, *Q. ithaburensis, Q. coccifera, Laurus nobilis, Arbutus andrachne, Cercis siliquastrum, Juniperus phoenicea, Myrtus communis, Olea europea, Phillyrea spp.* and *Pinus brutia.*

1.1.3 Subtropical steppes

The climate of the subtropical steppes is semiarid, with annual rainfall ranging from 200 to 500 mm. The vegetation consists mainly of low shrubs and grasses, interspersed with sparse trees, particularly in more humid locations. Forest steppes, with trees such as *Amygdalus korsuhinskii, A. arabica, Acer monspessulanum, Pistacia atlantica, Pyrus bovei, Rhamnus palaestina* and *Crataegus aronia,* are found in higher and more humid areas.

1.1.4 Subtropical mountain systems

The climate in the West Asian mountain systems is extremely varied, both in temperature and rainfall. Winter rainfall is predominant, ranging from 500 to 1 400 mm, while summers are dry and hot. Subtropical mountain systems account for about 25 percent of the total area of the subregion, while their forests represent about 50 percent of the total forest area.

Mediterranean mountain vegetation varies widely, encompassing dense humid forest, shrubland, forest steppe and treeless grass steppe. Forests may be either deciduous broad-leaved or coniferous. In Lebanon and Syria a deciduous oak forest is found between 1 000 and 1 600 m. The forest climax is *Quercus cerris*, accompanied by *Q. boissieri* and fragments of *Q. libani*. In western Turkey, black pine (*Pinus nigra*) dominates this belt. From 1 500 to 2 200 m, there is a subalpine coniferous forest with cedar (*Cedrus libani*), fir (*Abies cilicica*) and juniper (*Juniperus excelsa*), while juniper forest occupies drier areas. Above 2 200 m, alpine dwarf shrubs and meadows occur.

Forest steppe and steppe vegetation occupies large parts of the central highlands and plateaus of Turkey and Iran. Deciduous oak forests are found in humid locations, dominated by *Quercus persica* or other oak species, often in combination with juniper (*Juniperus spp.*), while Fraxinus *oxycarpa, Platanus orientalis, Ulmus campestris* and various species of *Populus, Salix, Tamarix* etc. are found in the valleys. Tree steppe with pistachio, almond and juniper occurs in sub-dry locations.

Well-developed forests grow on the higher slopes of mountains bordering the Black Sea and the Caspian Sea, with deciduous dense forests occurring between 800 and 2 000 m. The *Hyrcanian montane* forest is *Fagetea hyrcanic*a with *Fagus orientalis,* accompanied by *Carpinus betulus*, Acer insigne and *Quercus castaneifolia*, while the *Euxinian montane* forest is composed of deciduous broad-leaved trees and conifers with species of oak, fir and pine.

In Afghanistan, various types of west Himalayan evergreen sclerophyllous forest and woodland are found. *Quercus baloot* woodlands are the most extensive, occurring between 1 300 and 2 000 m. *Quercus dilatata, Q. semecarpifolia* and *Cedrus deodara* communities are confined to the higher parts of wet mountains.

1.1.5 Mangrove forests

Mangrove ecosystems are unique and highly productive, and they constitute a critical element in the coastal hydrosphere, with important functions in conserving biodiversity and providing wood and non-wood forest products. They protect coasts and provide habitats, spawning grounds and nutrients for a variety of fish and shellfish, including many commercial species. Mangrove forests are found on the sea coasts of Bahrain, Iran, Oman, Qatar, Saudi Arabia, the United Arab Emirates and Yemen, although Saudi Arabia and Iran account for the majority. The dominant species is *Avicennia marina*, which reaches heights of 2 to 6 m. *Rhizophora mucronata* also occurs occasionally in Saudi Arabia, Iran and Yemen.

Although information is scarce, population pressure in coastal areas has led to the conversion of many mangrove areas to other uses. However, countries have made some effort to protect mangroves. In the United Arab Emirates, some mangrove forests have been protected by fencing the area. This along with regeneration efforts have increased the area from 3 600 ha in 1990 to 4 000 ha in 2000.

1.2 Extent of forests and woodlands

The arid and semiarid climate limits forestry potential and the subregion has never been heavily forested because of its harsh climatic conditions. The total forest area accounts for only 4 percent of the subregion's land area and only 1 percent of the world's forests, corresponding to an average of 0.12 ha per capita. (Average world forest cover is 30 percent, corresponding to an average of 0.65 ha per capita.) The unfavourable climate not only causes low productivity in the subregion's forests, but also makes it hard to re-establish forest vegetation once destroyed.

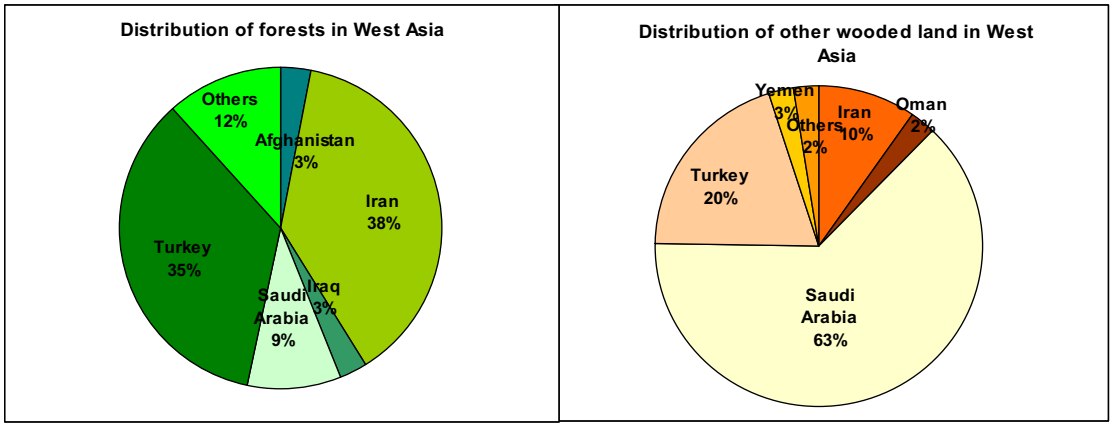
Of the existing 27.4 million ha of forests in West Asia, five countries account for 88 percent (Turkey 38 percent, Iran 35 percent, Saudi Arabia 9 percent, Afghanistan 3 percent and Iraq 3 percent). Forest cover is over 10 percent in only three countries (19 percent in Cyprus, 13 percent in Turkey and 13 percent in Lebanon), while five countries (Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates) have little or even no natural forest at all.

Figure 2 West Asia Forest and other wooded land

Source: FRA 2005, FAO

West Asia has more "other wooded land" than "forests", with a total area of 54.2 million ha, or twice that of forests, representing 7 percent of the world total for wooded land. Saudi Arabia has the largest amount of other wooded land, accounting for 63 percent of the subregional total. Turkey, Iran, Yemen and Oman account for 20, 10, 3, 2 and 2 percent respectively, while the remaining ten countries together account for only 2 percent (Figure 3).

Figure 3 Forests and wooded land



Source: FRA 2005, FAO

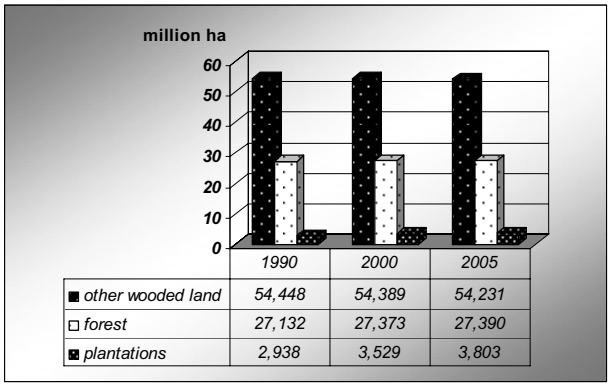
Juniperus is the most widespread genus and is found in almost all the countries of West Asia. Acacia is another common genus and is found in all the countries except Iran and Turkey. *Pistacia* is an important genus that is found in Iran, Afghanistan, Turkey, Cyprus, Iraq, Syria, Lebanon and Jordon. *Quercus* is also found in Turkey, Cyprus, Syria, Lebanon, Jordan, Iran and Afghanistan. *Cedrus* is biologically valuable in Lebanon and is also found in Turkey, Syria, Cyprus and Afghanistan. The largest *Pinus* forests are found in Turkey, with growing stock of nearly 700 million m^3, and also in smaller quantities in Cyprus, Syria, Lebanon and Jordan. In addition, significant amounts of *Carpinus, Fagus* and Acer forests are found in Iran and Turkey. The evergreen broad-leaved *Olea europaea* grows in such countries as Jordan,

Lebanon, Syria, Turkey, Saudi Arabia, Yemen and Cyprus. The potential for timber production is negligible except in Turkey.

1.3 Changes in forest cover

Forest cover has been relatively stable over the past 15 years, increasing very slightly, while wooded land has decreased very slightly. However, there is a fundamental problem with the availability and reliability of information. The countries have only limited capacities for regular monitoring and reporting of changes in forest cover and the state of tree growth. Moreover, area figures seldom provide an indication of degradation, which is often a slow and less obvious process.

The slight increase in forest area reflects both afforestation and tree-planting efforts, even if the scale of the latter is limited, and also the natural expansion of forests (for example forest succession on abandoned agricultural land in Cyprus and Lebanon on account of migration to urban areas). Forest plantations account for about 14 percent of the total forests of West Asia, with Turkey having the largest share. Afghanistan is the only country where the forest cover has decreased quite significantly.



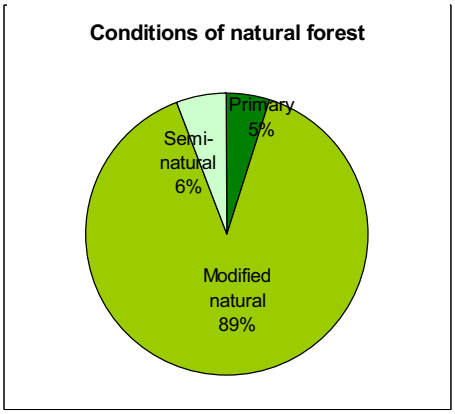
	1990	2000	2005
other wooded land	54,448	54,389	54,231
forest	27,132	27,373	27,390
plantations	2,938	3,529	3,803

Source: FRA 2005, FAO

The reduction in wooded land reflects transfers between forest, rangeland and agricultural land. Iraq has seen the largest decline in wooded land, although no country has seen an increase. Subsidized agricultural production for food self-sufficiency has resulted in large-scale agricultural expansion at the expense of rangelands, forests and woodlands.

1.4 Conditions of natural forests and wooded land

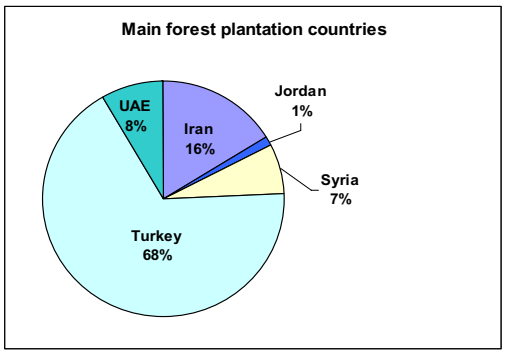
Natural forests can be divided into primary forest, seminatural forest and modified natural forest. Only 5 percent of natural forests in West Asia belong to the primary forest category. Most natural forests and all wooded lands are "modified". These are forests and wooded land with naturally regenerated native species, where there are clear indications of human activities, such as areas that have been selectively logged-over, areas of natural regeneration following agricultural use or areas recovering from human-induced fires. Semi-natural forests, which are established through planting, seeding or assisted natural regeneration with native species, account for 6 percent.



Source: FRA 2005, FAO

1.5 *Extent and functions of forest plantations*

Many West Asian countries have made substantial efforts to develop forest plantations. The main species used are eucalyptus, pines (*Pinus brutia, P. pinea* and *P. halepensis*), *acacias, cypresses, poplars, Salix spp., Cedrus libani, Cupressus sempervirens, Quercus calliprinos* and *Pistacia palaestina*. Turkey has also established significant areas of poplar plantations. In most of the Gulf countries, large numbers of date palms can be found in blocks, on cropland and along roads.



Source: FRA 2005, FRA

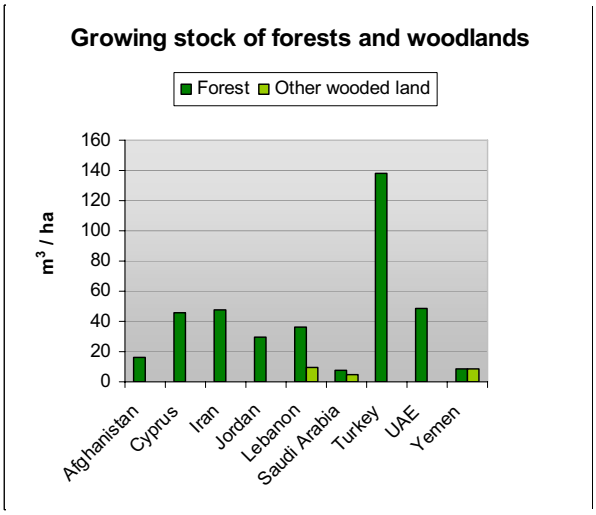
According to FRA 2005 data, West Asian countries have established about 3.8 million ha of forest plantations, representing nearly 14 percent of their total forests. Turkey, Iran, the United Arab Emirates, Syria and Jordan are the top five countries in terms of plantation areas. Plantations represent the entire national forest areas of Bahrain, Kuwait, Oman and the United Arab Emirates, while they account for about half the total forests of Syria and Jordan, and 25 percent of the forest area in Turkey.

Turkey and Iran have the largest areas of forest plantations, and most of these are for timber production. On the other hand, all the forest plantations in the countries with smaller areas of such plantations are used for protection purposes (Annex 8), except in the case of Lebanon, where they are composed mainly of *Pinus pinea* for pine-nut production.

It should be noted that information regarding forest plantations is incomplete. For example, Yemen has a number of forest plantations, but no data on them.

1.6 *Productivity of forests and wooded land*

The unfavourable environmental conditions and related species composition have contributed to the low productivity of forests and wooded land in West Asia. The productivity of forests and trees can be assessed on the basis of growing stock and increment. Data on growing stock cover only nine countries in the subregion (Figure on the right), but the average growing stock of forests is estimated at 42 m^3 per hectare, or less than half the world average of 110 m^3. Turkey is the only country in the subregion whose growing stock, estimated at about 138 m^3 per hectare, is slightly higher than the world average. Only Lebanon, Saudi Arabia and Yemen have data on woodlands, and growing stock in these areas is less than 10 m^3 per hectare.



Source: FRA 2005, FAO

Increment is also low. Turkey is considered to have the most productive forests in the subregion, and the average increment of its forests is 3.15 m^3 per hectare, while the average increment of other wooded land is only 0.22 m^3 per hectare. The main commercial species in Cyprus is *Pinus brutia*, which constitutes about 60 percent of State forests and 90 percent of growing stock. However, the average annual growth rate is only about 1 m^3 per hectare, although *Pinus brutia* can reach large sizes and produce good-quality timber.

Based on the very low growing stock and increment figures, wood supplies are extremely limited in West Asia.

1.7 Fire

Although fire, insects and disease are the main destructive factors threatening the forests and woodlands of West Asia, data on these elements are generally sparse. Fire is the main cause of forest destruction in most of the countries, a situation determined to a large degree by the predominant climatic conditions. Low rainfall, prolonged summers with high temperatures and wind enhances the fire hazard significantly. The forests of the Mediterranean countries of West Asia have been heavily affected by forest fires. Although there is no concrete information on the causes of such fires, it is clear that most of them are of human origin. Forest fires are a recurring phenomenon and have always had a major impact on forests. Between 1995 and 2004, the average area burnt each year in Turkey was about 9 000 ha, or 0.09 percent of the country's total forests. Forest fires are even more severe in Cyprus, with an average of about 1 955 ha burnt each year, or about 1.1 percent of the country's total forests over the same period.

1.8 Insects and disease

The range of forest types in the subregion make it hard to make any general statement on the health of the forests, and some countries produce no reports on the ill-health of trees.

Some of the countries share common tree species and may therefore share pest problems. For example, the European gypsy moth *Lymantria dispar* is a problem in broad-leaved forests in Afghanistan, Iran, Iraq, Syria, Turkey (on *Quercus spp*., particularly *Q. cerris* and *Q. petraea*) and Lebanon (on *Quercus calliprinos* and *Q. infectoria*), while the brown-tail moth *Euproctis melania* is one of the most destructive defoliators of oak and fruit trees in northern Iraq and southwestern Iran, and is also reported in Turkey. Several species of the pine processionary caterpillar, *Thaumetopoea spp*., can be a serious pest in pine forests in Cyprus and Lebanon (on *P. brutia* and *P. halepensis*), and in Turkey (on *P. brutia, P. pinaster* and *P. radiata*).

In the past few years forest pests have caused extensive damage to forests in Lebanon, and a previously unknown insect (*Cephalcia tannourinensis*, named after the forest where it was first identified) infested and devastated one of the largest cedar forests in Lebanon. The risk of its spreading further was prevented by an intensive and successful control programme.

Pines sometimes become infested with bark beetles, which may result in the death of the trees or branch dieback and reduced productivity. *Pinus pinea* stands in Lebanon are currently

suffering a serious infestation, leading to the death of trees in all the stands. The pest has not yet been identified, but could be a species of *Tomicus*.

Decline and dieback have occurred so extensively in the subregion that a proposal to create an information network is being considered. In 1996, *Juniperus polycarpos* was observed with dieback symptoms in the northern mountains of Oman, and juniper diseases (as yet unidentified) and dieback are currently widespread in the northern border areas between Yemen and Saudi Arabia. In Saudi Arabia, the overall health of *Juniperus procera* woodlands in the Sarawat Mountains is generally considered to be poor, with extensive decline and dieback. In Lebanon, the health of *Juniperus excelsa* and *Abies cilicica* stands is generally considered to be poor, with various forms of dieback and loss of vigour.

2 MANAGEMENT OF FORESTS AND TREES

The widespread and growing recognition of the importance of the protective functions provided by forests has led to a shift in the management objective away from the production of woodfuel, poles etc. in recent years, although countries are at different stages in this transition. The overall objective of management is determined to a large extent by the ownership of forests, the goals of the owners and most importantly the technical and financial capacity of the owners.

2.1 Forest ownership and land tenure

Most forests in West Asia are under public ownership, with some exceptions as in Lebanon and Cyprus. Lebanon's private forests account for about 60 percent of the country's total forest area and are well managed. Cyprus's private forests are reported as representing about 40 percent of the country's total forest area; they are primarily found as enclosures within State forests and are often abandoned agricultural land. Jordan's non-public forests account for 9 percent of its total forest area, while non-public wooded land accounts for 44 percent of total wooded land; most of these non-public areas are found on agricultural land as windbreaks. Yemen also has a substantial area of forests – about 80 percent of the total – defined as "private", but the precise nature of ownership is ambiguous, owing particularly to the absence of proper surveys, mapping and, more importantly, an effective legal system protecting ownership rights.

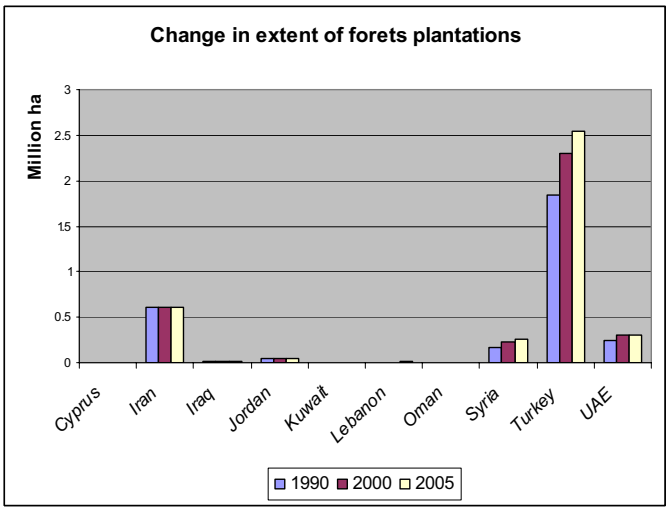
The absence of a clear land tenure system is a challenge to forest management in many countries in the subregion. One issue of vital importance for the sustainability of management in Turkey is the lack of clear ownership boundaries in forest areas. In Afghanistan, there is no clear legal framework for land tenure and user rights. Along with the collapse of government institutions, this has led to the control of resources by local landlords and generated insecurity of land tenure. Yemen also lacks a tenure system for forest land, so that private and public ownership is unclear, leading to conflicts of interest, especially considering that most forests are owned by individuals, families, communities and tribes. There is also no binding government legislation defining the beneficiary rights, but people living near forest areas have customary rights to benefit from wood extraction, grazing, fruit gathering and hunting within these areas.

2.2 Afforestation and reforestation

Environmental improvement is a major objective of reforestation and afforestation programmes in most countries. Reforestation is carried out in degraded natural forest areas to restore the productivity, biodiversity and other ecological functions of natural forests, while afforestation is carried out in barren areas for ecological purposes, including sand-dune fixation. Plantations established mainly to provide wood and timber are concentrated in Turkey and Iran, which have relatively favourable conditions for fast-growing species such as poplar and eucalyptus. NWFP production is another objective of plantations in many countries. The dry climate and sandy soil reduce survival rates and mean that plantations require significant irrigation. Although many countries are making efforts, it is hard to make any significant progress in increasing the scale of reforestation and afforestation.

2.2.1 Change in the extent of forest plantations

While caution needs to be exercised in interpreting estimates of planted forest area (especially in view of the inadequacies of reporting systems), available information indicates a slow expansion in the subregion. The figure on the right shows changes in the extent of planted forests between 1990 and 2005. Planted forests in the subregion account for about 13.9 percent of total forest cover, which is higher than the world average (3.8 percent), but account for only 2.7 percent of the world total of planted forests.



Source: FRA 2005, FRA

2.2.2 Tree nurseries

One of the main tasks of almost all forestry departments is the establishment and maintenance of nurseries for tree seedling production. Most nurseries are publicly owned and managed by forestry departments. The seedlings produced are used not only for afforestation and reforestation by the departments, but also distributed to interested municipalities, communities, private individuals and NGOs, usually free of charge. One of the technical efforts of nurseries is to produce seedlings of drought- and salt-tolerant species such as *Cedrus libani, Quercus calliprinos, Pistacia palaestina, Pirus syriaca, Amygdalus orientalis and Rhus coriaria*. The seedlings produced are mainly indigenous species.

In Syria, the production of tree seedlings increased from 8 million in 1977 to 30 million in 1992, when there were 40 nurseries. In Iran, the nursery area doubled in ten years, increasing from 198 000 ha in 1990 to 384 000 ha in 2000. In Jordan, the Forestry Department has established 13 nurseries, which produce 7 million to 9 million seedlings annually for forest land and rangeland. In Saudi Arabia, the Forest and Range Administration has established a number of tree nurseries, with a production capacity of 1 million seedlings per year. Turkey's Ministry of Forestry and the Environment manages 76 nurseries, producing 200 million to 300 million seedlings annually for afforestation and reforestation. Incentives are now being offered to encourage private investment in seedling production, since public nurseries have not been economically viable and have gradually closed. In Yemen, 53 nurseries had been established in various governorates, districts and villages by 1999, thanks to a forest development project initiated in 1985, which was financed by Switzerland and supported by FAO. However, many nurseries have been closed since the project was completed, for the Forestry Department lacks sufficient funds to maintain all those established.

2.2.3 Afforestation and reforestation for environmental purposes

Environmental protection is the general objective of afforestation and reforestation in most of the countries of West Asia, generally conducted by the forestry department.

Iran has established about 2 million ha of environmental plantations, including afforestation on barren land in most of the country's ecological zones for sand-dune stabilization and desertification control, using *Haloxylon persicum*, *Tamarix spp*. and *Prosopis spp*. Reforestation has been carried out in degraded forests to restore productivity, biodiversity and other ecological functions, using seedlings or seeds of native species.

In Turkey, the General Directorate of Forestry is responsible for reforestation activities such as forest regeneration and the rehabilitation of degraded forests. Annual regeneration, both natural and man-made, is between 25 000 and 30 000 ha, while the annual rehabilitation of degraded forests is about 5 000 ha. The Ministry of Forestry and the Environment is responsible for such afforestation activities as erosion control and sand-dune stabilization. Some NGOs have initiated tree-planting campaigns in partnership with the Government. In addition, silvicultural activities such as forest tending, pruning and the conversion of coppices into high forests have been implemented by the General Directorate of Forestry.

About half of Oman's very limited forest plantations are located in rangeland for rehabilitation purposes, while the other half are intended for the rehabilitation of degraded forest areas. Of Jordan's registered forest lands, 30 000 ha are located in rangeland, and the Directorate of Forests has established 22 pasture reserves with an area of 72 000 ha. Fodder tree and shrub planting, seeding, water harvesting, controlled grazing and other soil conservation measures have been conducted.

Forest plantations in Yemen were started in the southern governorates in 1964 and in the northern governorates in 1984 for purposes of sand-dune fixation. Forest plantations have been mainly established by forest development projects sponsored by donor countries and international organizations. Greenbelts or windbreaks are also being established around cities in Yemen. In Saudi Arabia, the sand barrier project was implemented in 1962 in the Al Ahsaa Governorate, afforesting an area of 1 560 ha, while reforestation in deteriorated forests has also been carried out since 1966.

2.2.4 Afforestation and reforestation for wood and timber production

Turkey and Iran are the main producers of wood products in the subregion and have established considerable plantations in areas with higher wood productivity for production purposes. In Turkey, poplar plantations cover about 130 000 ha (located on non-forest land) and provide 3.3 million m^3 of industrial wood per year, accounting for 25 percent of total domestic industrial wood supplies. In addition, the General Directorate of Forestry establishes between 11 000 and 14 000 ha of energy forests each year.

In Iran, there were 204 000 ha of industrial plantations in 1999, composed mainly of poplar and eucalyptus, and covering more than half the total consumption of the domestic wood industry. In addition, plantations aimed at fuelwood and pole production covered 101 000 ha in 1999.

Box 1 Change of plantation objectives in Cyprus

In the past, many areas were planted for fuelwood production, sand-dune stabilization and swamp drainage, especially in coastal areas and lowlands, but most plantations are now being managed for amenity and other environmental benefits. There are 94 village fuel areas, covering a total of 1 583 ha, which were established in the early years of the Second World War to produce fuelwood for local communities. By the time the plantations reached maturity, the war was over and liquid fuel was freely available. Living standards in rural areas rose markedly and there was no more demand for fuelwood. On the other hand, the demand for recreational and amenity areas increased, so that these village fuel areas were converted to amenity and recreation areas by planting ornamental species.
Source: Cyprus country report, 2005

Poplar plantations are also found in Afghanistan and Lebanon, where they are intended for small local industries and fuelwood production.

2.2.5 Afforestation and reforestation for NWFP production

Some plantations in certain West Asian countries are intended for NWFP production (pine nuts, honey, carob molasses etc.). Most of these plantations are privately owned.

2.2.6 Privatization of forest plantations

In view of adverse growing conditions, commercial enterprises have very little interest in embarking on forest planting. Private-sector involvement in plantations has been slight to date and most planting is undertaken by governments, although various incentives have been offered to encourage private planting, as in the case of Turkey and Iran (Box 2). The prolonged dry conditions obtaining in most countries necessitate irrigation in the early years of establishment. For example, all the plantations in the United Arab Emirates have been established through irrigation, as have half those in Iraq. Obviously the high investment required for such irrigation is an important constraint in expanding plantations. In addition, the predominant public ownership of forest land limits the private sector's participation in afforestation and reforestation activities.

Box 2 Private forest plantations in Turkey and Iran

The Government of Turkey has been promoting private plantations during the past decade and a total of 47 000 ha has been allocated for such plantations. Various incentives, including low-interest loans and low-priced land, are offered. Recent policy measures also include incentives to encourage private nurseries. However, the development of private plantations has not taken off, since it is not seen as a commercially attractive investment, being dependent on government funding.
Source: Turkey country report, 2005.

Although all land belongs to the State, various incentives and types of assistance – the granting of land facilities, the provision of long-term low-interest loans, the distribution of seedlings and the provision of technical assistance – have been offered to promote private investment in afforestation schemes. However, to ensure the success of tree-planting operations, most plantations are irrigated during at least the first two or three seasons, and site preparation and irrigation are both extremely costly. According to the 1992 national inventory, private poplar plantations covered 150 000 ha. The current policy aims to achieve an annual increase of 10 000 ha in private poplar plantations in order to meet domestic timber demand.
Source: Planted Forests and Trees. Islamic Republic of Iran country case study. FAO 2003.

2.3 Agroforestry systems

Agroforestry systems are found in most West Asian countries and are usually managed by private farmers. They can be divided into two main types: windbreaks and shelterbelts, and fruit orchards.

2.3.1 Green shelterbelts

Green shelterbelts are an important element on agricultural land in most countries of the subregion, although there is no concrete information on the scale and production of agroforestry. The farmers of West Asia understand the importance of windbreaks and shelterbelts in protecting croplands against drying winds and sand deposition. They often plant fast-growing tree species on and around farmland and near homesteads to meet their needs for wood and NWFPs, protect crops from wind damage and provide shelter and other amenities.

In Yemen, farmers plant and tend forest trees around farms, on terraces and along water courses, and agroforestry areas are estimated at 400 000 ha, providing building materials, fuelwood, fodder and habitat for honey production. In Syria, where agroforestry is recognized as reflecting traditional knowledge, windbreaks composed of several tree species cover 4 600 ha and it is estimated that they increase crop production by 15 to 40 percent. In addition, the area planted with poplars covers about 12 000 ha. Windbreaks are commonly found around farmland in Cyprus. In areas with intensive cropping, the main tree species are *Tamarix aphylla* and *Cuypressus sempervirens*. In Oman, shelterbelts and windbreaks are beneficial in increasing agricultural production and stabilizing canal banks, using such tree species as *Ziziphus spp., Prosopis cineraria* and *Phoenix dactylifera*, which also produce cash crops. It is reported that farmers in Iraq plant poplars or other woody shrubs in hedges or shelterbelts around agricultural land and along irrigation channels.

In some cases, agroforest areas have been converted to cropland. The case of Jordan is emblematic here. There are about 10 700 ha of private forests in Jordan, accounting for more than 9 percent of the country's total forests. These private forests are mainly in the form of shelterbelts and windbreaks around agricultural holdings or in the form of scattered plots in rangelands. The total area of agroforests was 1 269 000 ha according to the 1964 forest inventory, or 100 times the current area.

2.3.2 Fruit orchards

Fruit orchards are an important system in most West Asian countries, providing considerable economic benefits by producing fruit, while protecting farmland and providing wood and other environmental services. In the Mediterranean zone, there are substantial numbers of olive and fruit trees in agricultural fields. In arid areas, large numbers of date palms are planted and cultivated, either as palm farms or as windbreaks.

In the United Arab Emirates, date palm cultivation is playing a key role in turning large tracts of desert into green oases. Over 40 million date palms have been grown, 16 million lining roads. Apart from these trees' very important environmental role, 4 000 tonnes of dates were sold for a value of US$8 million in 2003. Farmers receive subsidies or incentives (obtaining seedlings at half price, free use of water for irrigation and free fertilizer). An existing regulation stipulates that every 4-hectare farm must have at least 200 date palms.

Fruit orchards in Oman cover 100 886 ha, accounting for 57.7 percent of the country's agricultural land. The 10 million date palms planted account for 84 percent of the total orchard area. There are also 179 000 coconut palms in fruit orchards.

Coconut and date palms are the main components of orchards in Iran. Significant projects have been implemented for the development and modernization of orchards over the past decade, and it is estimated that their area increased by 38.8 percent between 1990 and 2000, rising to 1.7 million ha. Fruit orchards in Cyprus are composed mainly of olives, carobs, almonds and terebinths. The Ministry of Agriculture in Iraq previously had regulations encouraging farmers to plant olives and dates on agricultural land, and there are about 1 million olive trees and 16 million date palms today.

2.3.3 Provision of wood

Agroforestry planting, especially of fast-growing tree species (for example poplars and eucalyptus) outside state forests contributes significantly to domestic wood supplies, particularly in Turkey. The potential contribution of such private agroforestry plantations in other countries deserves attention when formulating country strategies. According to the Iran country report, more than 50 percent (2.5 million m^3) of the country's annual timber consumption depends on private forest plantations located in agricultural areas. Wood produced in orchards is used mainly for woodchip production. Although data are scant, it is clear that agroforestry contributes significantly to meeting local demand for fuelwood and construction timber in West Asian countries.

2.4 Urban forestry

West Asia has been experiencing fast urbanization over the past few decades, a trend that will continue, although more slowly now that many countries are already highly urbanized. Urbanization has a major impact in terms of changing pressures on forests and woodlands.

One of the consequences of urbanization is the growing demand for green spaces, and substantial investments have been made to improve the urban environment, especially in cities that are commercially and politically important (for example Dubai and Abu Dhabi).

However, migration from rural to urban areas has had both positive and negative impacts on forests. In many cases, urban expansion has been achieved by sacrificing large areas of forest, rangeland and cropland in the areas surrounding the urban centre. Some forest and rangeland areas have been converted into industrial or construction land. Ecotourism expansion has had similar impacts, with houses and tourist facilities being constructed in forest areas.

Almost all urban and peri-urban forests need to be heavily irrigated in West Asian countries, especially in their early stages. Although underground water has been used for such irrigation, there is a scarcity of fresh water in most of the countries. An increasing number of countries, including Jordan, Oman, Cyprus, Turkey, Iran and Saudi Arabia have therefore developed and improved irrigation systems and are using treated sewage water to irrigate forest plantations and greenbelts. As the shortage of fresh water becomes a major constraint, the expansion and maintenance of urban forests will become increasingly dependent on the use of treated waste water. In addition, drip-irrigation techniques have been developed and are widely used to irrigate urban forests.

Box 3 Forest development in the United Arab Emirates

The United Arab Emirates have been highly urbanized since the 1980s with more than 80 percent of the population living in urban areas. This high urbanization, combined with strong financial support, has resulted in fast forestry development in an area where there are almost no natural forests.

A total of more than 378 000 ha of forests has been established in the Emirates, including 317 000 ha in Abu Dhabi, about 40 percent of which is located in agricultural and rangeland areas. The main functions of the planted forests are:

- providing greenery and amenities, and protecting cities, including city parks, trees along roads and green belts around cities;
- combating desertification, particularly the protection of cities from sandstorms;
- providing natural sanctuaries for breeding animals such as gazelles, bush rabbits and birds, and generally preserving wildlife;
- protecting farmland and rangeland.

Most forest plantations are established in fenced-off areas and each tree stem is protected with plastic tree-guards during the first two years or until it becomes self-sustaining. Drip irrigation from groundwater, treated sewage effluent or desalinated water is used over the whole life of trees. Each tree receives between 18 and 30 litres of water per day, leading to an annual consumption of 2 135 m^3 per hectare.

Source: United Arab Emirates country report, 2005.

Especially in the Gulf countries, strong economies and often strong central planning mean that urban development has been well organized, with considerable attention to improving the urban environment. The growth of some West Asian cities as major centres of international tourism, trade, commerce and finance has further encouraged greening efforts. Urban and peri-urban forests are playing an important role in protecting nomad settlements and habitations from sand and dust storms and for recreational and other amenities. Parks and gardens have been established at high cost to enhance major urban centres in the United Arab Emirates (Box 3), Kuwait, Oman, Bahrain and Saudi Arabia. Green spaces in Iran have expanded from 6 000 ha in 1987 to about 14 000 ha today to compensate for private orchards removed during the urbanization process. Syria has also undertaken a vigorous urban forestry programme and forest plantations near cities have been turned into recreational sites. In Turkey, the establishment of greenbelts around urban areas has been gaining increasing importance since the mid-1980s and a total of 132 000 ha of greenbelts has been established around cities in 32 provinces.

City administrations have been taking the main responsibility for managing urban forests and green areas within city boundaries. Forestry departments and other related institutions have also been involved in activities, especially in peri-urban forestry development. In most countries, urban forestry requires high investments for establishment and maintenance, and almost all of these come from national budgets. However, the financial commitment of governments is not always assured, because priorities are set at different levels. Cyprus appears to have a more stable system for financing its urban forestry, with special taxes intended to finance the management of urban green spaces, while the greening of urban areas is one of the main tasks of the country's municipal administrations. With tourism becoming a major source of income, improving the urban environment has become all the more important. In countries where the government has insufficient resources, urban forestry is mainly dependent on international support. Apart from the paucity of finance, a significant obstacle to

the development and management of urban green resources is the lack of specific laws and regulations throughout the subregion.

2.5 Reduced level of wood production

A number of countries that earlier depended on their natural forests for wood production have over time reduced the level of extraction and paid greater attention to environmental benefits. According to available information (FRA 2005), West Asia as a whole has steadily reduced wood extraction (from 40 million m^3 in 1990 to 33 million m^3 in 2005). Woodfuel accounted for more than half (56.6 percent) the total wood extracted in 2005 (Figure on the right).

Source: FRA 2005. FAO

In Cyprus, annual timber production from the Troodos forests (about 36 000 ha) has fallen from about 50 000 m^3 in the 1980s to about 10 000 m^3 in recent years, and one-third of the area is currently managed as a forest park that receives one million visitors annually. In Iran, the Caspian forests are considered efficient in terms of commercial and industrial wood production, but the extraction rate has fallen in recent years for environmental considerations, with timber production decreasing from 840 000 m^3 in 1993 to 600 000 m^3 in 2003.

The reduction in wood production has been achieved mainly through forest management planning in the various countries. In Turkey, the significant reduction in the total extracted has been attributed mainly to the reduction in fuelwood production, and 40 percent of the total extracted in 2005 was for industrial roundwood. In Cyprus, the main commercial species in its forests is *Pinus brutia*, which can reach large sizes and produce high-quality timber but has a low growth rate. The Forestry Department controls its extraction from both state and private forests.

2.6 Increasing importance of managing protected areas and national parks

Most forests in the subregion are managed for multiple purposes, with protection as an important function. Increasing attention is being paid to conserving biodiversity and protecting soil and water. Management of protected areas and national parks is increasingly important in Cyprus, Iran, Jordan, Lebanon and Turkey, and protective and amenity planting is receiving considerable attention. An important indicator reflecting this whole trend is the ongoing increase in protected areas and national parks. For example, Cyprus reports seven areas with a total of about 5 000 ha, covering a wide range of vegetation and including endemic forests of Cyprus cedar and golden oak. In Turkey, about 957 000 ha (more than 1.2 percent of the country's land area) have been declared protected zones, while in Syria, more than 288 000 ha (more than 1.5 percent of the country's land area) were declared protected areas between 1996 and 2004. These protected areas have been allocated mainly for the protection of cedar, fir, pistachio and oak forests, and aquatic and wildlife habitats.

Wildlife protection is another important objective of protected areas and national parks, some parts of which are managed as wildlife sanctuaries. In the United Arab Emirates, for example,

extensive areas of land with natural vegetation and old trees have been enclosed, and various wild animals, especially rare and endangered species, have been introduced. Some forest plantations have also been converted to natural sanctuaries for breeding gazelles, bush rabbits and birds, and the general preservation of wildlife.

One of the main challenges in management is the participation of the people or communities who live in or around protected areas or national parks and who have in many cases depended on resources in their vicinity, for example collecting fuelwood for cooking and heating, and fruits or herbs for their livelihood. Such activities are supposed to stop in what are now protected areas, so it is vital to consider how these people can best be compensated and benefited when formulating and implementing the management plan. The local people's or community's participation is crucial in the management of protected areas.

2.7 Forest-based ecotourism development

Increased attention is being given to the development of forest-based ecotourism, driven by the overall expansion of the tourism sector in most West Asian countries and the special capacity of forests to improve the living environment and provide various amenities in the extremely dry, hot climates of most areas. However, countries are at varying stages in their forest-based ecotourism development, because of differences in economic, social, environmental, political and institutional contexts. Some countries have been able to take advantage of the recreational use of forests, supporting their overall tourism development.

As Cyprus becomes a major tourist destination in the Mediterranean, the significance of forests for wood production has declined and their environmental value for supporting the tourism sector is receiving more attention, with many forest-owners taking advantage of the opportunities offered by "agrotourism". In the case of state forests, the increasing demand for recreational and ecotourism facilities has led to the constitution of several national forest parks for recreational and other amenities, biodiversity conservation, environmental education and scientific research. In communities around forests, tourism development has contributed significantly to increasing employment opportunities and incomes. However, it should be noted that tourism development and the construction of holiday dwellings have also had a negative impact on private forests.

Tourism is one of the fastest growing sectors in Turkey and most of the tourist areas are located in forest zones. Ecotourism could provide opportunities for forest dwellers as an alternative source of income and particularly of employment, while also reducing the pressure on natural forests.

In Oman, ecotourism in forests, rangelands and parks is receiving considerable attention. Forest and rangeland areas in Dhofar Governorate were visited by about 200 000 tourists from Gulf countries and other parts of Oman in 2004.

Although ecotourism can conserve natural resources, provide employment opportunities and boost the rural economy, tourism development in forest areas has also had some negative effects. The unplanned construction of facilities, restaurants and hotels, and the driving of vehicles through forests and rangelands have caused degradation in a number of countries. It is therefore essential to plan and manage tourism development to ensure both environmental protection and economic optimization.

Saudi Arabia's Supreme Commission for Tourism was established in 2000 in order to promote domestic tourism. Its efforts to date have included the establishment of infrastructure and services to encourage private investment, tourism development in major cities and coastal areas with a suitable climate, and the setting aside of some forests for public investment in tourism. However, the lack of environmental concern and the limited capacities of the executing institutions in the initial stages have meant that tourism development has resulted in a noticeable deterioration in natural resources, including the loss of vegetation cover and wildlife, soil degradation and pollution of coastal areas.

Overall, while the scope for wood production is limited, recreational use could be an important way of enhancing the economic viability of forest management. Although forest-based ecotourism is in its infancy, it has great potential for many countries in the subregion.

3 AGRICULTURE, RANGELAND AND FORESTS

The predominant aridity of the subregion has led to half the total land area's being used as rangelands. The subregion contains a significant number of pastoralists who move seasonally between low and high altitudes in mountainous areas and between wetter zones and dry steppes. The long history of human settlement, unequal access to land and increasing urbanization have led to serious degradation of land and forest resources in much of the subregion.

3.1 Agricultural development

Over the past few decades, many countries, especially in the Gulf region, [2] have been heavily subsidizing agricultural development in order to achieve self-sufficiency in basic food crops, regardless of the national natural resource base. Incentives include the setting of very low land and water prices for crop production and very high crop prices. Moreover, most countries have invested heavily in irrigation infrastructure. Agricultural development policies have resulted in the expansion of agriculture and especially of cultivated land.

Forests and rangelands are particularly vulnerable where the economy is not diversified and the population is constantly growing, for example Afghanistan and Yemen. The expansion of rain-fed mixed farming to uplands and the increasing pressure of livestock are major problems in Yemen, Turkey, Jordan, Syria, Iran and Iraq. Unless there is significant growth in non-agricultural sectors and a concomitant increased absorption of labour by such sectors, rangelands and forests will continue to be subject to grazing and agriculture.

Box 4 Agricultural expansion in Saudi Arabia

After the discovery of fossil fuel, the increase in its price during the second half of the past century and the accompanying economic development of Saudi Arabia, the agricultural sector has been heavily subsidized. Support has included the construction of dams, the allocation of arable land free of charge to investors for agricultural development, the setting of low prices for fodder to assist nomads to overcome drought effects, and the drilling of many deep boreholes. Approximately 6 000 specialized agricultural projects have been launched for a total of approximately US$12 billion, and many shareholding agricultural companies have been created. The peak of agricultural development was reached in 1995 with a growth rate of 8.6 percent and a cultivated area of 1.7 million ha. However, the absence of regulations on environmental protection and poor environmental awareness have resulted in the deterioration of renewable natural resources. The huge agricultural expansion has been achieved at the expense of rangelands, forests and marginal areas, the intensive use of groundwater resources and the excessive use of pesticides and fertilizer.
Source: Saudi Arabia country report, 2005.

[2] Gulf Cooperation Council member countries: Bahrain, Kuwait, Qatar, Oman, Saudi Arabia and the United Arab Emirates.

3.2 Rangeland development

3.2.1 Changes in rangeland management

Animal husbandry has been an important source of income, contributing 30 to 40 percent to agricultural production. A large proportion of the people of West Asia is still dependent on rangelands for its livelihood, especially in Iran, Oman, Syria and Yemen (1.6 million households depend on rangeland in Iran), although urbanization has to some extent reduced the pressure on land. Very little information is available on the condition of these rangelands and on tree growth, but the general opinion is that they are deteriorating fast on account of increased pressure for fodder and woodfuel.

To some extent this deterioration can be attributed to changes in the responsibility for management. Nomadic communities, who owned and used rangelands, had developed control systems to prevent the overuse of rangelands. Over time, rangelands were brought under government ownership and control, but such changes did not improve governments' management capacities, a situation leading to degradation. In most cases rangelands are seen as free-access resources with no one taking responsibility for their effective management (Box 5).

Box 5 Changes in livestock management in Oman and Saudi Arabia

The traditional system of rangeland use in Oman played a major role in environmental conservation and natural resource management. Under this system, each tribe or group of tribes had a well-defined area. The right of control over the use of rangeland and water resources was vested in the tribe's members. In the case of scarcity of natural resources, members of neighbouring tribes were allowed to share the available pasture and water. The movement of nomads and livestock was organized according to defined routes and timings. Resources were efficiently managed and well protected, tribe members were committed to the management systems, conflicts were resolved and penalties against offenders defined. The change to public ownership of forest and rangelands has caused a break-down in the traditional management system. The absence of any alternative system guaranteeing the protection and conservation of natural resources and the lack of responsibility for the use of rangelands have led to land deterioration.
Source: Oman country report, 2005.

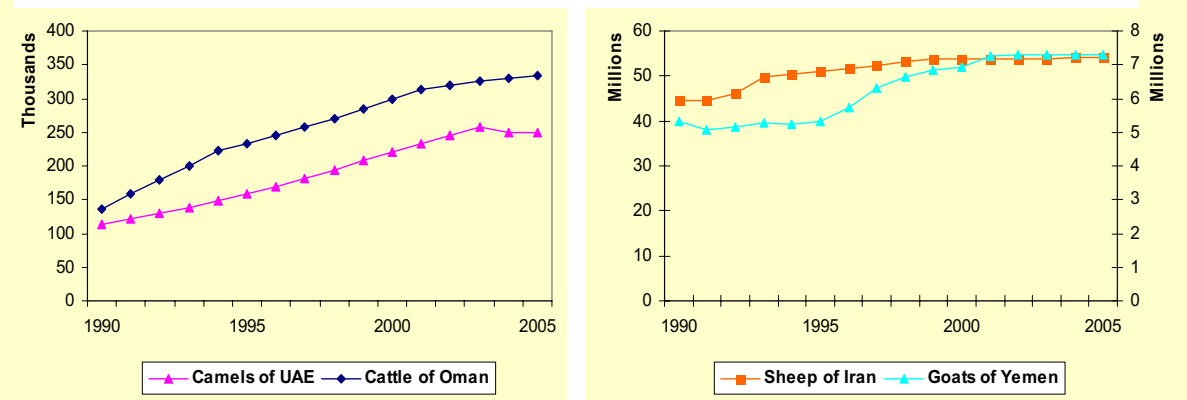
Protection is considered one of the most important and effective means of conserving natural rangeland and ensuring its development. This approach was practiced in the past in some areas of Saudi Arabia where traditional protection systems depended on tribal customs to identify area, utilization methods and beneficiaries. In the second half of the twentieth century, these systems were abolished for social and economic reasons, and grazing became a right for everybody in the country. Rangeland then suffered considerable deterioration owing to the large numbers of livestock, which exceeded the carrying capacity.
Source: Saudi Arabia country report, 2005

3.2.2 Increasing numbers of livestock

In most countries increased wealth and urbanization have resulted in a significant decline in the population of nomadic tribes. However, this has not always led to a decline in the numbers of livestock. In countries such as Saudi Arabia the pressure on rangeland has increased on

account of commercial-scale animal husbandry, with increased income enabling animals to be transported over longer distances to pastures and water sources.

Figure 4 Increase of livestock in some West Asian countries



Source: FAO STAT, 2006.

This situation along with a sharp increase in population in almost all the countries over the past thirty years has led to a significant increase in the demand for livestock products. Livestock numbers have therefore risen enormously, causing overgrazing of rangelands. Herder participation is obviously critical for rangeland management, but mechanisms for such participation are still inadequate. Countries have taken various measures to control livestock expansion, including the reduction of numbers by certain projects and the issuing of grazing licences. However, such measures have been very insufficient. The Camel Project, lasting two years for a total cost of US$36.4 million, has the aim of reducing pressure from camels on rangelands in the Dhofar region of Oman, by purchasing camels from herders and selling them for meat. Camels are often bought at double the market price and then sold in United Arab Emirates markets at a very low price, an approach that is unlikely to prove successful and may even be counter-productive, inasmuch as the high price offered by the project becomes an incentive to increase herd sizes.

3.3 Challenges and prospects for forests and trees in relation to rangeland and agricultural development

One of the key challenges facing forests and trees is the steady conversion of rangelands and forests to cultivated land. For example, in response to government incentives in the United Arab Emirates, the number of agricultural farms has increased from 1 833 in 1988 (with 41 620 ha) to 38 239 in 2002 (with 270 941 ha), an increase achieved by reducing rangelands (United Arab Emirates country report, 2005). Some countries, for example Saudi Arabia, are also facing the problem of shifts in the location of agriculture: in line with the policy of conserving water resources, areas under cereals and fodder crops began to shrink in unforested zones, and there has been a trend toward intensive agriculture in watershed areas, including the southwest, where rainfall is fair and where most of the dams and seasonal water courses are found. Encroachment on forest land and shrinking of forest area will therefore increase in the future (Saudi Arabia country report, 2005).

However, most arable land is already being exploited and there is limited scope for further expansion (FAO and World Bank, 2001). Newly cultivated land will often face serious constraints owing to climate and poor soil. Access to land will become increasingly difficult and the anticipated increase in the cultivation of marginal land will lead to significant environmental degradation.

Rangeland degradation and desertification represent a major challenge to forests and trees. In some countries, forests have been converted to rangeland or used for livestock grazing, mainly as a result of rangeland degradation, overpopulation of livestock and the lack of regulations and management for both rangelands and forests. Forests and rangelands are also facing the challenge of conversion to other types of land for tourism or urban development.

With growing water scarcity, broad policy reforms and changing global trade policies, the old paradigm of food self-sufficiency is being replaced by efficiency and competitiveness, which could result in reduced subsidies to the agricultural sector. On the other hand, tariffs on agricultural products will be reduced as many countries join the World Trade Organization, and this will encourage imports of agricultural products, a development that would bring some advantages for forests, especially in the Gulf countries.

Afforestation and reforestation on rangelands are among the main forestry activities of the forestry departments of many countries as key measures in rehabilitating and restoring rangeland ecosystems and increasing their productivity. In Jordan, for example, forest land is composed of natural forests (25 800 ha), forest plantations (47 000 ha), forests on rangelands (30 000 ha) and bare land (13 200). Forests on rangelands thus account for 26 percent of the total, and forests and trees are therefore being restored with a view to rangeland development (Jordan country report, 2005).

4 SERVICES PROVIDED BY FORESTS AND TREES

Biodiversity conservation, watershed protection, and desertification and land degradation control are among the main environmental services provided by forests in West Asia, although the fulfillment of these functions varies considerably. The recreational and amenity values of forests and trees have been finding greater recognition more recently, and ecotourism based on forests and wildlife has seen rapid growth. Moreover, with the expanding urban population, the demand for green spaces for recreational and other amenities is growing. Confronted with problems of climate change, increasing attention is also being paid to the role of forests and trees in carbon sequestration.

While the economic value of wood and NWFPs is modest, the economic value of the protective functions of forests is significant in most of the countries of the subregion, although most countries have not so far carried out any evaluation of environmental services. It is expected that there will be a great demand for such evaluations in view of the increasing demand for these services and the development of tourism.

4.1 Biodiversity conservation

The wide range of landforms, soils and climates in West Asia has resulted in highly diverse ecosystems, ranging from coastal mangroves to deserts and alpine forests (Box 6). The subregion has suffered substantial loss of biodiversity on account of human activities. Loss of habitat has been a major problem, caused largely by overgrazing and the overharvesting of fuelwood. Agricultural expansion, hunting and fires are other primary causes of forest loss and degradation, resulting in biodiversity loss. Changes in biodiversity are therefore mainly consequences of human activities and depend on the extent to which policy, legal and institutional mechanisms are in place to protect and manage biodiversity.

Box 6 Biodiversity in West Asia

The subregion has a wide range of terrestrial and aquatic ecosystems. The estimated number of endemic vascular species in the subregion is 800, and in some hot spots such as the Socotra Islands of Yemen, 34 percent of the total number of vascular plants are endemic. There are seven endemic mammal species and ten endemic birds species.

Habitat destruction and fragmentation have increased dramatically in most countries over the past three decades owing to the growth in human population and resource consumption. Degradation of unique terrestrial and aquatic ecosystems and loss of genetic resources are the main biodiversity issues in West Asia. Mangroves have been shrinking along the shores of the Gulf over the past 30 years owing to unplanned coastal development, so that only 125–130 km^2 of mangrove patches now remain.

An overall decline in the larger terrestrial species has been recorded. While wild goats and gazelles are still present in the subregion, they have been much reduced in range and numbers. The leopard, which was formerly widespread, persists in a few isolated areas. The cheetah is on the verge of extinction, if not already extinct, the last confirmed specimen being taken in 1977. The Arabian oryx was extinct in the wild but has been successfully reintroduced using captive stock. The ostrich is believed extinct, the Arabian bustard has been reduced in numbers and is possibly extinct in Saudi Arabia and the Houbara bustard now winters in much reduced numbers.
Source: Global Environment Outlook 3, UNEP, 2002.

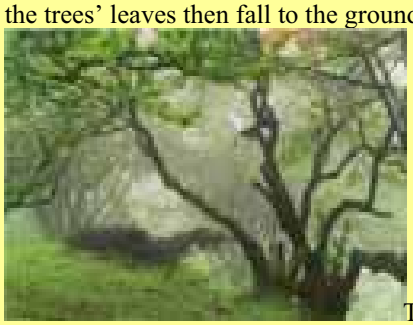
With regard to forest biodiversity, the area of primary forests has been fairly stable in West Asia over the past 15 years, although the forest area designated primarily for conservation has increased slightly in the past five years. Other indicators of biodiversity include the number of tree species per country and the number of species considered to be endangered or vulnerable. Based on available information, there is no evidence that forest biodiversity is either substantially decreasing or increasing in the subregion.

Prosopis juliflora is a major invasive woody species in Oman, Yemen and Saudi Arabia, and Oman and Saudi Arabia have conducted large-scale mechanical control programmes.

Cedrus libani in Lebanon represents the world's genetic base for the species, while *Juniperus procera* in the Asir highlands of Saudi Arabia and *Juniperus polycarpus* in Oman also have high genetic value. The cloud forest in Oman is anomalous inasmuch as cloud forests typically form in moister climates (Box 7).

Box 7 Unique cloud forest with self-watering trees

Trees in a rare cloud forest in the desert subregions of Oman water themselves with seasonal fog, according to Massachusetts Institute of Technology scientists. The researchers studied this unusual watering process in a forest located in the Dhofar Mountains in the south of the country. Clouds form in the forest when moist air flows in from the Arabian Sea and pushes up against the mountains. Water droplets from the clouds collect on the trees' leaves then fall to the ground, where the water can be stored and used by the trees in drier weather.



This forest is anomalous because cloud forests typically form in moister climates where a forest can largely sustain itself without the lower-lying fog layer, since it gets plenty of rainfall from higher clouds**.** The Omani forest would not fare as well without its essential fog. "Without additional water from the low-level clouds, the trees wouldn't exist," said the scientists, who used rain gauges to measure rainfall above the trees and also the larger amount of precipitation beneath the trees, showing that the water droplets that form from the fog and drip to the ground are essential to the forest.

The researchers are worried that overgrazing from goats and camels could damage the forest by decreasing the amount of water it obtains from the fog and making the trees less likely to grow back. If an ecosystem of this kind is destroyed, they say, it is hard for it to regenerate.
Source: LiveScience 2006.

Following ratification of the United Nations Convention on Biological Diversity (CBD) most countries have prepared national environmental action plans or national biodiversity strategy and action plans. Although priorities may differ, most of these programmes and plans adopt a common framework, with considerable emphasis on awareness raising, assessment of biodiversity status and improvement in institutional capacity. In most cases such initiatives are undertaken with financial and technical support from bilateral and multilateral organizations and international NGOs. Without such assistance, many countries would not have been in a position to develop national strategies and action plans. However, this raises the question of long-term sustainability, especially when resource availability for implementation is limited and the preparation of plans is an initial step that is meaningful only if concrete action is pursued.

In addition to global conventions, many countries are also signatories to regional and subregional strategies and priorities. Part of the aim of participation in regional and global initiatives is to gain access to external resources and enhance collaboration, especially to address trans-boundary issues. To some extent this has resulted in programmes and activities that are important from the donors' perspective, but not necessarily high priorities for governments and other national-level stakeholders. Although biodiversity conservation is undoubtedly recognized as important, most countries are unable to allocate adequate resources, given other economic and social priorities.

A significant indicator of progress in achieving biodiversity conservation is the ongoing establishment of protected areas. According to the latest statistics of the United Nations Environment Programme (UNEP), the total protected area in West Asia is now 98.9 million ha including International Union for Conservation of Nature and Natural Resources (IUCN) categories Ia to IV, or 103 million ha (equivalent to 14-15 percent of the total land area) if

other categories are also included. Annex 10 gives details of protected areas in each West Asian country. Saudi Arabia, Iran and Turkey have the largest shares of protected areas in the subregion. However, poor infrastructure, limited staff and the absence of financial support undermine the effectiveness of protection.

4.2 Watershed protection

A high proportion of the subregion receives annual rainfall of less than 100 mm. In view of acute limitations on the extraction of surface water, there is an increasing dependence on tapping groundwater – or, in resource-rich countries, on the desalinization of seawater.

Tigris and Euphrates catchment basin

Watersheds are very important in many countries. The largest watershed in West Asia is the Tigris and Euphrates catchment basin, which covers a total area of 765 000 ha in Turkey, Iraq, Syria, Iran and Saudi Arabia. The second largest is the Kizilimak catchment basin in Turkey, which covers 122 000 ha. The forest cover in these areas is only about 1.2 and 1.6 percent respectively. About half their areas is covered by grassland, savannah and shrubland, while about one-third is managed as cropland. It is estimated that over a long period of time the Tigris and Euphrates catchment basin has lost 99 percent of its original forest cover (World Resources Institute, 2005). Apart from these large watersheds, there are a number of smaller watersheds, watercourses and springs in the subregion.

In most countries of West Asia, water availability is the most critical issue in terms of sustaining and expanding agricultural production, and many countries rely heavily on dams to meet their irrigation requirements. Soil erosion and floods are the main problems resulting from water mismanagement, while overgrazing and the increasing demand for woodfuel also contribute to watershed degradation.

Forests and other vegetation are crucial components of watersheds, maintaining water quality, moderating water flow, reducing runoff during high-water periods and maintaining flow during dry periods. The extent of historical deforestation is thus a useful indicator of watershed degradation. However, experience indicates that afforestation in such areas often requires irrigation in the early stages of establishment. Several instances of adverse impacts on stream flow on account of forest clearance have been reported from the subregion. Deforestation and overgrazing have led to erosion, causing high water turbidity in many countries, especially those with an unsatisfactory economic situation and a predominantly

rural population, for example Yemen. Grazing and woodfuel gathering (especially for charcoal production) are the most important factors in watershed degradation.

Frequent land-use changes, especially those resulting in increased tillage, are particularly damaging to the stability of water flow. Watershed management efforts are therefore increasingly adopting an integrated approach, which addresses the human dimension as well as the mosaic of land uses in a given ecological context, with stress on improving agricultural practices and enhancing the income of local communities.

4.3 Desertification control

Land degradation and, at its extreme, desertification continue to be the major environmental issues in West Asia, especially in countries where the agricultural sector makes a significant contribution to the national economy. There is extensive desert in the subregion, ranging from more than 70 percent in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates and Yemen, to 50–70 percent in Iraq and Jordan, 10–50 percent in Syria, Iran and Afghanistan, and less than 10 percent in Cyprus, Lebanon and Turkey. Desertification has affected large areas of rangeland in Iraq, Jordan, Syria and the countries of the Arabian Peninsula. The causes include climate, high population growth and intensive agriculture, while poverty and inappropriate government policies exacerbate the problem. Arid and semiarid land is highly vulnerable to human- and climate-induced changes, which reduce its productivity irreversibly especially on account of erosion and sand deposition. Increased salinity is another factor contributing to falling productivity and desertification (Box 8).

Forestry is the key component in combating desertification and focuses on both preventive and remedial measures, although most stress has been laid on the latter, especially when adverse effects become very evident. Key areas of forestry intervention in West Asia include the following:

- Most West Asian countries have developed national action programmes to combat desertification within the framework of the United Nations Convention to Combat Desertification (CCD), with the aims of preventing land degradation, improving soil productivity and ensuring food security. A subregional strategic action plan to combat desertification has also been established.
- Many countries have adopted remedial measures, particularly the afforestation of degraded areas to stabilize soil and prevent further wind and water erosion, and protective measures to maintain the productivity of agricultural and other land through the establishment of shelterbelts and windbreaks, and measures to fix sand dunes.
- Forestry interventions have largely focused on technical aspects, especially the planting of species adapted to the adverse environmental conditions, the production of sufficient numbers of seedlings to meet the demands of government organizations (including forestry departments) and farmers, and the adoption of appropriate techniques for planting and after-care. Considerable efforts have also been made to design appropriate shelterbelts and windbreaks and develop techniques for sand-dune stabilization.

Box 8 Land degradation and desertification in West Asia

Sixty-four percent of West Asia's land base is drylands on calcareous soils prone to degradation. 79 percent of the land was degraded, with 98 percent of that being caused by people. Wind erosion, salinity and water erosion constitute the major threats, while soil waterlogging, fertility degradation and soil crusting are secondary problems. Poor management and irrational use of irrigation water has increased salinity and alkalinity, which affects about 22 percent of the region's arable land. Rangelands occupy over 52 percent of the total land area. The impacts of heavy and early grazing, rangeland cultivation and recreational activities have significantly reduced species diversity and density, and increased soil erosion and sand dune encroachment on agricultural lands. Forest degradation occurs widely. Fires, wood cutting, overgrazing, cultivation and urbanization all negatively affect the products and services of the forests.
Source: Global Environmental Outlook 4, UNEP. 2007.
Note: West Asia, classified by the UNEP GEO studies, include Bharain, Iraq, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen

4.4 Forests and climate change

There is increasing evidence that forests will be profoundly affected by climate change. In addition to higher average temperatures, other factors, such as more intense droughts, floods, and greater temperature variability, will generate negative results on trees and forests. On the other hand, forests can contribute to reduced carbon sequestration (storage) through deforestation. Deforestation accounts for about 11 percent of global greenhouse gas emissions (the World Bank, 2007). Forests can also play a key role in mitigating it, for they play essential roles in carbon conservation and sequestration (through afforestation and reforestation) and in replacing fossil fuels (use as biofuel).

The 1997 Kyoto Protocol shares the objective, principles and institutions of the United Nations Framework Convention on Climate Change (FCCC), but significantly strengthens it by committing parties to individual, legally-binding targets to limit or reduce their greenhouse gas emissions. Ten West Asian countries have so far ratified the protocol. Since it came into force on 16 February 2005, its implementation has slowly been gathering momentum, although there has been little impact in the forest sector. Cyprus registered two projects (not in forestry) under the protocol's Clean Development Mechanism in 2006, while Qatar has requested registration of its Al-Shaheen Oil Field Gas Recovery and Utilization Project.

It is believed that greenhouse gas emissions can be dramatically reduced through carbon trading. The emerging market for trading carbon emissions offers new possibilities for forestry to benefit from activities that sequester carbon, thereby enhancing carbon storage and avoiding deforestation. Greenhouse gas mitigation projects in developing countries are funded through the Clean Development Mechanism (CDM) of the Kyoto Protocol, the main carbon trading mechanism available to developing countries, which cover afforestation and reforestation projects.

5 GOODS PROVIDED BY FORESTS AND TREES

Given the very limited forest cover and low forest productivity in West Asia, the production of industrial wood products is very limited in most countries. Turkey is the only country with a developed wood industry and a significant production of industrial wood products. However, the production of fuelwood, wood charcoal and NWFPs is significant in most countries.

5.1 Fuelwood and charcoal

Several countries have tried to control fuelwood and charcoal production through legislation and licensing, but it is believed that most fuelwood collection and charcoal production take place informally or illegally. Apart from the lack of management in this sphere in many countries, the increasing population, especially of the rural poor, their dependence on fuelwood and their inability to purchase fuel hamper any efforts to control fuelwood production. Information on the production and consumption of fuelwood and charcoal is thus extremely sparse in the subregion.

5.1.1 Importance and extent of use

Fuelwood and charcoal are more important than industrial wood products in many countries of West Asia. Woodfuel[3] is used mainly by rural people as the principal source of domestic energy, especially for cooking and heating. Forests, rangelands and shelterbelts or windbreaks on agricultural land are sources of fuelwood. Since most fuelwood harvesting takes place illegally, reliable data on production and consumption are not available.

The degree of reliance on fuelwood and charcoal varies considerably among the countries. Fuelwood and charcoal provide almost 85 percent and 70 percent of household energy needs in Afghanistan and Yemen respectively, while charcoal production is also an important source of income for the rural poor. Consumption has increased significantly in the wake of prolonged conflict, which disrupted supplies of commercial fuels. Iraq has been experiencing a similar situation since the war caused a fall in petroleum production.

Most of the population depends on petroleum products, electricity and to a lesser extent solar energy, while the poorest rural communities depend on fuelwood for cooking and heating in Turkey, Iran, Syria and Jordan, where they have access to free or cheap fuelwood in surrounding forests or rangelands.

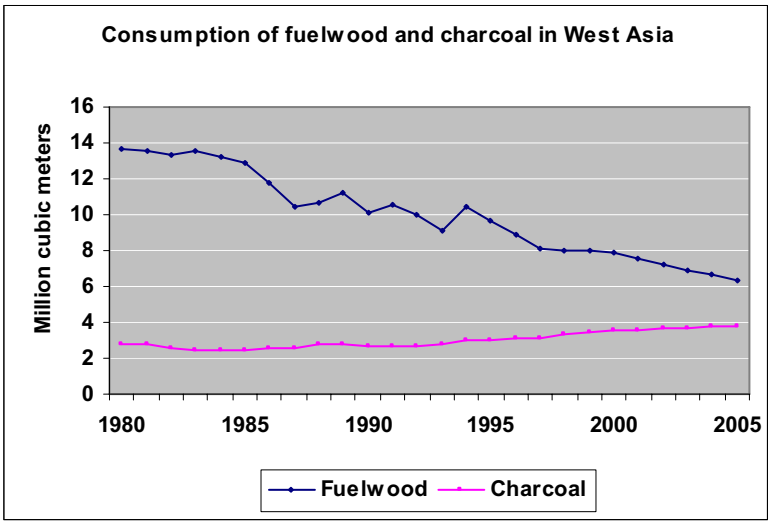
5.1.2 Decrease in fuelwood consumption and increase in charcoal consumption

According to FAO's assessment, Turkey has been the foremost country in both fuelwood and charcoal consumption, although the amounts have been steadily decreasing over the past twenty years. Increasing income, ongoing urbanization and access to commercial petroleum and natural gas in Cyprus, Iran, Lebanon, Oman, Saudi Arabia, Syria, Turkey and the United Arab Emirates have resulted in a significant decrease in dependence on fuelwood over the past twenty years. In contrast, Afghanistan and Yemen have increased their fuelwood and charcoal consumption significantly over the same period, as have Jordan and Syria, although

[3] Woodfuel refers to fuelwood plus charcoal.

to a lesser extent. Charcoal consumption is expected to increase in almost all the countries except Iran. In Cyprus, Lebanon, Jordan, Oman, Saudi Arabia and the United Arab Emirates, there is an increasing trend toward charcoal consumption in restaurants and for barbecues, while the consumption of fuelwood for cooking or heating in rural areas has fallen greatly.

In order to protect forest and tree resources from overexploitation, some countries have formulated and imposed regulations to control fuelwood collection and charcoal production. For example, Saudi Arabia imposed a five-year ban on both in 2000 and permitted imports to meet domestic demand, while Syria has adopted a system of licensing charcoal production from forests and fruit trees. However, such restrictions have not always been effective.



Source: Jeremy Broadhead, FAO, 2001.

5.1.3 Possible impact of high oil prices on woodfuel

High – and constantly rising – oil prices are driving a global switch to biofuels. Although there are no recent reports from West Asian countries regarding the immediate impact of high oil prices on domestic woodfuel consumption and production, it can be assumed that the decline in woodfuel consumption and production could slow down in such countries as Turkey, while they could increase in such countries as Jordan and Syria. Indeed, despite decreasing woodfuel production and consumption in many countries in the subregion, Jordan's woodfuel production has risen by 50 percent over the past 15 years, possibly in part because of the increase in charcoal production and consumption. In addition, the high rate of unemployment and the high cost of fossil fuels may encourage a return to fuelwood.

5.2 Non-wood forest products

NWFPs are an important source of livelihoods in all the countries of the subregion. Their most important roles are in food security and nutrition, health care, support to agricultural and livestock production, the supply of construction materials and household items, and cultural values. NWFPs vary greatly in local availability and preference, ranging from products used for local consumption to products traded on international markets. Most NWFPs are gathered or produced by individual farmers, local communities or societies. However, insufficient information, especially on account of unorganized collection, processing and trade, makes it hard to assess the precise nature of their contribution.

5.2.1 Main NWFPs

The main NWFPs in West Asia are medicinal and aromatic plants, herbs and spices, gums, resins, tannins, mushrooms, honey, fruits, nuts and fodder. According to available data, several NWFPs are commercially important in some countries. For example, Turkey annually

produces about 5 800 tonnes of bay leaves, 1 000 tonnes of pine nuts, 318 tonnes of chestnuts, 326 tonnes of natural mushrooms, 3 300 tonnes of sorax and 3 000 tonnes of thyme. Lebanon produced 70 tonnes of pine nuts in 2004, while Oman produced about 100 tonnes of honey in the same year and Saudi Arabia produced 60 tonnes of honey in 2005.

Some NWFPs are important to rural communities and people's livelihoods and income, despite their limited commercial value. For example, pine nuts, carob molasses and various seeds, nuts and fruits are popular in many countries of West Asia. Most countries produce natural honey; for example, Cyprus has nearly 47 000 beehives with an average annual production of 20 kg per hive.

Trees and shrubs in most countries are used as forage for cattle, sheep, goats and camels, but no quantitative data exist in any country. Medicinal and aromatic plants are also important in Afghanistan, Cyprus, Iran, Iraq, Jordan, Oman, Syria and Yemen. The main flowering aromatic plants in Lebanon are wild marjoram and sage, which are harvested for both local consumption and export.

5.2.2 Development trends

The majority of NWFPs are used for subsistence and for small-scale, household-based enterprises that provide income and employment for rural people. NWFPs are more valuable than wood products in Lebanon, Oman and Saudi Arabia. They are usually produced in the informal sector, with no regulations concerning harvesting and trade, and this has resulted in overexploitation in some areas. Regulations exist only in very limited cases; for example, regulations have been laid down in Lebanon concerning the harvesting of wild marjoram and sage to ensure their optimal use for both herb and honey production.

Box 9 Exports of NWFPs from West Asian countries

The following data provide a general indication of the increasing importance of certain NWFPs from some West Asian countries. In 2003 Iran exported 185 million kg of pistachios, with an export value estimated at US$680 million, or 2 percent of total national exports. The country is the world's largest exporter of pistachios, accounting for 76 percent of global exports in 2003. Afghanistan is another major exporter of pistachios, with an export volume of 513 000 kg in 2002, earning an income of US$1.9 million. Turkey is the world's largest exporter of thyme and bay leaves, earning an income of US$29 million in 2004. Turkey is also the world's fifth largest exporter of chestnuts, exporting 8 million kg and earning an income of US$12 million in 2003. Turkey, Iran and Yemen are the main exporters of natural honey in the subregion.
Source: UN COMTRADE database http://unstats.un.org/unsd/comtrade/

Rising exports, combined with a growing demand on the international market, have been a key driver of NWFP development. Turkey has made significant progress in the sector since 1995, mainly with regard to certain food products, leading to an increase in private and foreign investment in the processing and marketing of NWFPs. The value of thyme and bay leaf exports rose from US$21 million in 2002 to US$29 million in 2004, with the United States, Germany, China and the Netherlands as the main export partners. Many countries in West Asia have emerged as major exporters of NWFPs.

Local initiatives and national policies have been promoting the development of certain NWFPs, particularly honey. In Oman, there is growing interest among farmers in growing woodlots of *Ziziphus* for foraging bees and there is a new trend toward the establishment of beekeeping reserves. In 2002, there were about 28 000 beehives producing more than

60 000 kg of honey. The Lebanese Government has encouraged the development of *Pinus pinea* forests for pine-nut production and *Ceratonia siliqua* forests for carob molasses production. Policies have also been adopted to promote NWFPs, including a ban on the importation of pine nuts.

NWFPs have great potential for future development and could contribute significantly to the livelihood of the rural poor in many countries. Information, improved techniques and investment in the production, processing and marketing of NWFPs are the main challenges to development of these items.

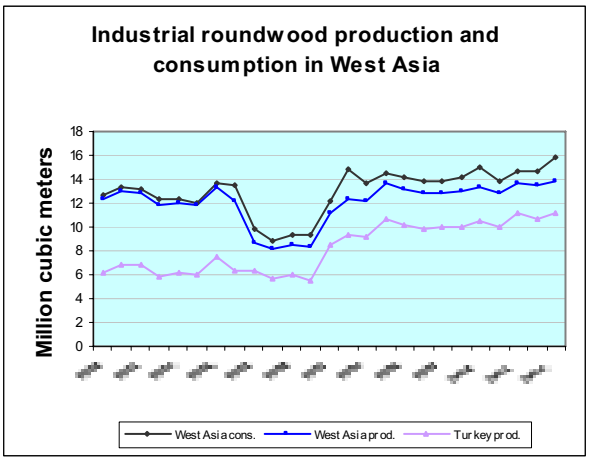
5.3 Industrial wood products

As a result of the low forest cover and more particularly the low productivity of forests and trees in West Asia, the subregion produces only small quantities of industrial wood products. Turkey has dominated all types of industrial wood products and shaped production trends in the subregion, but the subregion depends greatly on imports, mainly of sawnwood, wood-based panels, paper and paperboard. Total imports of forest products accounted for 2.7 percent of total world imports in 2004. However, the per capita consumption of all types of industrial wood product is far below the world average. It should also be noted that widespread unrecorded wood extraction is a major problem in assessing the real level of wood production from the subregion's forests. It is clear that substantial quantities are extracted illegally in certain countries (particularly Afghanistan).

In addition to the scarcity of forests, official logging has been banned in some countries (for example Lebanon) and harvesting is limited to sanitary felling, while production quotas from natural forests have been reduced in some countries (for example Iran and Cyprus). As mentioned earlier, agroforestry, especially using fast-growing species such as poplars and eucalyptus, is an important source of wood supplies.

5.3.1 Trends in production, consumption and trade

Industrial roundwood

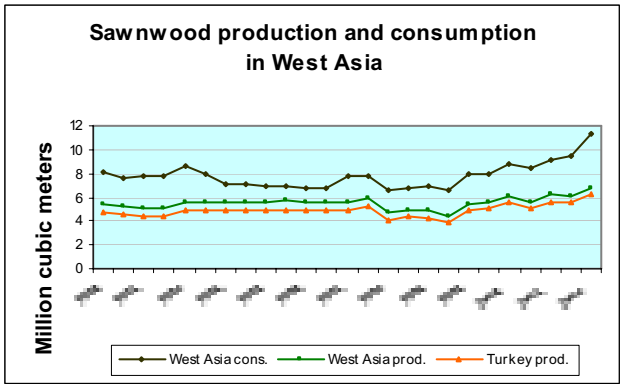


Source: FAO STAT, 2006.

For the subregion as a whole, the production and consumption of industrial roundwood have increased from 12.3 million m^3 to 13.8 million m^3 and from 12.7 million m^3 to 15.9 million m^3 respectively over the period 1980–2004. Although per capita consumption of industrial roundwood (0.055 m^3) is much lower than the world average (0.258 m^3), its consumption has remained fairly stable, with an average annual increase of only 0.9 percent. West Asia is a net importer of industrial roundwood (12.7 percent of consumption in 2004). Turkey has dominated production within the subregion. Iran and Afghanistan are the other two main roundwood-producing countries, whereas production is negligible in the Gulf countries.

Sawnwood

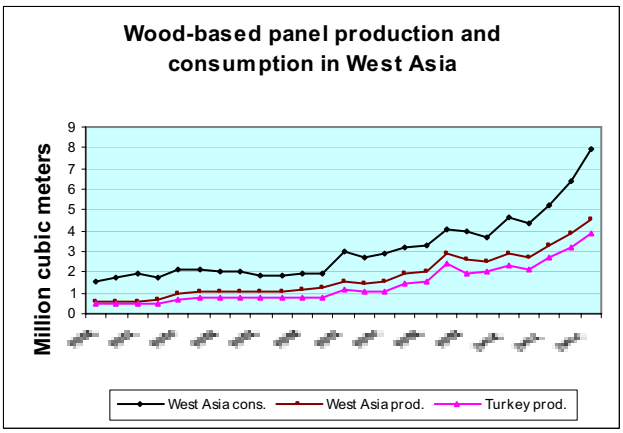
Overall consumption of sawnwood rose from 8.1 million m^3 to 11.3 million m^3 over the period 1980–2004, making an average annual increase of 1.4 percent. Average per capita consumption is 0.039 m^3, which is a little over half the 2004 world average. Production has stagnated, increasing from 5.4 million m^3 in 1980 to 6.7 million m^3 in 2004. Dependence on sawnwood imports has increased significantly. Again, Turkey has dominated production in the subregion, while Afghanistan and Iran are the other two main contributors and production is negligible in the Gulf countries. Saudi Arabia accounts for the largest proportion of total sawnwood imports in West Asia (34 percent in 2004).



Source: FAO STAT, 2006.

Wood-based panels

Unlike industrial roundwood and sawnwood, the production and consumption of wood-based panels have increased enormously, rising from 0.6 million m^3 and 1.5 million m^3 respectively in 1980 to 4.6 million m^3 and 7.9 million m^3 in 2004. The average rates of increase in production and consumption were 8.7 percent and 7.2 percent over the same period. However, average annual per capita consumption is 0.028 m^3, which is lower than the world average (0.036 m^3). Turkey has obviously dominated production in the subregion. Particularly over the past decade, it has significantly developed its wood-processing industry, mainly for the production of oriented strand board (OSB) and medium density fibreboard (MDF), leading to a significant increase in the production of wood-based panels. Iran also produces wood-based panels, but to a smaller extent, and its production has also increased over the past decade. Afghanistan, Iraq, Lebanon and Syria produce very limited quantities. Like other wood products, the production of wood-based panels has been steadily shrinking in Cyprus. There is no production in the remaining countries. Over the past decade, almost every country has increased its imports of wood-based panels considerably to meet domestic demand, largely from the construction and furniture sectors.

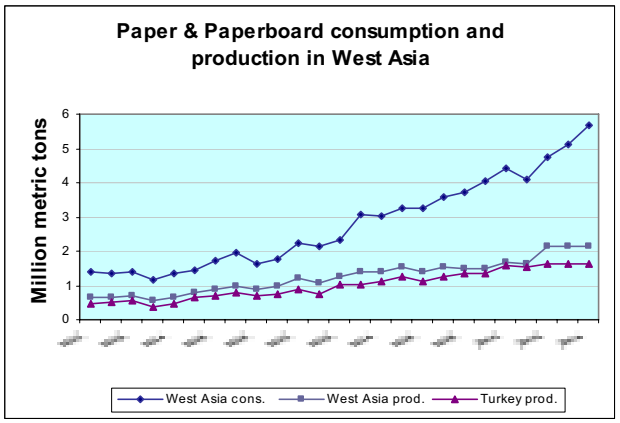


Source: FAO STAT, 2006.

Paper and paperboard

The consumption of paper and paperboard in West Asia has increased from 1.4 million tonnes in 1980 to 5.7 million tonnes in 2004, making an annual increase of 6.1 percent. The production of paper and paperboard increased from 0.6 million tonnes to 2.1 million tonnes over the same period. The figures indicate the increasing dependence on paper and paperboard imports, especially after the 1990s. Up to 2004, net imports accounted for 62

percent of total consumption. Average per capita consumption was 0.02 tonnes in 2004 (as compared with a world average of 0.055 tonnes). As in the case of other products, Turkey has dominated paper and paperboard production in West Asia, while Iran produces a certain amount. Iraq, Jordan, Lebanon and Syria produce very limited amounts. All the remaining countries are wholly dependent on imported paper and paperboard. Turkey, Saudi Arabia, Iran and the United Arab Emirates account for the largest share of imports.



Source: FAO STAT, 2006.

5.4 Wood industry development

In view of its limited forest resources, the subregion produces only small quantities of various types of wood products. Although wood industries do exist in Iran, Iraq, Jordan, Lebanon, Syria and Turkey, many countries do not have their own wood industry and are entirely dependent on imports to meet domestic demand. While sawnwood production has tended to stagnate, wood-based panel and the paper and paperboard production have expanded considerably in the past decade. The development of wood industries is driven mainly by the availability of resources, increased awareness of environmental issues, competition from imported products and development of wood-processing technology.

Turkey dominates the industry for all wood products in the subregion and all its enterprises are owned and run by the private sector. Driven by strong domestic demand, better access to foreign markets, the low wages and increasing investment in equipment and technology, the production of MDF and wooden furniture has been growing significantly and steadily over the past decade. However, the Turkish wood industry is facing a number of challenges, such as insufficient supplies of domestic wood and competition from foreign wood products. Turkey's paper and paperboard industries have been affected negatively by the increase in imports. The pulp industry in particular is not competitive on global markets and the production cost of woodpulp is higher than the imported pulp price.

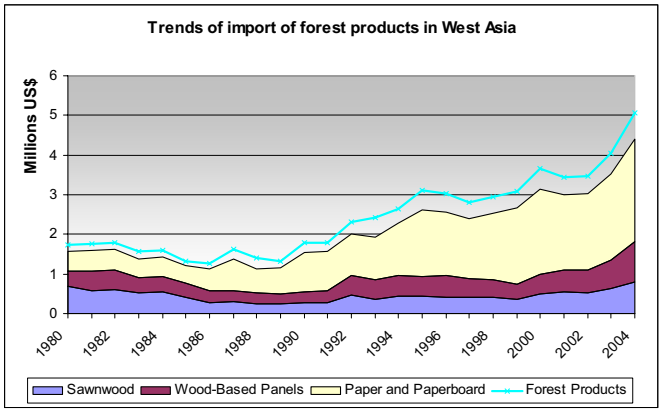
Iran's particle-board industry has been expanding. Increased domestic consumption has led to the establishment of new factories, which are mostly operating with second-hand imported machinery. Particle-board producers are all now trying to renew their production lines and improve the quality and quantity of their products, and the competitiveness of the sector is increasing each year. Imports, which are still much higher than exports and come mainly from Turkey, have not risen since the late 1990s owing to the increasing quality and quantity of domestic products. It is forecast that in coming years particle-board consumption will increase at an average annual rate of at least 6 percent.

Turkey has successfully increased its competitiveness in MDF and furniture production and Iran its competitiveness in particle-board production by taking advantage of every opportunity over the past decade. On the other hand, in most of the remaining countries of West Asia, the wood industry is confined to small-scale sawmills and panel-board factories, which depend largely on imports of finished or semifinished products. The competitiveness of these

operations has been losing ground and the wood industry has been gradually shrinking. The case of Cyprus is typical here: the production of both sawnwood and wood-based panels has been significantly reduced owing to the continuous reduction in domestic wood production and to competition from foreign wood products over the past decade.

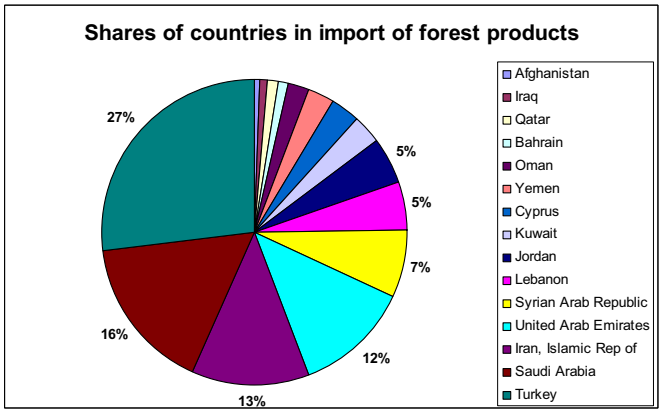
5.5 Trade trends and flows [4]

All the countries of West Asia are net importers of almost all wood products, with the exception of wooden furniture produced in Turkey. During the period 1995–2004, imports grew at an annual rate of 5.6 percent, reaching about US$5 billion in 2004. The figure on the right shows that paper and paperboard, wood-based panels and sawnwood account for the largest share of forest product imports. Imports of paper and paperboard have increased most significantly, reflecting the huge increase in paper and paperboard consumption in the subregion. The relatively slow increase in imports of wood-based panels is mainly a result of Turkey's constantly increasing production. The stagnating imports of sawnwood reflect stable consumption in the subregion.



Source: FAO STAT, 2006

The figure on the right shows that the main importing countries in West Asia are Turkey, Saudi Arabia, Iran, the United Arab Emirates, Syria, Lebanon and Jordan, which together account for 85 percent of the subregion's total imports. Bahrain, Qatar, Kuwait, Oman, Saudi Arabia, the United Arab Emirates and Yemen rely almost entirely on imports for their domestic consumption of industrial forest products.



Source: FAO STAT, 2006

West Asian countries import industrial forest products from a wide range of countries around the world (Figure 5). Taking West Asia as a whole, Russia, Ukraine, the United States and South Africa are the main suppliers of industrial roundwood, while Romania and Russia are the main suppliers of sawnwood, Indonesia, China and Malaysia the main suppliers of plywood, Romania, Italy, and China the main suppliers of fibreboard, and Sweden, Germany, Finland and Russia the main suppliers of paper and paperboard.

[4] Data source: FAO STAT and UN COMTRADE, 2004.

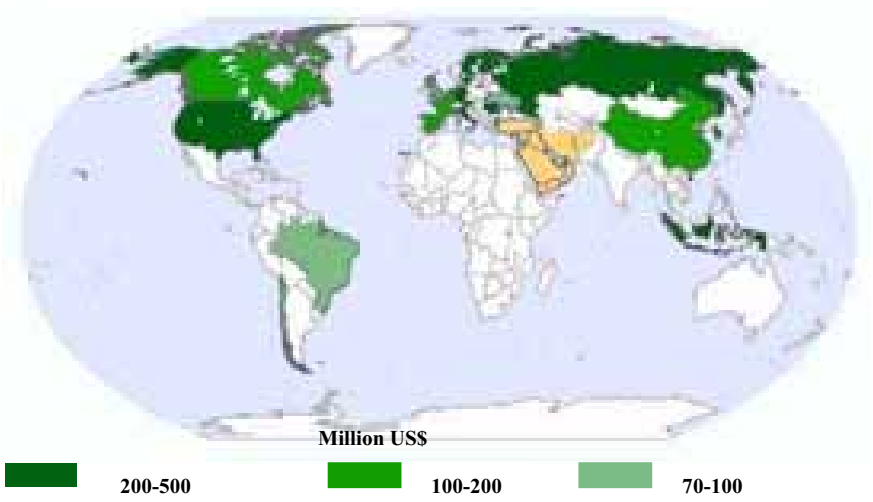
Trade in forest products among West Asian countries is limited. Turkey is the largest supplier to other countries in the subregion. MDF is probably the most widely traded product among the subregion's countries. The table below provides data on exports of MDF from Turkey to other West Asian countries, which accounted for about 90 percent of Turkey's total MDF exports in 2004. Iran is by far the largest importer of Turkish MDF.

The MDF export from Turkey to other West Asia countries in 2004

	Trade value	Proportion of trade value	Net weight (kg)	Proportion of net weight
Total export	$26,199,479		69,580,024	
Iran	$22,025,033	84.07%	58,828,522	84.55%
Cyprus	$1,120,631	4.28%	3,113,562	4.47%
Iraq	$290,596	1.11%	676,003	0.97%
Saudi Arabia	$44,864	0.17%	45,882	0.07%
UAE	$27,007	0.10%	22,832	0.03%
Syria	$18,106	0.07%	42,074	0.06%
West Asia	$23,526,237	89.80%	62,728,875	90.15%

Source: UN COMTRADE

Figure 5 Main supporters of industrial forest products to West Asia



Source: UN COMTRADE, 2006.

6 RURAL PEOPLE, RURAL DEVELOPMENT, AND FORESTS AND TREES

Most forests provide mainly environmental services, with very limited wood products, except in the cases of Turkey and Iran, where certain amounts of commercial timber are produced. The direct contribution of forests and trees to the national economy is negligible in most countries and the share of the forest sector in GDP is about 1.8 percent in Turkey (excluding income from NWFPs and the recreational services of forests). However, most countries report that forests and trees are particularly important to rural people, especially those who live in or around forests or wooded land.

6.1 Forests and trees, and rural people

Although many countries are highly urbanized, there are still more than 107 million rural inhabitants, accounting for about 38.5 percent of the total population of West Asia. The majority of the poor live in rural areas, especially mountainous forest and rangeland areas. Based on UNDP statistics, 48 percent of people are living below the poverty line in Yemen, about 75 percent of them in rural areas. According to Turkey's 2000 census, about 7.4 million people live in 19 577 forest villages, constituting approximately 11 percent of the total population and nearly half the rural population. Forest villagers constitute the lowest income group in society. On the other hand, forest lands and resources, which are the major natural resources that forest villagers live on, are owned almost exclusively by the State. Forest villagers often depend heavily on agriculture and livestock for their income, although they depend on forests for heating and cooking fuel and animal grazing. In addition, most NWFPs in Turkey are produced in wooded areas along the coast, and inhabitants of these areas are usually forest villagers with low incomes.

Although in most cases trees and forests play only a marginal role in reducing rural poverty, they do contribute significantly to poor rural people's livelihoods and to livestock production. Their roles can be summarized as follows:

- provision of energy for cooking and heating, and raw materials for charcoal production;
- provision of food, medicinal plants and other products for domestic use and commercial processing;
- provision of fodder and shade for livestock;
- operation of small-scale sawmills and other wood and non-wood processing factories;
- provision of employment and income through participation in forestry activities conducted by the government in public forest areas.

According to available data, about 40 percent of Yemen's land area is rangeland, containing about 16 million farm animals. Trees provide 50–60 percent of fodder for livestock, while 41.6 percent of the population rely on traditional fuels for cooking. Honey and charcoal production are important sources of income for some poor people. A national case study carried out in Iran in 2002 estimates that 5 million people rely on forests and forest land for goods and services, while the forest sector provides 7 453 permanent jobs and 12 831 temporary jobs to rural people. An earlier national study (1995) indicates that 25 108 households earn a total of US$1.4 million per year (about US$55 per household) by producing NWFPs from forests and rangeland.

Although the majority of people in Cyprus do not depend directly on forests and trees because of the country's economic development, especially that of the service sector, and the rapid migration from rural to urban areas, there are 53 forest communities containing 37 000 people spread over the country's various forest areas. Many of these people still depend directly on forests. Since these forests are publicly owned, local people earn their living by activities such as sawmilling, charcoal production, the production of essential and other oils from aromatic herbs and other NWFPs, logging, forest protection, fire-fighting, reforestation and the maintenance of picnic sites and facilities in national parks. However, the steady reduction in timber production from state forests has had a negative economic impact on these communities.

In the case of Lebanon, some forests, composed mainly of *Pinus pinea* and *Ceratonia siliqua*, are privately owned and in these areas the production of pine nuts and carob pods has been the main source of income for several rural communities. The production of oils for the soap industry and of aromatic and medicinal plants has also contributed significantly to some rural economies.

6.2 Rural development, forest management and poverty reduction

The Governments of Cyprus, Turkey, Iran, and Lebanon are stressing rural development, with a view to improving the livelihoods of rural inhabitants and reducing migration to urban areas. They are also trying to encourage local community involvement in sustainable forest management as a means of achieving this aim. Integrated rural development strategies, with stress on the involvement of the local community in forestry, are common in the development plans of these countries. Annex 11 provides a summary of rural development policies and programmes in these countries.

However, implementation of these policies is much more of a challenge. As mentioned before, most of the forests in the subregion are publicly owned. Rural people's and communities' participation in the formulation and implementation of forest management plans is essential for rural development. Most countries in the subregion face the challenge of ensuring that rural people benefit from forestry activities and that a favourable environment is created for them to develop the local economy, including local wood and non-wood industries.

Cyprus is currently implementing its Rural Development Plan and is facing the crucial issue of ensuring benefits for rural people, especially those living in forests and accustomed to depending on them. Some efforts have been made in this direction, but the reduction in logging has had a negative impact on local people, who have moreover not been involved in the new forest management and protection system. However, without the participation of rural inhabitants, the forest management plan cannot be effectively implemented.

The new trend in forest management for ecotourism and rural tourism development, in which forests and trees could play a major role, has been stressed in the rural development plans of many countries and could certainly benefit the rural economy and poor people's incomes. However, ecotourism development could also generate conflict between environmental benefits and economic benefits to the local poor. A participatory approach should be adopted to ensure that local people benefit.

Rural people's access to resources is another crucial factor in the effectiveness of forest programmes or management plans aiming at poverty reduction and resource protection. Recent surveys in Turkey show that the current contributions of forest programmes are relatively insignificant and that the factor most closely associated with poverty reduction is access to land that villagers can use for livestock grazing or agriculture. The inability of villagers to generate more income from forest management has led to reluctance to engage in forest conservation or development activities, while efforts to sustain their livelihoods by other means often result in serious natural resource degradation.

7 FOREST POLICIES AND INSTITUTIONS

7.1 Forest-related international conventions and impacts on countries

The countries of West Asia are very keen to join the now global effort to ensure environmental protection. International conventions relating to forests, such as the United Nations Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (FCCC), the Kyoto Protocol, the United Nations Convention to Combat Desertification (CCD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Ramsar Convention on Wetlands and the World Heritage Convention, have been ratified by most countries in the subregion. Annex 12 summarizes the status of ratification of international conventions and agreements in the various West Asian countries in 2006. Nevertheless, implementing the stipulations of these conventions requires financial resources beyond the possibilities of many countries.

By 2006, all the West Asian countries had accepted the World Heritage Convention, and CBD, FCCC and CCD had been ratified by all the countries except Iraq. The three main objectives of CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. CCD was adopted as a follow-up to UNCED to address threats posed by drought and desertification to the livelihoods of an estimated one billion people in more than 110 countries. The agreement came into force in 1996 and is particularly relevant in West Asia with its vast expanses of desert, but progress towards safeguarding land from desertification has been slow in most countries. One of the main strategic challenges in the subregion is the limited capacity to institutionalize effective mechanisms for the participation of natural resource users in defining policies and designing and implementing actions to combat desertification.

Within the framework of FCCC, afforestation and reforestation qualify for carbon credits under the Clean Development Mechanism. It should be noted that Iran, Kuwait, Oman, Qatar, Saudi Arabia, Syria and the United Arab Emirates have started to accept the Kyoto Protocol over the past two years, while only Cyprus, Jordan and Yemen had signed it by December 2004.

7.2 Forest policies and legislation

The general policy trend toward forest and rangeland protection throughout the subregion is reflected in the increase in designated protected areas, the reduction in timber production quotas, increased afforestation and reforestation etc. However, only a few countries, such as Cyprus and Turkey, have formulated or updated independent forest policies, national forest programmes and laws. In most of the remaining countries, forest policies are subsumed in agricultural, rangeland or environmental policies. There are also a few countries such as Yemen where no forest policy or legislation even exists, or is enforced if it does exist. Forest policy and legislative frameworks vary widely, but are generally weak, partly because of the low forest cover in many countries. However, the urgent need to upgrade forest policy and legislation in most countries in the subregion cannot be denied. Afghanistan, Jordan and Syria are thus formulating forest policies under FAO Technical Cooperation Projects (TCP), while Yemen is seeking support for the formulation of a forest policy and national forest programme and the updating of forest legislation through FAO's National Forest Programme

Facility. Annex 13 shows the status of the national forest policy, legislation and institutional framework of each West Asian country.

Turkey's forest laws have been in force since 1956 and the Government is currently preparing a complete reform package. Turkey's forest regulations are comprehensive, including measures for the protection and expansion of forests, and measures to secure cooperation between the State and the inhabitants of villages located within or near forests in order to ensure forest conservation while improving the living conditions of these people. Detailed regulations include the allocation of degraded land for forest plantation, tax exemption for private plantations and a reforestation fund.

Iran's forest laws have also been in place for a long time (since 1968) and have been amended several times since.

Cyprus has formulated a forest policy and national forest programme, and started a process of updating its forest legislation, laying the stress on environmental services and recreation rather than wood production. The new strategy has two main thrusts: multiple use (protection, recreation and trade) and sustainability (ecological, economic and social). A participatory approach to forest management and its planning is introduced in the proposed new legislation.

Jordan, Lebanon and Syria view forests as important elements in their environmental conservation and rural development schemes. Forest conservation and management policies are part of agricultural policy in Jordan and Lebanon, and part of biodiversity strategy in Syria. Lebanon has launched a five-year National Reforestation Plan with a budget of US$16 million, while its long-term objective is for forest cover to reach 20 percent in 30 years. In Jordan and Syria, the concern of the international community is an important factor determining the priority given to the forest sector and the amount of resources allocated to it. Laws regulating forest management in some countries, especially Jordan, focus mainly on prohibitions and limitations, ignoring planning, management and development issues. Jordanian law emphasizes forest protection, supports management aspects that regulate timber extraction from state and private forests, and authorizes the Ministry of Agriculture to permit and manage grazing in state forests. Forest issues are regulated under agricultural and environmental law in Lebanon, although there is some specific legislation regarding forests, focusing on protected natural areas to preserve forest, plant and wildlife wealth, the promotion of NWFPs and limitations on fuelwood and charcoal production.

The Gulf countries of Qatar, Saudi Arabia and the United Arab Emirates have allocated sufficient resources for greening activities. Saudi Arabia has already prepared its draft forest strategy and action plan. Qatar's agricultural policy aims to protect trees and shrubs through administrative measures and the country also attributes importance to mangroves, declaring them nature reserves and encouraging their expansion. Forest legislation is limited to general environmental protection laws (Bahrain, Kuwait, Qatar and the United Arab Emirates), grazing regulations (Kuwait and Oman) and the designation of protected areas for mangroves (Bahrain and Qatar).

Saudi Arabia's forest and rangeland regulations have been in force since 1978, dealing with the protection of vegetation, forests and rangelands, and regulating their use. In addition, religious edicts play an important role in protecting forest resources. The Saudi Arabian legal system regulates fuelwood collection and transportation, and charcoal production activities through licences. The country's cabinet approved the establishment of rangeland affairs

committees in 1999, an initiative to encourage the participation of local communities of pastoralists and breeders in the development and conservation of grazing resources. A document was also prepared concerning the allocation of funds for long-term support to forestry activities and desertification control, with the participation of NGOs and individuals in programme financing.

Oman is preparing a new law to control human and livestock utilization patterns for forest and rangeland resources by preventing illicit use and conversion to other land uses. The proposed law takes traditional protection customs into consideration and encompasses consultation with local administrators, technical units and local communities.

Owing to limited resources in Yemen and Afghanistan and the current security situation in Iraq, these countries are highly dependent on external assistance, which in a way influences the nature of policies directly and indirectly. Forest regulations do exist in Iraq, but the political situation in the country limits the ability of the authorities to enforce them. In Afghanistan and Yemen, the legislative framework for forests and related areas is very weak. Several versions of forest laws were drafted between 1970 and 1991, but none of them was ratified, because no agreements could be reached among the many stakeholders concerned.

Forest policies and legislative frameworks are not usually comprehensive and systematic, since forest issues have been addressed only as part of national agricultural or environmental policies and laws in many countries. Only very specific forest issues, such as limitations on fuelwood collection, tend to be addressed in the legal framework. Forests and trees have been considered only as part of agricultural land or rangeland, so that policies and legislation on forest conservation are found only for the protection of rangeland or natural resources. Many countries thus lack a comprehensive development strategy for forests. In addition, decentralization and public participation in forest planning and management decision-making are not yet supported by legislation in many countries, although awareness of the merits of decentralization and participation in the forest sector has been growing.

7.3 National forest institutional framework

Government forestry institutions dominate the management of forests in all West Asian countries, since the majority of the forests are publicly owned. On the other hand, local communities and NGOs have been playing an increasing role in forestry activities. Meanwhile, private forests and the private sector's participation in forestry activities are being promoted, although they are still very limited.

7.3.1 Governmental forestry institutions

In most countries in the subregion, the majority of forest land is state property. The forestry department of the ministry of agriculture is responsible for forestry activities in most cases – although in many countries the "forestry department" is in fact the "department of rangeland and forests" (Afghanistan, Iran, Iraq, Lebanon, Oman, Qatar and Saudi Arabia), reflecting national legislation that treats forestry not individually, but as part of agriculture and rangeland. Turkey has the strongest authority – the Ministry of the Environment and Forestry, which is responsible for all types of forestry activity. Kuwait and Bahrain are the only two countries with no designated authority responsible for forestry. Annex 14 summarizes the

status of central and local authorities responsible for forestry in each of the West Asian countries. The central forestry authority usually has headquarters composed of various divisions with technical and administrative staff, and a local office in each province of the country. The general mandates of the forestry authority are to implement and enforce forestry and forest-related policy and legislation, and conduct such forestry activities as afforestation, reforestation, forest conservation and protection, and desertification control.

Centralized management systems

Regarding the administration and management of the forest sector, the whole subregion tends to have centralized systems, with a top-down approach to planning and decision-making, although management systems do vary from country to country. Cyprus appears to have the most decentralized system, followed by Turkey, which is taking steps towards decentralization, while Iran is still in the early stages, although decision-making in the forest sector is still fairly centralized in the latter two countries. In Jordan, Lebanon and Syria, major decisions are made at the top level and implementation is carried out at lower levels, although efforts are being made to limit this centralization, especially in Lebanon and Jordan. For example, the reforestation and afforestation plan of Lebanon's Ministry of the Environment stresses the importance of coordination among all the concerned stakeholders, including local communities and NGOs. On the whole in most countries forest administration tends to be highly centralised, with most decisions being made in a top-down manner.

Shift in responsibility and cooperation among the various authorities concerned.

A recent trend in many countries is to establish a ministry of the environment and move forestry to this body, mainly as a result of the growing concern for environmental conservation. However, the lack of a clear mandate for the various institutions responsible for managing forest and rangeland resources has been cited as a major problem in most countries. Competition, the duplication of effort and the lack of cooperation are the main challenges for future development in Iran, Lebanon, Jordan, Oman and Yemen.

In addition, in view of the multiple services increasingly provided by forests and trees and the consequent involvement of increasing numbers of institutions, cooperation among the latter is essential in harmonizing forest management. In Cyprus, for example, in addition to the Forestry Department, the institutions involved in forest management and related issues such as the management of wildlife, protected areas and the environment are the Environmental Service, the Game Service, the Town Planning and Housing Department, local authorities and the Cyprus Tourism Organization. However, in many cases in the subregion, cooperation among the various authorities or institutions concerned is absent or far from satisfactory.

Limited technical capacity

The professional and technical capacity in the forest sector in most countries is extremely limited. One indicator when assessing institutional capacity is the proportion of highly qualified staff members. In the Department of Forestry and Rangeland of Afghanistan's Ministry of Agriculture and Food, there are only 196 technical staff as against 1 215 administrative staff. In Cyprus, only 25 of the 719-strong staff of the Forestry Department have university degrees. The lack of forestry specialists is another feature of forest-related institutions, especially in the Gulf countries. Further, the institutional capacity for long-term

planning and resource inventory is non-existent or weak, and needs boosting in almost all the countries. Only Turkey and Iran have a strong capacity in forestry expertise.

7.3.2 Emerging role of NGOs

The development of NGOs and their involvement in forest-related issues vary among the countries in the subregion, generally reflecting the overall political and sociocultural environment. Annex 15 provides detailed information on various NGOs and civil societies in certain countries. The main spheres of NGO activities include:

- raising of public awareness of environmental and forest issues;
- conservation and management of forest and wildlife protected areas;
- supplementing or undertaking of development tasks on behalf of government organizations;
- implementation of afforestation or reforestation activities or projects;
- provision of training or organization of seminars on forest-related issues.

Box 10 NGOs in Turkey and Lebanon

The Turkish Foundation to Combat Soil Erosion and for Reforestation and Natural Habitat Protection (TEMA) was founded in 1992 by two prominent Turkish businessmen with the main aim of raising public awareness of environmental issues posing major threats to Turkey's future. Land erosion, deforestation, the falling productivity of arable land and threats to biodiversity are the main issues the TEMA founders chose as their focus. TEMA develops and carries out model projects in rural development, rangeland rehabilitation and reforestation. However, education of the public on these matters remains the main focus. TEMA currently has more than 177 000 members and 555 volunteer representatives throughout the country. The main challenges facing the foundation are the participation of villagers, the marketing of products and project monitoring.
Source: Ma .Q 2004a travel report.

The Association for Forest Development and Conservation (AFDC) has been conducting a reforestation programme through which it aims to raise awareness among the local community on the importance of conserving natural resources and contributing to national efforts to increase green cover. Reforestation activities are carried out in partnership with municipalities, other NGOs, schools, youth clubs, volunteers and farmers. In addition to reforestation activities, AFDC organizes and implements various capacity-building activities such as workshops, seminars and training courses for local communities by cooperating with the Lebanese Mediterranean Forest Development and Conservation Centre. Capacity-building covers the following topics: forest fire fighting and prevention, reforestation techniques, environmental education tools and techniques, planning for ecotourism, management of natural resources, sustainable rural development, project development and implementation, and communication skills and mediation techniques. AFDC runs a tree nursery supporting its reforestation programme and produces some NFWPs as well. It is mainly sponsored and supported by international NGOs, the European Union and the Lebanese Government.
Source: Lebanon country report, 2005.

Most NGOs derive their support from governments or international organizations such as the Global Environment Facility, the World Wide Fund for Nature, the European Union, etc. or sometimes individuals. The ability of NGOs to bring about policy and institutional changes depends largely on the overall political environment, public support for the individual NGO and their technical, organizational and financial capacities.

NGOs are active in environmental and forestry spheres in Cyprus, Jordan, Lebanon, Syria and Turkey (Box 10). It seems that some NGOs in Turkey have significant numbers of members, but the main challenge they face is that of ensuring that forest villagers and communities are involved in programmes and activities and benefit from these. NGOs are increasingly active in Yemen and Afghanistan, driven mainly by international organizations and donor countries, but their main constraints are their weak capacity in human resources and their high dependence on financial support from donors. Overall, NGOs in West Asia have a long way to go before they are able to function effectively to bring about changes in policies, institutions, programmes and activities, or influence decision-making by government organizations.

Improved access to information with the growth of information and communication technology will further enhance the role of NGOs. Support from international NGOs would further strengthen national NGOs and could to some extent unify some of the local and national issues. The increasing awareness among government organizations of the need to involve the various stakeholders, including NGOs, in their decision-making processes and activities will further enhance the role of NGOs in the forest sector.

7.3.3 Increased participation of local communities

The formal involvement of community organizations in resource management is still in its infancy and there are only limited initiatives to involve local communities in the management of forest and tree resources. However, there is also increasing recognition of the role of local communities in decision-making regarding forests and woodlands. Communities are involved in the management and protection of degraded forests. NWFP production is the main income-generating activity in forests, and some communities depend on these products for their living. The current expansion of ecotourism and rural tourism has led to a sharp increase in income, contributing significantly to poverty reduction in some cases, a development with great potential in many countries.

Box 11 Community participation in Turkey, Cyprus and Iran

In Turkey, there were 4 948 agricultural village cooperatives with 684 936 members by the end of 2001, and 3 199 of these were forest villages. Forest village cooperatives have been given special rights and privileges by forest laws since the 1970s. For example, they have the priority in receiving the job of timber production in accordance with the management plans of the State Forest Organization. These legal rights have provided villagers with additional opportunities to obtain further income and significant benefits through their cooperatives. About 287 000 members of the 2 100 village development cooperatives were involved in forest product harvesting operations in 2000. It was estimated that about 60 percent of total wood production was carried out through cooperatives during this period.
Source: The Forestry Cooperatives Central Union of Turkey

Forest communities in Cyprus play a vital role in the existence, protection and management of forests. There are 53 such communities spread throughout the country's forest areas. Their total population is only about 37 000 and is decreasing rapidly with the drift to the towns. The Department of Forests puts considerable effort into helping these communities by employing people, supplying local sawmills with timber and providing raw materials to satisfy their needs, for example for charcoal production. With effective conservation and sound management, forest resources offer multidimensional opportunities for socio-economic development, especially in rural areas. The Union of Cyprus Communities is a significant actor in the decision-making process. It is worth mentioning that rural communities contribute significantly to the preservation of tradition, culture, local architecture, heritage, family links and many other values that are lost as the population congregates in large towns.
Source: Cyprus country report, 2005.

Forest dwellers' cooperatives in Iran were established to focus more on forestry activities than animal husbandry. They are in fact considered a kind of social forestry because they are managed directly by local communities. At present, nearly 63 cooperatives are involved in the forest sector, engaged mainly in managing and protecting degraded forests. They urgently need financial support, but the Government is their only source of finance.
Source: Islamic Republic of Iran country report, 2005.

Some of the countries of West Asia have made efforts to involve local communities in managing forests. Although Turkey's Forest Village Cooperatives currently have very little say in how forests are managed or even in the price of products, the situation is likely to change with Turkey's entry into the European Union. The participation of local communities has also been boosted in Cyprus by giving forest communities a greater role in decision-making, mainly driven by the new rural development strategy to adapt to European Union standards. Iran has also established forest cooperatives, which are focusing on managing degraded forests (Box 11).

The tribal system used to play an important role in natural resource management in many countries of the subregion, but was reduced or abolished when public ownership of rangelands and forests was established. Some initiatives have been taken in certain countries to revive the system. For example, the Society for the Protection of Nature in Lebanon manages some protected areas on the basis of a traditional system, combined with ecotourism development. If the traditional tribal system were revived and enhanced, it could play a significant role in ensuring the livelihoods of rural people while protecting natural resources, especially in such countries as Yemen and Oman.

7.3.4 Development of the private sector

Involvement of the private sector in forest management in West Asia is very limited, largely because of the predominantly public ownership of forests, the economic unfeasibility of forest management (low productivity of forests and high costs of afforestation and reforestation), and the fact that environmental services are the main benefits of forests and trees. Forestry activities tend to be confined to carrying out afforestation and forest conservation activities under contracts with government institutions. On the other hand, the private sector is the lead player in forest industries and also in the trade in forest products.

A few countries in the region, such as Cyprus and Lebanon, have a long history of private ownership of forests and woodlands. In Cyprus more than 38 percent of forests and 76 percent of other wooded land are in private hands. However, most of these forests are not managed, partly because of the small sizes of the holdings but also because many of them have absentee owners who have no interest in managing them. In Lebanon, private ownership of forests and other wooded land predominates, in many cases with management for pine-nut production. In Turkey, where the trade in wood products and wood processing are considered income-generating enterprises, recent policy instruments have been introduced to help increase private forest ownership from the current 1 percent to 10 percent. Private poplar and eucalyptus plantations for timber production have been encouraged by the governments of Turkey, Iran and Afghanistan. In addition, most of the farm trees are privately owned, although in most cases there is no quantitative information about this subsector. Private forests account for about 9 percent of the total registered forests in Jordan and are mainly in the form of shelterbelts and windbreaks around agricultural crops. In many countries it is anticipated that the private sector will develop the potential of forest-based ecotourism.

7.3.5 Forest-sector finance

Based on the predominantly public ownership of forests in West Asia, forestry activities are financed mainly by public investment. Levels of such public investment vary widely, driven by the country's overall economic situation and the extent of its forests.

In oil-producing countries, resource availability to the forest sector is generally satisfactory. For example, the Emirates Government has been providing strong financial support for large-scale afforestation programmes, granting subsidies and incentives to farmers for date palm cultivation and encouraging municipalities to green urban areas. However, there are questions as to the sustainability of such a policy because of the high costs involved.

Turkey is the only country in West Asia with significant revenue from forestry activities and this contributes about half the total forest budget. In some of the non-oil producing countries, forestry has been receiving increasing financial support from the central government, reflecting growing environmental concern within the country. For example, the Forestry Department of Cyprus has been receiving increasing budget allocations in recent years and has recently received extra funding from the country's rural development plan to subsidize private forestry, forest industries and the routine work of the department. In Syria, the Forestry Directorate has been receiving increased budgetary allocations to supplement its budget and the forestry budget represents 20 percent of the total agricultural budget. Lebanon invests more in rehabilitating its forests and has recently launched a national reforestation plan with a budget of US$16 million for the next five years.

Box 12 Resource constraints in Jordan

The annual budgetary allocation for Jordan's Forestry Department has remained constant for some years and barely covers staff salaries and the wages of seasonal workers, with very little left over for the development of forests, certainly not enough for any ambitious planting programme, improvements in the working conditions of field staff or the renewal of outdated equipment. The Forestry Department's functions tend to concentrate on law enforcement for forest protection and the staff are therefore viewed by rural inhabitants and the general public as officers of repression. Communications and transport equipment is limited, particularly at district level, making it hard to monitor field operations. Civil servants' salaries are low in comparison with other sectors and many staff with university degrees have found other career opportunities and left the Forestry Department.
Source: Jordan country report, 2005.

In some countries, the government is unable to support forestry, especially in a context of limited budgetary resources and the need to give priority to such social sectors as education and health care. Jordan is an example of such a situation (Box 12). Forestry activities in Afghanistan, Jordan and Yemen are mainly dependent on external support especially bilateral and multilateral agencies and international NGOs. However, such support entails problems with sustainability. In most cases, when the funding ceases, the project activities stop with very little follow up activities to sustain or maintain what has been done. Governments therefore need to take the lead in national forest development (Box 13).

In most West Asian countries, the level of funding to the forest sector is very low and undiversified in terms of sources. Investment from sectors other than the public sector should be encouraged.

Box 13 Domestic financial constraints and donor support in Yemen

Yemen's General Directorate of Forestry and Desertification Control was established in 1984 with the help of FAO and other donor agencies, and was originally very active in many areas, including forest plantations, land and water preservation, nurseries and honey production. However, all the donor-sponsored projects have now ended or been stopped and no new projects have been launched, so that donor funding has dwindled drastically. The directorate has 120 staff members, with a total budget of US$30 000, most of which goes to cover salaries. The directorate owns 62 nurseries with a production capacity of 1.5 million seedlings, but only a few nurseries are now operational, producing only 500 000 seedlings per year, because of the shortage of funds.

On the other hand, the Environmental Protection Authority was established recently and is receiving financial support from international donors. For example, the Natural Protected Areas Project is being funded by the Global Environment Facility and implemented by the World Bank.

According to a European Union report, the annual commitment level of the various donors amounts to about 10 percent of Yemen's total GDP. Donors play an important role in many spheres, including environmental protection, support to NGOs and community participation. However, most such projects are fragmented, ignoring long-term economic viability and institutional sustainability. Both the Government and the donors have recognized that the Government needs to take the lead in managing its natural resources, rather than pursuing donor-driven actions.
Source: Ma Q. 2005b travel report.

7.3.6 Forest education and research

Turkey is the only country in West Asia with forestry faculties in various universities, although there are faculties of agriculture or natural resources covering forestry subjects in Lebanon, Iran and Syria. Undergraduate-level forestry training is provided in Afghanistan, Cyprus and Jordan. There is basically no forestry education or training in Yemen.

Jordan's professional foresters are trained mainly in Turkey and Iraq, while technicians are trained in Syria and Cyprus. The Cyprus Forestry College provides a three-year diploma course, a six-month diploma course and a short training course not only for staff of the Forestry Department of the Ministry of Agriculture, Natural Resources and the Environment, but also for staff from other countries inside and outside the subregion. Syria's Arab Institute for Forestry and Rangelands provides Arab countries with forestry and rangeland technical experts. The institute is currently improving its training capacities with the support of FAO, reviewing and adapting curricula, improving expertise in modern teaching methods and taking into account changes in the forest sector. Overall, forestry education and training in West Asia are insufficient and of a low level – the main reason for the lack of forestry specialists in many countries. In addition, training curricula need to be revised to adapt to new developments and techniques in the forest sector. Courses on forest policy and planning in particular need to be strengthened.

Research institutions in the forest, rangeland, agricultural or environmental spheres and universities are the main institutions carrying out research work on forests and forestry. Research is carried out on forests and forestry in Yemen, but research levels vary in other countries. Turkey has eleven forest research institutions apart from the Research and Development Department of the Ministry of the Environment and Agriculture. Annex 16 gives an overview of forestry training and research institutions in West Asian countries.

8 SUMMARY OF MAIN FOREST ISSUES IN WEST ASIA

Low forest cover and low productivity

Forest cover in most countries in West Asia is very limited, and 12 of the 15 countries in the subregion are classified as low forest-cover countries. The total forest area accounts for only 4 percent of the subregion's land area, corresponding to an average of 0.12 ha per capita. More seriously, the forest area is unevenly distributed, with Turkey and Iran accounting for 73 percent of total forests. However, West Asia countries have an average of 7 percent of their land classified as other wooded land and 42 percent as pastures with sparse trees. In view of the severe climatic conditions, growing stock and wood productivity are extremely low in most countries, not only resulting in very limited timber production, but also making it hard to re-establish forest vegetation once it has been destroyed.

Land degradation and desertification: the most critical challenges

Land degradation and desertification are widespread and are the most crucial challenges facing West Asian countries. Apart from extreme climatic conditions, land degradation and desertification are mainly caused by human intervention regarding land use and the poor management of agricultural land and rangelands. The direct causes of land degradation and desertification are:

- excessive use of irrigation water for crops, resulting in rising groundwater tables, with soil salinization and sodization problems;
- overgrazing of livestock such as camels, sheep, goats and cattle;
- uncontrolled fires in forests and on other land, caused especially by such human activities as agriculture;
- illegal and excessive fuelwood collection and charcoal production;
- conversion of forests, rangelands and croplands for unplanned urban expansion and infrastructure development;
- conversion of forests, rangelands and croplands for unplanned ecotourism development, including the construction of facilities;
- conversion of forests and rangelands to croplands;
- conflicts, resulting in the direct or indirect destruction or damage of forests.

Increasing dependence on imports

West Asia's generally low forest cover and low forest productivity limit its production of industrial roundwood and wood products. Turkey dominates the production of all types of wood product. Driven by a rising demand, West Asia has shown increasing dependence on imports of wood products, especially paper and paperboard, wood-based panels and sawnwood, over the past twenty years. During the period 1995–2004, imports grew at a rate of 5.6 percent. In 2004, West Asia's total imports were valued at about US$5.06 billion.

Importance of biological diversity

The wide range of landforms, soils and climates in West Asia has resulted in a major variety in ecosystems, ranging from coastal mangroves to deserts and alpine forests. Mangrove ecosystems are unique and highly productive, and constitute a critical element in the hydrosphere on the coasts of the Red Sea and the Arabian Sea, while a unique cloud forest in

southern Oman has self-watering trees. West Asia has suffered a substantial loss of biodiversity and the degradation of vegetation on account of human intervention, although there is a lack of quantitative information.

Afforestation and reforestation: the main forestry activities, primarily for protective purposes

Environmental improvement is a major objective of reforestation and afforestation programmes in most of the countries. Reforestation is carried out in degraded natural forest areas to restore the biodiversity and other ecological functions of natural forests, or in cleared forest areas to rehabilitate vegetation and restore the landscape. Afforestation is carried out in barren areas for sand-dune fixation or shelterbelt establishment. However, as the main producers of wood products in the subregion, Turkey and Iran have established a certain number of plantations for wood production. West Asia had a total of 3.8 million ha of forest plantations in 2005, representing only 2.7 percent of the world total. The dry climate and sandy soil hamper any significant progress in increasing the scale of reforestation and afforestation.

Agroforestry: widespread in most West Asian countries

Agroforestry, mostly managed by private farmers, is practised fairly widely in many countries in the subregion, although information is sketchy. Its main form is as green shelterbelts to protect crops from desiccating winds and as fruit orchards to produce fruit and provide environmental services. Agroforestry also contributes significantly to domestic wood supplies, especially in Turkey and Iran. Afforestation and reforestation on rangelands is carried out in Jordan and Oman to rehabilitate rangeland ecosystems and increase their productivity.

Urban forestry receiving considerable attention

With the process of urbanization, urban forestry has received increasing attention in many countries. Urban and peri-urban forests are playing an important role in protecting cities from sand and dust storms and for recreational and other amenities. City parks and gardens have been established at high expense to enhance major urban centres, especially in the Gulf countries. Most urban and peri-urban forests in West Asia need heavy irrigation, especially in the early stages. In view of the scarcity of fresh water, the use of treated waste water has been developed in some countries to irrigate forest plantations and greenbelts.

Ecotourism: potential

Increased attention is being given to the development of forest-based ecotourism in many countries in the subregion, combined with increasing stress on managing protected areas and national parks. This development is being driven by the overall trend toward development of the tourism sector in many West Asian countries. While the scope for wood production is limited, recreational use could be an important alternative for enhancing the economic viability of forest management. Ecotourism can also help to conserve natural resources, provide employment and develop the rural economy. It is considered to have great potential in many countries.

Woodfuel and NWFPs: essential to rural livelihoods

Fuelwood and charcoal are mainly used by rural people for cooking and heating, but the extent of reliance on them varies considerably; for example, they are crucial for household energy needs in Afghanistan and Yemen. Fuelwood consumption has decreased over the past 25 years, while charcoal consumption has increased for the subregion as a whole. This trend is a result of increased incomes, ongoing urbanization and access to petroleum and natural gas in many countries. NWFPs are another important source of livelihoods and income in West Asian countries, with the production of such items as pine nuts, carob molasses, natural honey, and medicinal and aromatic plants.

Need for integrated management of forests and trees

In view of the multiple functions performed by forests and trees, and especially the very low forest cover and large areas covered by scattered trees in most countries in West Asia, forests cannot exist as a distinct sector, but forestry concerns should be addressed in conjunction with other land uses, especially agriculture and range management. Although current forest policy and management are part of agricultural or rangeland policy or management in most countries in West Asia, forest issues tend to be handled on a case-by-case basis, rather than in a comprehensive manner.

Poor information and weak institutional capacity

The state of information on forests and forestry is very poor in West Asia. Many countries have been unable to provide recent information on the area under forests and other wooded land, the condition of forests, growing stock, etc. The situation is similar with regard to the production, consumption and trade of forest products, and also to the environment. Many countries do not have remote sensing equipment for forests and carry out no forest resource surveys. The lack of forest specialists and the lack of capacity for strategic planning and policy formulation are common weaknesses in many forestry departments in the subregion.

Weak policy and legislative framework

Forest policies and legislative frameworks are not in general comprehensive and systematic, since forest issues have been addressed within agricultural or environmental policies and laws in many countries. Only very specific forest issues, such as limitations on fuelwood collection, the promotion of certain NWFPs, the protection of mangroves, incentives for afforestation and reforestation, and the establishment of protected areas are addressed largely from legal perspective. Planning, management and development concerns seldom receive the attention they deserve. Many countries therefore lack any comprehensive development strategy for the forest sector. In addition, decentralization and public participation in forest planning and management decision-making have not yet been reflected in the legislation of many countries. In many countries, the lack of a coherent policy framework, appropriate, complementary legislation and a well-defined institutional structure are recognized as the most important factors leading to forest degradation.

Centralized public management systems and limited private-sector participation

The administration and management of the forest sector in most West Asian countries highly centralised with a top-down approach to planning and decision-making processes, although the extent of this situation in the various countries differs. The centralized management system has resulted in the weakness and ineffectiveness of local institutions and the lack of participation on the part of local people and other stakeholders. The private sector's involvement in forest management in West Asia is very limited, largely because of the predominantly public ownership of forests and the limited commercial viability of forestry on account of the unfavourable growing conditions.

NGOs and rural communities: growing importance

NGOs are active in several countries in West Asia. Local NGOs are mainly supported by international NGOs, national governments and individuals. The main spheres of action of NGOs in West Asia have been in raising public awareness concerning environmental and forest issues, conserving and managing forest and wildlife protected areas, supplementing or undertaking development tasks on behalf of government organizations and implementing afforestation and reforestation activities or projects. The formal involvement of community organizations in resource management is still in its very early stages and initiatives to involve local communities in the management of forest and tree resources are only limited. There is also growing recognition of the role of local communities in decision-making relating to forests and woodlands. Overall, the participation of NGOs and rural communities in forest management and activities is increasing in West Asia, driven by growing concern for environmental protection and rural development.

ANNEX 1 DEMOGRAPHIC OVERVIEW OF WEST ASIA IN 2004

Country	Total population (millions)	Population growth (%)	Urban population (% of total)	0-14 (% of total)	15-64 (% of total)	64 and above (% of total)
Afghanistan	28.6*	..	24	..	..	..
Bahrain	0.7	1.4	90	27.5	69.6	3
Cyprus	0.8	1.2	69	20.4	67.7	11.9
Iran	67	0.9	67	29.8	65.7	4.5
Iraq	28.1*	..	67	..	..	..
Jordan	5.4	2.5	79	37.6	59.3	3.1
Kuwait	2.5	2.6	96	24.5	73.8	1.7
Lebanon	3.5	1	88	29.1	63.6	7.3
Oman	2.5	0.9	78	34.9	62.7	2.5
Qatar	0.8	5.8	92	22.3	76.5	1.3
Saudi Arabia	24	2.6	88	37.8	59.4	2.9
Syria	18.6	2.5	50	37.4	59.5	3.1
Turkey	71.7	1.4	67	29.5	65.1	5.4
United Arab Emirates	4.3	6.7	85	22.4	76.5	1.1
Yemen	20.3	3.1	26	28.5	64.2	7.3
West Asia	278.8					

Source: World Development Indicators database. * Country outlook reports.

ANNEX 2 ECONOMIC OVERVIEW OF WEST ASIA IN 2004

Country	GDP (current US$) millions	GDP growth (annual %)	GDP per capita (constant 2000 US$)	Agriculture, value added (% of GDP)	Industry, value added (% of GDP)	Services, value added (% of GDP)
Afghanistan	5 761	8	..	..	..	..
Bahrain	11 012	5	13 852	..	..	..
Cyprus	15 418	4	12 439	..	..	..
Iran	163 445	6	1 885	10.8	41.5	47.7
Iraq	..	47	..	..	..	..
Jordan	11 515	8	1 940	2.8	28.9	68.4
Kuwait	55 718	7	17 674	..	..	..
Lebanon	21 768	6	5 606	6.9	20.8	72.3
Oman	24 284	3	8 961	1.9	56	42.1
Qatar	..	..	..	..	..	..
Saudi Arabia	250 557	5	8 974	4	58.9	37.2
Syria	24 022	2	1 115	23	27.2	49.8
Turkey	302 786	9	3 197	12.9	22.4	64.7
United Arab Emirates	104 204	8	22 173	2.7	55.1	42.2
Yemen	12 834	3	534	13.8	37.5	48.7
West Asia	1 003 324					

Source: World Development Indicators database

ANNEX 3 LAND USE OVERVIEW OF WEST ASIA IN 2003

Country	Land area*	Arable land		Permanent Pasture		Forests and woodland	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%
Afghanistan	65 209	7 910	12.1	30 000	46.0	867	1.3
Bahrain	71	2	2.8	4	5.6	0	0.0
Cyprus	924	100	10.8	4	0.4	388	42.0
Iran	163 620	16 117	9.9	44 000	26.9	16 415	10.0
Iraq	43 737	5 750	13.1	4 000	9.1	1 749	4.0
Jordan	8 824	295	3.3	742	8.4	135	1.5
Kuwait	1 782	15	0.8	136	7.6	6	0.3
Lebanon	1 023	170	16.6	16	1.6	242	23.7
Oman	30 950	37	0.1	1 000	3.2	1 305	4.2
Qatar	1 100	18	1.6	50	4.5	0	0.0
Saudi Arabia	214 969	3 600	1.7	170 000	79.1	36 883	17.2
Syria	18 378	4 593	25.0	8 338	45.4	496	2.7
Turkey	76 963	23 358	30.3	13 167	17.1	20 864	27.1
United Arab Emirates	8 360	64	0.8	305	3.6	316	3.8
Yemen	52 797	1 537	2.9	16 065	30.4	1 955	3.7
West Asia	688 707	63 566	9.2	287 827	41.8	81 621	11.9

Source: FAOSTAT, 2006 * excluding inland water

ANNEX 4 ESTIMATED MANGROVE AREA IN WEST ASIA

Country	Mangrove area (ha)	Reference year
Bahrain	100	1992
Iran	20 700	1994
Kuwait	2	2000
Oman	2 000	1992
Qatar	500	1992
Saudi Arabia	20 400	1985
United Arab Emirates	4 000	1999
Yemen	927	1993
West Asia	48 629	

Source: Status and trends in mangrove area extent worldwide, FRA 2000 working paper 63, FAO, 2003.

ANNEX 5 EXTENT OF FORESTS AND OTHER WOODED LAND IN 2005

Country	Forest (1000 ha)				Planted forests (1000 ha)				Other wooded land (1000 ha)			
	1990	2000	2005	% of land area (2005)	1990	2000	2005	% of forests (2005)	1990	2000	2005	% of land area (2005)
Afghanistan	1 309	1 015	867	1	-	-	-	-	-	-	-	-
Bahrain	n.s.	n.s.	n.s.	0.6	n.s.	n.s.	n.s.	100	0	0	0	0.0
Cyprus	161	173	174	18.9	3	3	5	2.9	-	214	214	23.1
Iran	11 075	11 075	11 075	6.8	616	616	616	5.6	5 340	5 340	5 340	3.2
Iraq	804	818	822	1.9	15	15	13	1.6	1 245	1 033	927	2.1
Jordan	83	83	83	0.9	40	40	40	47.6	55	54	52	0.6
Kuwait	3	5	6	0.3	3	5	6	100	0	0	0	0.0
Lebanon	121	131	136	13.3	-	-	8	5.7	-	117	106	10.2
Oman	2	2	2	n.s.	2	2	2	100	1 303	1 303	1 303	6.1
Qatar	n.s.	n.s.	n.s.	n.s.	-	-	-	-	n.s.	n.s.	n.s.	n.s.
Saudi Arabia	2 728	2 728	2 728	1.3	-	-	-	-	34 155	34 155	34 155	15.9
Syria	372	432	461	2.5	175	234	264	57.3	35	35	35	0.2
Turkey	9 680	10 052	10 175	13.2	1 839	2 304	2 537	24.9	10 905	10 728	10 689	13.8
United Arab Emirates	245	310	312	3.7	245	310	312	100	4	4	4	0.0
Yemen	549	549	549	1	-	-	-	-	1 406	1 406	1 406	2.7
West Asia	27 132	27 373	27 390		2 938	3 529	3 803		54 448	54 389	54 231	

Source: FRA 2005, FAO.

ANNEX 6 CHARACTERISTICS OF FORESTS

Country	Total area 1000 ha	Primary 1000 ha	Modified natural 1000 ha	Semi-natural 1000 ha	Productive plantation 1000 ha	Protective plantation 1000 ha	Forest growing stock (m^3/ha)
Afghanistan	867	-	867	-	-	-	16
Bahrain	n.s.	-	-	-	-	n.s.	-
Cyprus	174	22	111	36	0	5	46
Iran	11 075	200	10 031	228	616	-	48
Iraq	822	0	809	0	0	13	-
Jordan	83	0	37	6	0	40	30
Kuwait	6	-	-	-	-	6	-
Lebanon	136	0	129	0	8	0	36
Oman	2	-	-	-	-	2	-
Qatar	n.s.	-	-	-	-	-	-
Saudi Arabia	2 728	-	2 728	-	-	-	8
Syria	461	-	198	-	-	264	-
Turkey	10 175	975	5 925	738	1 916	621	138
United Arab Emirates	312	0	0	0	0	312	49
Yemen	549	-	161	388	-	-	9
West Asia	27 390	1 197	20 996	1 396	2 540	1 263	

Source: FRA 2005, FAO.

ANNEX 7 EXTRACTION OF WOOD PRODUCTS

Country	1990	2000	2005			
	Total	Total	Total	Industrial roundwood	Woodfuel	% of growing stock
	1000 m³ o.b.	1000 m³ o.b.	1000 m³ o.b.	1000 m³ o.b.	1000 m³ o.b.	
Afghanistan	2 391	1 033	863	170	693	6.4
Bahrain	-	-	-	-	-	-
Cyprus	56	28	13	9	4	0.2
Iran	1 681	2 105	2 468	2 448	20	0.5
Iraq	0	9	0	0	0	-
Jordan	6	10	12	3	9	0.5
Kuwait	-	-	-	-	-	-
Lebanon	0	0	0	0	-	0.0
Oman	-	-	-	-	-	-
Qatar	-	-	-	-	-	-
Saudi Arabia	35	46	0	0	0	0.0
Syria	6	5	-	-	-	-
Turkey	36 104	32 024	29 983	11 836	18 147	2.1
United Arab Emirates	0	0	0	0	0	0.0
Yemen	-	-	-	-	-	-
West Asia	40 279	35 260		14 466	18 873	

Source: FRA 2005, FAO.

ANNEX 8 OWNERSHIP OF FORESTS AND OTHER WOODED LAND

Country	Forest				Other wooded land			
	Total	Public	Private	Other	Total	Public	Private	Other
	1000 ha	%	%	%	1000 ha	%	%	%
Afghanistan	1 015	100	0	0	-	-	-	-
Bahrain	n.s.	100	0	0	0	-	-	-
Cyprus	173	61.2	38.8	0	214	23.7	76.3	0.0
Iran	11 075	100	0	0	5 340	100.0	0.0	0.0
Iraq	818	100	0	0	1 033	0.0	0.0	100.0
Jordan	83	85.5	0	14.5	54	55.6	22.2	22.2
Kuwait	5	100	0	0	0	-	-	-
Lebanon	131	38.2	60.3	1.5	117	13.7	79.9	6.4
Oman	2	-	-	100.0	1 303	100.0	-	-
Qatar	1	100	0	0	0	-	-	-
Saudi Arabia	2 728	99.3	0.7	0	34 155	99.6	0.4	0.0
Syria	432	100	-	-	35	100.0	-	-
Turkey	10 052	99.9	0.1	0	10 728	100.0	n.s.	0.0
United Arab Emirates	310	100	0	0	4	100.0	0.0	0.0
Yemen	549	5	80	15.0	1 406	5.0	80.0	15.0

Source: FRA 2005, FAO.

ANNEX 9 MAIN SUPPLIERS OF WOOD-BASED FOREST PRODUCTS TO WEST ASIA IN 2004

Total forest products		Sawnwood			Plywood			Particle board			Fibreboard			Paper & paperboard		
Supplier	Value: 1000 US$	Supplier	Value: 1000 US$	Quantity: m^3	Supplier	Value: 1000 US$	Quantity: m^3	Supplier	Value: 1000 US$	Quantity: m^3	Supplier	Value: 1000 US$	Quantity: m^3	Supplier	Value: 1000 US$	Quantity: tonnes
Germany	513 273	Romania	1 787 736	185 391	Indonesia	372 637*	143 552	Bulgaria	120 392	22 813	Romania	505 922*	70 756	Germany	403 479*	429 621
Russian Fed	469 041	Russian Fed	1 409 485	168 870	China	49 704	16 128	Turkey	85376*	19 597	Italy	477 592*	66 905	Finland	471 106*	313 394
Finland	385 025	Chile	430 274	76 442	Finland	18 153*	14 082	Greece	87 328	16 052	China	494 624*	60 155	Sweden	524 042*	265 482
Sweden	373 203	Canada	425 774	33 627	UAE	23 800	9 999	Italy	70957*	12 484	Germany	127 453	50 290	Russian Fed	406 406*	197 998
Indonesia	359 058	USA	223 351	37 832	Malaysia	30 017	8 131	Spain	60125*	9 780	Spain	334 360*	47 045	Italy	233 323*	190 009
USA	330 404	Ukraine	171 854	7 488	Singapore	25 312	5 772	Romania	63267*	9 282	Turkey	206 773*	40 151	Indonesia	260 355*	173 981
Romania	306 220	Sweden	156 097	70 019	Russian Fed	9 366*	4 705	Germany	13784*	4 883	Poland	266 555*	37 438	Austria	237 070*	154 492
Italy	284 098	Austria	145 361	18 600	Jordan	11 512*	4 699	Austria	10919*	3 185	Switzerland	67 543*	25 702	France	161 324*	137 729
Austria	201 851	Germany	138 667	11 125	Romania	5 848*	2 549	Pakistan	8214*	2 557	Indonesia	155 945*	21 885	Netherlands	186 963*	120 638
Spain	160 006	Finland	95 445	29 087	Germany	2 521*	2 394	Indonesia	10 782	2 528	Malaysia	108 765	16 762	USA	201 474*	113 794
France	156 795	Turkey	89 032	3 598	India	3 939	2 179	France	6385*	2 196	Brazil	123 183*	15 495	Korea Rep	166 024*	107 131
Canada	153 871	Italy	81 371	4 759	Italy	2 530*	1 971	Belgium	7366*	1 867	Luxembourg	30 049	12 807	Canada	196 841*	98 086
Netherlands	128 295	UAE	76 608	16 458	Pakistan	4 003*	1 802	Chile	4 882	1 046	UAE	48 569	9 921	Spain	126 986*	90 687
Korea Rep	110 247	Singapore	76 250	5 089	Unspecified	2 424*	1 686	Saudi Arabia	1 897	915	UK	65 473*	9 589	Portugal	91 250*	59 671
China	103 283	Malaysia	54 262	23 507	Austria	3 288*	1 456	China	3469*	899	Russian Fed	57 559	8 416	UK	44 981*	56 883
Turkey	101 024	Saudi Arabia	41 712	1 676	Turkey	2 718*	1 437	Poland	2915*	896	Austria	11 336*	6 970	Belgium	105 684*	55 944
Brazil	97 501	India	41 646	4 441	Bulgaria	1 988*	1 378	Thailand	2 593	819	Argentina	56 006*	6 447	Brazil	83 072*	44 431
Chile	82 824	Spain	25 625	1 498	Spain	1 274	1 317	Malaysia	3 199	780	France	15 604*	6 260	Japan	42 800*	38 051
Belgium	73 717	New Zealand	5 622	2 547	Thailand	1 583	1 245	Unspecified	915	593	Belgium	15 929*	5 680	Romania	78 066*	34 417
UK	71 733	Slovenia	5 394	1 363	France	1 627*	1 096	India	925*	569	Portugal	27 629	4 449	India	45 640*	33 672
Ukraine	71 157	Cameroon	4 964	2 354	Sweden	2 494	647	Sweden	468*	497	Thailand	16 192	4 427	Turkey	34 135*	33 140

Source: UN COMTRADE database. * declared by partner.

ANNEX 10 STATUS OF PROTECTED AREAS IN WEST ASIAN COUNTRIES

Country	Total sites	Ia to VI, no category (M & T) sites	Ia to VI (M & T) sites	Ia to VI, no category (M & T)		Ia to VI (M & T)		Total land area*
				Area (ha)	% of land area	Area (ha)	% of land area	1000 ha
Afghanistan	7	7	7	218 629	0.34	218 629	0.34	65 209
Bahrain	5	4	2	6 000	8.45	850	1.20	71
Cyprus	19	19	10	91 982	9.94	78 232	8.46	925
Iran	152	152	129	11 463 764	6.96	11 001 430	6.67	164 820
Iraq	8	8	8	541	0.00	541	0.00	43 832
Jordan	36	36	12	973 403	10.91	917 300	10.28	8 921
Kuwait	7	7	5	59 700	3.35	27 250	1.53	1 782
Lebanon	24	24	2	7 818	0.75	4 000	0.38	1 040
Oman	6	6	6	2 982 840	14.04	2 982 840	14.04	21 246
Qatar	13	13	4	13 669	1.24	1 669	0.15	1 100
Saudi Arabia	81	81	78	82 643 217	38.44	82 365 945	38.32	214 969
Syria	28	28	0	358 348	1.94	0	0.00	18 518
Turkey	477	474	85	3 353 170	4.33	1 255 922	1.62	77 482
United Arab Emirates	19	19	2	455 866	5.45	40	0.00	8 360
Yemen	4	4	0	362 500	0.69	0	0.00	52 797
West Asia	886	882	350	102 991 447	15.12	98 854 648	14.51	681 072

Source: GEO 4 statistics: http://www.unep-wcmc.org/wdpa/ * FRA 2005, FAO.

ANNEX 11 RURAL DEVELOPMENT POLICIES OF SELECTED COUNTRIES IN WEST ASIA

Country	Programme/plan	Summary
Cyprus	Rural Development Plan 2004–2006	Within this plan, the Government provides finance for forest owners taking measures to protect and conserve their forests. The plan also provides grants to encourage public and private owners to restore burnt areas.
Turkey	8th Five-Year Development Plan 2000–2005	The Government aims to help the rural economy by reducing pressure on forests. It also plans to reduce the proportion of the rural population and the share of agriculture in the national economy.
Iran	4th Five-Year Development Plan 2005–2010 (in preparation)	The Government intends to integrate agricultural and rural development efforts into the goal of economic liberalization while maintaining an emphasis on equitable distribution.
Lebanon	Rural Development Programme	The programme provides assistance to small and medium-scale farmers, with a view to sustainable human development through start-up activities, including improvements in health, social services, education and income-generating non-agricultural activities.
Yemen	2nd Five-Year Economic and Social Development Plan 2001–2005	The plan aims to confront the dual challenge of poverty and unemployment by encouraging investment to absorb the annual increase in the labour force, particularly focusing on labour-intensive activities such as agriculture, construction and small-scale manufacturing, by providing incentives to labour-intensive methods and technologies and encouraging their settlement in rural areas.

Source: FOWECA thematic study, Bashour 2005

ANNEX 12 STATUS OF RATIFICATION OF INTERNATIONAL CONVENTIONS AND AGREEMENTS AS AT 2006

Country	UNCBD	UNFCCC	Kyoto Protocol	UNCCD	CITES	Ramsar Convention	World Heritage Convention
Afghanistan	*	*		*	*		*
Bahrain	*	*		*		*	*
Cyprus	*	*	*	*	*	*	*
Iran	*	*	*	*	*	*	*
Iraq							*
Jordan	*	*	*	*	*	*	*
Kuwait	*	*	*	*	*		*
Lebanon	*	*		*		*	*
Oman	*	*	*	*			*
Qatar	*	*	*	*	*		*
Saudi Arabia	*	*	*	*	*		*
Syria	*	*	*	*	*	*	*
Turkey	*	*		*	*	*	*
United Arab Emirates	*	*	*	*	*		*
Yemen	*	*	*	*	*		*

Source: State of the World's Forestry, FAO, 2005; websites of the various conventions

ANNEX 13 STATUS OF NATIONAL FOREST POLICY, LEGISLATION AND INSTITUTIONAL FRAMEWORK

Country	National forest legislation	National forest policy[5]	National forest programme	National forest authority[6]
Afghanistan	*	x[7]		*
Bahrain				
Cyprus	*	*	*	*
Iran	*			*
Iraq	*			*
Jordan		x		*
Kuwait				
Lebanon	*			*
Oman				*
Qatar				*
Saudi Arabia	*			*
Syria	*	x		*
Turkey	*	*	*	*
United Arab Emirates				
Yemen				*

Source: Country outlook reports, 2005
UNFF, UNCCD, UNCBD website
FOWECA thematic study, Bashour 2005

[5] Refers to independent forest policy statement at national level.
[6] Refers to authority responsible at central governmental level.
[7] Refers to the policy that is in the process of formulation.

ANNEX 14 GOVERNMENT/LOCAL AUTHORITIES RESPONSIBLE FOR OR CONCERNED WITH FORESTS

Country	Authorities responsible	Mandate of authorities responsible	Organization/capacity of authorities responsible	Other authorities concerned
Afghanistan	Department of Forestry and Rangeland, Ministry of Agriculture and Food	management, use, protection and regeneration of natural forests, forest plantations, rangelands, national parks and wildlife resources	• 11 directorates in HQ • 1 office in each of 34 provinces • 196 technical staff • 1 215 administrative and support staff • very limited budget • very little access to training • no survey or inventory of forest resources	
Cyprus	Department of Forests, Ministry of Agriculture, Natural Resources and the Environment (MANRE)	• administration of state forests • implementation of government forest policy • implementation of forest development plans • cooperation with the fire brigade regarding fire-fighting • collaboration with other government services and NGOs to implement the National Forest Programme and forest policy	719 staff: • 25 professional foresters and university graduates • 263 foresters and college graduates • 158 permanent forest workers, skilled and semi-skilled • 273 seasonal forest workers, skilled, semi-skilled and unskilled the forestry budget has been steadily increased over the past 10 years; forestry has been cofinanced by the European Union and the national budget, with a total budget of US$24.2 million in 2004	• Environmental Service of MANRE • Department of Agriculture of MANRE • Wildlife and Game Service of the Ministry of the Interior • Town Planning Department of the Ministry of the Interior • Land and Survey Department of the Ministry of the Interior • Cyprus Tourism Organization of the Ministry of Commerce, Industry and Tourism • Police Fire Service of the Ministry of Justice and Public Order • Environmental Committee • Planning Bureau of the Ministry of Finance

Country	Authorities responsible	Mandate of authorities responsible	Organization/capacity of authorities responsible	Other authorities concerned
Iran	Forest, Rangeland and Watershed Management Organization, Ministry of Agricultural Jihad	• establishment of guidelines, planning, implementation and monitoring of programmes for desertification control, forestry and rangeland management and development, and urban and peri-urban forestry • enforcement of policies, legislation and regulations pertaining to land use, forestry, conservation, rangeland management and desertification control	• Departments include Forest Management, Afforestation and Parks, Rangeland Management, Sand Dune Fixation and Desertification Control, Extension and Public Participation, Training, Protection, Legal Affairs, Land Survey, Planning, and Institutional Affairs. • 32 provincial offices with a few subunits each; • weak in resource inventory, long-term planning, extension and the participatory approach	
Iraq	Horticulture and Forests Public Company of the Ministry of Agriculture Directorates of Agriculture of the various governorates	supervision of agricultural, administrative and financial aspects of forests		
Jordan	Forestry Directorate, Ministry of Agriculture	• forest conservation and protection • enforcement of the Agriculture Law with regard to forest protection	36 field offices within the agricultural directorates Divisions include: Afforestation and Nurseries, Forest Management, Land and Survey, and Biodiversity and Seeds	
	Ministry of the Environment	• management of nature reserves		

Country	Authorities responsible	Mandate of authorities responsible	Organization/capacity of authorities responsible	Other authorities concerned
Lebanon	Rural Development and Natural Resources Directorate, Ministry of Agriculture	• implementation of forestation projects • natural resource protection, supervision and management, including forest fire prevention, management and control; combating of illegal wood harvesting; and forest pest control • provision of assistance whenever necessary	175 staff, with a plan to recruit 75 new forest guards receives an annual budget of about US$1 million for afforestation and reforestation activities	• Green Plan, Ministry of Agriculture • National Centre for Remote Sensing, National Council for Scientific Research
	Ministry of the Environment	• implementation of the National Reforestation Plan • natural resource protection and management, including protected areas	established in 1993 US$16 million for a five-year reforestation programme	
Oman	Rangeland Resources Department, General Directorate of Animal Health, Ministry of Agriculture and Fisheries Directorate General of Agriculture, Livestock and Fisheries (DGAAF), Dhofar Governorate	• livestock breeding programmes • woodland and rangeland management • combating of soil and vegetation degradation • desertification control • environmental protection	the central government has been allocating decreasing financial support to DGAAF has been receiving decreasing financial support in recent years no forest and rangeland survey	• municipalities of the various governorates • Town Planning High Committee
	Ministry of Regional Municipalities, the Environment and Water Resources Directorate General of the Environment and Water Resources, Dhofar Governorate	• environmental protection, including rangeland and forest protection • desertification control		

Country	Authorities responsible	Mandate of authorities responsible	Organization/capacity of authorities responsible	Other authorities concerned
Qatar	Forestation and Rangeland Division of the Department of Agricultural Development, Ministry of Municipal Affairs and Agriculture	• development, protection and establishment of forest areas • maintenance of new types of forest and grazing plants in cooperation with other agencies • expansion of mangroves along the coasts • expansion of nature reserves • proposal of legislation to develop forests		
Saudi Arabia	Directorate of Rangelands and Forests, Ministry of Agriculture	• implementation of forestation programme • forest improvement • sand-dune stabilization • forest protection • development and supervision of rangelands • supervision of national parks	• lack of forestry specialists • lack of forest management plans	• Ministerial Committee for the Environment • National Commission for Wildlife Conservation and Development • Meteorology and Environmental Protection Administration • Ministry of Municipal and Rural Affairs • Ministry of Petroleum and Mineral Wealth • Ministry of Finance • Ministry of Economy and Planning • Ministry of the Interior • Ministry of Transport • Ministry of Water • Supreme Commission for Tourism
Syria	Directorate of Forests and Afforestation, Ministry of Agriculture and Agrarian Affairs	• forest management, development and protection • supervision of forestation projects	• 560 forest rangers • 142 fire fighters and supervisory technicians • 69 forest offices and monitoring towers • 15 fire-fighting centres Departments include Investment, Biodiversity Protection, and Protected Area Management the Directorate of Forests and Afforestation has been receiving increasing funds in recent years	

Country	Authorities responsible	Mandate of authorities responsible	Organization/capacity of authorities responsible	Other authorities concerned
Turkey	Ministry of the Environment and Forestry (MEF)	• reforestation • erosion control • range improvement • seedling production • protected areas • national parks • wildlife • forest villages • research work	• 4 units • 81 provincial directorates • 11 forest research institutes the combined budgets of MEF and GDF in 2003 were about US$820 million	• Ministry of Agriculture and Rural Affairs • Ministry of Tourism
	General Directorate for Forestry (GDF), in coordination with an MEF unit	forest protection, development and management	• 3 units • 27 regional directorates • 217 forest district directorates • 1 312 forest subdistricts most resources, both capital and human, are allocated to forest fire control	
United Arab Emirates	Ministry of Agriculture and Fisheries Special Bureau of His Highness the Head of the State and His Highness the Crown Prince Forest Departments of Abu Dhabi and Al Ain municipalities of the various emirates.	• afforestation and reforestation • urban forestry • desertification control • wildlife and protected areas	no forest survey	• Marine Resource Research Centre • Natural History Museum
Yemen	General Directorate of Forestry and Desertification Control, Ministry of Agriculture and Irrigation	• supervision of the forest sector • formulation of policies and preparation of forest management strategies and plans • desertification control • implementation of forestation campaigns	120 staff, including 24 professionals minimal financial resources allocated, less than 1% of the total Ministry of Agriculture budget	• General Corporation for Environmental Protection • General Corporation for Water Resources • General Corporation for Water and Sewage Disposal • General Corporation for the Tourism Development • General Corporation for Development of the Islands • General Corporation for Agricultural Research and Extension
	Environment Protection Authority	• management of protected areas	a 4-year protected natural area project, implemented by the World Bank and funded by GEF, with a total budget of US$740 000	

Source: Country outlook reports, 2005
Country travel reports, 2004 and 2005
FOWECA thematic study, Bashour 2005

ANNEX 15 INSTITUTIONS OF NGOS AND CIVIL SOCIETY ORGANIZATIONS

Country	NGOs/civil society organizations	Functions/programmes	Sponsors/partners
Cyprus	Federation of Environmental and Ecological Organizations of Cyprus	• protection of nature and wildlife • genetically modify organisms • waste management etc. • exhibitions, demonstrations, symposia and lectures on environmental and cultural issues	• founded in 1988 by a number of environmental NGOs • comprised of 15 member NGOs • financial resources: members' environmental projects; UNOPS; and Research Promotion Foundation (government funding)
	Cyprus Professional Foresters Union	• support to the Forestry Department's mandate • focus on private forest management	supported by the Forest Department
	Union of Cyprus Communities	rural villages	composed of the presidents of rural villages
Jordan	Royal Society for the Conservation of Nature	responsible for the supervision of wildlife protected areas, including the reintroduction of extinct species, the control of hunting and the supervision of hunting rules and regulations	
Lebanon	Friends of the Cedars of God	a local NGO, working on the protection, management and conservation of the Cedars of God Forest	**personal sponsorship**
	Association for Forest Development and Conservation	• reforestation activities • building awareness of natural resource conservation • tree nurseries • workshops, seminars, training courses for local communities	Forest Development and Conservation Centre of Lebanon,WWF, Spanish Aid Agency, European Union, Istituto per la Cooperazione Universitaria, Government of Lebanon
	Society for the Protection of Nature in Lebanon	management of protected areas based on the traditional *hima* system, combined with ecotourism development	local communities
Turkey	Turkish Foundation to Combat Soil Erosion and for Reforestation and Natural Habitat Protection	• building of public awareness of various environmental issues such as land erosion, deforestation, the falling productivity of farmland and threats to the biodiversity • development and implementation of model projects for rural development, rangeland rehabilitation and reforestation	• founded in 1992 by two prominent Turkish businessmen • more than 177 000 members and 555 volunteer representatives • main challenge is villagers' participation
	Forestry Cooperatives Central Union of Turkey	• organization of forest villagers • timber harvesting	• a semi-NGO supported by the government • legally founded in 1997 • 1 822 member cooperatives, encompassing 1.2 million forest farmers

Source: Country outlook reports, 2005
Country travel reports, 2004 and 2005

ANNEX 16 INSTITUTIONS OF FOREST EDUCATION, TRAINING AND RESEARCH

Country	Education and training	Research
Afghanistan	undergraduate level at: • Department of Forestry and Natural Resources of the Faculty of Agriculture, Kabul University • Agricultural Faculties of Balkh, Herat and Nagarhar Universities	
Cyprus	Cyprus Forestry College (providing 2-year diploma course)	
Iran	7 natural resource faculties, providing training on forest, rangeland, watershed and desert management, including PhD courses in the field of renewable natural resources	• Forest and Rangeland Research Institute • 7 faculties as listed in the education and training square to the left
Jordan	• Forestry Directorate conducts local training on forest resource management and conservation • technicians are trained in Syria or Cyprus • professional foresters are trained in Turkey and Iraq	
Lebanon	• American University of Beirut • University of Saint Joseph • Balamand University • Holy Spirit University • Lebanese University • Forest Development and Conservation Centre of Lebanon	• American University of Beirut • University of Saint Joseph • Balamand University • Holy Spirit University • Lebanese University
Saudi Arabia		• Natural and Environmental Research Institute • Prince Sultan Bin Abdulaziz Centre for Environmental, Water and Desert Research, King Saoud University • other universities
Syria	• Faculty of Agriculture, Halab University • Faculty of Agriculture, Latakia University • Faculty of Agriculture, Damascus University • Faculty of Agriculture, Dier Ez Zur University • Arab Institute for Forestry and Rangeland Management	• universities • Public Corporation for Scientific and Agricultural Research
Turkey	9 forestry faculties in various universities, such as the University of Istanbul	• Research and Development Department of the Ministry of the Environment and Forestry • 11 other forest research institutions
Yemen	non-existent	non-existent

Source: Country outlook reports, 2005
Country travel reports, 2004 and 2005

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19	*Understanding forest tenure in Africa: opportunities and challenges for forest tenure diversification*. 2008
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