

## 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.

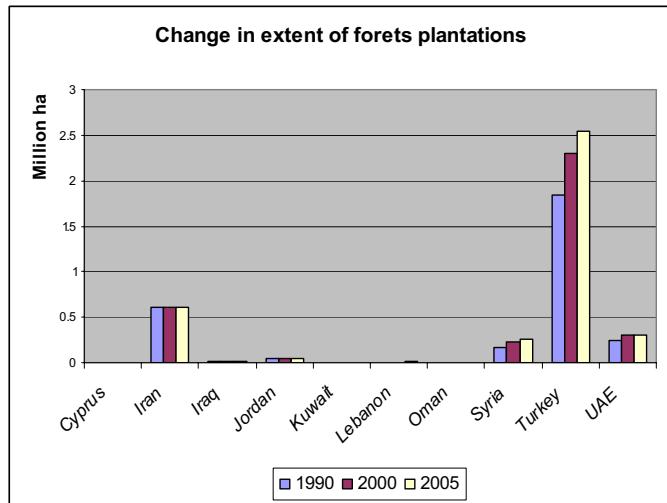
The absence of a clear land tenure system is a challenge to forest management in many countries in the subregion. One issue of vital importance for the sustainability of management in Turkey is the lack of clear ownership boundaries in forest areas. In Afghanistan, there is no clear legal framework for 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<sup>3</sup> 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 *Cypruss 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<sup>3</sup>) 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<sup>3</sup> 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<sup>3</sup> in 1990 to 33 million m<sup>3</sup> 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<sup>3</sup> in the 1980s to about 10 000 m<sup>3</sup> 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<sup>3</sup> in 1993 to 600 000 m<sup>3</sup> 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.

