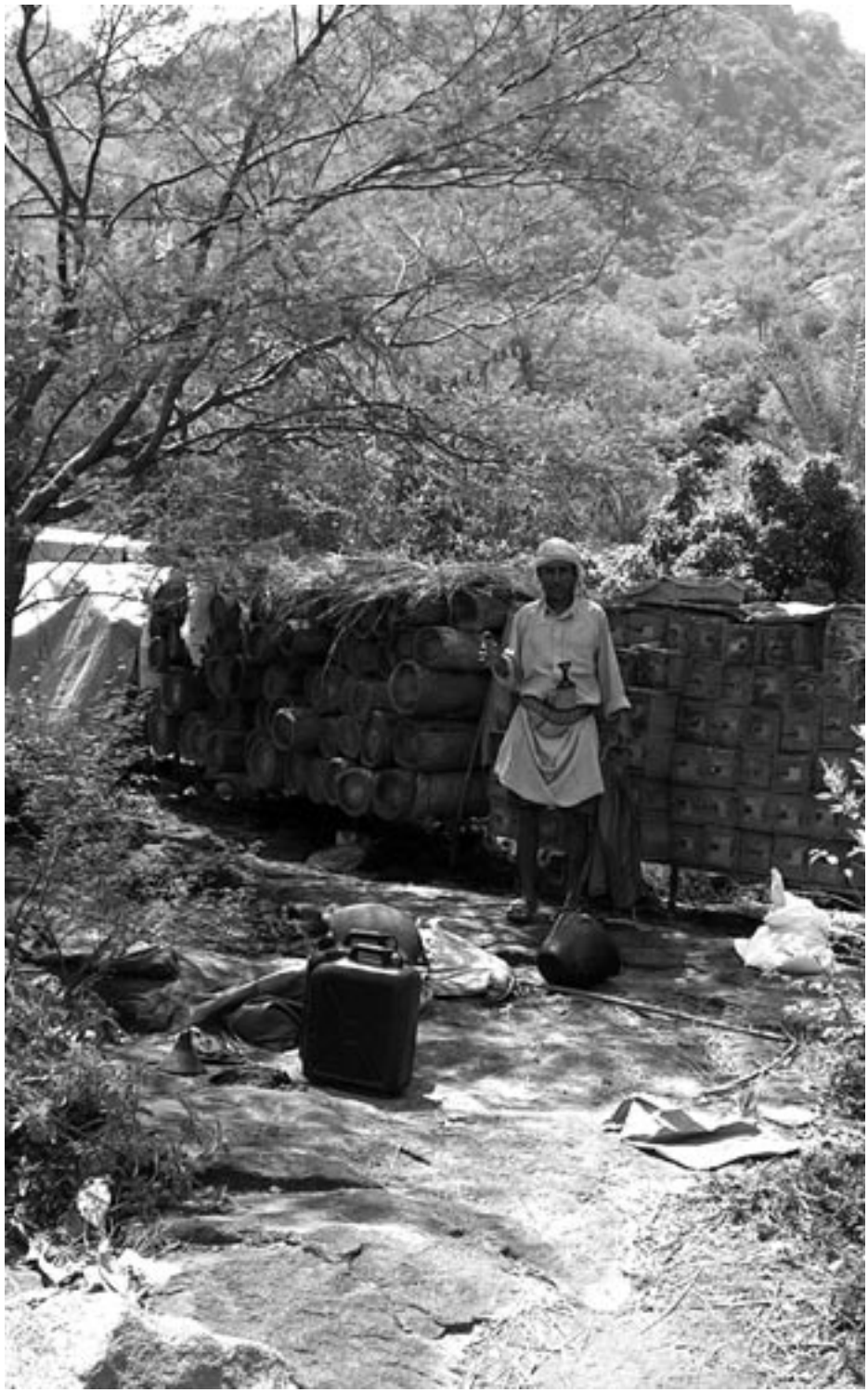


Q. MA

Beekeeping and honey production by a farmer in the Bura Forest, Yemen

3. Economic and environmental significance of forests and woodlands

The previous chapter provided an overview of the state of forests and forest management, including policy and institutional frameworks. Interventions by the different actors result in a varied flow of goods and services that cater to the diverse demands of society. Broadly, the benefits derived from forests and woodlands include products (wood and non-wood) and services, especially environmental benefits – biodiversity, maintenance and improvement of watershed values, arresting desertification, and the protection of agriculture and habitations from shifting sand dunes. Interventions within and outside the sector alter the flow of these goods and services. This chapter provides an overview of the economic and environmental significance of forests and woodlands in the West and Central Asia region.

PRODUCTION OF GOODS

Wood and wood products

In view of the low productivity of forests and woodlands, the current level of production of wood products is limited; therefore most of the countries highly depend on imports. Unrecorded wood removal is a serious problem in many countries, making it difficult to assess the actual level of wood production from forests. Although officially logging has been banned in most countries (exceptions being Cyprus, Georgia, the Islamic Republic Iran and Turkey), or harvesting has been limited to sanitary fellings, substantial quantities are removed illegally, which is often reported to far exceed what is legally permitted.

Agroforestry planting, especially the planting of fast growing species such as poplars and eucalypts outside state forests, forms an important source of wood supply. For example, Turkey's annual wood production from such plantations is estimated to be about 3.5 million m^3. Iran, Iraq, Kazakhstan and the Syrian Arab Republic are some of the other countries where a substantial quantity of wood is produced from farm trees. In Iran, for instance, around 58 percent of the annual production of wood (estimated at 1 million m^3) is from plantations and trees in orchards.

Table 3.1 gives an overview of the production, consumption and trade of the region's most important products in 2004. In view of unrecorded production, actual consumption of certain products will be higher than what was actually reported.

Notwithstanding the limitations stated earlier, the following observations can be made:

- In view of the high population, West Asia accounts for a major share of the consumption of all forest products. In 2004, West Asia accounted for 80 percent of the population in the region and consumed about 97 percent of industrial roundwood, 92 percent of paper and paperboard, 91 percent of sawnwood and 84 percent of wood-based panels. Within West Asia, Turkey produces most wood products as it has a high proportion of productive forests (see Box 3.1).
- As the degree of processing increases, the extent of dependence on imports increases. In 2004, the West and Central Asia region imported about 15 percent of the industrial roundwood consumed, but the share of imports in consumption was 45 percent for sawnwood, 56 percent for wood-based panels and 68 percent for paper and paperboard. For most countries, the exception being Turkey, the dependence on imports to meet consumption is very high.
- Per capita consumption of most products is far below the global per capita consumption and results from a number of factors. This is partly due to the decline in consumption in the Central Asian and Caucasus countries after their independence.

TABLE 3.1
Production, consumption and trade of important wood products, 2004

Product	West Asia	Central Asia and Caucasus	Total West and Central Asia	Per capita consumption, West and Central Asia	Global per capita consumption
Industrial roundwood *(m^3)*					
Production	13 845	161	14 005		
Imports	2 137	401	2 538		
Exports	121	58	179		
Consumption	15 861	503	16 364	0.047	0.258
Sawnwood *(m^3)*					
Production	6 718	339	7 057		
Imports	4 709	942	5 651		
Exports	81	186	267		
Consumption	11 347	1 095	12 442	0.035	0.065
Wood-based panels *(m^3)*					
Production	4 579	23	4 602		
Imports	3 821	1,489	5 310		
Exports	460	6	466		
Consumption	7 940	1 506	9 446	0.027	0.036
Paper and paperboard *(tonnes)*					
Production	2 146	222	2 368		
Imports	3 884	277	4 161		
Exports	365	6	371		
Consumption	5 665	492	6 158	0.018	0.055

Source: FAO, 2006b.

BOX 3.1

Wood industry in West Asia

In view of the limited forest resources, the region can only produce a small quantity of different types of wood products. Turkey dominates the production of all wood products in the region, and produces about 80 to 90 percent of the region's total production. Industrial roundwood and sawnwood production have relatively stagnated. Afghanistan, Cyprus, the Islamic Republic of Iran, Iraq and the Syrian Arab Republic produce, to a less extent, some industrial wood products and sawnwood as well. This trend reflects the availability of resources, increased awareness of environmental issues, the competition from imported products and the development of technology (medium-density fibreboards [MDF] and oriented strand board production in Turkey). Although the production of wood-based panels and paper and paperboard has expanded considerably in the past decade, and is mainly driven by Turkey's increased production, the production of these products in other countries such as the Islamic Republic of Iran, Iraq, Jordan and Lebanon has stagnated. In recent years, Turkey has significantly increased its production of medium-density fibreboards and paper and paperboard. However, all the countries in the region, including Turkey, are net importers of industrial wood products. Many countries are entirely dependent on imports to meet their domestic consumption.

Industrial roundwood. Industrial roundwood production is negligible in most countries because of low stocking and productivity of forests, but also because most forests have been set aside to fulfil protective functions. Table 3.2 shows the trends in the production and consumption of industrial roundwood for the region. For the region as a whole, consumption in 2004 was significantly lower than the 1990 level, largely owing to the decline of production and consumption in the Central Asian and Caucasus countries. Kazakhstan and Uzbekistan accounted for most of the consumption of industrial roundwood in Central Asia and the Caucasus. In 1990, their consumption accounted for about 70 percent of the Central Asia consumption, and although consumption has declined their share still remains above 70 percent of the regional consumption.

In the West Asia subregion, Afghanistan, Turkey and Iran are the most important consumers of industrial roundwood, accounting for about 98 percent of the consumption in 2004. These three countries have more or less maintained their high share in the subregional and regional production and consumption. West Asia is a net importer of industrial roundwood, which is mostly destined to Turkey with a limited quantity going to Iran, Saudi Arabia and the United Arab Emirates.

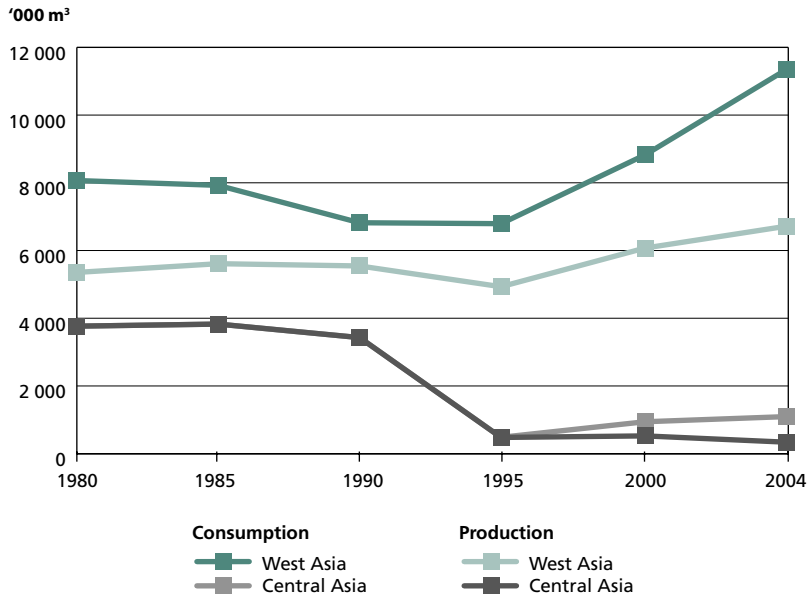
Sawnwood. Figure 3.1 indicates the trend in the production and consumption of sawnwood in the two subregions. The production of sawnwood in West Asia seems to be levelling off, while consumption is increasing, necessitating increased imports.

TABLE 3.2
Production and consumption of industrial roundwood[a] *('000 m³)*

Region	1980	1990	1995	2000	2004
West Asia	12 293	8 465	13 695	13 369	13 845
	(12 692)	(9 376)	(14 498)	(14 962)	(15 861)
Central Asia and Caucasus	2 063	1 931	594	315	161
	(9 645)	(9 512)	(817)	(346)	(503)
Total West and Central Asia	**14 356**	**10 396**	**14 288**	**13 684**	**14 005**
	(22 337)	**(18 888)**	**(15 315)**	**(15 309)**	**(16 364)**

[a] Figures in parenthesis are estimated consumption.

FIGURE 3.1
Trends in production and consumption of sawnwood



Turkey produces most of the sawnwood in West Asia, with Iran, Saudi Arabia and the United Arab Emirates accounting for a major share of the imports. In Cyprus, declining wood production along with such factors as low labour availability and higher wages have led to closure of sawmills (see Box 3.2)

As with other products, Central Asia's production and consumption of sawnwood markedly declined in the post-1990 period; the consumption in 2004 was just about 16 percent of the 1990 level. Even if an allowance were given to unrecorded production and consumption, the figure is still far lower than that of the pre-independence period. However, some countries have seen a marginal increase in consumption since 1995, particularly Armenia, Azerbaijan, Georgia and Uzbekistan.

BOX 3.2

Wood industry changes in Cyprus

Cyprus Forest Industries Ltd was established 1970 and is the main company operating in the wood industry sector. The major shareholder is government, with 51 percent of the capital share. The company used to have a unit for producing particle boards and sawn timber using local pine wood but it closed down due to the lack of raw material. The major products have shifted to secondary processing products, e.g. dressing imported particle boards and medium-density fibreboards with veneer sheets and plywood using imported wood.

The Kambos village is enclosed in a state forest area. The village used to depend on timber production before 1995. The sharp decrease in timber production in this area has produced in some negative outcomes to the village. Three of the village's five sawmills closed down because of shortages in raw material. In addition, logging costs are growing because of insufficient log production. In one surviving small sawmill, imported roundwood provides more than 50 percent of raw material consumption for sawnwood production, and six foreign workers from a total of 15 are employed to reduce production costs.

Source: FOWECA country outlook paper, Cyprus.

Wood-based panels. Table 3.3 shows the trends for the production and consumption of wood-based panels in the West and Central Asia region. Although the figures need to be interpreted with caution in view of the weak national reporting system, the overall trend is evidently upward. This is particularly the case with West Asia, where production and consumption registered an annual increase of about 10 percent and 11 percent, respectively, in the 1990-2004 period. Both production and consumption of panel products declined drastically in Central Asia during the post-1990 period, with recovery beginning only after 1995.

In West Asia, Iran, Lebanon, the Syrian Arab Republic and Turkey are the most important and probably the only producers of wood-based panels; all other countries are dependent on imports to meet their domestic needs. The rapid growth of importing wood-based panels since 1980 is largely in response to the increasing demand from the construction and furniture sectors. Rapid urbanization and the consequent construction boom will continue to boost the demand for panel products. Key producer countries, especially Iran and Turkey with significant domestic demand, have invested in additional capacities for the production of medium-density fibreboard (see Box 3.3).

Paper and paper products. Paper and paperboard is one of the more important items of forest products the region imports and there has been a steady increase

TABLE 3.3
Production and consumption of wood–based panels[a] *('000 m³)*

Region	1980	1990	1995	2000	2004
West Asia	610	1,159	1,945	2 876	4 579
	(1 505)	(1 889)	(3 168)	(4 680)	(7 940)
Central Asia and Caucasus	–	–	0	55	23
			(4)	(394)	(1 506)
Total West and Central Asia	**–**	**–**	**1 945**	**2 931**	**4 602**
			(3 173)	**(5 074)**	**(9 446)**

[a] Figures in parentheses are estimated consumption.

BOX 3.3
MDF consumption in the Islamic Republic of Iran and imports from Turkey

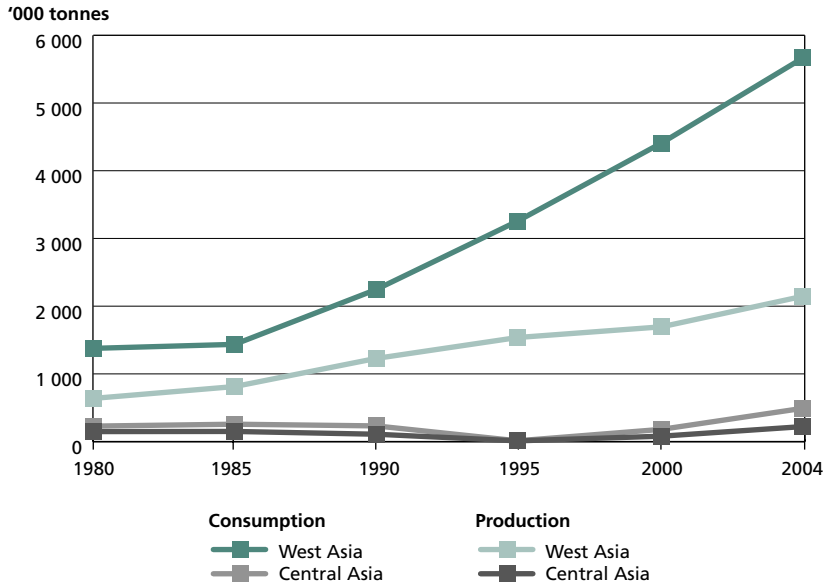
Between 1996 and 2003, the entire MDF consumption in Iran was supported by imports and in 2004, in spite of the production in Iran, most of the consumption was still reliant on imports… Countries which export MDF to Iran include Turkey, Malaysia, the United Arab Emirates, Russia, Germany, Italy, Spain, Romania, France and Belgium among others. Turkey supplies about half of the imported board. The proximity of Iran and Turkey – and the existence of fast and cheap connections such as railway and road, cheaper transportation and a long history of commercial exchange between these countries on the one hand and the over capacity of MDF in Turkey and the competitive prices – are good reasons that encourage the Iranian consumer to import MDF from Turkey.

Source: Wood Based Panels International (www.wbpionline.com/story.asp?sc=36446&ac)

in the volume and value of their imports since 1990. In 2004, the region imported paper and paper products valued at US$3.2 billion. Turkey is the only country that has substantial production capacity, and in 2003 production was adequate to meet about 66 percent of consumption. Most other countries, however, depend on imports to meet the domestic demand of printing and writing paper. In a number of Gulf Cooperation Council countries, there has been a large expansion of production of tissue paper and corrugated cartons (Mubin, 2004).

Figure 3.2 illustrates the trends in production and consumption of paper and paperboard in the West and Central Asia region. Paper and paperboard production in the region has increased substantially, especially in the post-1990 period. Production capacity, though, has grown much slower, and imports have increased. In Central Asia, production and consumption declined in the post-1990 period, but since 1995 there has been some upward trend. Although the 2003

FIGURE 3.2
Trends in production and consumption of paper and paperboard



consumption remained below the 1980 and 1990 levels, rapid economic growth could boost consumption.

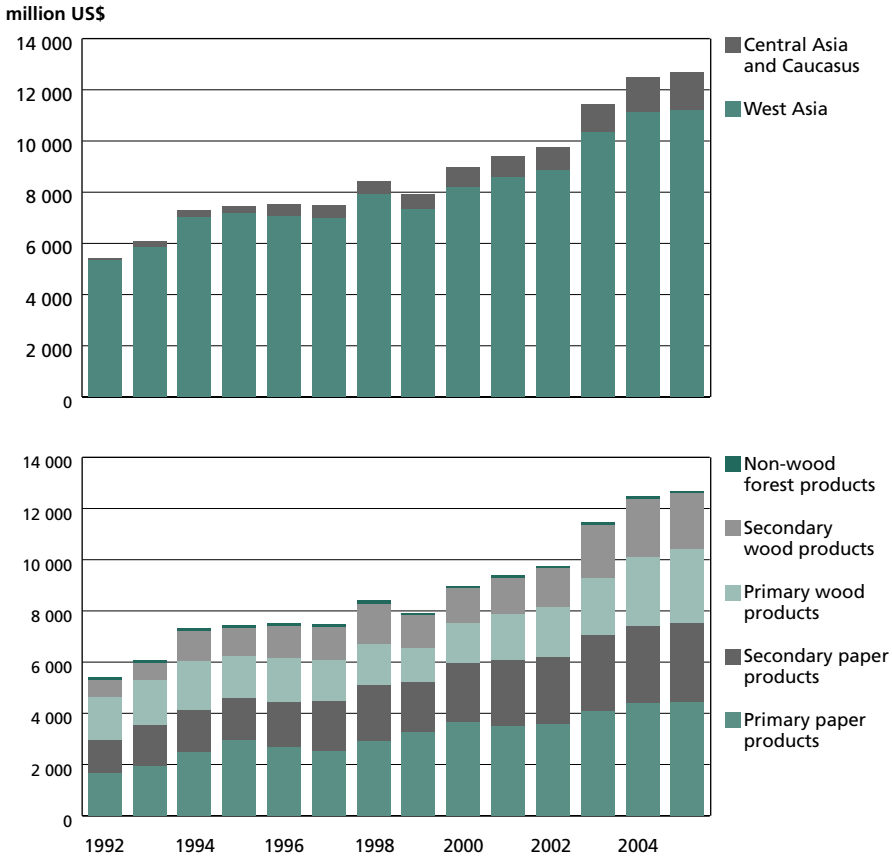
Forest products trade

In view of the rapid growth in consumption (due to increasing incomes and very low levels of consumption) and the limited levels of domestic production, countries have considerably increased their imports of forest products, from about US$5.4 billion in 1992 to more than US$12.7 billion in 2005 (see Figure 3.3).[3] Imports increased for almost all types of forest products. Primary and secondary paper products, for instance, accounted for almost 60 percent of the value of imports. The importing of secondary wood products, mostly furniture, also shows that demand is increasing significantly.

The main importers of forest products are Iran, Kazakhstan, Saudi Arabia, Turkey and the United Arab Emirates, which together accounted for about 65 percent of the value of imports in 2005. All indications show that imports will continue to grow rapidly, in view of the continued growth of the economies and the consequent increased demand for various wood and wood products. The booming construction sector in many countries, especially in West Asia, has led to the fast growth in wood imports (Box 3.4). The growth in imports is particularly

[3] These figures are adjusted for inflation and shown at the price levels and exchange rates for the year 2005.

FIGURE 3.3
Imports of forest products in West and Central Asia, 1992–2005



BOX 3.4

Construction boom in the United Arab Emirates and wood imports

According to data compiled by the Statistics Department of Dubai Ports, Customs and Free Zone Corporation, the total trade of wood and wood products registered increased by 37.5 percent in 2005 over the previous year. Nearly a third of this amount (about US$435 million) is re-exported to other countries within and outside the region. This rapid growth is attributed to the booming construction sector. Furniture and furniture parts formed the bulk of the total trade. China ranked first on the list of exporters of wood and wood products to Dubai with a 26.7 percent share, followed by Chile, Indonesia, Italy and Malaysia.

Source: Malaysian Timber Industry Board, 2006.

notable in the Central Asia and Caucasus subregion. In 1995, the Central Asia and Caucasus countries imported wood and wood products valued at US$300 million; in 2005 this amount had increased to more than US$1 500 million – over 50 percent of this amount, however, is accounted by Kazakhstan, whose economy is quickly recovering from the post-1991 decline.

Most products imported to the region come from Europe, including the Russian Federation (paper and primary wood products), and Asia (primary and secondary wood products, especially furniture).

Some of the countries in the region have also emerged as important exporters of wood and wood products, in part by re-exporting goods to other countries in the region. Between 1992 and 2005, the value of exports from the countries in the region increased more than twofold, from about US$1.2 billion to US$2.8 billion. Jordan, Lebanon, Saudi Arabia, Turkey and the United Arab Emirates were the primary exporters in 2005. Of these countries, Turkey has developed a vibrant forest industry (especially panel products and furniture) based on its domestic wood resources as well as imports. Other countries have also established processing capacity at the higher ends of the value chain based on imported inputs, for example producing sanitary paper and corrugated cartons from imported waste paper.

Woodfuel

While there has been a rapid substitution of woodfuel for fossil fuels, in several countries rural people continue to depend on wood as the main source of domestic energy, especially for cooking and heating. Since woodfuel harvesting largely takes place in the informal sector, reliable data on production and consumption are not available. The estimated trend of woodfuel consumption is presented in Table 3.4.

While fuelwood consumption has declined, charcoal consumption has increased, largely reflecting the impact of urbanization and changes in lifestyles. Fuelwood consumption increased only in several countries, Afghanistan, Tajikistan, Uzbekistan and Yemen, for example. Turkey's fuelwood consumption has declined significantly, from about 10.1 million m^3 in 1990 to about 5.9 million in 2005. Notwithstanding this reduction, Turkey still accounts for about three-fourths of the regional fuelwood consumption.

TABLE 3.4
Estimated woodfuel consumption in the West and Central Asia region

Year	Fuelwood *(million m^3)*	Charcoal *(million tonnes)*	Total woodfuel[a] *(million m^3)*
1990	11.76	0.51	14.79
1995	11.50	0.65	14.38
2000	9.74	0.73	14.13
2005	8.13	0.81	12.97

[a] Charcoal in tonnes converted into equivalent woodfuel in cubic metres.
Source: Broadhead, Bahdon and Whiteman, 2001.

As shown in Table 3.4, almost all the countries in the region (especially the Arabian Peninsula countries) are experiencing an upward trend in charcoal consumption, except for Iran where its charcoal consumption has been declining since 1990. Most countries in the region, in fact, import charcoal to meet the increasing demand.

With the exception of Turkmenistan (where gas, electricity and water are supplied free of cost), in most of the other Central Asia and Caucasus countries the demand for woodfuel has increased since independence because of the decreased supply of accessible and affordable alternative energy sources (see Box 3.5). In Georgia and Tajikistan, more than 80 percent of rural households depend on woodfuel as the main source of cooking energy. Disruption of gas supplies is a major concern for countries such as Georgia as this could have a significant impact on woodfuel demand.

Woodfuel accounts for about 85 percent and 70 percent of household energy in Afghanistan and Yemen, respectively. In Afghanistan, consumption of woodfuel has increased owing to disruption of commercial fuel supplies because of conflict. Iraq, despite being a major producer of oil, is also experiencing a similar situation, as war-related disruption in commercial fuel supplies has led to increased woodfuel consumption.

BOX 3.5

Double hardships – limited legally harvested fuelwood and decreased energy supply

During the Soviet period, some harvesting was carried out in the forests of Azerbaijan. In 1991, the Government of Azerbaijan decided to ban industrial felling in order to enhance the environmental functions of forests. At the same time, the break up of the integrated Soviet economy resulted in a disruption of 1.2 m^3 to 1.5 million m^3 of timber annually imported from the Russian Federation. Because only maintenance and sanitary felling have been officially permitted, fuelwood volume obtained from legal harvesting has become limited.

Extensive power and gas networks in Soviet times were capable of delivering electricity and acceptable quality gas to most of the population. After independence, however, lack of investment and limited maintenance have resulted in significantly deteriorating these networks.

Subsequent loss of access to energy sources has forced people to cut down trees for fuelwood for sustaining their livelihoods, which was mostly illegal under the government decision.

Whether there is a logging moratorium or not, insufficient supplies of fuelwood and other energy sources have resulted in similar consequences in the region, apart from Turkmenistan.

Source: FOWECA country outlook paper, Azerbaijan; Savcor Indufor, 2005.

BOX 3.6

Decrease in woodfuel consumption in Iran

In recent years, Iran has made a concerted effort to reduce the dependence on woodfuel for meeting household energy needs. Woodfuel production from Caspian forests reduced from 771 000 m^3 in 1979 to about 379 000 m^3 in 2003. Fossil fuel supply has been expanding rapidly because gas pipelines have been extended even to remote areas.

Source: FOWECA country outlook paper, Islamic Republic of Iran.

In some countries – Cyprus, Lebanon, Oman, the Syrian Arab Republic, Turkey, Saudi Arabia and the United Arab Emirates – dependence on woodfuel has declined largely because of the growth in incomes, increased urbanization and improved access to commercial fuels (see Box 3.6). There are exceptions to this trend: Jordan's woodfuel production and consumption have increased during the past 15 years, partly due to the greater use of charcoal, especially in restaurants. An increase in income also encourages traditional methods of cooking using charcoal, often because it is a status symbol.

In order to protect forest and tree resources from overexploitation, some of the countries have formulated rules and regulations to control fuelwood collection and charcoal production. For example, in 2000 Saudi Arabia imposed a ban on wood collection and charcoal production for a period of five years and permitted the import of fuelwood and charcoal to meet the domestic demand. The Syrian Arab Republic has adopted a system of licensing charcoal production from forests and fruit trees. Such restrictions have not always helped to deal with the problem, especially because of the limited institutional capacity to enforce the regulations. The existence of sale outlets for domestically produced charcoal in countries such as Saudi Arabia indicates the persistence of demand and the difficulties in enforcing legislation.

Non-wood forest products

Non-wood forest products (NWFPs) are an important source of livelihood in all the countries in the West and Central Asia region. They range from subsistence items to products traded on the international markets. Insufficient information, mostly because of the unorganized collection, processing and trade of these products, makes it difficult to assess the precise nature of their contribution. Often the information available is general and rather qualitative.

Important non-wood forest products in the Central Asia and the Caucasus region include nuts, berries, honey, medicinal plants and wildlife (see wildlife management). These products are particularly important at the local level. For example, in southern Kyrgyzstan walnut is the most important NWFP and is a

major source of cash income for the local population, especially during years of good harvest (Fisher *et al*., 2004). Similarly, pistachios are important for a number of countries (for example Turkmenistan, see Box 3.7). In most cases, people are allowed to collect them freely. In Kyrgyzstan, collectors have to pay a fee to forestry enterprises (*leskhozes*) after reaching a certain quantity. Most of the NWFPs support local economies, providing the base for small-scale, household-based enterprises. Some *leskhozes* in Central Asia hire local people to collect and process NWFPs thus providing employment opportunities, though the income from such employment remains limited (CAREC, 2006). Since the informal sector dominates the collection and trade of most NWFPs, very little information is available on their actual economic significance, and this possibly results in the neglect of their management (Asanbaeva, 2005).

The main non-wood forest products in West Asia include medicinal and aromatic plants, herbs and spices, gums, resins, tannins, mushrooms, honey, fruits and nuts. In some cases, fodder is also considered a non-wood forest product as a large number of livestock depend on it from forests and woodlands. NWFPs are more valuable than wood products in some West Asian countries (in Lebanon, Oman and Saudi Arabia). However, in most countries information on production, processing and marketing is poor. Because the production and trade of a number of NWFPs are in the informal sector, regulations relating to harvesting and trade do not exist. Overexploitation of resources is widespread.

A number of countries in the West Asia region have emerged as major exporters of non-wood forest products (see Box 3.8). Some NWFPs, such as bay leaves in Turkey, are important commercially. The production of bay leaves has increased about six times, from 1 062 tonnes in 1989 to 6 626 in 2002. The development is also a reflection of the increased private investments in processing and marketing of NWFPs. Improvements in storage and packaging technologies (especially to maintain freshness) have helped to improve trade prospects. The export of thyme and bay leaves increased from US$21.0 million in 2002 to US$29.0 million in 2004.

BOX 3.7

Pistachio forests in Turkmenistan

Pistachios grow individually or in small thickets in southern Turkmenistan. A total area of natural pistachio forests in Turkmenistan reaches more than 80 000 ha. The high oil content in the fruit has been used in food preparation and food processing and the tannin and gum for lacquer production. They provide a significant income to those who grow and sell the products. Disease and dry-wind resistant, pistachios also serve as fodder for animals. Pistachio is very precious for dry horticulture in Turkmenistan.

Source: CAREC, 2006.

BOX 3.8

International trade of NWFPs from West Asia

The UN Comtrade data provide a general indication of the increasing importance of some of the non-wood forest products from the West Asia region. In 2003, Iran exported 185 million kilograms of pistachios, whose export value was estimated at US$680 million and accounted for 2 percent of the total national export. With 76 percent of the global exports in 2003, Iran is the biggest exporter of pistachios in the world. Afghanistan is another important exporter of pistachios, with an export volume of 513 000 kilograms and an income of US$1.9 million in 2002. Turkey is the largest exporter of thyme and bay leaves, earning an income of US$29 million in 2004. Turkey is also the fifth largest chestnut exporter, exporting 8 million kilograms, earning an income of US$12 million in 2003. Lastly, Iran, Turkey and Yemen are the main exporters of natural honey in the region.

PROTECTIVE BENEFITS AND SERVICES

Forests and woodlands in the West and Central Asia region provide a number of environmental services, including conservation of biological diversity, protection of watersheds and arresting land degradation and desertification. Increasing emphasis is also being given to the recreational and amenity functions of forests and woodlands and, as noted earlier, substantial investments are being made to establish and manage urban and peri-urban forests. For most countries, these environmental services are probably more important than the productive functions of their forests and woodlands.

Conservation of biological diversity

Biodiversity hotspots. The wide range of topographic, soil and climatic conditions in the West and Central Asia region has resulted in highly diverse ecosystems, ranging from coastal mangroves to alpine forests and deserts to humid forests. Of the 32 global biodiversity hotspots five are located in the region (see Box 3.9).

The mountains of Central Asia are particularly significant for their biodiversity value. Due to the several altitudinal zones, they are characterized by high diversity at the ecosystem, population and species level (Magin, 2005). Mountain ecosystems serve as a place of origin for many cultivated plants and animal breeds and a refuge for several globally important species. Considerable areas in the Central Asia mountains have wild fruit-bearing forests, and represent the genetic centres of origin of cultivated varieties of apple, pear and pomegranate. The Caucasus is also characterized by a high level of endemism (UNEP, 2002).

Extent of protected areas. Almost all countries are signatories to the Convention on Biological Diversity and are making efforts to protect and manage important biomes and ecosystems. Many countries have prepared national biodiversity action

BOX 3.9

Biodiversity hotspots in West and Central Asia

Conservation International has identified the following five biodiversity hotspots in West and Central Asia:

- ***Mountains of Central Asia:*** The hotspot's ecosystems range from glaciers to desert, and include areas that provide refuge to a number of threatened plants and animals.
- ***The Caucasus:*** The deserts, savannas, arid woodlands and forests that comprise the Caucasus hotspot contain a large number of endemic plant species.
- ***The Irano-Anatolian region:*** Forming a natural barrier between the Mediterranean Basin and the dry plateaus of Western Asia, the mountains and basins that make up the Irano-Anatolian hotspot contain many centres of local endemism. The greatest threat to the Turkish part is the development of irrigation schemes for agriculture and associated infrastructure, such as dams.
- ***The Mediterranean Basin:*** It has 22 500 endemic vascular plant species. Tourism development has placed significant pressure on coastal ecosystems.
- ***The Horn of Africa:*** This extends to the southwestern part of Saudi Arabia as well as Yemen and Oman. The junipers in the region form a unique ecosystem and are subjected to severe degradation.

Source: Conservation International, 2005.

programmes – often with external support – and much of the effort is directed towards establishment and management of protected areas. Table 3.5 shows the proportion of protected areas in the different countries of the region.

The extent of protected areas (IUCN Categories I to IV) in the West and Central Asia region is about 32.5 million hectares, accounting for about 3.0 percent of the region's land area. In West Asia, Iran and Saudi Arabia account for 94 percent of the protected areas while in Central Asia and the Caucasus, Kazakhstan alone accounts for about 49 percent of the protected areas. In terms of the proportion of land area covered, Tajikistan has about 18.3 percent of its area protected. Other countries having a high proportion of protected areas are Armenia with 10.1 percent and Cyprus at 8.2 percent. In addition, some countries have areas that have been declared protected but do not fall under IUCN Categories I to IV. Saudi Arabia is an example; when such areas are included, its protected area increases from 1.8 percent to about 38 percent of the land area.

While the extent of protected areas is impressive, there are two key issues concerning protected areas:

- Coverage of critical ecosystems: the existing protected area system encompasses some of the ecosystems and ecoregions but others – notably steppes, deserts and semi-desert – are poorly represented. Temperate grasslands typical of Central Asia are poorly protected.

TABLE 3.5
Extent of terrestrial protected areas (IUCN categories I to IV)

Country or area	Protected areas (IUCN categories I to IV)	
	Area *(ha)*	% of land
Kazakhstan	7 741 945	2.8
Kyrgyzstan	608 290	3.0
Tajikistan	2 602 925	18.3
Turkmenistan	1 883 220	3.9
Uzbekistan	2 050 293	4.6
Total Central Asia	**14 886 673**	**3.7**
Armenia	299 107	10.1
Azerbaijan	393 651	4.5
Georgia	290 276	4.2
Total Caucasus	**983 034**	**5.3**
Afghanistan	218 629	0.3
Bahrain	800	1.1
Cyprus	75 957	8.2
Iran (Islamic Republic of)	10 373 294	6.3
Iraq	541	0.0
Jordan	913 300	10.2
Kuwait	250	0.0
Lebanon	3 500	0.3
Oman	22 000	0.1
Qatar	50	0.0
Saudi Arabia	3 923 000	1.8
Syrian Arab Republic	289 646*	1.5
Turkey	804 312	1.0
United Arab Emirates	40	0.0
Yemen	0	0.0
Total West Asia	16 625 319	2.5
Total West and Central Asia	**32 495 026**	**3.0**

Source: UNEP–WCMC, 2005; figures for Syrian Arab Republic provided by the Directorate of Forests.

- Protected areas established for recreation and tourism: the value of such protected areas for biodiversity conservation is rather limited, because this is not their focus.

Issues in the management of protected areas. The level of management in protected areas varies enormously, depending primarily on the financial and institutional capacities. Some of the protected areas are highly degraded and receive little or no protection. Boundaries are often not clearly marked and local people may not even be aware of their protected status. Designated park areas often exclude areas of high biodiversity that are just beyond the boundary, while large-scale farming areas and high-intensity tourism sites are included. Poor infrastructure, limited staff and

insufficient financial support undermine the efficacy of protection. Agricultural expansion has been one of the major factors contributing to biodiversity loss (see Box 3.10). Other issues that affect biodiversity conservation in the West and Central Asia region include:

- Intersectoral issues have not been addressed effectively and frequently the key players who influence land-use decisions are not involved in the decisions relating to biodiversity conservation. Coordination of biodiversity conservation is primarily the responsibility of the environment department, but resource constraints limit its ability to implement the tasks assigned to it. Often it is relatively powerless to influence the decisions of other ministries or departments.
- Discontinuities in the policy and institutional environment are a major problem in conserving biological diversity. Frequent institutional changes have undermined the continuity of various initiatives.
- Often the National Biodiversity Action Plans tend to be a wish list of projects, primarily aimed to secure external funding. Very few of them have concrete proposals for mobilizing internal resources and how biodiversity conservation aspects could be incorporated into national development priorities, especially in the use of natural resources.

Watershed protection

Water is probably the most critical natural resource in the West and Central Asia region and is a key concern for national and regional security. The degradation of watersheds and the consequences on the water supply, including for irrigation and power generation, have been reported widely (see Box 3.11). While soil erosion

BOX 3.10

Agricultural expansion: a threat for biodiversity conservation

In Kazakhstan, agriculture is one of the main threats for ecosystems. In the 1950s, more than 90 percent of the area of regular *chernozems* and around 60 percent of dry steppes were ploughed. This led to serious wind erosion, and dust storms became common. The steppe areas that remained are considerably modified because of overgrazing.

In Turkey, in the eastern part of the ecoregion, agriculture is so extensive that, except in the hilly areas, all the natural vegetation has been converted to fields. Even in the hilly areas, natural communities are highly degraded as a result of overgrazing.

Economic and socio-cultural changes are causing a decline in the environmental quality in the Caucasus. Urban and rural developments have converted most lowland forests to agricultural and development lands.

Source: WWF, 2005.

BOX 3.11

Watershed degradation in Iran

As with most of the other countries in West Asia, water availability is the most critical issue with regards to sustaining and expanding agriculture production. In most parts of Iran, the limited precipitation (about 250 mm) is confined mainly to the cold winter season and is often short and intense. In the absence of vegetation and the degradation of catchments, soil erosion and floods are common. Since Iran relies heavily on dams to meet its irrigation requirements, siltation is a major problem, reducing the capacity of reservoirs. Some examples are the Latian, Sefidrud and Dez dams, which will be filled in the near future.

Source: Iran Daily, 2000.

and watershed degradation are recognized as important problems, it is necessary to assess the potential role of forests in providing a solution, especially in the context of several factors that influence the hydrology in the region. General statements on the positive hydrological functions of forests, in particular "the sponge effect" of the forest floor in absorbing and releasing water, have often ignored the specific situation in the various watersheds. Two key issues that need to be addressed are:

- the extent to which forests and trees augment and regulate the supply of water, including maintaining its quality;
- the demand for water for afforestation and reforestation, which competes with alternative uses.

Major watersheds in the region. Many rivers in Central Asia, the Caucasus and West Asia traverse more than one country, and managing demand and supply between countries creates economic, social, institutional and political problems. The role of forests in regulating water flow needs to be seen in this context. Table 3.6 shows the extent, number of countries covered, population and land use of the major transboundary watersheds in West and Central Asia.

As shown in Table 3.6, the extent of forest cover in all the important watersheds in the region, excluding that of the Ob River (whose catchment largely falls in China, Mongolia and the Russian Federation), is rather negligible, varying from 0.1 percent for Amu Darya to 2.4 percent for Syr Darya to 4 percent for Lake Balkhash. The Kura and Araks watershed has higher forest cover (7.1 percent) as a large part of it is situated in the relatively better forested country of Georgia.

Because almost all watersheds are predominantly grassland and cropland, watershed benefits depend primarily on the management of these land uses. Considering the complex nature of hydrology and the multitude of factors that affect the quantity and quality of stream flow, afforestation efforts will have to be integrated with other land uses. Given the preponderance of arid and semi-arid land, particular

TABLE 3.6
Major watersheds in West and Central Asia

Watershed	Watershed area (km^2)	Countries within the watershed	Population density (per km^2)	Percent of watershed that is:				Large dams in progress	% of protected area
				Cropland	Forest	Grassland	Arid area		
Amu Darya	534 739	Afghanistan Kyrgyzstan Tajikistan Turkmenistan Uzbekistan	39	22.4	0.1	57.3	72.0	2	0.7
Kizilirmak	122 277	Turkey	55	38.0	1.6	52.0	84.9	9	0
Kura and Araz	205 037	Armenia Azerbaijan Georgia Iran Turkey	75	54.0	7.1	30.6	25.4	4	4.3
Ili-Balkhash	512 015	China Kazakhstan Kyrgyzstan	11	23.2	4.0	61.1	91.6	0	7.2
Ob	2 972 493	Mongolia China Kazakhstan Russian Federation	10	36.9	33.9	16.0	42.5	0	1.9
Syr Darya	782 617	Kazakhstan Kyrgyzstan Tajikistan Uzbekistan	28	22.2	2.4	67.4	88.5	4	1.0
Tigris and Euphrates	765 742	Iran Iraq Syrian Arab Republic Turkey	57	25.4	1.2	47.7	90.9	19	0.4

Source: WRI, 2005.

attention will have to be paid to ensure that afforestation does not enhance water loss through increased evapotranspiration. More importantly, afforesting degraded pasture- and agricultural land may face significant economic constraints.

The regulatory functions of forests and woodlands seem to be more important for small watersheds. Total rainfall may be low, but its intensity can be very high, causing high levels of run-off. The problem mainly stems from land-use changes, especially when woodlands are cleared for high-tillage crops without adequate soil and water conservation measures. Increased grazing, far beyond the carrying capacity of the land, causes soil compaction and is another factor that reduces infiltration and enhances run-off. Increased urban build up and infrastructure development (especially roads) have reduced the proportion of water that seeps into the soil, resulting in increased peak flows and reducing the duration of stream flow. Grazing and woodfuel collection (especially production of charcoal) are important causes of land degradation, undermining watershed values.

Causes of watershed degradation. As with biodiversity, watershed management issues and the role of forests and trees therein, need to be considered in the larger socio-political, economic and environmental context. Because most of the countries in the region are arid and semi-arid with low precipitation, the potential to increase

renewable water supplies is rather limited. Some of the important considerations in the context of the West and Central Asia region are:

- population growth and its consequence on land use, especially agriculture and animal husbandry;
- development of the industrial and services sectors and consequent changes in the demand for water;
- policies and institutional capacity to make necessary changes in the way water is used and how demand and supply are balanced;
- knowledge on watershed management.

Integrated approaches to watershed management. Although forests and trees have important regulatory functions, these depend on a number of other factors, which need to be taken into account in watershed management initiatives. Frequent land-use changes, including cultivation of high-tillage crops, are particularly damaging to the stability of water flows. Increasingly, watershed management efforts are adopting an integrated approach, which addresses the human dimension and the mosaic of land uses in a given ecological context, with substantial emphasis on improving agricultural practices and enhancing the incomes of local communities. An example is the Anatolia Watershed Rehabilitation Project in Turkey (Box 3.12). Furthermore, there is greater emphasis on enhancing local community participation, especially through making appropriate changes in policy and legal and institutional frameworks.

BOX 3.12

Anatolia Watershed Rehabilitation Project

This seven-year project approved in 2005 and covering 28 micro-catchments has a number of interrelated components, namely the rehabilitation of degraded natural resources; income-raising activities; strengthening policy and regulatory capacity towards meeting European Union standards; and awareness-raising, capacity building and replication strategy. The main activities under the rehabilitation of degraded natural resources component include:

- rehabilitation of forest land including soil conservation by afforestation, protection and improvement of poor and degraded soils, gallery plantation, rehabilitation of oak coppices and of degraded high forests, participatory replanting and inventory of non-wood forest products;
- rangeland rehabilitation, including improved management of forest rangelands and rehabilitation of rangelands outside forests;
- rehabilitation of agricultural land including fallow reduction and appropriate use of marginal agricultural land; and
- environment-friendly agricultural practices.

Source: World Bank, 2005.

Poverty alleviation and strengthening local level institutional arrangements underpin most watershed management efforts.

Control of desertification

Almost all countries (except Cyprus) in the West and Central Asia region are affected by desertification, and in 9 of the 23 countries, drylands account for over 90 percent of the land area. All West Asian countries are located in the arid and semi-arid zone and about 79 percent of land is desert or desertified. In addition, another 16 percent is vulnerable to desertification. The preponderance of arid and semi-arid areas, poor management of water resources, including excessive extraction of groundwater that results in lowering water tables (and in many coastal areas creates salt water intrusion), and land-use practices that are beyond the carrying capacity (see Box 3.13) are the key factors contributing to desertification.

Forestry plays important preventive and remedial roles in combating desertification. Most attention hitherto has been on the latter, especially when adverse effects become very evident. Preventive actions are often neglected as a result of policy, institutional and economic constraints. Governments find prevention particularly difficult if more comprehensive approaches require significant policy and institutional changes. Key areas of forestry interventions include:

BOX 3.13

Desertification in West Asia

Land degradation and, at its extreme, desertification, continue to be the most significant 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 region, ranging from 10 percent in the Syrian Arab Republic to nearly 100 percent in Bahrain, Kuwait, Qatar and the United Arab Emirates. Desertification has also affected wide areas of rangelands in Iraq, Jordan, the Syrian Arab Republic and the countries of the Arabian Peninsula. The causes include a combination of climate, high population growth rates and intensive agriculture. Poverty and inappropriate government policies exacerbate the problem.

Geopolitical instability in and around the countries of West Asia has persuaded governments to adopt policies aimed at achieving national food security. These policies have been accompanied by agricultural protectionism, the erection of trade barriers and government subsidies for agricultural inputs. Subsidies, together with free or cheap irrigation water, have had severe impacts on land and water resources and have contributed to the unsustainability of agriculture in the region. As a result, land degradation has become widespread, and it has accelerated as more rangelands have been reclaimed and put under cultivation.

Source: UNEP, 2002.

- improved management of vegetation (which involves a large array of policy, institutional, legal and technical interventions), including attention to the problem of forest fires;
- remedial measures, particularly afforestation of degraded areas to stabilize soil and to prevent further erosion through wind and water, and protective measures, particularly establishment of shelterbelts and windbreaks to maintain the productivity of agricultural and other land. Sand-dune fixation is a key area in several countries (see Box 3.14). Most countries are also establishing "green belts" to improve the microclimate and to enhance recreational values in urban areas.

Forestry interventions have largely focused on technical aspects, especially to establish windbreaks and shelterbelts and to stabilize sand dunes using species that are well adapted to the adverse environmental conditions. Producing a sufficient number of seedlings to meet the demands from government organizations (including those of the forestry departments) and farmers and adopting appropriate techniques for planting and aftercare have received considerable attention. Substantial work has been done on aspects such as designing shelterbelts and windbreaks and techniques for sand-dune stabilization. In almost all cases, establishment of shelterbelts and windbreaks and other amenity planting requires irrigation, especially in the first few years. In the extremely arid and semi-arid conditions this is critical for successful planting. Particular attention has been given to:

- economize water use, especially through drip irrigation;
- use of treated wastewater to establish green belts and other amenity planting in urban areas.

A number of countries in West Asia have pursued these actions, especially with the urban greening initiatives. The costs of these planting initiatives are very high and hence their wider adoption largely depends on resource availability. Most of

BOX 3.14

Control of desertification in the United Arab Emirates

A variety of sand dunes are found in various parts of the Emirates. Recent observations made on the comparatively stable and mobile dunes in the Western Region of Abu Dhabi indicate that they may be moving at the rate of 2 to 3 metres annually in the direction of the wind. A number of methods and techniques are being used to check their advancement.

The sand has to be physically removed by using heavy earth moving machinery to clear the roads or to save habitations and farmlands. Physical impediments such as cement asbestos sheets, galvanized iron sheets or date palm fronts are erected to across the main prevailing direction of the wind. As a long-term measure, live shelterbelts or windbreaks of arid-zone species are raised to reduce wind velocity and to prevent the sand invading the habitations and agriculture. Both live shelterbelts and windbreaks and block plantations are being used to lessen or check encroachment by sand.

these efforts tend to be focused on key urban centres; cities that are emerging as centres of trade, tourism and manufacturing are receiving increased attention in this regard.

Afforestation of the exposed Aral Sea bed is a major joint initiative in a number of countries. The drying up of the Aral Sea and its consequences for extensive agricultural areas because of the deposition of toxic salts is a major environmental problem affecting a number of Central Asian countries (see Box 3.15). The environmental conditions make it extremely challenging to undertake reforestation in the dry seabed. Temperature fluctuates from –40°C in winter to 40°C in summer, with the rainfall amounting to about 300 mm. A number of techniques have been adopted to afforest the area and to stabilize the sand. Although there was a scaling down of afforestation efforts immediately after the break up of the Soviet Union, efforts have been stepped up recently with substantial donor support. While afforestation has been successful in some areas, the basic problem is the declining river flow because water is being diverted to enhance crop production.

Forest-based ecotourism

Forest-based ecotourism is another important service that is gaining prominence in many countries. In most West and Central Asian countries, where the scope for wood production is limited, recreational use could partly help to enhance the economic viability of forest management. International tourism has grown rapidly during the past few years (see Table 3.7) and the West and Central Asia region has increased its share in world tourism. There also has been a significant increase in domestic tourism in both subregions. In fact, in some countries domestic tourism provides a more stable income than international tourism. Both domestic and international tourism are expected to increase in the context of increased incomes

BOX 3.15

Human induced desertification is the Aral Sea

The Soviet practice of indiscriminately exploiting natural resources to feed its industrial machine had devastating consequences for the Aral Sea region. In 1959, the waters of Syr Darya and Amu Darya Rivers, the Aral Sea's two main feeders, were diverted to irrigate newly planted cotton fields in Uzbekistan. With the diversion of two of its feeding rivers, evaporation took its toll on the Aral Sea. Furthermore, the pesticides used to accelerate cotton growth heavily polluted the water system. Moscow's attempt to transform one of its republics into a major agricultural center was a shortsighted project and was abandoned within a decade. But the environmental effects were not so transient: the Aral Sea has lost three-fifths of its water in the past 40 years, and its shoreline has at some areas receded more than 60 miles. What remains of the sea is salty and polluted.

Source: Schaar, 2001.

and increased investments in infrastructure (for example, the revival of the Great Silk Road). Forests and forestry could significantly contribute to the growth in tourism. Countries such as Cyprus have been able to take advantage of the recreational use of forests, and have supported the overall tourism development in the country. In fact, wood production is becoming less important than the recreational use of forests (see Box 3.16).

There are, however, other countries in the West and Central Asia region where tourism still remains undeveloped even despite the presence of natural assets as, for instance, attractive landscapes, biodiversity, wildlife, and historical and cultural sites. The situation is expected to change rapidly for these countries, providing important opportunities for the forestry sector. Much will depend on moving up the value chain through investments in infrastructure and other facilities and enhancing the overall attractiveness of forest-based tourism (see Horak, 2004). A major issue related to the development of ecotourism is political stability and security. A study on the impact of the wars in Afghanistan and Iraq on ecotourism in Iran demonstrates the enormous fluctuation in the number of visitors to the country (Sakari and Vahabi, 2004) (see Box 3.17).

TABLE 3.7
International tourist arrivals in some countries of West and Central Asia *('000 people)*

Region	1990	1995	2000	2002	2003	2004
Central Asia	346	1 836	3 304	2 889	3 552	
Caucasus	190	1 113	1 294	1 533	1 980	
West Asia	13 306	19 829	31 289	40 716	41 121	47 016
Total West and Central Asia	13 306	20 365	34 238	45 314	45 543	52 548
Total world	**441 033**	**538 062**	**680 562**	**700 427**	**689 689**	**763 235**
Percent of world's tourists in West and Central Asia	3.0	3.8	5.0	6.5	6.6	6.9

Source: World Tourism Organization, 2005.

BOX 3.16

Tourism: A key objective of forest management in Cyprus

As Cyprus is becoming an important tourist destination in the Mediterranean, the significance of forests for wood production is declining and the environmental value for supporting the tourism sector is receiving more attention. This is particularly the case with privately owned forests. Direct dependence on forests as a source for wood has declined (especially as most wood is imported) and has led to lower incomes and negligence in forest management. However, tourism that is based on forests and other natural assets is growing rapidly and many forest owners have begun to manage "agritourism", taking advantage of forest benefits. The Forest Department is also changing its management approaches and increasingly tourism within the forestry sector is seen as an added attraction.

Several countries are competing to get a larger share of the tourism market, but only a few of them have been able to take advantage of the potential. Important strengths, weaknesses, opportunities and threats with regard to ecotourism are discussed in Table 3.8.

While the potential for forest-based ecotourism development is substantial, so are the threats and constraints. Political instability from conflicts in the region will remain a key problem. Where the conditions are favourable, management will have

BOX 3.17

Impact of wars in Afghanistan and Iraq on ecotourism in Iran

A four-year study in Guilan province in northern Iran assesses the trend in the number of visitors to the area, in particular for sport birds hunting (especially woodcock). In the survey, visitors clearly stated that security issues, especially stemming from the conflicts in Afghanistan and Iraq, were the major factors that prevented others from travelling to Iran.

Source: Sakari and Vahabi, 2004.

TABLE 3.8

Tourism in West and Central Asia – strengths, weaknesses, opportunities and threats

Strengths
• A wide range of ecological, social and cultural environments
• Rather unknown in comparison with other sites and therefore has some novelty
• Expansive wilderness, especially in some Central Asian countries
Weaknesses
• Poorly developed infrastructure (especially roads and other access) and hotels and facilities
• Cumbersome travel formalities, especially for obtaining a visa
• Conflicting objectives of the different agencies involved in tourism development
• Poorly developed institutional capacity
• Lack of information in potential markets
• Political conflicts and security concerns
• In some countries, tourism is generating adverse environmental impacts and has reached saturation stage
Opportunities
• Situated close to rapidly developing markets and the volume of tourism is expected to grow rapidly
• Increased interest for different kinds of tourism, focusing on local cultures and lifestyles
• Increasing incomes in the region may help to boost domestic and foreign tourism
Threats
• Political instability and frequent changes in institutions, which undermines consistency in management
• Unmanaged rapid expansion of tourism could undermine the basic resources – flora and fauna and the landscape – through congestion and environmental degradation
• Local communities may not be able to gain significantly from the growth in tourism
• Rapid growth of investments and very severe competition, which reduces the profit margins considerably

to address the problem of unmanaged and often very rapid expansion of tourism, degrading the very resource base. A typical example of this issue concerns the juniper woodlands in the Sarawat mountains in Saudi Arabia (Box 3.18)

Carbon sequestration

Sequestration of carbon is a key environmental service provided by forests and trees and thus their importance in mitigating climate change. Land-use changes (deforestation and afforestation) could significantly alter the carbon balance, changing what is retained in the biomass and in the atmosphere. In the context of the growing concern about climate change, there is some recognition on the potential of afforestation and reforestation for carbon sequestration.

The ratification of the Kyoto Protocol has opened the potential for investing in reforestation and afforestation under the Clean Development Mechanism. Although improved management of natural forests and all afforestation and reforestation projects help to sequester carbon, the use of the Clean Development Mechanism (CDM) to support afforestation and reforestation has a number of constraints. Primarily CDM is intended to allow industrialized countries to meet their greenhouse gas reduction obligations through offset projects in developing countries. It is within this context that the potential of the West and Central Asia region to sequester carbon and to generate funding for forestry is to be considered.

Carbon sequestration initiatives in the forest sector can be broadly grouped into two areas: externally funded afforestation and reforestation projects where carbon sequestration is one of the objectives; and projects within the framework of the CDM, driven by demand for credits – certified emission reductions – from private and public entities in developed countries. Within the West and Central Asia region, there are no afforestation and reforestation projects in the

BOX 3.18

Tourism in the Asir region in Saudi Arabia

On account of its favourable climatic conditions, the Asir region has become an important tourist destination in Saudi Arabia. Annually, between 2 to 3 million tourists visit Abha, the capital of Asir region, and its surrounding region; most of the tourism takes place from June to August. One of the more popular attractions in the Asir region is the juniper woodlands, which have been subjected to intensive recreational use. This has led to significant degradation of the trees in the family parks. During the tourist season, the influx of visitors is so excessive that park management is unable to enforce regulations. There is concern that the high numbers of visitors are changing the characteristics of the parks through soil compaction and, for instance, the cutting of tree branches – a factor predisposing trees to dieback. Changes in the overall appearance of the parks could significantly reduce the attractiveness of the region.

latter category, and what is now being implemented in some of the countries are primarily forestry projects where carbon sequestration is one of several, often incidental, objectives.

Recently, a pilot afforestation project funded by the Global Environment Facility (GEF) was initiated in Iran with the objective of carbon sequestration. The six-year project aims to demonstrate that desertified rangelands can be cost-effectively reclaimed for the benefit of the local community while at the same time benefiting the global community through carbon sequestration. The project has adopted a community-based approach by establishing village-development groups who take responsibility for managing afforested areas.

Studies have also been carried out on the carbon sequestration potential of afforestation and forest conservation in Kazakhstan. In the non-power sector, afforestation and reforestation are considered a priority area for carbon sequestration, and one of the objectives of the "Forests of Kazakhstan" programme is to increase the forest area to 5.1 percent (about 3.8 million hectares) by 2020 – from 3.7 percent (9.6 million hectares) in 1990. Annual carbon dioxide (CO_2) sequestration under this programme is expected to increase by about 6 million tonnes, with total investment estimated at about US$3.5 billion. Implementation of this largely depends on resource availability and institutional capacity.

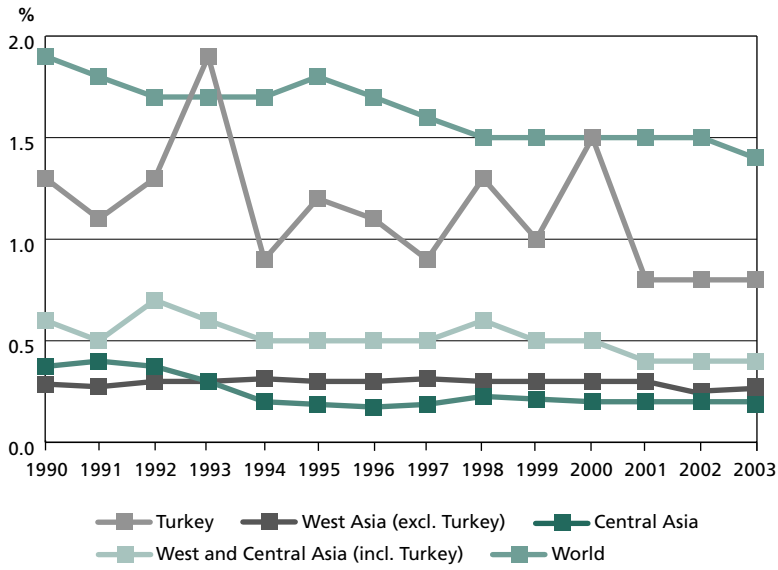
Although forests and woodlands are important carbon sinks, the scope for taking advantage of the CDM facility in the West and Central Asia region is limited. Most CO_2 sequestration projects now implemented in the region are outside the CDM framework, although there are a number of externally funded afforestation/ reforestation projects where CO_2 sequestration is accomplished incidentally. As such, the region does not have any CDM afforestation projects. Inherent low biomass productivity is a major limiting factor in taking advantage of the CDM facility. Because CDM is a market-based mechanism, most resources may flow to those countries that are able to sequester carbon more competitively. Low biomass productivity and the high costs of establishing plantations would make the cost of sequestration substantially higher. There are also a number of other stipulations that many countries may not be able to fulfill, not just for afforestation/ reforestation projects, but for all CDM projects.

ECONOMIC SIGNIFICANCE OF FORESTRY

Contribution to gross domestic product

In view of the low productivity of forests, the direct economic contribution of trees and forests to the national economies is negligible in most countries, except for Turkey and Georgia (Lebedys, 2004). Based on national income accounts, FAO has updated the long-term trends in the contribution of the forest sector to gross domestic product in the 1990-2003 period. In absolute terms, value added by the forestry sector increased in the region, mainly due to the expansion of the paper and furniture industries in West Asia. In 1990, value added generated by the forestry sector in the region was about US$3.5 billion and by 2003 this had increased to about US$4.0 billion. However, as Figure 3.4 illustrates, proportionately the share of

FIGURE 3.4
Contribution of the forestry sector to GDP: share of forestry, wood, pulp and paper, and furniture industries in gross value added



forestry has been on a long-term decline. This is nothing particular to forestry, but applicable to all other primary sectors, including agriculture.

Globally, the share of the forestry sector (including the furniture industry) declined from about 1.9 percent in 1990 to about 1.5 percent in 2003; the decrease was largely attributed to the faster growth of the other sectors. Within the West and Central Asia region, it declined from 0.6 percent in 1990 to about 0.4 percent in 2003. For reasons that are obvious, the share of the forest sector in West Asia is consistently higher than that of Central Asia; within West Asia, Turkey is a major player owing to its well-developed forestry sector, especially in the wood industries and pulp and paper sectors, which significantly contribute to its GDP.

Employment in the forestry sector

Analysis of national employment statistics indicates that in 2003 about 545 000 people were employed (full-time equivalent) in the forestry sector (excluding the furniture industry) in the region. Including the furniture industry, the total full-time employment in the region in 2003 was 620 000 people. Overall, the employment level in the forestry sector has remained stable in comparison with the level of employment in 1990 (when the total number of employees amounted to 628 000). The structural change within the sector is obvious – the number of employees in forestry has declined, but in other subsectors (industries) it increased. Figure 3.5 shows the number of persons employed (full-time equivalent) in the forestry sector.

In view of its relatively well developed forest industries, Turkey has a higher proportion of the labour force employed in the forestry sector in comparison with the rest of the region. In fact, Turkey accounts for 60 percent of the forestry sector employment in the region. Since the absolute number of people employed in the forestry sector has remained unchanged, the relative contribution of the sector to employment has declined over time (Figure 3.6). In line with global trends,

FIGURE 3.5
Trends in employment in the forestry sector (including furniture)

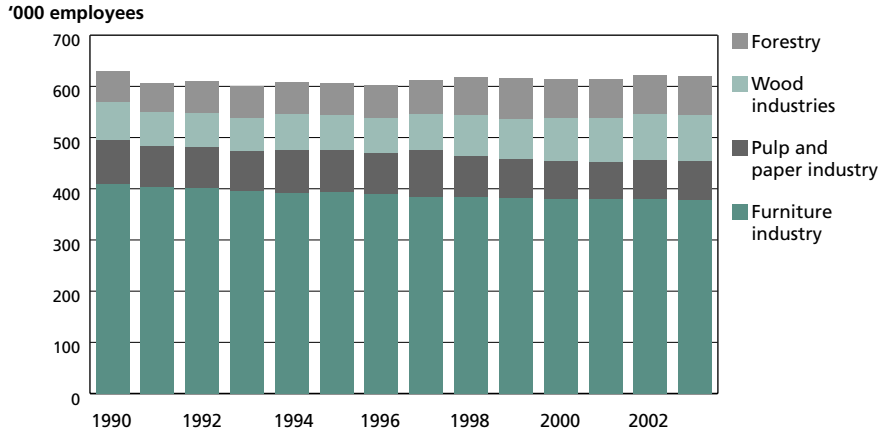
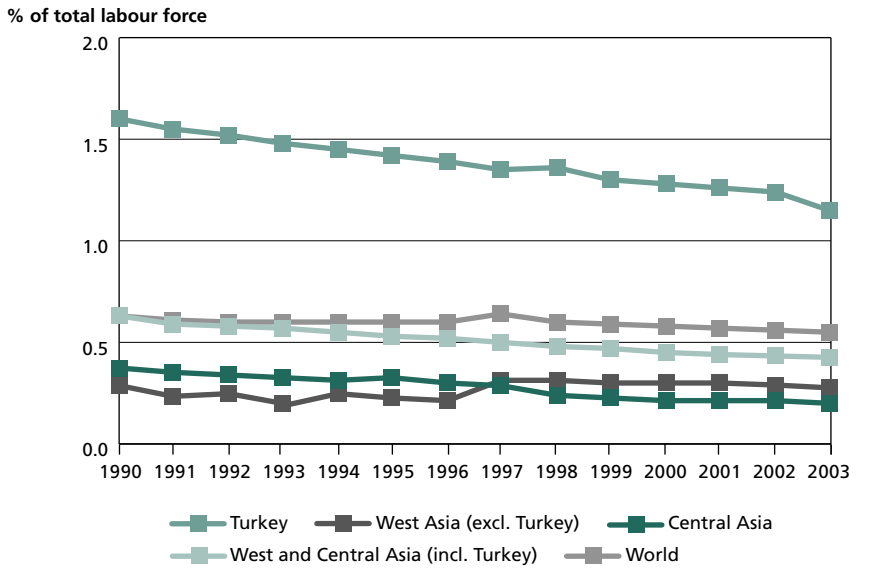


FIGURE 3.6
Employment in the forestry sector (including furniture)



forestry's share of employment in the region is declining. Although there has been some increase in employment in wood processing, the long-term prospects of such employment growth will depend on the availability of raw material (especially imports of industrial roundwood and sawnwood), growth in investments in wood processing and the nature of the technology adopted.

SIGNIFICANCE OF FORESTS AND WOODLANDS: AN OVERVIEW

Despite their low extent and productivity, forests and woodlands are important for their direct economic benefits, and more importantly, for the environmental services they provide. The following are some key aspects.

- Forest management for industrial wood production is limited to a few countries and most countries are dependent on imports to meet the demand for wood products.
- Fuelwood demand is declining, especially in view of the substitution with fossil fuels. However, in countries where access to fossil fuels is limited. it still remains the most important source of household energy for the rural population.
- Demand for charcoal is increasing because of increased urbanization and changes in lifestyles.
- There is an increasing recognition of the environmental functions of forests and woodlands. Of particular significance is their role in arresting land degradation and desertification, especially the protection of agriculture and habitations from sand encroachment.
- With the rapid growth of domestic and international tourism, the amenity values of forests and woodlands are being appreciated better. Several countries have stepped up their efforts to improve the urban environment by creating green spaces. In most countries, provision of such amenities will remain the most important function of forests and woodlands.
- While the direct contribution of forests and woodlands to gross domestic product and employment remains low (largely due to the small extent of forests and low productivity), the environmental benefits, although not quantified, remains important.