

4 SERVICES PROVIDED BY FORESTS AND TREES

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

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

4.1 Biodiversity conservation

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

Box 6 *Biodiversity in West Asia*

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

Habitat destruction and fragmentation have increased dramatically in most countries over the past three decades owing to the growth in human population and resource consumption. Degradation of unique terrestrial and aquatic ecosystems and loss of genetic resources are the main biodiversity issues in West Asia. Mangroves have been shrinking along the shores of the Gulf over the past 30 years owing to unplanned coastal development, so that only 125–130 km² of mangrove patches now remain.

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

Source: Global Environment Outlook 3, UNEP, 2002.

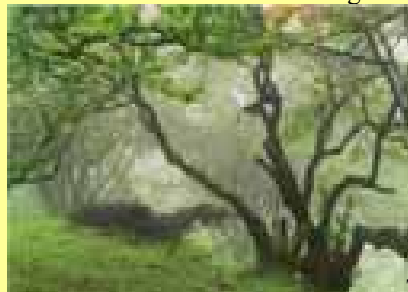
With regard to forest biodiversity, the area of primary forests has been fairly stable in West Asia over the past 15 years, although the forest area designated primarily for conservation has increased slightly in the past five years. Other indicators of biodiversity include the number of tree species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

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

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

Box 7 *Unique cloud forest with self-watering trees*

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



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

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

Source: LiveScience 2006.

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

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

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

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

4.2 Watershed protection

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

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

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

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

Tigris and Euphrates catchment basin



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

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

4.3 Desertification control

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

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

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

Box 8 *Land degradation and desertification in West Asia*

Sixty-four percent of West Asia's land base is drylands on calcareous soils prone to degradation. 79 percent of the land was degraded, with 98 percent of that being caused by people. Wind erosion, salinity and water erosion constitute the major threats, while soil waterlogging, fertility degradation and soil crusting are secondary problems. Poor management and irrational use of irrigation water has increased salinity and alkalinity, which affects about 22 percent of the region's arable land. Rangelands occupy over 52 percent of the total land area. The impacts of heavy and early grazing, rangeland cultivation and recreational activities have significantly reduced species diversity and density, and increased soil erosion and sand dune encroachment on agricultural lands. Forest degradation occurs widely. Fires, wood cutting, overgrazing, cultivation and urbanization all negatively affect the products and services of the forests.

Source: Global Environmental Outlook 4, UNEP, 2007.

Note: West Asia, classified by the UNEP GEO studies, include Bahrain, Iraq, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen

4.4 Forests and climate change

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

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

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