



**Forestry Outlook Study for West and Central Asia
(FOWECA) - FOWECA/WP/2**

Working paper

**Forest related environmental issues
in West and Central Asia: problems and outlook**

**Axelle Boulay
Rome, 2006**

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Information Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	CONSERVATION OF BIOLOGICAL DIVERSITY.....	3
2.1	Extent of biodiversity.....	3
2.2	Loss of biodiversity.....	3
2.3	Biodiversity conservation initiatives.....	4
2.3.1	Policy and strategic initiatives.....	4
2.3.2	Implementation of biodiversity conservation.....	5
2.4	Issues in the conservation of biological diversity.....	7
2.5	Factors impacting biodiversity conservation.....	9
2.5.1	Economic and social development.....	9
2.5.2	Political and institutional environment.....	10
2.6	Conclusion.....	11
3	FORESTS AND WATERSHED MANAGEMENT.....	13
3.1	An overview of water issues in the region.....	13
3.2	Large trans-boundary watersheds.....	14
3.2.1	Watershed management and forests.....	16
3.2.2	Demand management.....	17
3.3	Role of forests in small watersheds.....	18
3.4	Factors impacting watershed management.....	19
3.5	Need for an integrated approach.....	20
3.6	Conclusion.....	21
4	COMBATING DESERTIFICATION.....	23
4.1	Extent of the problem.....	23
4.2	Causes of desertification.....	26
4.2.1	Proximal factors.....	26
4.2.2	Fundamental causes.....	28
4.3	Current efforts to combat desertification.....	31
4.3.1	Regional and sub-regional initiatives.....	31
4.3.2	National initiatives.....	31
4.4	Forestry interventions.....	33
4.5	Conclusion.....	34
5	OPPORTUNITIES AND CONSTRAINTS FOR FOREST BASED ECOTOURISM... 35	35
5.1	Introduction.....	35
5.2	Tourism – a rapidly growing sector.....	36
5.3	Tourism, ecotourism and forests.....	37
5.3.1	Forests as tourism asset in the region.....	38
5.3.2	Key issues in eco-tourism in the region.....	39
5.4	Conclusion.....	42
6	FORESTS, CARBON SEQUESTRATION AND CLIMATE CHANGE MITIGATION .	43
6.1	Introduction.....	43
6.2	Ongoing initiatives for carbon sequestration.....	43
6.2.1	Afforestation and reforestation activities with carbon sequestration as an objective 43	43
6.2.2	Afforestation and reforestation under CDM.....	44
6.3	Summary.....	45

7	PAYMENTS FOR ENVIRONMENTAL SERVICES	47
7.1	Current situation	47
7.2	Future demand of environmental services	47
7.3	Future for payments	48
7.3.1	Local, national or regional buyers.....	48
7.3.2	Global buyers	48
7.4	Conclusion.....	49
8	FUTURE SCENARIOS FOR ENVIRONMENTAL SERVICES.....	51
8.1	Scenario 1: Successful environment conservation in a good economic and institutional context	51
8.2	Scenario 2: Efficient protection inside the national boundaries but trans-boundary issues are not addressed.....	52
8.3	Scenario 3: Difficult implementation because of serious economic and institutional constraints.....	53
9	SUMMARY AND CONCLUSIONS.....	55
10	ANNEXES	59
11	REFERENCES.....	63

LIST OF TABLES

Table 1	West and Central Asia: major watersheds.....	14
Table 2	Extent of deserts and drylands in West and Central Asia (in percentages of the total land area)	25
Table 3	International tourist arrivals in some of the countries in West and Central Asia	36
Table 4	International tourism in West and Central Asia – strengths, weaknesses, opportunities and threats	40
Table 5	Deserts and dryland areas in West Asia	59
Table 6	Deserts and dryland areas in Central Asia	59
Table 7	Extent of terrestrial protected areas (National IUCN categories I-IV Areas).....	60
Table 8	International Tourist Arrivals by country of destination.....	61

LIST OF FIGURES

Figure 1	Euphrates & Tigris Watershed	15
Figure 2	Syr Darya Watershed	16
Figure 3	Severity of human induced soil degradation	23

LIST OF BOXES

Box 1	Forest related environmental services in West and Central Asia – Key questions ...	2
Box 2	Biodiversity hotspots in West and Central Asia.....	3
Box 3	Agriculture expansion: a threat for biodiversity conservation	4
Box 4	Elements in Biodiversity Strategies	5
Box 5	The Pan-European Biological and Landscape Strategy	5
Box 6	Extent of terrestrial protected areas (National IUCN categories I-IV Areas)	6
Box 7	Central Asia Trans-boundary Biodiversity Project	7
Box 8	Kazakhstan: Resource allocation for environmental protection	7
Box 9	Biodiversity conservation in Armenia.....	8
Box 10	Effects of top-down approach to conservation.....	10
Box 11	The Royal Society for the Conservation of Nature, Jordan	11
Box 12	Soil Erosion in Turkey	13
Box 13	Effects of land use on watersheds	13
Box 14	Balkhash Lake - Another Aral sea in the making	15
Box 15	Water use in the Aral Sea basin	15
Box 16	Decline of the Aral Sea	17
Box 17	Observations on integrated watershed management in the Kura & Araz basin.....	18
Box 18	Impact of deforestation on water supply in Eastern Georgia	19
Box 19	Watershed management in Iran.....	19
Box 20	Management of scarce water resources and mitigation of drought.....	20
Box 21	Anatolia Watershed Rehabilitation Project	21
Box 22	Erosion and sedimentation	22
Box 23	Definition of desertification	23
Box 24	Desertification in West Asia	24
Box 25	Kazakhstan	25
Box 26	Causes of desertification in Iran.....	26
Box 27	Human induced desertification is the Aral Sea	27
Box 28	Impact of war on combating desertification in Iraq	29
Box 29	Combating desertification in Central Asia	29
Box 30	Poverty and land degradation in Turkey	30
Box 31	Rangelands in West Asia.....	30
Box 32	Central Asia – Priority areas of sub-regional cooperation	31
Box 33	Lines of Action in Combating Desertification in Lebanon	32
Box 34	Kazakhstan National Action Programme Objectives.....	32
Box 35	Greening of Ashgabat, Turkmenistan	33
Box 36	Tourism: A key objective of forest management in Cyprus	35
Box 37	Issues/ Questions relating to forest-linked tourism in West and Central Asia.....	35
Box 38	Tourism potential of Kazakhstan	37
Box 39	Trends in tourism in Uzbekistan	37
Box 40	Definition of ecotourism	38
Box 41	Hunting Tourism in Central Asia	39

Box 42	Central Asia Tourism: Current Status	40
Box 43	The Silk Road Project	41
Box 44	Ecotourism in forest villages in Turkey	41
Box 45	Degradation of tourism assets in Iran.....	42
Box 46	CDM projects and comparative advantages.....	45
Box 47	Who could pay for watershed protection?.....	49
Box 48	Scenario 1 in Cyprus	52
Box 49	Scenario 2 in Saudi Arabia.....	53
Box 50	Scenario 3 in Afganistan	53
Box 51	Scenario 3 in Afganistan or Yemen	54

1 INTRODUCTION

Availability of forest products and environmental services is a function of the state of forests and trees (including composition, productivity and location), the level of investment and the costs that the society is willing to pay for such goods and services. Increased awareness of the environmental role of forests has led to setting aside large tracts of forests as protected areas or to investing in afforestation/reforestation for enhancing the amenity values. Such awareness has also led to the increased scrutiny of the impacts of developmental activities that affect the flow of environmental services.

Conservation of biological diversity, protection of watersheds and control of desertification and land degradation are some of the important environmental services provided by forests, although the fulfilment of these functions varies considerably. More recently the recreational and amenity values of forests and trees are finding greater recognition and demand for eco-tourism based on forests and wildlife is growing rapidly. Urbanisation has further increased the demand for green spaces for recreational and other amenity purposes. Confronted with problems of climate change, increasing attention is also being paid to the role of forests and trees in sequestering carbon and afforestation and reforestation are recognized as eligible for financial support under the Clean Development Mechanism of the Kyoto Protocol.

It is in this context that the Forestry Outlook Study for West and Central Asia¹ aims to assess the current state of the provision of environmental services by forests and trees. The region is characterized by very diverse ecological and socio-economic conditions and consequently, what the different ecosystems can provide and how the society manages the different ecosystem services will vary. Box 1 outlines some of the key questions relating to the current and future role of forests and trees as regards the provision of environmental services. Information on the subject is rather fragmented and is not readily accessible. Therefore the main objective of this paper is to provide an overview of the available information on the role of forests and woodlands in the provision of environmental services in the Region. Largely this is based on a review of literature published in English, and to that extent this does not represent the entire knowledge base on the subject. Nevertheless an attempt is made to highlight the critical issues drawing upon the experience of addressing forest related environmental issues from the Region.

¹ The West and Central Asia region includes 23 countries namely Afghanistan, Armenia, Azerbaijan, Bahrain, Cyprus, Iran, Iraq, Jordan, Georgia, Kazakhstan, Kyrgyzstan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Tajikistan, Turkmenistan, Turkey, United Arab Emirates, Uzbekistan, Yemen.

Box 1 Forest related environmental services in West and Central Asia – Key questions

What is the current situation with regard to the provision of environmental services provided by forests and trees and to what extent their importance will change in the next two decades?

- Will the West and Central Asia region play an important role in the protection of biological diversity? What are the opportunities and challenges in utilizing biological diversity for social and economic development of the region?
- How is desertification and land degradation affecting the economic well-being of people? What options are available as regards forestry interventions to arrest desertification and land degradation? What will be the future scenarios as regards controlling desertification?
- What will be the future role of forests and trees in addressing the growing water scarcity in the region? To what extent forestry interventions could improve watershed values and what will be the future scenarios?
- What is the future of nature based tourism in the region? Which of the countries are in a position to fully capture this? And under what conditions?
- Will the region be able to contribute to global public goods, especially through sequestration of green-house gases? Will the countries be able to take advantage of the emerging opportunities for carbon trading?
- What are the prospects for forest-based eco-tourism in the region and what will be its impact on forests and forestry?

Keeping in mind the above questions, this paper aims to put together available information on the subject. Providing answers to all the above questions requires intensive research and in view of limited resources this has not been possible. Section 2 addresses the issues relating to conservation of biological diversity. Issues relating to the current state of knowledge on the role of forests and woodlands in the provision of watershed values are discussed in section 3. Section 4 provides an overview of the issues relating combating desertification focusing on the role of trees and forests. Opportunities for and constraints in forest based eco-tourism are examined in section 5. Section 6 highlights issues relating to carbon sequestration through afforestation in the Region. Emerging issues like payment for environmental services and its relevance to the Region are discussed in section 6. The concluding session summarizes important findings from the paper.

2 CONSERVATION OF BIOLOGICAL DIVERSITY

In the spectrum of land uses, forests are relatively less subjected to modifications and hence account for most of the terrestrial biological diversity. The status of conservation of biological diversity differs significantly among the countries in the region. Primarily this is dependent on (a) the inherent differences in composition of forests and tree lands, (b) the importance assigned to their conservation and management as reflected in the policies, legislation and institutional capacities and (c) how conflicts, especially on account of competing resource uses, are addressed. This section explores some of the issues and highlights the long-term prospects for conservation of biological diversity in the West and Central Asia region.

2.1 *Extent of biodiversity*

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, 4 are in the region (see Box 2).

Box 2 Biodiversity hotspots in West and Central Asia

Conservation International has identified the following 4 biodiversity hotspots in the West and Central Asia:

- **Mountains of Central Asia:** The hotspot's ecosystems range from glaciers to desert, and include a highly threatened type of walnut-fruit forest.
- **The Caucasus hotspot:** The deserts, savannas, arid woodlands, and forests that comprise the Caucasus hotspot contain a large number of endemic plant species.
- **The Irano-Anatolian hotspot:** 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.

Source: Conservation International, 2005

The mountains of Central Asia are of particular significance for their biodiversity. High diversity at the ecosystem, population and species levels is due to their locational attributes, in particular the several altitudinal belts. Mountain ecosystems serve as a place of origin of many cultivated plants and animal breeds and a refuge for several globally important species. Considerable areas in the Central Asian Mountains are under wild fruit-bearing forests, and represent the genetic centres of origin of cultivated varieties of apple, pear, pomegranate, etc. The Caucasus is also characterized by a high level of endemism (GRID-Tbilisi, 2002).

2.2 *Loss of biodiversity*

The region has suffered substantial loss of biodiversity (see Box 3) on account of human interventions. No more than 15% of the original native vegetation remains intact at present. Agricultural expansion, illegal felling, hunting and fires are some of the primary causes of forest loss and degradation resulting in biodiversity loss. Political tensions and military operations in the countries in the region have also resulted in the loss of forests and wetlands,

although as regards the latter, there are some positive indications of improvements in the marshlands in Iraq in the recent months. Loss of biodiversity is thus largely a function of the intensity of human intervention and the extent to which policy, legal and institutional mechanisms are in place to protect and manage biodiversity.

Box 3 *Agriculture expansion: a threat for biodiversity conservation*

In Kazakhstan, agriculture is one of the main threats for the ecosystems. In the 50's, more than 90% of the area of regular chernozems and around 60% 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 environmental quality in the Caucasus. Urban and rural development have converted most of lowland forests to agricultural and development lands.

Source: WWF, 2005

2.3 *Biodiversity conservation initiatives*

Most countries in the Region recognise the importance of conservation of biological diversity. The ratification of the Convention on Biological Diversity (CBD) by almost all countries (except Iraq) in the WECA region is an important step in this direction. In addition to CBD, many are also signatories to other related treaties and instruments, especially the RAMSAR convention and CITES. While this reflects the concern for protecting biological diversity, for several reasons implementation lags behind. Current efforts are outlined below:

2.3.1 *Policy and strategic initiatives*

Following the ratification of the Convention on Biological Diversity, most countries have prepared National Environmental Action Plans (NEAP) or National Biodiversity Strategy and Action Plans (NBSAP). Although priorities may differ between countries, most of these programmes and plans adopt a common framework with considerable emphasis on awareness generation, assessment of the status of biodiversity, improvement of institutional capacity, etc. (see Box 4). In most cases, such initiatives are undertaken with financial and technical support from bilateral and multi-lateral organizations and international non-governmental organizations. Such assistance has been particularly important and many countries would not have been able to develop national strategies and action plans without such support. However, this raises the question of long term sustainability, especially when resource availability for implementation is limited and preparation of plans is just an initial step which is relevant only if it is followed up with concrete action.

Box 4 Elements in Biodiversity Strategies

As per the Iranian National Biodiversity Action Plan, four strategies have been formulated for conservation of biodiversity. These include:

- Promotion of public participation, including private sector and non-governmental organizations,
- Establishment of biodiversity information and monitoring systems,
- Reorganization of institutional structures for sustainable use,
- Systematic management of biodiversity resources.

Source: Forests, Rangelands and Watershed Management Organization of Iran, 2005

In addition to global conventions, many countries are also signatories to regional and sub-regional strategies and priorities (for example see Box 5). Accessing external resources and enhancing collaboration, especially to address trans-boundary issues, are some of the objectives of participation in regional and global initiatives. To some extent this has resulted in programmes and activities that are important from the perspective of the donors, but not necessarily of high priority for governments and other national level stakeholders. No doubt that biodiversity conservation is recognized as important, but most countries are unable to assign a high priority for this in resource allocation, especially in the context of other urgent economic and social priorities.

Box 5 The Pan-European Biological and Landscape Strategy

The Pan-European Biological and Landscape Strategy was endorsed at the third Ministerial Conference “Environment for Europe” in 1995 with the objective of providing an innovative and pro-active approach to stop and reverse the degradation of landscape diversity values in Europe. All the 8 countries in the FOWECA study covering the Caucasus and Central Asia are signatories to this strategy. Initiatives under this include support to the preparation of national biodiversity strategies, establishment of a Pan-European Ecological Network, integration of biological and landscape diversity considerations in all sectors, raising awareness, action to protect threatened species, etc.

Source: EFI, 2005

Another thrust of the national environment plan/ national biodiversity action programme is the establishment of appropriate institutional arrangements to enforce the policies and legislation. In many cases this task has been assigned to newly established environment departments. They are required to coordinate and oversee the implementation of biodiversity initiatives by other departments, including the forestry agencies.

2.3.2 Implementation of biodiversity conservation

In most countries, biodiversity conservation has adopted a two-pronged approach involving:

- Establishment of a system of protected areas ; and
- Mainstreaming biodiversity protection into all developmental activities.

Invariably much of the emphasis has been on the former and substantial areas have been set aside as protected areas. The current level of efforts of these two approaches and their efficacy are discussed below:

Establishment and management of protected areas

As elsewhere in the world, establishment of protected areas has been probably the most important strategy as regards conservation of biological diversity in the West and Central Asia and the Caucasus. Effectiveness of this depends on:

- The extent of protected areas and in particular whether they cover critical biomes that are important from the perspective of biodiversity.
- Efficacy of management of protected areas, especially in the context of increasing land use conflicts.

These issues are dealt with in the following paragraphs:

Extent of protected areas

The total extent of protected areas (I –IV) is about 16.3 million hectares in the West Asia, 14.9 million hectares in Central Asia and 1.0 million hectares in the Caucasus, respectively accounting for about 2.4%, 3.7% and 5.3% of the land area (see Box 6). In the case of West Asia, Iran accounts for 63% of the protected areas, while in Central Asia and the Caucasus, Kazakhstan alone accounts for about 49% of the protected areas. In terms of the proportion of land area covered, Tajikistan has about 18.2% of its area as protected. Other countries with a high proportion of area under protection are Armenia (10%), and Cyprus (8.2%). In addition to these, there are other areas that are declared as protected, but need not fall into the IUCN categories. Saudi Arabia is an example where there are extensive areas which are declared as protected but outside the IUCN grouping and when these areas are also included, the extent of protected areas in the country increases from 1.8% to about 38% (see table in Annex 2).

Box 6 Extent of terrestrial protected areas (National IUCN categories I-IV Areas)

Area Name	Terrestrial Protected area	
	Area (000 Ha)	Percentage of land
CENTRAL ASIA	14,887	3.7
CAUCASUS	983	5.3
WEST ASIA	16,336	2.4
TOTAL WECA region	32,206	2.9

Source: United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC), 2005

Management of protected areas

Recent years have witnessed some efforts to improve the management of protected areas, especially through external support. One important initiative is the enhancement of inter-country collaboration in managing contiguous protected areas. A prime example of this is the Central Asia Trans-boundary Biodiversity Project supported through the Global Environment Facility (see Box 7).

Box 7 Central Asia Trans-boundary Biodiversity Project

The project, implemented under the guidance of a Trans-national Steering Committee, currently includes the Aksu-Djabagly Reserve of Kazakhstan, the Sary Chelek, Besh Aral reserves in Kyrgyz Republic and Chatkal Reserve of Uzbekistan. Support is being provided to the four protected areas through capacity building (including training, transport, communications and infrastructure), community awareness, education, research and monitoring. The four reserves are managed at the national level, but the project has facilitated the adoption of compatible management standards. The project is demonstrating the value of regional approaches to transborder ecosystem management, especially through intercountry collaboration.

Source: Global Transboundary Protected Areas Network, 2005

2.4 Issues in the conservation of biological diversity

Management of protected areas

The extent of efforts to manage biodiversity varies enormously. Some of the protected areas are highly degraded receiving little or no protection. Boundaries are often not clearly marked and local people may not be aware of the protected status of such areas. Park boundaries often omit areas of high biodiversity value that are just beyond the boundary, while including large-scale farming areas and high-intensity tourism sites. Poor infrastructure, limited staff and absence of financial support (see Box 8) undermine the efficacy of protection.

Box 8 Kazakhstan: Resource allocation for environmental protection

Government expenditure on environmental protection is low in the Euro-Asian context – it seems to amount to no more than US\$ 0.5 per person per year. About 70% of the state-sector expenditure for nature protection is planned from local resources. But the decentralization of responsibilities is rarely supported by sufficient financial resources. As a result, there is excessive fragmentation of capacities and responsibilities.

Source: United Nations Economic and Social Council, 2003

Sustainability of protected area management also depends on the economic viability of alternative uses. Often, protected areas are established when no economically viable alternative uses are foreseen and therefore involve no direct or indirect costs. This is particularly true in the case of remote inaccessible areas with low or negligible population pressures. Factors like improved accessibility enhance the opportunity costs and this in turn increases the pressure to use protected areas for alternate uses.

Implementation of national action plans

As indicated earlier, most countries have prepared national biodiversity action plans. While these outline what needs to be done, implementation of the proposals is constrained by a number of factors:

- Inter-sectoral issues have not been addressed effectively and most often key departments or ministries responsible for land use – mining, agriculture, forestry, and animal husbandry – are not involved in the process. In many countries, coordination of

biodiversity conservation is the responsibility of the environment department and the limited resources constrain their ability to undertake the tasks assigned to them.

- Discontinuities in the policy and institutional environment are a major problem in the conservation of biological diversity. In many countries, there have been too frequent institutional changes that have undermined continuity of initiatives. This has been particularly severe in the case of the countries in Central Asia and the Caucasus in the context of the political and economic changes stemming from the collapse of the Soviet system.
- 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 in view of the limited domestic resources many of the proposals remain “paper-plan”. More importantly, inadequate attention is given to mainstream biodiversity conservation into other land uses.

Conservation of biodiversity outside protected areas

In general, biodiversity conservation efforts are implemented in isolation, and most conservation efforts are focused on designated protected areas, neglecting what happens outside (see Box 9). However, many endangered species are found outside the protected areas. Protected areas do not represent all the critical biomes. The existing protected area system encompasses some of the ecosystems and eco-regions, but others –notably steppes, deserts and semi-deserts– are poorly represented. Temperate grasslands typical of Central Asia are poorly protected and are often subjected to intense pressures from alternative uses. Protection of biodiversity outside the designated areas requires mainstreaming conservation into all economic activities, especially agriculture, animal husbandry, development of infrastructure facilities like roads, irrigation, hydel reservoirs, etc. Policies in other sectors do not take cognizance of biodiversity conservation. Incorporation of biodiversity conservation issues would imply costs. Willingness of society to meet such costs is thus critical to ensure that conservation issues are taken into account in all developmental activities. Current political, institutional and economic conditions in many countries make this difficult and this aspect receives negligible attention.

Box 9 Biodiversity conservation in Armenia

“Biodiversity is threatened by natural resource mining. Increasing pressures on critical rangelands and forest habitats have been reduced to isolated areas of globally significant biodiversity, making the movement of wildlife increasingly difficult. Even within protected areas such Dilijan State Reserve, for example, many demarcated “protected” areas are becoming small islands rather than part of a larger mosaic of protected ecosystems inside and outside park boundaries. Under-use of remote cropland and range also threatens agrobiodiversity, which depends on interaction with agricultural activities such as grazing and mowing. Due to the difficulty of access to them, many meadows are no longer used and may lose their global ecological value.”

Source: Ministry of Nature protection, 2002

Further, the value of some of the protected areas for biodiversity conservation is rather limited, especially as some of them have been established primarily for recreation and tourism.

Mainstreaming biodiversity in key economic activities

Environment Impact Assessment (EIA) is one of the important tools that could help to incorporate biodiversity conservation issues into all key economic activities. Its wider application is constrained on account of:

- EIAs are undertaken for a very limited number of large projects and small scale projects and activities are excluded from its purview. Although individually their impact may be low, collectively their impact on biodiversity and other environmental aspects could be substantial.
- Even in the case of large projects, there are limitations to the application of EIAs in conserving biodiversity. Limited technical and financial resources, short term economic compulsions and limited awareness of long-term impacts of loss of biodiversity, undermines the effectiveness of EIA as a tool that could help prevent or mitigate the adverse effects of development activities on biodiversity conservation. Agencies implementing large developmental projects are often reluctant to undertake systematic EIAs on account of the higher costs that may arise from incorporating environmental considerations in project implementation. Often the environmental costs and benefits are inequitably distributed, and those who incur environmental costs are economically and politically marginalized voice-less communities.
- EIA studies are often only made to secure funding and the mitigation plans are not actually implemented.

2.5 Factors impacting biodiversity conservation

Conservation of biological diversity fundamentally revolves around land use changes, in particular expansion of agriculture (including animal husbandry) and conversion of natural vegetation to monocultures. Other factors that affect biodiversity include over harvesting of selected plants and poaching of animals. Large infrastructure projects like reservoirs, irrigation canals, oil and gas pipe lines, roads, etc. also affect biodiversity protection. Intense visitor pressure has been another factor that has degraded ecosystems in some of the countries (for example Saudi Arabia). In West and Central Asia and the Caucasus, there has been a significant expansion of crop production through clearance of forests and other woodlands. Also in several countries, grazing pressures have increased, undermining regeneration of important plants. Food self-sufficiency policies have led to the extension of cultivation to marginal areas, resulting in their degradation, including loss of natural flora and fauna. These proximal drivers are largely influenced by:

- Overall level of economic and social development;
- Policy and institutional environment.

2.5.1 Economic and social development

The economic and social conditions directly and indirectly influence the ability and willingness of people to conserve biodiversity. In general, conservation of biodiversity is easy in situations characterized by higher national and household incomes, low levels of poverty and low levels of direct and indirect dependence on land. However, such a situation exists in

very few countries, whereas the opposite is more relevant for most countries in the WECA region.

More common is a situation characterized by low levels of income, continued population growth, consequent pressure on natural resources and low investments in human resource development, all of which undermine biodiversity conservation. Poor state of the economy also affects the ability of governments to invest in biodiversity conservation measures, especially in the context of other urgent priorities like investment in education, healthcare, etc. In such situations, there is considerable dependence on external assistance.

2.5.2 Political and institutional environment

The political and institutional situation defines the scope for involvement of different actors in a wide range of activities including conservation of natural resources. In the WECA region, the situation in this regard varies ranging from highly centralized top-down approaches to decentralized participatory approaches.

- *Centralized decision-making:* In most countries, conservation efforts are largely spearheaded by governments. Excepting in a few instances, other players (communities, civil society organizations, individuals, etc.) have only limited roles. Implications on biodiversity conservation in such situations will depend on the perception of governments of the significance of biodiversity conservation and more importantly the overall economic situation. Success of conservation initiatives in many situations depends on the specific local situation, especially the active participation of local communities. On the other hand, top-down approaches (see Box 10) enhance conflicts, undermining conservation efforts.

Box 10 Effects of top-down approach to conservation

It is difficult to develop effective programmes for conservation in the region, because there is no tradition to involve local people in natural resources management. Local people are generally unhappy with the existing biodiversity conservation programmes because they are not involved in decision-making. In addition, they see both direct and indirect costs with no benefits for them. This has a direct negative impact on the ability and willingness to protect and manage biodiversity. In fact, because of this, laws, which in any case often lack implementing regulations, are unimplementable.

Source: USAID, 2001

In many countries there has been some proliferation of governmental institutions often resulting in overlapping responsibilities. “*There is duplication of enforcement functions (e.g. for forestry inspections, the State Forestry Department, the State Ecological Police and the Ministry of Environment, all have responsibilities), and all inspectorates are under-funded.*” (United Nations Economic and Social Council, 2003). This fragmentation of efforts has complicated effective implementation of various programmes.

- *Decentralized decision-making:* Wider participation of people in resource management requires appropriate political and institutional environment and this is still in its infancy in the region. Non-governmental organizations and other civil society institutions are involved in creating awareness and supporting conservation efforts. Whether this will have an impact or not will however depend on the overall

economic situation. Communities which are relatively well-off and are aware of the long-term benefits of conservation are willing and able to pay for biodiversity conservation and vice versa.

There are a number of successful initiatives by civil society organizations although what they do directly and indirectly depend on financial support from governments or external agencies. One of the most successful NGO initiatives is the one of the Royal Society for the Conservation of Nature in Jordan (see Box 11).

Box 11 The Royal Society for the Conservation of Nature, Jordan

The Royal Society for the Conservation of Nature is an independent voluntary organization, established in 1966 with the mission of protecting and managing the natural resources of Jordan. It has been instrumental in establishing protected areas, captive breeding of endangered species and setting up nature conservation clubs in schools helping to enhance awareness about environmental conservation.

Source: Royal Society for the Conservation of Nature, 2005

2.6 Conclusion

In almost all countries in the Region there is widespread recognition of the importance of conservation of biological diversity. Most of the countries in the region have ratified the Convention on Biological Diversity and many have prepared national strategies and plans to protect and manage biodiversity. Several countries have established a system of protected areas to conserve and manage important biomes, ecosystems and species. The Region has over 32 million ha under the system of protected areas accounting for about 2.9 percent of the land area. Awareness of the significance of biodiversity has mobilized substantial civil society initiatives. Governments in the Region however continue play a critical role in these efforts, especially as they own most of the land and other natural resources and drive the various social and economic development initiatives.

However, there are concerns about the effectiveness of the current level of efforts in protecting biological diversity. Most countries are in the early phase of economic growth, inevitably resulting in rapid changes in the way natural resources are used. Under the current approaches to economic development, there is a strong tendency to give priority to immediate monetary benefits and in the process long term social and economic benefits from environmental protection tends to be given a low priority. In the event of a conflict in resource use that involves foregoing immediate benefits for conservation of biological diversity, strong compulsions exist not to follow the conservation option. Institutional capacity for biodiversity conservation remains weak and often the efforts are fragmented. Key players, whose actions result in biodiversity loss, are not fully involved in the conservation efforts. Financial resources available for conservation efforts remain limited. In many countries staff involved in managing the protected areas is not provided with the tools and facilities to effectively discharge their responsibilities. There is also high dependence on external support that is often not sustained after a few years.

3 FORESTS AND WATERSHED MANAGEMENT

3.1 *An overview of water issues in the region*

Water is one of the most critical natural resources in West and Central Asia and the Caucasus and is a key concern of national and regional security. Almost all countries in the region face high water deficit, which is expected to worsen in the future, accentuating social, economic and political problems. Most of the important river systems have been subjected to major modifications, especially to improve irrigation and to generate power. Sharing of water between different countries and sectors remains a contentious issue, and as elsewhere, many of the conflicts in the region have some link to securing and protecting water supplies.

Box 12 Soil Erosion in Turkey

Soil erosion occurs on about 75% of Turkey's land area and is one of the most serious environmental problems in the country. According to surveys, the amount of soil carried off by erosion is more than 500 million tons annually of which 350 millions are carried by rivers and streams into dam reservoirs, interfering with their vital functions in the energy, irrigation and agriculture sectors. Damage from frequent floods is also very serious.

Source: Bishop and Young, 1995

Degradation of watersheds and its consequences on water supply, including for irrigation and hydel projects, have been reported widely (for example, see Box 12). While soil erosion 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 and "the sponge effect" of forest floor in absorbing and releasing water have often ignored the specific situation in the various watersheds. The two key issues that need to be addressed are:

- The extent to which forests and trees augment/ regulate the supply of water, including maintaining its quality; and
- Demand for water by afforestation and reforestation in competition with alternative uses.

Box 13 Effects of land use on watersheds

"The effects of land use on water resources vary according to local conditions. The assessment is difficult due to large delays between cause and effect and the interference between anthropic and natural impacts caused by e.g., climatic changes. These limitations make it difficult to draw general conclusions about the relations between land and water use in watersheds. However, some experiences show that land management impacts on watershed hydrology and sedimentation are observed more clearly in small watersheds of about tens of square kilometers. Some land management effects on water quality can be observed also at larger scales"

Source: FAO, 2004

Considering the differences in ecological conditions including rainfall, topography and land use, the effects of land use including the role of forests and trees in regulating water flow could significantly vary according to local conditions (see Box 13). The size of the watershed

and the overall state of land use are more critical. There are several large watersheds that are spread over more than one country and several smaller sub-watersheds. The mismatch between distribution of water vis-à-vis human and livestock population accentuates the problem of water sharing, especially when water is seen as a free “God-given” good.

Studies hitherto indicate the effect of size of watersheds on the possible role of forests and trees in regulating water flow. Vegetation is one of the many factors that influence hydrology and the complexity of interaction makes it extremely difficult to clearly isolate the role of forests and trees. In the case of larger watersheds, the role of forests and trees in enhancing dry season flows and control of floods seems to be minimal, although this may be important in the case of small watersheds.

3.2 Large trans-boundary watersheds

Many rivers in Central Asia, Caucasus and West Asia traverse more than one country and managing demand and supply between countries faces economic, social, institutional and political problems. The hydrological functions of forests in regulating water flow needs to be seen in this context. Table 1 gives the extent, number of countries covered, population and land use in the major trans-boundary watersheds in the region.

Table 1 West and Central Asia: major watersheds

Major watersheds in the region	Watershed area (km ²)	Countries within the watershed	Population density (per km ²)	Percent of watershed that is:				Large dams in progress	Percent of protected area
				Crop-land	Forest	Grass-land	Arid area		
Amu Darya	534,739	5	39	22.4	0.1	57.3	72.0	2	0.7
Euphrates & Tigris	765,742	5	57	25.4	1.2	47.7	90.9	19	0.4
Kizilirmak	122,277	1	55	38.0	1.6	52.0	84.9	9	0
Kura & Araz	205,037	5	75	54.0	7.1	30.6	25.4	4	4.3
Lake Balkhash	512,015	2	11	23.2	4.0	61.1	91.6	0	7.2
Ob	2,972,493	4	10	36.9	33.9	16.0	42.5	0	1.9
Syr Darya	782,617	4	28	22.2	2.4	67.4	88.5	4	1.0

Source: World Resources Institute, 2004 (Earth trends)

Amu Darya: Turkmenistan + Uzbekistan + Tajikistan + Afghanistan + Kyrgyzstan

Euphrates & Tigris: Turkey + Iran + Iraq + Syria + Saudi Arabia

Kizilirmak: Turkey

Kura & Araz: Armenia + Azerbaijan + Georgia + Iran + Turkey

Lake Balkhash: Kazakhstan + China

Ob: Mongolia + Kazakhstan + Russia + China

Syr Darya: Uzbekistan + Kazakhstan + Kyrgyzstan + Tajikistan

Ob is the largest watershed, but only a small part of it is in the region, in Kazakhstan, while most of it is in China, Mongolia and Russia. The watershed of Lake Balkhash is mostly in Kazakhstan, but inflow is from China, especially through river Ili. There are already concerns that increased use of water in China is reducing inflows to Lake Balkhash with adverse environmental consequences (see Box 14).

Box 14 Balkhash Lake - Another Aral sea in the making

Lake Balkhash is the second largest water body in Central Asia after the Aral Sea. Increased use of water and evaporation has already led to its shrinkage. The situation seems to worsen further on account of the planned diversion of the Ili River in China, particularly to enable agricultural and industrial development of the Xinjiang Uygur Autonomous Region. As well as a source of fish, Lake Balkhash also provides water for irrigation and hydropower. The diversion of water could aggravate tensions in the region.

Source: UNEP, 2005 (a)

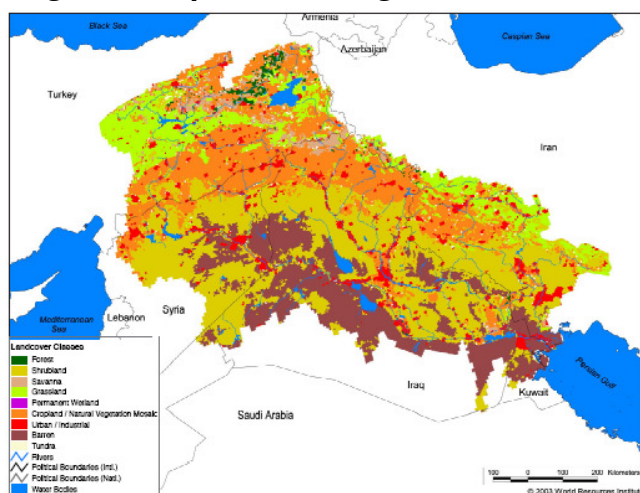
The most important watershed in Central Asia is that of the Aral Sea consisting of the rivers Amu Darya and Syr Darya. This has been subjected to substantial modifications through construction of irrigation and hydel projects (see Box 15). Aral Sea represents one of the major environmental disasters in the region, resulting in the drying up of the sea on account of water diversion and land degradation in extensive areas through salt deposition.

Box 15 Water use in the Aral Sea basin

The Aral Sea basin, consisting of the two most important rivers in the region, namely Syr Darya and Amu Darya and their tributaries, has over 60 reservoirs with a usable capacity of over 10 million m³ each. Their total volume is 64.5 km³ of which 46.5 km³ is the usable capacity. These reservoirs and a network of irrigation canals, including large scale lift irrigation and gravity irrigation facilities are the mainstay of the agricultural economy of the countries in Central Asia. Of the total irrigated area of 7.9 million ha in the countries, about 5 million ha is in the Aral Sea basin. In the Central Asian countries, there are 45 operational hydropower stations with a total capacity of 34.5 GW, with individual capacities ranging from 50 to 2,700 MW. Hydropower accounts for about 27% of power consumption in the Aral Sea basin countries, with Tajikistan and Kyrgyzstan getting more than 90% of the consumption from hydropower.

Source: Interstate Coordination Water Commission (ICWC), 2005

Figure 1 Euphrates & Tigris Watershed



Watershed management in Central Asia and the Caucasus poses unique challenges, especially in the post Soviet period. Independence from the Soviet Union and consequent changes in economic, political and institutional environment has particularly impacted water management in Central Asia and the Caucasus. Until then, water sharing was largely an internal issue and was dealt with under unified management of the erstwhile Soviet Union. Consequent to the political changes, internal water sharing problems have become inter-country issues. Mechanisms

like the Interstate Coordination Water Commission (ICWC) are in place to facilitate water sharing among the 5 Central Asian countries.

The Euphrates and Tigris rivers are the largest in the West Asia region (see Fig 1). Both rivers originate in the mountains of Turkey, flow through Syria and Iraq and drain through the Shatt

Al Arab waterway into the Persian Gulf. Several tributaries of the Tigris drain the Zagros Mountains between Iran and Iraq. Ninety percent of the water in Euphrates River originates in Turkey, though it accounts for only about 28% of the river basin. Sharing of water has been a long-standing dispute between Iraq, Syria and Turkey, all of which have a rapidly growing population requiring increased withdrawal of water for agriculture, industries and domestic consumption. Some of the key issues that exacerbate the problem have been discussed at length (see Kangarani, 2005) and include:

- Overall water supply deficit in the region;
- High dependence of people on the this river system;
- Increased demand on account of rapid population growth in the watershed;
- Over-use, wasteful practices and pollution of groundwater;
- Persistence of mistrust and suspicion among countries and people on the sharing of water resulting in “zero-sum diplomacy” and conflicts (Kangarani, 2005)

There are several other watersheds which, although small, are trans-boundary in nature and form the centre of water sharing disputes in West Asia. For example, despite its small size, the Jordan River, shared by Syria, Jordan, Israel and Lebanon, is the locus of intense international competition. It drains an area of less than 20,000 km² where the average annual precipitation is less than 200 mm. Since the establishment of Israel in 1948, this basin has been the centre of intense interstate conflict and the dispute over the waters of Jordan River is an integral part of this conflict (Al-Zagaibeh Heedier, 1995).

3.2.1 Watershed management and forests

In analyzing watershed management in relation to forests and woodlands, the nature of land use, including the extent of forests and their distribution and the total amount and intensity of precipitation are probably the most important.

Figure 2 Syr Darya Watershed

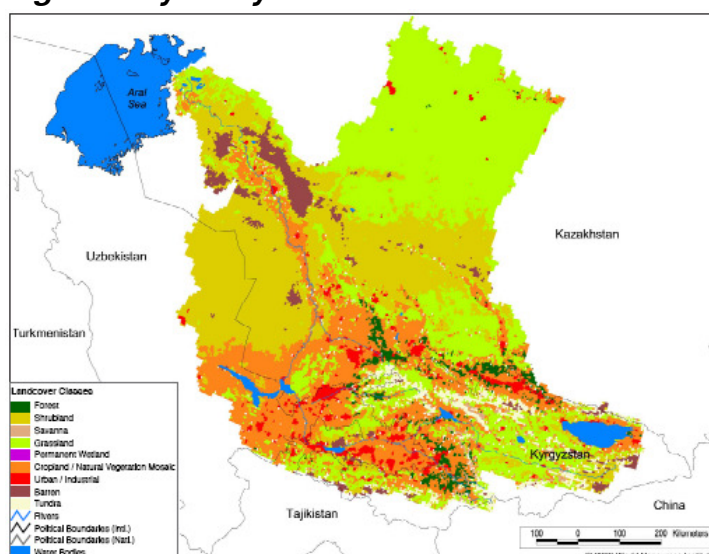


Table 1 shows that the extent of forest cover in all the important watersheds in the region, excluding the Ob River (whose catchment largely falls in China, Mongolia and Russia), varies from 0.1% in the case of Amu Darya to about 7% in the case of Kura & Araz watershed which has higher forest cover especially in view of the high forest cover in Georgia, the most forested country in the Caucasus. In the case of Syr Darya, the forest cover is only 2.4% (see Fig 2).

Since the predominant land use in almost all the watersheds is grass lands and crop lands, how these are managed is more critical as regards watershed values than the potential regulatory functions of forests. Studies

as regards the impact of different land uses on watershed values indicate that well managed grasslands are able to protect watersheds as effectively as forests. Although at the micro-level, forests may have some role and its clearance could alter the pattern of flow, at the macro-level the role of forests seems to be rather limited.

More importantly, the intensity and the nature of precipitation are key factors that influence the watershed values, especially as regards soil loss. As indicated in Table 1, a significant share of the watersheds comprises of arid areas. The average annual precipitation in most of the key catchments is less than 250 mm. Further, most of the key river systems, especially in the Central Asia, are fed by melting snow. This implies that most of the flooding takes place during spring and summer, and obviously the role of forests and trees in regulating this becomes minimal, in addition to the fact that forest cover in the catchments is rather negligible.

Hence the potential role of forests in intercepting rainfall and enhancing infiltration is rather limited in most of the large catchments in the region. Regulating the overall supply of water seems to go far beyond what can be currently accomplished by forests and trees. Other land uses, especially agriculture and range, seem to be more important than forests and trees per se in the region. Considering the complex nature of hydrology and the multitude of factors that affect quantity and quality of stream flow, afforestation as a means of regulating water flow is unlikely to make a dent on the water crisis in the region. Given the preponderance of arid and semi-arid land, afforestation is more likely to enhance water loss on account of increased evapo-transpiration. More crucially, afforesting the degraded range and agricultural lands may face significant economic constraints.

3.2.2 Demand management

Finding a solution for the water crisis in the region hence primarily depends on demand management. Indeed, the main problem relating to water in most countries in West and Central Asia and the Caucasus largely stems from unplanned use without due consideration for long term ecological impacts. Managing the demand and an effective mechanism to coordinate efforts at the regional level, especially to enable an equitable distribution of available water and to ensure maintenance of water quality is the most important issue in the region. A classic example of unplanned development of agriculture and the diversion of water for large scale cultivation is the Aral Sea (see Box 16). Substantial efforts are underway to address the problem of degradation caused by the drying up of the Aral Sea - including stabilizing the exposed areas through afforestation and rehabilitation of salt-affected areas - especially as along as demand is not managed and inflow into Aral Sea is not restored.

Box 16 Decline of the Aral Sea

The crisis of the Aral Sea, its basin and the surrounding area is well known. Excessive water consumption for irrigated agriculture and other water consuming sectors during the last three decades has resulted in the Aral Sea losing its fisheries, transportation and various biological functions. Its volume has decreased to one third and area by half, while the salinity has increased by 5 times. The deltas of Amu Darya and Syr Darya rivers, which flow into the Aral Sea, have been affected by degradation. The dry sea bed has become a centre for spreading salt and dust over thousands of kilometres from the shoreline drastically undermining agricultural productivity.

Source: Dukhovny et al., 2001

Another major problem relating to water in the West and Central Asia is the high levels of pollution and contamination, making water unusable for domestic, agricultural and industrial uses. Increased use of fertilizers and pesticides in agriculture, discharge of industrial waste into water courses and inadequate treatment of waste water are the major sources of water contamination. In the context of such major problems relating to increased demand and decline in the quality of water, the supply stabilizing role of forests is often seen less important by those dealing with water management in most of the countries (see Box 17).

Box 17 Observations on integrated watershed management in the Kura & Araz basin

- Effective integrated water resource management approaches within each country are necessary for effective trans-boundary integrated water resource management;
- Present water management and enforcement regimes within each country are legally and institutionally weak, but stronger regimes will be essential to establish integrated water management and agreements.
- Ministries of environment/ nature protection are the weakest agencies in the countries, and reliance on them for integrated water resource management as currently empowered and supported is problematic.

Source: Development Alternatives, 2002

3.3 Role of forests in small watersheds

The regulatory functions of forests seem to be more important in the case of small watersheds. In many cases, although the rainfall is low, it is often very intense resulting in high levels of surface run-off. Much of the problem stems from changes in land use, especially when wood lands are cleared for high tillage uses without adequate efforts to adopt soil and water conservation measures. Increased grazing, far beyond the carrying capacity, resulting in soil compaction is another factor that reduces infiltration, and consequent increase in surface run-off.

Several instances of adverse impacts on stream flow on account of forest clearance have been reported from the region (see Box 18). Deforestation and over-grazing have led to erosion causing high turbidity of water in many countries. For example the Araz River in Azerbaijan is reported to be one of the most turbid rivers in the world (United Nations, 2004). High turbidity increases the cost of drinking water and Azerbaijan faces serious problems with water quality especially it is at the end of the Kura & Araz basin. This is all the more so in countries whose economic situation is unsatisfactory and where most of the population is rural, for example in the case of Yemen. Grazing and woodfuel collection (especially production of charcoal) are the most important problems causing watershed degradation in Yemen.

Box 18 Impact of deforestation on water supply in Eastern Georgia

In Eastern Georgia, forests perform an important water protection role but they have been overexploited during recent years mainly through illegal commercial logging by the local population. As a result, numerous villages that depend on springs for water supply were left without water at all and their inhabitants are facing migration. Local authorities are well aware of this but are unable to mitigate the situation.

Source: GRID- Tbilisi, Caucasus Environment Outlook, 2002

As indicated earlier, the West and Central Asia region is characterized by extreme aridity with a high proportion of the area receiving an annual rainfall of less than 100 mm. In the context of acute limitations of extracting surface water, there is increasing dependence on tapping ground water, or as in many resource-rich countries, on desalinization of sea water. Role of forests and trees in conserving water in such situation is very limited. While trees may have some role in protecting stream banks from flash floods, any efforts to afforest such areas need to take into account the high rate of evapo-transpiration. Experience hitherto indicates that afforestation in such areas, especially to arrest land degradation and desertification, often requires irrigation in the early stages of establishment.

Box 19 Watershed management in Iran

As in most other countries of West Asia, water availability is the most critical issue as regards 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 degradation of catchments, this results in soil erosion and floods. 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 Larian, Sefidrud and Dez dams, which will be filled in a not too distant future.

Source: Iran Daily, 2004

No doubt watershed degradation is an important issue in these areas, especially when the rainfall is concentrated in a few months (See Box 19). But in most cases this stems from overgrazing and the increasing demand for woodfuel, for meeting household needs and for sale to earn cash income as in the case of low income countries like Afghanistan and Yemen. While changes from forests to other land uses may increase the run-off immediately, eventually it stabilizes, while afforestation may not have a significant effect on reversing the situation, considering the high evapo-transpiration from trees.

3.4 Factors impacting watershed management

As in the case of 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. Since 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 in this regard are:

- Population growth and its consequence on land use, especially agriculture and animal husbandry;

- Development of industrial and services sectors and consequent changes in 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.

Historically most of the population in West and Central Asia is concentrated along river valleys, oases and in the areas with facilities for canal irrigation. Population growth has necessitated expansion of agriculture and this has led to a substantial increase in the demand for water. Construction of large reservoirs to store/ divert water for expansion of agriculture and for power generation had a number of unintended consequences. Livestock population has also increased, often far beyond the carrying capacity causing degradation of rangelands reducing their watershed values.

Further, in view of the uneven distribution of water in relation to population, sharing of water resources between countries is critical. Within the differing national priorities and the inadequacy of mechanisms that facilitate such sharing arrangements, water is becoming a cause of political tension between countries. At the macro-level, much of the efforts need to focus on equitable distribution of available resources and managing demand, especially to reduce activities that place high demand on water. Since agriculture accounts for almost 90% of the water use in the region, this would particularly require a reassessment of the choice of crops and irrigation methods (see Box 20).

Box 20 Management of scarce water resources and mitigation of drought

The medium-term research plan 2005-2007 lead by ICARDA in the region focuses on developing strategies for the more efficient and more effective use of limited water resources in agricultural production.

Major elements of this research project comprise:

- Assessment of available water resources and their use;
- Options for improving the productivity of water and for mitigating drought, including water resource management, drought-tolerant and water-use efficient germplasm; and agronomic management of cropping systems;
- Policy and institutional research to create an enabling environment that supports the dissemination and adoption of water-efficient technologies and drought mitigating practices;
- Institutional strengthening and capacity building.

Source: International Center for Agricultural Research in the Dry Areas (ICARDA), 2005

3.5 Need for an integrated approach

Although forests and trees do have some water regulatory functions, these depend on a number of other factors which have to be taken into account in watershed management initiatives. Frequent land use changes, especially those resulting in increased tillage, are particularly damaging to stability of water flows. Increasingly, watershed management efforts are adopting an integrated approach, which addresses the human dimension as well as the mosaic of land uses in a given ecological context, with substantial emphasis on improving agricultural practices and enhancing income of local communities. An example is the case of the Anatolia Watershed Rehabilitation Project in Turkey (see Box 21). Also, greater emphasis is being given to enhance local community participation, especially through making appropriate changes in the policy, legal and institutional frameworks. Poverty alleviation and

strengthening local level institutional arrangements underpin most watershed management efforts.

Box 21 Anatolia Watershed Rehabilitation Project

This 7-year project, approved in 2005 and covering 28 micro-catchments, has a number of inter-related components namely (a) rehabilitation of degraded natural resources, (b) income raising activities, (c) strengthening policy and regulatory capacity towards meeting EU standards, and (d) awareness raising, capacity building and replication strategy. The main activities under Rehabilitation of Degraded Natural Resources include:

- Rehabilitation of forest land including soil conservation by afforestation, protection and improvement of poor & 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, appropriate use of marginal agricultural land; and
- Environment-friendly agricultural practices.

Source: World Bank, 2005 (a)

3.6 Conclusion

Undoubtedly, water availability remains a critical problem in the region, and sharing of water has important political dimensions often resulting in conflicts within and between countries. The low rainfall and the preponderance of desertic and arid and semi-arid lands make sharing of the limited river water supplies a critical economic, political and social issue. Several factors have exacerbated the problem, the most important being the growth of population and the consequent increase in demand of water for domestic, agricultural and industrial users. Agriculture remains major user of water and in many countries it has expanded increasing the demand for irrigation. Much of the water related problem stems from failure to manage the demand.

Supply management has been attempted through construction of reservoirs, mainly to regulate seasonal flows (both for domestic and agricultural needs) or for power generation. Siltation is a major problem of water reservoirs in the region, and this primarily stems from inappropriate land use including intense grazing. Considering the small extent of forests in the region, its role in regulating water supplies in the case of the large watersheds is limited. Maintaining stability of land use and minimizing erosion and siltation through improved agriculture and range management would be more important in the region than isolated forestry focused interventions. Forests and trees per se have very limited impact on erosion and sedimentation and other land uses can be equally or more effective provided soil is adequately covered (see Box 22).

Box 22 Erosion and sedimentation

It is widely perceived that forests can control erosion and sediment process. While forest cover tend to check erosion, it is not the tree canopy that is directly responsible for this; rather it the undergrowth and forest litter. Experiments indicate that the erosive power of rain drops under trees actually tends to be very high because the raindrops merge before dripping off the leaves and therefore hit the ground with greater force (Wiersum, 1985, Hamilton, 1987, Brandt 1988). This sometimes leads to particularly serious erosion problems in plantations where the soil has been cleared of vegetation and litter to reduce fire hazard or where litter is collected for livestock bedding or fuel. If the soil surface is adequately protected by a well-developed litter layer and complete vegetative cover, other vegetation types can offer equivalent protection against erosion, but with added advantage of lower water use.

FAO, 2005

Most governments have recognized this and increasingly watershed management adopts an integrated approach to land use. Protecting natural vegetation and afforestation is one of the components of such integrated land use. Considering the predominance of other land uses, there is greater need to improve conservation efforts in agriculture and range lands. Another major problem afflicting the water sector in the region is contamination, especially from fertilizers and pesticides and domestic and industrial waste. However, this requires significant departures from many of the current approaches to agricultural and industrial development and obviously substantial financial resources. Inherent constraints in deviating from current approaches would suggest continued problems in the water sector. Although forests and trees do influence the hydrological cycle, in the context of the situation in West and Central Asia, their impact will be mostly at the micro level, especially in view of limited extent of forests and wood lands and the preponderance of other land uses.

4 COMBATING DESERTIFICATION

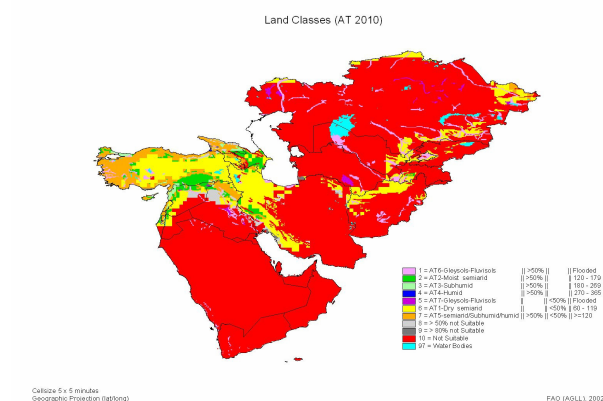
Desertification, which is defined as the decline in productivity and degradation of land in the arid and semi-arid zones (see Box 23), is another major environmental problem facing almost all countries in West and Central Asia. This is strongly linked to the preponderance of arid and semi-arid areas, poor management of water resources, including excessive extraction of ground water resulting in lowering of water tables (which in many coastal areas results in salt water intrusion) and intensive land use far beyond the carrying capacity. The low biological productivity of arid and semi-arid areas makes them extremely vulnerable to desertification. Being at the margin of productivity, they are also extremely vulnerable to climatic changes. This section discusses the current state of knowledge on desertification and the potential role of forests and trees in combating it in the West and Central Asia region.

Box 23 Definition of desertification

Desertification means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.
UNCCD

4.1 Extent of the problem

Figure 3 Severity of human induced soil degradation



Approximately 40% of the global land area (excluding Greenland and Antarctica) is considered as dryland and in Asia (including Russian federation) drylands account for about 43% of the total land area. Almost all countries (except Cyprus) in the FOWECA region are affected by desertification and in 9 out of the 23 countries, drylands account for over 90% 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 and another 16 percent is vulnerable to desertification (see Figure 3 and Box 24).

Box 24 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 per cent in Syria to nearly 100 per cent in Bahrain, Kuwait, Qatar and the United Arab Emirates. Desertification has also affected wide areas of rangelands in Iraq, Jordan, Syria 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 (UNESCWA, 1997). As a result, land degradation has become widespread, and it has accelerated as more rangelands were reclaimed and put under cultivation (CAMRE, UNEP and ACSAD, 1996).

Source: UNEP, 2002

The region is characterized by low, unpredictable, and variable rainfall, and by high evaporation rates. Most of the rainfall occurs during winter, with the summer lasting 5-9 months each year. There is considerable rainfall variability, making it difficult to plan for rain-fed agricultural activities (UNEP, 1997). This variability in precipitation coupled with the inability to adapt land use practices taking into account the changing carrying capacity is the root cause of land degradation and desertification in the region.

Table 2 provides the extent of deserts and drylands in the West and Central Asia region (see ANNEX 1 for details).

Table 2 Extent of deserts and drylands in West and Central Asia (in percentages of the total land area)

Country or Area Name	Deserts (%)	Drylands (%)
CENTRAL ASIA		
Armenia	0	100
Azerbaijan	0	81
Georgia	0	36
Kazakhstan	0	97
Kyrgyzstan	9	84
Tajikistan	8	85
Turkmenistan	3	83
Uzbekistan	7	85
TOTAL CENTRAL ASIA AND CAUCASUS	2	91
WEST ASIA		
Afghanistan	20	80
Bahrain		
Cyprus	0	100
Iran (Islamic Republic of)	39	60
Iraq	67	32
Jordan	68	32
Kuwait	100	0
Lebanon	0	54
Oman	100	0
Qatar	100	0
Saudi Arabia	100	0
Syrian Arab Republic	25	69
Turkey	0	85
United Arab Emirates	100	0
Yemen	93	6
TOTAL WEST ASIA	62	35

Source: FAO, AGLL, Terrastat database, 2003

The deserts are the hyper-arid areas with no growing period at all (number of days conducive for plant growth is zero), while the drylands areas are those with less than 180 days of growing period. Since most of the drylands are at the margin of productivity, year to year fluctuations and increasing land use pressures accelerate desertification. Desertification is reported to be affecting the adjoining rangelands, reducing land productivity and thus the livelihood of people. The encroachment of sand into cultivated land through the activation of dune, called “sandification”, is the worst case of land degradation. In Yemen, existing statistics show that the average for the country annual rate of cultivated land abandonment due to soil degradation has increased from 0.6% in 1970-1980 to about 7.0% in 1980-1984 (UNEP, 2005 (b)).

Box 25 Kazakhstan

In Kazakhstan “every year 10 percent to 15 percent of arable land in Kzyl-Orda province is turned into desert as a result of improper irrigation system, while between 20 and 25 percent of the pastures in the southern areas of Aral sea has been lost.”

UNDP. Kazakhstan. 2003

Arid and semi-arid lands are highly vulnerable to human and climate induced changes, which reduces their productivity irreversibly, especially on account of erosion and deposition of sand. Increased salinity is another major factor contributing to declining productivity and desertification. Desertification results in:

- On-site decline in productivity of agriculture and livestock, affecting the livelihood of people; Most people in the arid and semi-arid areas are poor and further decline in productivity accentuates poverty;
- Off-site effects, especially on account of spread of sand to more productive areas through wind erosion undermining productivity of land elsewhere. An example of this is that of Aral Sea which has contributed to land degradation on account of wind erosion and salt deposition in large tracts of agricultural lands.

4.2 Causes of desertification

4.2.1 Proximal factors

While long term climatic changes do result in desertification, invariably what is witnessed in the West and Central Asia Region is largely human induced desertification, primarily stemming from intensive use of land and water resources, exceeding the carrying capacity (see Box 26).

Box 26 Causes of desertification in Iran

Land degradation and desertification in Iran have accelerated during recent decades due to the following factors:

- Population has doubled during last 25 years (since 1979).
- More agricultural and pastoral products have forced people to use land extensively or convert forest and rangelands to cultivated land.
- Over use of wood and plants as fuel for household cooking and heating. And use of natural regulation tends to denude the soil and intensify desertification.
- Irregular and uncoordinated exploitation of water resources.

Source: Aminmansour, 2004

“Desertification usually results from interactions among multiple causal factors and in most cases three to five underlying causes drive two to three proximate causes. A frequent pattern of causal interaction, driven mostly by policy, economic and technological factors, stems from the creation of water-related infrastructure, which results in the expansion of irrigated croplands and pastures” (Geist and Lambin, 2004)².

² “In Central Asia, the establishment during the second half of the 20th century of large hydro-technical installations with low water-use efficiency disrupted fragile hydrographic ecosystems that had sustained flexible nomadic grazing or small-scale settled oasis farming for centuries or millennia. Consequently, severe and partly irreversible degradation (salinization, drop in water tables, reduced volume of discharge), soil and vegetation degradation and even sandification (the encroachment of sand into cultivated land through the activation of fixed or semi-fixed dunes are reported from the Aral and Caspian sea regions.” (Geist and Lambin, 2004)

Agricultural expansion in the region has taken place in two broad patterns:

- Many Central and West Asian countries have given considerable emphasis to expand commercial agriculture, especially cotton (see Box 27), wheat, etc. to enhance export income or for the strategic reason of self reliance. This has been accomplished primarily through expansion of irrigation facilities, especially reservoirs and canals. In addition to the high water requirements for irrigated cultivation under arid and semi-arid conditions, loss during conveyance has also been high. High rates of evaporation results in salt deposition in the surface reducing productivity. More importantly, diversion of water has led to ex-situ desertification, as has happened in the case of the Aral Sea, and subsequent salt deposition in vast areas on account of wind erosion.

Box 27 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. Further 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 centre was a short-sighted 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

- Expansion of small scale agriculture and animal husbandry also are important factors contributing to desertification³. This is particularly so in the context of increasing population and persistence of poverty. Those living in marginal areas are compelled to intensify cultivation and animal husbandry far beyond the carrying capacity. This is particularly the case in countries like Turkey, Yemen, Iran, Afghanistan, as also a number of countries in Central Asia and the Caucasus. High dependence on land and the limited opportunities for alternative sources of income results in intensive and unsustainable use of marginal lands. In the case of many countries which were part of the former Soviet Union, the economic decline on account of the collapse of Soviet Union accentuated the problem. Household incomes declined drastically undermining the institutional and human capacity for sound land management, accentuating the problem of desertification. Expansion of agriculture in many countries has been accomplished through increased withdrawal of ground water, resulting in a significant lowering of the water table, increasing aridity and reducing productivity. In the coastal zone of several countries, excessive use of ground water and consequent lowering of water tables has led to salt water intrusion, irreversibly undermining fresh water availability.

³ In most of the Central Asian and Caucasus countries, the livestock numbers have seen a decline during the period since 1991 and only in the last few years some recovery is taking place. For example, the number of head of cattle declined from about 21 million in 1992 to about 15.2 million in 1999, and since then it has recovered to about 17 million in 2004. The number of sheep and goats decreased from 70 to 37 million between 1992 and 1999, but has since increased to about 43 millions in 2004 (FAO STAT 2004).

The above proximal changes are an outcome of certain fundamental drivers, especially (a) policy and institutional factors, (b) economic changes and (c) demographic factors. It is in this context that we need to consider the role of forests and forestry in addressing the problem of desertification in the West and Central Asia region.

4.2.2 Fundamental causes

Policy and institutional factors

Undoubtedly policy and institutional weaknesses remain the most critical factor contributing to desertification. In most cases sectoral policies, relating to development of agriculture, livestock, etc. are formulated without due consideration for their long term impacts. Environmental impact assessments are seldom carried out effectively and in the context of over-arching considerations of national security and self-reliance, environmental sustainability issues are given a low priority. Institutions that are designed to address narrow sectoral issues are often unable to take into account the cross-sectoral linkages and much of the attention is focused on accomplishing technical and financial targets on short term basis.

Many countries do have a long history of wise management of resources like water and community level institutions have played an important role in allocating resources in a balanced manner. However, several external factors, including population growth, have undermined traditional community arrangements for natural resource management.

In the case of most of the countries in Central Asia and the Caucasus, there has been a significant decline in institutional capacity during the period following independence. Collective management of land (under Kolkhozes or Svokhozes) has broken down and subsequent owners had neither the institutional nor the financial capacity to manage the resources. In Tajikistan and Kyrgyzstan, most of the shelterbelts and windbreaks are reported to have been cleared during the post-independence period, largely due to economic and political/ institutional factors. In the case of Kazakhstan, the number of staff in the Forestry and Hunting Committee declined from about 25,000 in 1990 to about 7,000 now (World Bank, 2005 (b)) and this had a significant impact on the ability of the country to protect and manage forest resources and take up afforestation work including rehabilitation of the Aral sea. Also in Kazakhstan the forest agencies went through several reorganizations in the 1990s, including decentralization that led to discontinuities of policies, programmes and changes in responsibilities affecting their ability to manage forests.

Wars and other conflicts have also undermined the efforts to control desertification. This has been particularly so in Iraq as a result of the Gulf war and subsequent sanctions. (See Box 28).

Box 28 Impact of war on combating desertification in Iraq

“As a direct result of the Gulf war the natural vegetation in large areas in southern Iraq were destroyed. Subsequent sanctions and difficulties for the local people led to almost complete loss of shelterbelts and other plantings. The cutting of trees and bushes arose from the destruction of energy sources upon which people depended for their cooking and heating needs, especially during the winter months. They were forced to cut large areas of trees and shrubs, which had been sown to protect the environment. [...] Efforts to combat desertification have been badly affected by the economic sanctions because of the unavailability of supplies.”

Source: Al-Faraji, 2001

Economic changes

An important factor that contributed to continued land degradation is the decline in the economic situation of many countries in Central Asia and the Caucasus. Since 1991, most countries faced an economic decline to the extent of reducing the GDP by about 50% of the pre-transition years (See Box 29). This has affected all key actors, including governments and individuals. Subsidized supply of several products – including energy – has ceased resulting in increased exploitation of natural resources, like woodfuel.

Box 29 Combating desertification in Central Asia

All the Central Asian Countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) are affected or severely affected by drought and desertification. The main feature of the Central Asian sub-region is that it comprises countries with very similar patterns of historical, economic and political development in the pre-independence (1991) period. Since the early 1990s, all countries of the sub-region have been undergoing a process of radical socio-economic reforms, including democratization, decentralization, privatization, improved access to information for ordinary citizens, and land reforms, which have direct or indirect implications for environmental protection, including combating desertification. The transformation period has been accompanied in most countries by serious economic difficulties, which, in some cases, have been exacerbated by political disturbances. Despite these difficulties, the Central Asian countries have adopted measures that are conducive to the effective implementation of the Convention. The trans-boundary projects, such as those on the Aral Sea Basin and Caspian Sea, reflect sub-regional cooperation for, inter alia, combating desertification and land degradation.

Source: UNCCD, 2003

In several countries, poverty is endemic in rural areas where people are dependent on marginal lands. This is particularly so on the desert fringes and slopes, where poverty and land degradation form a vicious spiral. Poverty limits the ability of people to use improved land management practices and consequent land degradation accentuates poverty (see Box 30).

Box 30 Poverty and land degradation in Turkey

Desert margins occupy about 54.4% of the land area of Turkey. According to the definitions, the desert margins occupy much of the Anatolian Plateau, the Mediterranean coast and the GAP area extending into Iran on the east and Syria in the south. The Konya Basin, being arid, is excluded. The Black Sea coastal zone has high rainfall and is also excluded from the region considered as desert margins. Dogan (1998) estimates that about 83% of the whole country suffers from wind or water erosion problems. In addition, there are other soil-related constraints, such as salinity/alkalinity and hydromorphism that reduce the agricultural producing capacity. Most of these constraints are in the desert margin zones. Productivity is further hampered by the fact that the rural poor do not have the means or the technology to appropriately manage such systems in a sustainable manner.

Source: Reich et al, 2000

This is further exacerbated by population growth and limited opportunities to pursue alternative means of livelihood, making them less dependent on land that is vulnerable to degradation.

Demographic changes

Population growth, especially in the context of continued dependence on land remains an important factor that results in unsustainable land uses and consequent degradation. With limited access to technologies, land use expands at the extensive margin to highly vulnerable areas. Population growth with its associated expansion of farming and grazing thus has been important in many countries, especially in West Asia (see Box 31). For example, Yemen has one of the highest population growth rates in the region and in the context of high levels of poverty, limited sources of alternative income and poor development of human resources, land and water resources are exploited beyond the levels of sustainability accentuating the desertification process.

Box 31 Rangelands in West Asia

Rangelands occupy about 50 per cent of the total area in West Asia. The vegetation cover is characterized by low tolerance, low plant density and coverage, and low species variability and plant productivity per unit area. Drought, overgrazing, uprooting of woody species for use as fuel, tillage, and mismanagement of water resources are the principal causes of rangeland deterioration. It is estimated that about 90 per cent of the rangelands are degraded or vulnerable to desertification. More than 30 per cent of the grazing land in Saudi Arabia is degraded (Shorbagy 1986, Al-Hassan 1991) and deterioration of rangelands has also been reported in several other countries of West Asia (Al-Kuthairi 1992).

The grazing intensity in most West Asian countries has more than doubled over the past four decades, mainly as a result of subsidized feeding, provision of water points and mechanization. Sheep density on some rangelands is more than one mature head per hectare - four times the natural carrying capacity (Le Houerou 1995). It is estimated that the grazing capacity in the rangelands of the West Bank is exceeded by a factor of 5.7 (Palestinian Authority 2000).

Source: UNEP, 2002

Demographic change is not always a cause in itself for intensive land use and consequent desertification. In several countries in the region, especially in Central Asia and the Caucasus, population has marginally declined during the last few years. While the sub-region as a whole registered an increase of 4.6 million between 1995 and 2004 (i.e. from 70.3 million to 74.9 million), most of this increase is accounted by countries like by Uzbekistan, Kyrgyzstan and Turkmenistan, while countries like Armenia, Georgia and Kazakhstan registered a decline in

population. Interestingly, most of the increase in population has been in the rural areas, while urban population has remained more or less the same in most of the countries in the region. Its impact on land use in a situation of low income is rather obvious.

4.3 Current efforts to combat desertification

There is however increasing realization of the adverse impacts of desertification and land degradation and increasing attention is being paid by national and international organizations to adopt both preventive and remedial measures. The United Nations Convention to Combat Desertification is providing the necessary impetus in this regard. Almost all countries in West and Central Asia are signatories to the Convention. Within the framework of UNCCD there have been a number of regional and national initiatives to combat desertification.

4.3.1 Regional and sub-regional initiatives

A Strategic Regional Action Plan to combat desertification in West Asia has been established within the framework of the United Nations Convention to Combat Desertification (UNCCD). There are also a number of sub-regional initiatives, either focused on general cooperation or addressing common problems of concern to more than one country. Within the framework of UNCCD, the Central Asian countries have drawn up a sub-regional action programme on combating desertification.

Box 32 Central Asia – Priority areas of sub-regional cooperation

- Monitoring and evaluation of desertification processes; establishment of an early warning system for drought and drought mitigation;
- Improvement of water use in agriculture; combating erosion, salinization and swamp formation;
- Agroforestry and management of forest resources and watersheds;
- Range management;
- Conservation of biodiversity and nature protection; development of eco- and ethno tourism;
- Economic capacity building of local communities.

Source: UNCCD, 2003

Priority areas for sub-regional cooperation are listed in Box 32: Two important sub-regional regional initiatives in this regard are the Aral Sea Programme and the Caspian Environment Programme, both having significant components of collaborative action to address the problem of desertification. Afforestation to stabilize the exposed areas of the Aral Sea and thus to prevent salt deposition in the adjoining areas is a major component of the Aral Sea programme.

4.3.2 National initiatives

Within the framework of the UNCCD, and often with support from bilateral and multilateral agencies, most countries have prepared national action programmes for combating desertification. The traditional approach of addressing desertification in a fragmented way,

largely through remedial measures, is being replaced by more holistic multi-sectoral approaches which adopt both preventive and remedial measures.

Almost all national action programmes take cognizance of the need to adopt an over-arching multisectoral approach to address the problem of desertification (see Box 33).

Box 33 Lines of Action in Combating Desertification in Lebanon

Combating desertification is an overarching task to which contributions are made by measures from the different sectors as well as measures relating to the political dimension. Priority actions under National Action Programme (NAP) were defined under two categories as follows:

Category A: National framework

- Institutional framework for NAP implementation
- Legislative framework
- Land use planning
- Socio-economic frame conditions

Category B: Natural resources

- Water management
- Forest management
- Sustainable agriculture
- Rangeland management
- Soil conservation
- Protected areas

Source: Government of Lebanon, 2003

National Action Programmes for combating desertification in most countries adopt more or less similar objectives and approaches. For example, the National Action Programme (NAP) for Kazakhstan prepared in 1997 and updated in 2002 outlines sustainable development of the country and improving the welfare of the people as the primary objectives. These are aimed to be achieved through preventing degradation of land, improving its productivity and ensuring food security. To accomplish these, NAP has outlined a number of objectives (see Box 34).

Box 34 Kazakhstan National Action Programme Objectives

- Prevention or reduction of the scale of desertification and the adverse impacts of drought;
- Reclamation of degraded lands and restoration of soil productivity;
- Creation of favourable conditions at the national level for balanced use, conservation and restoration of land resources;
- Development and introduction of economic mechanisms for sustainable land use which would ensure the conservation and/or restoration of the resource base and strengthen the ecological safety of the population;
- Awareness raising and the involvement of all strata of society in decision-making on the problems of combating desertification;
- Integration of anti-desertification activities into national economic and social development programmes and ensuring consolidated implementation of international environmental conventions and agreements; and
- Development of scientific research and involvement of local communities in combating desertification.

While the national action programmes provide a good framework, their effective implementation remains a major problem, especially in the context of persistent financial, policy and institutional constraints. In the final analysis, desertification is a fundamental problem of unbalanced use of land and water resources and the ability of countries to adopt an alternative path of development remains limited.

4.4 Forestry interventions

Forestry is one of the components for combating desertification and focuses on both preventive and remedial measures, although most attention hitherto has been on the latter, especially when the adverse effects become very evident. Like what happens in the case of agriculture and range management, unfavourable policy, institutional and economic environment results in the neglect of preventive actions. Governments find them particularly difficult, if more comprehensive approaches require significant policy and institutional changes. Key areas of forestry interventions include:

- Improved management of vegetation (which involves a large array of policy, institutional, legal and technical interventions) including addressing the problem of forest fires, which is a key factor contributing to land degradation;
- Remedial measures, particularly afforestation of degraded areas to stabilize soil and to prevent further erosion through wind and water and protective measures to maintain productivity of agricultural and other land through establishment of shelterbelts and wind breaks. Fixation of sand dunes is a thrust area in several countries in the region. Most countries are also establishing “green belts” to improve the micro-climate and enhance the recreational values in urban areas (see Box 35).

Box 35 Greening of Ashgabat, Turkmenistan

Policy of creation of green zones around cities, especially close to Ashgabat, at Kopetdag hill-sides, has been carried out since very first days of independence. Almost all sectors of economy are involved in carrying out such a huge amount of work. Presently forest-park area is more than 24 thousand ha. 30 million seedlings were planted in total – almost 100 species of coniferous, deciduous trees and bushes. It is planned to continue planting forests in future.

Source: Forest Department of Turkmenistan, 2005

Forestry interventions have largely focused on technical aspects, especially to plant species that are well adapted to the adverse environmental conditions, producing sufficient number of seedlings to meet the demands from government organizations (including that of the forestry departments) and farmers, adoption of appropriate techniques for planting and aftercare. Also considerable efforts have been made to develop appropriate design of shelterbelts and wind breaks and various techniques for sand dune stabilization. In almost all cases, establishment of shelterbelts and wind breaks and other amenity planting requires irrigation, especially in the early years. In the extremely arid and semi-arid conditions this is critical to success of any planting. Substantial efforts have been made to:

- Economize water use especially through drip irrigation; and
- Use of treated waste water, especially in the case of establishment of green belts and other amenity planting in urban areas.

A number of countries in West Asia have pursued the above line of action, especially in the context of urban greening initiatives. Costs of such planting are extremely high and hence their wider adoption largely depends on resource availability. At best such an approach may be adopted in a limited area, especially in the case of cities that are emerging as important commercial and tourist centres.

Large scale afforestation in many Central Asian countries has been attempted through aerial seeding. Efficacy of this approach has been at best mixed and its eventual impact as regards re-vegetation of the area depends on several factors, more particularly relating to climatic and soil conditions that determine the survival of seedlings.

4.5 Conclusion

Desertification remains a serious problem that all the countries in the region will have to confront in the coming decades. Preventive measures would require significant policy and institutional changes, re-examining the fundamental relationship between society and nature. Efficient and sustainable water and land management will remain a critical factor that will impact the process of desertification. Although almost all countries have developed national programmes for controlling desertification, translating them into action would require substantial policy and institutional changes supported by improved resource allocation. Mobilizing additional resources will be particularly difficult for most countries (excepting a few who have benefited from increased exploitation of natural resources like fossil fuels). However, major departures from the current approaches are less likely.

This being the situation, much of the attention will be directed at remedial measures and forestry will remain a significant component of this. Foresters will be required to address an ever-expanding problem with all the inherent institutional and economic constraints. Substantial efforts will be needed to identify priorities and to develop appropriate institutional and technical solutions that take into account the limited resource availability to the sector.

5 OPPORTUNITIES AND CONSTRAINTS FOR FOREST BASED ECOTOURISM

5.1 Introduction

Forest based ecotourism is another important environmental 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 be an important option for enhancing the economic viability of forest management. This is particularly so in situations where wood productivity is low. However, it is difficult to generalize the pattern of development of ecotourism potential on account of differences in the economic, social, environmental, political and institutional environment. Countries like Cyprus (see Box 36) have been able to take advantage of the recreational use of forests, supporting the overall tourism development in the country. In fact wood production is becoming less important than the recreational use of forests.

Box 36 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 on the decline and their 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 of wood has declined (especially as most wood is imported) and this has led to a lower incomes and neglect of forest management. However, tourism based on forests and other natural assets is growing rapidly and many of the forest owners have taken advantage of the opportunity to manage “agri-tourism” taking advantage of the forests. The Forest Department is also changing its management approaches and increasingly tourism to forests is seen as added attraction.

Source: Cyprian Ministry of Agriculture Natural Resources and Environment Department of Forests, 2005

There are however others where, notwithstanding the presence of assets like attractive landscapes, biodiversity, wildlife and historical and cultural sites, tourism remains undeveloped yet. Such differences could also be seen within countries, depending on site specific factors. The situation is however expected to change rapidly, providing important opportunities for the forest sector. This section provides an overview of the recreational significance of forests and trees, especially in the context of the overall growth in the trend of tourism (see Box 37).

Box 37 Issues/ Questions relating to forest-linked tourism in West and Central Asia

- What is the emerging role of forests and forested landscape in promoting tourism in the West and Central Asia region?
- Under what circumstances forests and trees and the associated values like heritage and biodiversity protection will enhance the tourism potential?
- What needs to be done to ensure social viability and environmental sustainability of tourism?
- How could the forest sector take advantage of the emerging opportunities and constraints?

5.2 Tourism – a rapidly growing sector

Tourism is one of the fastest growing economic activities in the world and in 2004 the total number of international tourist's arrival is estimated as 763 million. Globally income from international arrivals in 2003 is about US\$ 514.4 billion. Increased incomes, improved transportation facilities and enhanced access to information have led to a rapid expansion of tourism during the last two decades notwithstanding short term setbacks as happened immediately after September 11, 2001 and the continuing conflicts in Iraq and other countries. The World Tourism Organization projects the number of international tourist arrivals as 900-1000 million and 1,550 million by 2010 by 2020 respectively. In addition, domestic tourism is also expected to increase significantly. Table 3 provides an indication of the growth in the number of tourist arrivals in the region (see Annex 3 for data by country):

Table 3 International tourist arrivals in some of the countries in West and Central Asia

Country or Area Name	Tourist arrivals (*1000)					
	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 WECA region	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 tourists in WECA region	3.0	3.8	5.0	6.5	6.6	6.9

Source: WTO, 2005 (a).

The West and Central Asia region has registered a significant growth in tourism and its share in global tourist arrivals has increased from 3.8 percent in 1995 to 6.9 percent in 2004. Turkey, Saudi Arabia, UAE, Syria, Bahrain, Jordan and Cyprus are the top destinations in West Asia for international tourism, each on account of very specific reasons. Turkey has a highly diversified set of tourism assets, whereas a significant share of travels to Saudi Arabia is accounted by pilgrimage. Countries like Iran also have registered a substantial increase in international tourist arrivals, although this is still low considering the potentials, especially the diverse assets. Countries in the Central Asia and Caucasus have also witnessed a rapid growth in international tourism and Kazakhstan remains the top destination in the sub-region where international arrivals doubled to over 3.1 million in 2004. Other countries that have registered impressive growth rates are Kyrgyzstan and Armenia.

Evidently tourism is emerging as an important economic sector, taking advantage of the historical and cultural diversity in the region. On account of their vastness, diverse ecological conditions and low population densities, many of the Central Asian countries offer unique wilderness experience (see Box 38) and given favourable political and economic environment could see very rapid expansion of international tourism. Situated between Europe (an economically affluent region) and Asia (with rapidly growing economies) the region could benefit significantly from the rapid growth of international tourism as well as domestic tourism, stemming from the emergence of a middle and upper income groups willing and able to allocate resources and time for tourism.

Box 38 Tourism potential of Kazakhstan

“Until now Kazakhstan has been largely ignored by all but the most adventurous and independent of tourists. But it has much to offer: un-crowded ski slopes, mountain scenery of outstanding grandeur, an abundance of wildlife including many rare species, rivers teeming with carp, unspoiled forests, tranquil lakes and vast silent tracts of desert and steppe. The combination of areas of great natural beauty and the cities that are becoming cosmopolitan without losing their distinctive Central Asian flavour mean that Kazakhstan has the potential to draw growing number of international tourists.”

Source: Caspian Information Centre, 2005

Domestic tourism has also increased, largely due to increases in income. In some cases domestic tourism is much larger than international tourism. For example in Uzbekistan domestic tourists is almost twice that of international tourists. Prior to 1991, it was a major domestic tourist destination in the former Soviet Union. This however registered a significant decline in the years following the break up of the Soviet Union (see Box 39). Drastic decline in income experienced by most of the Central Asian and Caucasus countries has also led to a steep decline in domestic tourism. This however is changing, especially as income and infrastructure improve and information about the countries and their tourist potentials become readily available.

Box 39 Trends in tourism in Uzbekistan

While being part of the Soviet Union, Uzbekistan was an essential fragment of Intourist Agency Network. Intourist annually supplied far more tourists to Uzbekistan than it hosts nowadays. The peak year for the Uzbekistan tourism sector producing an estimated 1.1 million foreign tourists including former Soviet Union travelers was 1989. Since then the situation has dramatically degenerated, and in 1993 it was less than 100,000. However, efforts are underway to reverse the situation, and there has been a significant change since then.

Madjidov, 2003

Within the West Asia region Saudi Arabia is another country where domestic tourism, especially to the country side has grown rapidly. Increased urbanization, higher income and more leisure time has resulted in the rapid growth of domestic tourism. In 2000, Saudi Arabia established the Supreme Commission for Tourism to facilitate domestic tourism and this has already had some impact in increasing tourism within the country. Obviously most domestic tourism is towards sites of natural beauty and mild climate, but in the absence of adequate environmental safeguard measures, degradation is becoming a major problem (Seddon and Khoja, 2003).

Rapid expansion of domestic tourism is largely due to increases in income, changing views on how leisure time is to be spent and increasing facilities for travel. Diversity of ecological, cultural and other factors particularly provide greater scope for domestic tourism, supported by increasing incomes and existence of necessary infrastructure.

5.3 Tourism, ecotourism and forests

Tourism is a highly segmented market, with very different attributes catering to different consumers. The value chain in tourism depends on basic assets and how the infrastructure and other facilities are designed to enable the consumers to access the services. In the West and

Central Asia region, there is considerable difference in the tourism assets and it ranges from traditional mass tourism to well-known beaches to small scale adventure tourism in remote mountainous areas. Ecotourism (see Box 40), which in the recent years has registered significant growth, is one of the rapidly growing components of tourism. Another most important component of tourism in the region is historical and cultural sites, which remains the most important in the case of many countries, like Iran, Saudi Arabia, Turkey, Syria and a number of Central Asian countries. A number of countries are diversifying their economic base giving emphasis to the unique cultural characteristics and lifestyles. There are others which offer a wide range of options attracting tourists with diverse interests.

Box 40 Definition of ecotourism

The International Ecotourism Society defines ecotourism as "responsible travel to natural areas that conserves the environment and improves the well-being of local people."

The International Ecotourism Society, 2004

5.3.1 Forests as tourism asset in the region

The role of forests in the overall development of tourism depends largely on the specific historical, cultural, environment and economic setting and the portfolio of tourism assets in each of the countries. For some countries size and diversity provide a wide range of options, whereas others are largely focused on a limited number of assets, particularly suited for mass tourism. Ecotourism is a broad term, and forests and the experience they provide form a component with varying significance depending on the specific situation in each of the countries and locations in the West and Central Asia region. The extent to which forests play a role in promoting tourism varies as indicated below:

- In several countries in the West and Central Asia, tourism is primarily based on historical and cultural sites, places of religious significance and the more traditional assets like beaches and such other attractions. Forests and trees are not necessarily a core attractant, and, at best add marginally to the diversity of experience. In most cases the importance of trees in such situation is limited to their landscaping functions and to enhance the overall attractiveness of the location including the provision of shade. Investment in landscaping around historical, cultural and religious sites and in urban greening – notably in cities like Mecca, Abu Dhabi, Ashgabat, Dubai, Teheran, etc. - is largely directed towards this. Current efforts to revive the Silk Road will substantially boost cultural and historical tourism, and in the process natural and planted forests and trees is expected to receive greater attention.
- Wilderness based tourism has tremendous potential in the region, especially in many of the Central Asian countries. Low population densities and the vast landscapes including lakes and mountains offer unique experience to certain categories of tourists. Here again the market is segmented with visitors seeking diverse experience. Adventure tourism involving trekking, cave exploration and mountaineering is an important niche market, especially in countries like Lebanon, Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan. This is also the case in some of the countries in Caucasus and in Turkey and Iran. Forests form one of the components of this landscape enhancing the recreational experience. Although the market for this is small, increased

investment in infrastructure and other facilities is expected to result in a significant expansion of wilderness focused tourism. Protection of natural forests and the associated biological diversity would thus gain considerable importance.

- Increasing urbanization however is generating a demand for tourism, especially focused on forests and other greenery. Urban dwellers are particularly seeking weekend retreats to forested areas and wood lands. In many countries there is greater pressure on forests and woodlands close to urban centres and forest management is increasingly being geared to meet this demand, providing recreational facilities and protecting these forests from visitor induced damages like fire. In fact in many countries, recreation management in forests adjoining urban areas will become a key function of many forestry organizations.

Another important component of nature based tourism in the region is “hunting tourism”. While this is expanding rapidly in response to the demand from well-off visitors, especially from the relatively wealthy countries in West Asia, often this operates in the “informal sector” resulting in over-hunting and reducing the population of important species. Also the local population seldom gains from hunting tourism, reducing their interest in conserving and managing the resources sustainably (see Box 41).

Box 41 *Hunting Tourism in Central Asia*

A recent study by TRAFFIC (Hofer, 2002) reveals that hunting tourism in Central Asia is evolving. The number of foreign sport hunters is increasing in Central Asia region since the collapse of state-regulated markets in the early 1990s, but little information exists about the level of reinvestment of these funds in conservation and local development. A transparent overview of the actual money flow generated by foreign hunters is difficult to obtain.

Czudek, 2005

Desert tourism is another segment that is growing rapidly, especially in some of the West Asian countries. Marketing the unique experience of spending time in deserts environment along with substantially improved facilities for travel and accommodation has expanded the demand for desert tourism.

5.3.2 Key issues in eco-tourism in the region

Tourism, in particular eco-tourism, has substantial potentials and constraints and forests and forestry could gain considerably from this. Some of the strengths and weaknesses and opportunities and threats of tourism in the region are outlined in the Table 4 below:

Table 4 International tourism in West and Central Asia – strengths, weaknesses, opportunities and threats

<p>Strengths</p> <ul style="list-style-type: none"> • A wide range of ecological, social and cultural environment. • Rather unknown in comparison with other sites and thus has some novelty. • Expansive wilderness, especially in some of the Central Asian countries. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Poorly developed infrastructure, especially roads and other access and hotels and such facilities. • Cumbersome travel formalities, especially for obtaining visa. • Conflicting objectives of different agencies involved in tourism development. • Poorly developed institutional capacity. • Lack of information in potential markets. • Political conflicts and security concerns. • In some of the countries, tourism is generating adverse environmental impacts and has reached saturation stage.
<p>Opportunities</p> <ul style="list-style-type: none"> • Situated close to a rapidly developing market and the volume of tourism to grow very rapidly. • Increased interest for a different kind of tourism focusing on local cultures and lifestyles. • Increasing income in the region that may help to boost domestic and outbound tourism. 	<p>Threats</p> <ul style="list-style-type: none"> • Political instability and frequent changes in institutions that undermine consistency in management. • Unmanaged rapid expansion of tourism could undermine the basic resources like flora and fauna and the landscape through congestion and environmental degradation. • Local communities may not be able to gain significantly from the growth of tourism. • Increasing competition from other countries.

Obviously some of the basic components for attracting tourists exist, but moving up the value chain and actually capturing the full potential require substantial efforts especially at the institutional and infrastructure fronts. As indicated in the table above, poor infrastructure is a major problem especially in the Central Asian countries (see Box 42) as also in countries like Afghanistan. So also conflicts and insecurity are major problems in a number of countries. Many countries in West and Central Asia are still closed and visitors have to undergo cumbersome procedures for entry and travel within the country.

Box 42 Central Asia Tourism: Current Status

Central Asia has all the suppositions to represent a rather marginal target of tourism, comparable to the majority of Central African or Central American countries. Insufficient material and technical basis, complicated transport, information gap (and rather negative information) and bureaucratic obstructions are the most important barriers for tourism development there. However exotic and interesting the region is, the existing insufficiency in many aspects of successful tourism industry prevails.

Source: Horak, 2004

Notwithstanding some of the current political uncertainties in the region, ecotourism is expected to expand rapidly in the region. This is particularly so in Central Asia on account of its novelty and the fact that it has until recently remained closed to the rest of the world. Increased attention on account of its geopolitical significance is expected to result in a rapid growth in tourism, largely stemming from its various assets like mountains, lakes and unique cultures. There are already several initiatives to overcome some of the weaknesses like poor infrastructure, cumbersome travel procedures and lack of information. A notable example of this is the Silk Road project which is supported by the World Tourism Organization, UNDP and several other agencies (see Box 43).

Box 43 The Silk Road Project

For centuries the Silk Road that traversed the Central Asian countries served as a fundamental link between the East and the West, exchanging cultures, crafts, ideas, technologies, beliefs and people. With the independence of the Central Asian countries, there is a renewed interest in reviving this historical East-West link. The Silk Road Tourism project is being lead by the UNDP and the five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) who will be the primary beneficiaries. The World Tourism Organization is also spearheading an initiative to promote Silk Road tourism. In 1994 the Samarkand Declaration on Silk Road was adopted by 19 countries participating in the WTO initiative. In the core countries, the project focuses on capacity building, especially to improve frontier formalities, improve infrastructure facilities, etc. to accommodate the projected growth in tourism, while in others the emphasis is promotion of silk road tourism.

Source: World Tourism Organization, 2005 (b)

Two major issues that most countries in the region face as regards ecotourism are:

- its social impact, especially as regards generating income to the local communities; and
- environmental sustainability.

Both national and international agencies are aware of the problems and there are several projects that strive to promote local community involvement and to address environmental problems stemming from increased investments in tourism. Particularly, there are ongoing efforts to enable villagers to benefit from the development of ecotourism (see Box 44).

Box 44 Ecotourism in forest villages in Turkey

An ongoing pilot project in Southern Turkey implemented with financial support from European Community aims at improving the socio-economic conditions of the villagers. Primarily villagers are made aware of the income potentials of their natural, cultural and historical resources and how they could be managed sustainably. Introduction of home boarding business by restoring village houses and its market promotion is another component of the initiative.

Kahveci, Ok and Yýlmaz, 2003

This requires substantial policy interventions and improvements in institutional capacity, both in the public and private sectors. Most countries in Central Asia and the Caucasus will have to address the problems of transition from a centrally planned system to that of the market economy. Managing the transition will be a major concern. After the collapse of the Soviet Union, institutions responsible for protection of wildlife have suffered major setbacks on account of human and financial resource shortages.

On the other hand most West Asian countries will have to strengthen regulatory mechanisms to improve sustainability, in particular to ensure that environmental assets are not degraded. This aspect has been recognized by a number of countries, but developing appropriate policy and legal frameworks and enforcing them are uphill tasks. This is particularly so when degradation of tourism assets is caused by economic activities in other major sectors like oil extraction and refinement, one of the critical sector in the region (see Box 45).

Box 45 Degradation of tourism assets in Iran

“Of particular concern to us is the already deteriorated state of Iran’s coastal areas. In the Caspian coast, inappropriate tourism development has exacerbated beach erosion and amenity loss, while in the Persian Gulf Coast, the impact of war and ongoing oil mining, transportation and processing activities has exacted its toll on this precious coastal environment. With the expansion of tourism activities into the desert, mountain, lakes and river regions in Iran, we are concerned that the potential threat to these environments will increase unless sustainable development and management principles and processes are adopted.”

Government of Iran, 2002

5.4 Conclusion

In view of the expected rapid growth of tourism in general and ecotourism in particular, the role of forests as one of the component that could add value to the tourism experience is likely to gain importance. Tourism, in particular ecotourism, is however extremely sensitive to political factors, especially conflicts and the state of security. There are also several institutional and infrastructural constraints that hamper tourism, especially in Central Asia and Caucasus. In fact poor infrastructure and weak institutional capacity stem from political instability and continuing conflicts.

Once these uncertainties are resolved, tourism could be one of fastest growing sector. Countries in Central Asia and the Caucasus could particularly draw a large number of tourists; especially these now represent less visited areas and could provide new experience of cultures, people and history less known hitherto. Increased commerce and trade linkages and improvements in infrastructure and communication would further boost tourism. Initiatives like the revival of the Silk Road would strengthen the linkage between Central Asia and the rest of the world. In particular, Central Asia’s linkage with Asian economies like China and India are expected to strengthen increasing the number of visitors from these countries.

Whether these emerging opportunities will be fully taken advantage of will depend on substantial institutional improvements to ensure that the eco-tourism component is environmentally sustainable and that it generates income to local communities. Substantial efforts, involving governments, international organizations, private sector, local communities and non-governmental organizations are underway in the region. For several countries with a long history of mass tourism, much of the attention will be focused on improving the quality and minimizing the environmental degradation. This will be particularly the case with several of the countries in West Asia, including the Arabian Peninsula. In most of the Central Asia and Caucasus countries, tourism development would require substantial efforts to maintain the cultural and environmental integrity and to ensure that tourism initiatives are carefully assessed.

Given their limited extent, on the whole forests may not be the core component of tourism, except in some of the West Asian countries. However, the anticipated overall growth of tourism will provide substantial opportunities to forestry to be an active part of the tourism asset. Especially as wood productivity is limited in the region on account of adverse environmental factors, nature based tourism could become an important source of income from forests. Certainly this will require substantial institutional adaptation.

6 FORESTS, CARBON SEQUESTRATION AND CLIMATE CHANGE MITIGATION

6.1 Introduction

An important environmental service provided by forests and trees relate to the sequestration of carbon and thus its potential to contribute to climate change mitigation. Forests form an important terrestrial carbon sink and land use changes (deforestation/afforestation) could significantly alter the carbon balance, changing what is retained in the biomass and in the atmosphere. In the context of the impact of green house gases on climate change, there is an increasing interest in using afforestation and reforestation as a means of sequestering carbon.

With the ratification of Kyoto Protocol, the potential for investing in reforestation/afforestation under the Clean Development Mechanism has increased significantly. While all afforestation/reforestation projects as well as improved management of natural forests do help to sequester carbon, projects under the Clean Development Mechanism of the Kyoto Protocol are of rather limited scope. It is intended primarily for allowing industrialized member countries to meet their green house gas reduction obligations through offset projects in developing countries through investment and knowledge/ technology transfer. It is in this context that the potential of the West and Central Asia Region to sequester carbon and to take advantage of new resources for afforestation and reforestation is to be considered.

6.2 Ongoing initiatives for carbon sequestration

Carbon sequestration initiatives in the forest sector could be broadly grouped into (a) externally funded afforestation and reforestation projects where carbon sequestration is one of the objectives, and (b) projects within the framework of CDM, driven by demand for credits – certified emission reductions – from private and public entities in developed countries. Within the WECA region, there are no afforestation/reforestation projects in the latter category and what is now being implemented in some of the countries are primarily forestry projects where carbon sequestration is an explicit objective.

6.2.1 Afforestation and reforestation activities with carbon sequestration as an objective

Recently a pilot afforestation project has been initiated in Iran, funded by the Global Environmental Facility with the objective of carbon sequestration. This is a 6 year project aimed to demonstrate that desertified rangelands can be cost-effectively reclaimed for the benefit of the local community, but at the same time benefiting the global community through carbon sequestration. The project has adopted a community based approach through the establishment of village development groups, who take the responsibility for managing the afforested areas (see Box 42).

Studies have also been carried out on the carbon sequestration potentials of afforestation and forest conservation in Kazakhstan. In the non-power sector afforestation and reforestation is considered as a priority area for carbon sequestration and the programme “Forests of Kazakhstan” it has been recommended to increase the forest cover to 5.1% by 2020 from 3.7% (9.6 million ha) in 1990 or about 3.8 million ha additionally. Annual CO₂ sequestration

on account of this is expected to increase by about 6 million tones and the total investment is estimated as about US\$ 3.5 billion (World Bank, 2005 (c)).

Almost all countries are implementing afforestation and forest conservation projects and they do have a positive impact on the carbon balance. However, the rate of afforestation and forest conservation largely depends on availability of internal or external financial resources and the institutional capacity. Most countries face significant constraints on both the fronts. It is in this context that the scope for taking advantage of CDM opportunities needs to be considered.

6.2.2 Afforestation and reforestation under CDM

There are no projects under CDM in any of the countries in the region and are yet to establish the necessary institutional structure for implementing CDM projects. Recently an assessment has been done on the CDM potential of the Central Asian and Caucasus countries adopting the following criteria:

- a) Technical and economic potential of GHG emission reduction projects;
- b) Capacity to process CER deals;
- c) General investment climate;
- d) Current activities and strategic interest of EBRD; and
- e) Available CDM project pipeline and project leads.

Based on the above Kazakhstan and Armenia are the top two countries with the maximum potential in the region. Kazakhstan has a relatively good CDM infrastructure. However, much of the focus of CDM in these countries will be on improving energy efficiency. CDM is a market based mechanism requiring substantial development of national capacities to prepare projects in competition with other potential host countries. Until October 2004 a total number of 79 projects have been submitted to the Executive Board (EB) either as a PDD (project design document) or for methodology approval. However:

- All these projects are primarily from South and East Asia and Latin America and there has been no single submission from countries in the WECA region;
- Among the projects hitherto considered there is not a single afforestation/reforestation project and most of the CDM projects approved or under consideration focuses on energy conservation or replacing fossil fuels with renewables.

Participation in the CDM and getting EB approval has to fulfil a number of conditions. A primary requirement is the ratification of the Kyoto Protocol and the establishment of a Designated National Authority (DNA). However, many countries have not fulfilled these conditions. As of October 2004, 67 percent of the 126 developing countries have either not ratified the Kyoto Protocol or have not established a Designated National Authority. Among the eligible WECA countries only Jordan and Yemen, while Lebanon and Syria have established DNA but not yet ratified the Kyoto Protocol.

There are other reasons that the WECA countries may not be able to take advantage of the CDM mechanism to support afforestation/reforestation. The most important of these is the very low productivity of such investments. This primarily stems from the very low biomass

productivity in view of the preponderance of arid and semi-arid land in most of the countries⁴. The other factors include issues like stability of CDM investments and ability to account leakages. In view of this, the minimum size of the project would be high enough to exclude a number of countries from taking advantage of the opportunity (see Box 46).

Box 46 CDM projects and comparative advantages

“ If CDM can indeed be understood as a market mechanism, simply put, projects will go to countries with the best opportunities for emission reduction. Since success in the case of the CDM framework is measured in terms of reduced emissions, the first investment option will be countries with high reduction potential.”

Silayan, 2005

6.3 Summary

Although forests and woodlands play an important role as carbon sinks, the scope for taking advantage of this in the West and Central Asia region is limited for a number of reasons. Most CO₂ sequestration projects now implemented in the region are outside the CDM framework of the Kyoto Protocol. Most of these are externally funded afforestation/reforestation projects where CO₂ sequestration is accomplished incidentally. As such there are no CDM projects in any of the countries in the region. Inherent low biomass productivity and the rigorous requirements limit the capacity of the countries to implement afforestation/reforestation projects within the CDM framework. CDM is a market-based mechanism, most resources may flow to those countries that are able to sequester carbon competitively and this may limit the ability of many countries to take advantage of this in view of the very low biomass productivity. There are also a number of other stipulations that many countries may not be able to fulfil, not just for afforestation/reforestation projects, but for all CDM projects.

⁴ The average biomass productivity of desert scrubland is about 90 g/ m²/ year (ranging from 10 to 250 g/m²/ year) where as this is 2200 g, 1600g and 1,200 g per m² for tropical rainforest, tropical dry forest and temperate deciduous forests.

7 PAYMENTS FOR ENVIRONMENTAL SERVICES

As income increases, willingness of the society for payment for environmental services increases. However, payments for environmental services provided by forests may not be feasible.

7.1 Current situation

In public forest, services such as biodiversity conservation are financed by the government. As said earlier in this report, biodiversity conservation often depends on external funding and therefore of protection may fail to be sustainable on the long-term. When government has to follow up the actions, funding may be lacking. Wood production is often not economically viable in the region, and other key sectors such as healthcare or agriculture are likely to be given priority.

Therefore, the issue is who will pay for such services? In some cases, services, such as biodiversity conservation, are funded by governments through incentives to the forestry sector, as it is the case in Cyprus. Otherwise, there have not been any payments from individuals or private companies. What is already happening is return-benefit to the providers of these services. For example, some communities benefit from eco-tourism revenue.

7.2 Future demand of environmental services

Considering the upward trend in income that most countries in the WECA region are expected to witness, the demand for environmental services is expected to increase substantially. One of the most important demands will be for urban green spaces and recreational facilities areas adjoining urban centres. With improvement in transport and communications, international and internal tourism in the WECA region is expected to grow rapidly and forests and woodlands would provide an important component of tourist attraction. Forests and woodlands close to urban areas will be subjected to intense recreational pressure and most often forest management may not be in a position to develop appropriate management practices that would avoid deterioration of recreational experience. Especially in many of the West Asian countries, recreational demand will increase to such an extent as to cause severe degradation if adequate efforts are not made to regulate the use.

More areas are already set aside for nature based tourism or as protected areas to conserve unique species, biomes and ecosystems. Governments and other players (especially local level administration) are compelled to invest in improving the urban environment resulting in the expansion of urban green spaces.

The demand for protection of agriculture land and habitations from desertification and land degradation will also increase resulting in higher investments in the establishment of shelterbelts and windbreaks. Much of this will however depend on ability of the key players, namely governments and farmers, to make such investments. The prospects of an increase in the efforts would therefore vary between countries. In many low income countries, expansion of the programme to arrest desertification would be rather very slow and will depend very much on external funding. There will however be others, which are economically well-off and hence able to meet the growing demand for environmental protection.

7.3 *Future for payments*

For payments to be implemented, the first need is to identify the providers and the buyers of services. Providers are easily identified as the owners of the land which provide an environmental service such as biodiversity conservation, watershed protection, and control of desertification, eco-tourism and mitigation of greenhouse gases. In the region, the providers of environmental services are either the government or the private land owner. As a large amount of land is public, the government is the most frequent provider.

Identifying the buyers may prove to be difficult. The buyers should be the consumers. But identifying the consumers of an environmental service is not always easy. In the case of water or carbon credits, the consumer may be easily identified. Whereas in the case of biodiversity or land protection, defining the buyer may be more difficult. They can be differentiated whether they are local, national, regional or global buyers.

7.3.1 Local, national or regional buyers

This may be the case with watershed protection, control of desertification and eco-tourism and the key question would be the willingness and ability of these beneficiaries to pay for the services.

Sometimes, the government is both the provider and the buyer of environmental services. For example, in public land, the government may plant trees to protect catchments areas. Downstream, the public industry which purifies water in order to deliver drinking water to people is likely to spend less money in the process of purification because the quality of the water coming from upstream will be better due to the forests. In this case, the price of drinking water delivered to the inhabitants will remain the same and the money saved in the process of purification can finance the plantation of trees upstream.

Another case is the one of biodiversity protection, which may directly benefit to the eco-tourism sector. Even if tourists are likely to be more numerous if the fauna and flora are luxurious and exotic, this is difficult to prove. Tourists may value more landscape than biodiversity. Therefore, the willingness to pay by tourists for biodiversity may be rather limited. Small tourism industries or even communities, when they benefit from it, could be asked to pay for biodiversity conservation.

In the case of control of land degradation, the owner himself benefit from this because the value of his land stops decreasing. According to this, in the region, governments are the first to benefit from the control of public land degradation. Communities can also be the “consumers” of this service. The service is unlikely to be paid in the future as the provider and the consumers are often the same person.

7.3.2 Global buyers

This could be largely with regard to biodiversity and carbon sequestration. In the case of these two, the main concern is whether the global buyers (who would be from industrialized countries) have any other choice and whether the West and Central Asia could produce the services competitively with other regions. In the case of carbon sequestration, because of the low productivity and low forest cover, West and Central Asia is not likely to provide a huge amount of carbon credits to global buyers. According to the Kyoto protocol, forests in West and Central Asia do not represent a significant amount of carbon credits in comparison with other parts of the world.

Even if the buyers are identified, it is often very difficult to assess the value of services they benefit from, such as planting forests in catchments areas. An additional constraint to the implementation of payments is the lack of institutional capacity to develop markets for environmental services. In Central Asia, even conventional markets are not efficiently developed. Creating a market for environmental services is technically possible but may not be feasible on the ground because of the reduced set of sellers and buyers and a weak institutional capacity. Collaboration between countries to control such a market would be a major difficulty.

Payment for watershed protection as described in Box 47 is unlikely to happen. First of all, it is very difficult to assess the value of planting forests in catchments areas. Moreover, the key role in regulating markets should be played by governments and most of the West and Central Asian countries don't have the institutional capacity to develop such markets for environmental services.

Box 47 Who could pay for watershed protection?

At country level, it is very unlikely that downstream countries pay upstream countries for protection of catchments areas. It would be difficult to make them implement such a law.

At local level, a user could pay the specific producers for water-related services of a forest. The potential for such payments could be good in locations where demand for water resources is high and the benefits to the buyers of the service are clear.

People may not be willing to pay for environmental services. They take it for granted that the government has costs of environmental services provided by public lands. Donors' agencies would be the only ones to actually pay directly to the providers of the environmental services. In the future, payments for environmental services could become more important due to privatization of land.

7.4 Conclusion

As income increases, willingness of the society for payment for environmental services increases. However, payments for environmental services provided by forests may not be feasible. Indeed, it will be difficult implement payments for environmental services because of the need:

- to identify the providers and the buyers of services
- to assess the value of services they benefit from
- to develop markets for environmental services.

Therefore, it is very unlikely that individuals will pay for environmental services provided by governments in a near future. However, it is more probable that private companies will sell or have to buy such services.

8 FUTURE SCENARIOS FOR ENVIRONMENTAL SERVICES

As the time horizon expands from years to decades, conventional techniques, such as trend analysis and mathematical modelling, become inadequate. Scenarios are defined as plausible descriptions of how the future may develop, based on a coherent and internally consistent set of assumptions about key relationships and driving forces (e.g. socio-economic situation or institutional capacity). As such, scenarios are used as a systematic method for thinking creatively about complex, uncertain futures. They can pose positive future visions, which can guide policies and choices for helping to reach desired future conditions. The development of scenario storylines facilitates internal consistency of different assumptions and allows taking into account a broad range of elements and feedback effects that are either difficult to quantify, or for which no modelling capability exists.

Future scenarios of the role of forests in addressing environmental issues in West and Central Asia largely depend on two characteristics of each country: its economy and its political and institutional framework. It has been showed earlier that in some cases forests can contribute to address environmental issues such as biodiversity loss, water scarcity or land degradation. Whether they are effectively contributing depends on the implementation of the technical solutions based on afforestation/reforestation or protected areas. The lack of implementation is mainly caused by the lack of investment. Therefore it can be assumed that an economic growth would have a positive impact on investment. First, the government may have more funds to invest and second, the behaviour of people may evolve. If living standards improve, people may feel more concerned by environmental issues. Consequently, they may exert a stronger pressure on government to tackle environmental issues.

On the other hand, a politically mature inclusive development will allow government to implement the measures they have committed to take. On the contrary, a poorly developed economic base and a weak political and institutional development, both represent major hindrances to implement measures addressing environmental issues. Therefore, four situations can occur in a country depending on whether the economic base is strong or weak and whether the political development is mature or not. At this point, it has to be mentioned that a situation where the economic base would be weak and the political development would be mature is very improbable. Consequently, as one of these four situations is unlikely to happen, three future scenarios can be visualized. The storylines related to environmental issues have been developed and are presented below.

8.1 Scenario 1: Successful environment conservation in a good economic and institutional context

The best path of development that a country could follow would be to improve its decentralized decision-making and its economic and social situation. This is the most favourable scenario. As income increases, poverty declines and the willingness and ability of people to pay for environmental services increase. Environment protection such as biodiversity protection is given importance. People also have new needs such as green urban areas. Investments in afforestation of degraded areas and to establish protection forests, (especially windbreaks and shelterbelts) increase significantly. The decentralized decision-making enables the civil society to actively participate in the environment-friendly actions, through NGO for example. Coordination of national and international agencies in dealing with trans-boundary issues, especially as regards management of watersheds and protected areas, is improved. A demand water management is implemented through planning of land

uses. More attention is paid to water pollution. Regarding biodiversity, additional areas are put under protection. The case of Cyprus seems the most favourable one (See Box 48).

Box 48 Scenario 1 in Cyprus

Cyprus no longer depends on agriculture. It is largely transformed into a post-industrial society and provision of environmental services (tourism and related amenities) gains substantial importance. The total contribution of tourism sector in the national economy amounts between 15% and 20%. Forest department's expenditure may exceed income from timber. Society in a way subsidizes the provision of environmental services. The capacity for investment in services sectors as urbanization is such that green parks are created. Cyprus's open and central position among relatively rich countries and its good infrastructures favor coming of tourists. Environment protection and development of infrastructure in support of tourism have become the major thrusts making Cyprus environmentally pro-active. One asset of Cyprus as regards ecotourism is its large forest cover. Not all the countries in the region have the same opportunities for developing ecotourism in a similar way. In Cyprus, forests also play a role in stabilizing riverbanks.

8.2 Scenario 2: Efficient protection inside the national boundaries but trans-boundary issues are not addressed

This scenario is lead by a strong economic development in a centralized institutional context. In scenario 2, higher income also results in increased demand for environmental services, especially recreation. If the different governmental institutions are well coordinated, biodiversity conservation is improved. More areas are set aside for nature based tourism or as protected areas to conserve unique species, biomes and ecosystems. Governments and other players (especially local level administration) are compelled to invest in improving the urban environment resulting in the expansion of urban green spaces. However, trans-boundary issues such as watershed management are not addressed because of the lack of inter-countries collaboration.

In Saudi Arabia, 37% of the land area is protected (mainly in other categories than the IUCN I-IV). A better management of planted areas is possible mainly thanks to the country's strong economic base and limited dependence on agriculture. It is hoped that successful biodiversity conservation may encourage central government to delegate and decentralize further.

To reach this scenario, lessons may be learnt from some success stories in the region, such as biodiversity conservation in Saudi Arabia (see Box 49).

Box 49 Scenario 2 in Saudi Arabia

In Saudi Arabia, because of the centralized authority, people are not involved in the process and there is still a lack of implementation of preventing environmental measures.

Due to the favorable economic situation, the ability to invest in environmental protection increases. These investments help in improving the management of natural resources. People are not involved but government succeeds in stopping some of the environmental issues. Saudi Arabia succeeds in being environmentally reactive.

- *Biodiversity loss is arrested due to the decreased pressure on land. The already existing 38.1% of national land under protection are protected more effectively. The protected area network (including Forest reserves) is improved; linkages are built among the protected areas through the use of conservation corridors and other methods. There are new plans to increase protected areas to cover new ecosystems and biomes. Conservation and development of forests outside protected areas are made priority activities in the sustainable use of biodiversity.*

- *The government has realized the need to change its agricultural policies and Saudi Arabia imports a large quantity of food as it has other sources of income. This helps reducing pressure on water catchments. Other measures are also taken to address water issue: changes in crop patterns reducing demand for irrigation, use of drip irrigation systems and improved water delivery systems.*

- *The process of land degradation is arrested due to the diminished pressure on land. Also, the capacity to adopt mitigation measures is improved. Shelter belts and wind breaks are planted. Recreational and urban forestry is highly developed due to increased investments. Desert tourism is gaining importance and the Saudi Arabia coast is widely visited. Internal tourism is predominant and there is a positive trend towards development of ecotourism industry.*

8.3 Scenario 3: Difficult implementation because of serious economic and institutional constraints

This scenario is first defined by a poor economic and social context and centralised institutions. Under these conditions, the country faces financial constraints to implement environmental protection. The country is highly dependent on agriculture and the environmental services are undermined by land use conflicts. Biodiversity loss continues as well as watershed degradation. This scenario may happen in Afghanistan or Yemen (see Box 50).

Box 50 Scenario 3 in Afghanistan

In Afghanistan, the pressure on land is likely to increase in the future and the capacity of government may remain low. People are unlikely to pay attention to environmental services as far as they first try to satisfy primary needs. In this context, environment degradation may continue and water may be a crucial issue for future generations.

Box 51 Scenario 3 in Afganistan or Yemen

In Afghanistan and Yemen, the economy and the political and institutional frameworks are weak. Environmental issues are worsening. These countries cannot invest in environmental protection because of their weak economic situation. The centralized authority and its top-down approach are a hindrance to the implementation of the preventing and mitigating measures. If decentralization happens in these countries, it will not be deliberate but an initiative of the people in the context of lacking policies and institutions.

Pressure on land is increased -the countries still depend on agriculture as a main source of living- and the levels of urbanization are ones of the lowest in the region. Countries prove to be unable to manage natural resources sustainably.

- *Biodiversity loss continues. The number of “paper” protected areas remains because of poor financial means to implement the protection measures.*

- *There is no significant increase in water supplies but an increased demand. The dependence on water-intensive crops (cotton monoculture) remains strong. Consequently, land use conflicts are increased in the water catchments.*

- *The current trend of land degradation persists and has a significant negative impact to land productivity.*

The three scenarios described represent different situations that continuously evolve over time depending on the interaction between the different factors. In the process of such, it may result in a wide array of situations each with its unique forestry characteristics.

These scenarios aim to stimulate creative ways of thinking that help people break out of established way of looking at situations and planning their actions.

9 SUMMARY AND CONCLUSIONS

Forests and woodlands in the West and Central Asia region provide a number of environmental services, like conservation of biological diversity, protection of watersheds and arresting land degradation and desertification. In many countries, there is increasing emphasis on the recreational and amenity functions of forests and wood lands and, as discussed earlier, substantial investments are being made to establish and manage urban and peri-urban forests. In several countries the environmental services provided by forests are probably more important than their productive functions.

Conservation of biological diversity

The region is rich in biodiversity whose protection is often poor. Key issues that affect conservation of biological diversity in the West and Central Asia area region include:

- Inter-sectoral issues have not been addressed effectively and most often key departments or ministries responsible for land use are not involved in the process. In many countries, coordination of biodiversity conservation is the responsibility of environment department and the limited resources constrain their ability to undertake the tasks assigned to them.
- Discontinuities in the policy and institutional environment are a major problem in the conservation of biological diversity. In many countries, there have been too frequent institutional changes that have undermined continuity of 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 various land uses.

Forests and watershed management

Undoubtedly, water availability remains a critical problem in the region, and this has been an important factor in many of the conflicts. Much of the water related problem stems from failure to manage the demand. Also there has been a significant decline in water quality on account of contamination. Most governments have recognized this and increasingly watershed management adopts an integrated approach to land use. However, inherent constraints in deviating from current approaches would suggest continued problems in the water sector. Although forests and trees do influence the hydrological cycle, in the context of the situation in West and Central Asia, their impact will be mostly at the micro level, especially in view of limited extent of forests and wood lands and the preponderance of other land uses.

Combating desertification

As happens in the case of agriculture and range management, unfavourable policy, institutional and economic environment results in the neglect of preventive actions. Governments find them particularly difficult, if more comprehensive approaches require significant policy and institutional changes. Forestry interventions have largely focused on technical aspects, especially to plant species that are well adapted to the adverse environmental conditions, producing sufficient number of seedlings to meet the demands from government organizations and farmers, adoption of appropriate techniques for planting

and aftercare. A number of countries in West Asia have also developed appropriate design of shelterbelts and wind breaks, especially in the context of urban greening initiatives. Costs of such planting are extremely high and hence their wider adoption largely depends on resource availability. At best such an approach may be adopted in a limited area, especially in the case of cities that are emerging as important commercial and tourist centres.

Developing forest-based ecotourism

Tourism, in particular eco-tourism, has substantial potentials and constraints and forests and forestry could gain considerably from this. Two major issues that most countries in the region face as regards ecotourism are:

- its social impact, especially as regards generating income to the local communities; and
- environmental sustainability.

Given their limited extent, on the whole forests may not be the core component of tourism, except in some of the West Asian countries. However, the anticipated overall growth of tourism will provide substantial opportunities to forestry to be an active part of the tourism asset. Especially as wood productivity is limited in the region on account of adverse environmental factors, nature based tourism could become an important source of income from forests. Certainly this will require substantial institutional adaptation.

Sequestering carbon

Although forests and woodlands play an important role as carbon sinks, the scope for taking advantage of this in the West and Central Asia region is limited for a number of reasons. Most CO₂ sequestration projects now implemented in the region are outside the CDM framework of Kyoto Protocol. Most of these are externally funded afforestation/reforestation projects where CO₂ sequestration is accomplished incidentally. As such there are no CDM projects in any of the countries in the region. Inherent low biomass productivity and the rigorous requirements limit the capacity of the countries to implement afforestation/reforestation projects within the CDM framework.

Paying for environmental services

As income increases, willingness of the society for payment for environmental services increases. However, payments for environmental services provided by forests may not be feasible. Indeed, it will be difficult to implement payments for environmental services because of the need:

- to identify the providers and the buyers of services
- to assess the value of services they benefit from
- to develop markets for environmental services.

Therefore, it is very unlikely that individuals will pay for environmental services provided by governments in a near future. However, it is more probable that private companies will sell or have to buy such services.

Defining scenarios

The current and future situations facing the countries in the region differ considerably depending on the combination of the socio-economic situation and the institutional capacity of countries. Three scenario storylines related to environmental issues have been developed. The scenario 1 is the most favourable; it gives emphasis to biodiversity conservation, water demand management and land protection. The second is less favourable mainly because of some institutional constraints. Whereas the third one illustrates a difficult future situation in which environmental issues worsen.

10 ANNEXES

ANNEX 1

Table 5 Deserts and dryland areas in West Asia

	Total area	Desert		Drylands						Total area of drylands
		Hyper-arid		Arid		Semi-arid		Dry-Sub humid		
		lgp ⁵ 0 days		lgp 1-59 days		lgp 60-119 days		lgp 120-179 days		
West Asia Country	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000 km ²	'000 km ²
Afghanistan	650	20	133	25	164	54	348	1	5	517
Bahrain										
Cyprus	9	0	0	0	0	0	0	100	9	9
Iran	1,643	39	638	14	222	41	681	5	81	984
Iraq	438	67	295	2	8	13	58	17	72	138
Jordan	96	68	65	6	6	14	13	12	12	31
Kuwait	24	100	24	0	0	0	0	0	0	0
Lebanon	104	0	0	0	0	2	2	52	54	56
Oman	271	100	272	0	0	0	0	0	0	0
Qatar	11	100	11	0	0	0	0	0	0	0
Saudi Arabia	2,396	100	2,401	0	0	0	0	0	0	0
Syria	185	25	46	7	13	30	56	32	59	129
Turkey	778	0	0	0	2	64	502	21	162	666
United Arab Emirates	75	100	75	0	0	0	0	0	0	0
Yemen	480	93	447	3	13	1	7	2	10	30
TOTAL AREA	7,160	62	4,407	6	428	23	1,667	6	464	2,560

Source: FAO, AGLL, Terrastat database, 2003

Table 6 Deserts and dryland areas in Central Asia

	Total area	Desert		Drylands						Total area of drylands
		Hyper-arid		Arid		Semi-arid		Dry-Sub humid		
		lgp 0 days		lgp 1-59 days		lgp 60-119 days		lgp 120-179 days		
Central Asia Country	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000 km ²	'000 km ²
Armenia	30	0	0	0	0	88	26	12	4	30
Azerbaijan	86	0	0	0	0	31	27	50	43	70
Georgia	70	0	0	0	0	3	2	33	23	25
Kazakhstan	2,715	0	0	56	1,516	33	908	8	209	2,633
Kyrgyzstan	198	9	17	5	10	66	131	13	27	168
Tajikistan	143	8	11	28	40	55	79	2	2	121
Turkmenistan	487	3	15	49	238	34	166	0	2	406
Uzbekistan	446	7	32	56	248	28	124	1	2	375
TOTAL AREA	4,175	2	75	49	2,052	35	1,463	7	312	3,828

Source: FAO, AGLL, Terrastat database, 2003

⁵ length of growing period

ANNEX 2

Table 7 Extent of terrestrial protected areas (National IUCN categories I-IV Areas)

Country or Area Name	Terrestrial Protected area National IUCN categories I-IV	
	Area (Ha)	Percentage of land
CENTRAL ASIA		
Kazakhstan	7,741,945	2.8
Kyrgyzstan	608,290	3.0
Tajikistan	2,602,925	18.2
Turkmenistan	1,883,220	3.9
Uzbekistan	2,050,293	4.6
TOTAL CENTRAL ASIA	14,886,673	3.7
CAUCASUS		
Armenia	299,107	10.0
Azerbaijan	393,651	4.5
Georgia	290,276	4.2
TOTAL CAUCASUS	983,034	5.3
WEST ASIA		
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	0	0.0
Turkey	804,312	1.0
United Arab Emirates	40	0.0
Yemen	0	0.0
TOTAL WEST ASIA	16,335,673	2.4
TOTAL WECA region	32,205,380	2.9

Source: United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC), 2004

Note: In addition to these, there are other areas that are declared as protected but don't fall into the IUCN categories I to IV. Saudi Arabia is an example and when these areas are also included, the extent of protected areas in the country increases from 1.8% to about 38%.

ANNEX 3

Table 8 International Tourist Arrivals by country of destination

Country or Area Name	Tourist arrivals (*1000)					
	1990	1995	2000	2002	2003	2004
CENTRAL ASIA						
Former USSR						
Kazakhstan			1,471	2,832	2,410	3,073
Kyrgyzstan		36	59	140	248	248*
Tajikistan			4			
Turkmenistan		218				
Uzbekistan		92	302	332	231	231*
TOTAL CENTRAL ASIA		346	1,836	3,304	2,889	3,552
CAUCASUS						
Armenia		12	45	162	206	263
Azerbaijan		93	681	834	1,014	1,349
Georgia		85	387	298	313	368
TOTAL CAUCASUS		190	1,113	1,294	1,533	1,980
WEST ASIA						
Bahrain	1,376	1,396	2,420	3,167	2,955	2,955*
Cyprus	1,561	2,100	2,686	2,418	2,303	2,349
Iran (Islamic Republic of)	154	489	1,342	1,585	1,546	1,659
Iraq	748	61	78			
Jordan	572	1,074	1,427	2,384	2,353	2,853
Kuwait	15	72	78	96	94	91
Lebanon		450	742	956	1,016	1,278
Oman	149	279	571	817	817*	817*
Qatar	136	309	378	587	557	557*
Saudi Arabia	2,209	3,325	6,585	7,512	7,332	8,580
Syrian Arab Republic	562	815	1,416	2,870	2,788	3,032
Turkey	4,799	7,083	9,586	12,790	13,341	16,826
United Arab Emirates	973	2,315	3,907	5,445	5,871	5,871*
Yemen	52	61	73	89	148	148*
TOTAL WEST ASIA	13,306	19,829	31,289	40,716	41,121	47,016
TOTAL WECA region	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 tourists in WECA region	3.0	3.8	5.0	6.5	6.6	6.9

*: estimated value

Source: WTO, 2005

11 REFERENCES

Al-Faraji F.A.H. 2001. Combating desertification and sandstorms in Iraq, in United Nations, 2001: Global Alarm: Dust and Sandstorms from the World's Drylands, Asia Regional Coordinating Unit, Secretariat of the United Nations Convention to Combat Desertification, Bangkok.

Al-Zagaibeh Heedier. 1995. Water and war in the Middle East, (<http://www.globalsecurity.org/military/library/1995>)

Aminmansour M. 2004. Drought and desertification in "IRAN" Iran & Iranian Latest News Persian Journal, Aug 30, 2004 (Website http://www.iranian.ws/cgi-bin/iran_news/exec/view.cgi/2/35590).

Association for Forestry Development and Conservation, Lebanon. 2005. <http://www.afdc.org.lb/>

Bishop J. and Young C. 1995. Adjustment Policies and the Environment: A Critical Review of the Literature. CREED Working Paper Series No. 1

Caspian Information Centre. 2005. What role for tourism in Kazakhstan's economic future, Occasional Paper No 8, February 2005. <http://www.caspianinfo.org/story.php?id=535>

Conservation International. 2005. Biodiversity hotspots. (Website http://www.biodiversityhotspots.org/xp/Hotspots/hotspots_by_region/)

Cyprian Ministry of Agriculture Natural Resources and Environment Department of Forests. 2005. Forestry outlook study for Cyprus: Opportunities and Challenges towards 2020.

Czudek R. 2005. Wildlife issues and development prospects in West and Central Asia, FOWECA Working Paper, FAO Rome.

Development Alternatives, Inc. 2002. International experiences in water management: Laws and institutional issues affecting water management in the South Caucasus, prepared for US Agency for International Development,

Dukhovny V.A., Avakyan I.S., Prihodko V.G. and Ruziev M.T. 2001. The Aral Sea basin and irrigated agriculture in Central Asia in the 21st century.

EFL. 2005. Forest landscape restoration in Northern and Central Europe. (Website http://www.efi.fi/attachment/f5d80ba3c1b89242106f2f97ae8e3894/60aa43155d45f8440595e70d8a6aec03/Proc53_net.pdf)

FAO. 2005. Forests and floods: Drowning in fiction or thriving on facts, RAP publication 2005/3, Forest Perspectives 2, Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, Bangkok.

FAO, 2004. Payment schemes for environmental services in watersheds. Land and Water Discussion Paper 3, Food and Agriculture Organization of the United Nations, Rome

FAO. 2003. Terrastat database, AGLL (Website <http://www.fao.org/ag/agl/agll/terrastat/>)

Forest Department of Turkmenistan. 2005. Forestry outlook study for Turkmenistan: Opportunities and Challenges towards 2020.

Forests, Rangelands and Watershed Management Organization of Iran. 2005. Forestry outlook study for Iran: Opportunities and Challenges towards 2020.

Geist H. J. and Lambin E.F. 2004. Dynamic Causal Patterns of Desertification, Vol. 54 No. 9. BioScience. (website http://www.geo.ucl.ac.be/LUCC/pdf/04_September_Article_Geist.pdf)

Global Transboundary Protected Areas Network. 2005. Website <http://www.tbpa.net>

Government of Iran. 2002. Iran's plans for developing a sustainable environment for Ecotourism: Strengthening management Principles and Practices and the Legislative Framework, Statement made during the Asia Pacific Ministerial Conference on Sustainable Development of Eco-tourism, Maldives, 11-13 February 2002.

Government of Lebanon. 2003. National Action Programme to combat desertification, Unpublished Report, Ministry of Agriculture, Beirut

GRID-Tbilisi. 2002. Caucasus Environment Outlook. (Website <http://www.gridtb.org/projects/CEO/index.htm>)

Haddad R. 2002. Taking action for earth's future.

Hofer D. 2002. The Lion's Share of the Hunt: Trophy hunting and conservation: A review of legal Eurasian tourist hunting market and trophy trade under CITES, TAFFIC Europe, Brussels, Belgium.

Horak S. 2004. Central Asia: Problems and Perspectives of International Tourism - Conference Paper "Tourism and Regional Development", Tábor, Czech Republic, May 2004. (http://slavomirhorak.euweb.cz/konference_Tabor2004.htm)

International Center for Agricultural Research in the Dry Areas (ICARDA). 2005. Medium-Term Plan 2005 – 2007. (Website www.icarda.org)

Interstate Coordination Water Commission (ICWC). Central-Asian international scientific-applied conference "Water partnership in Central Asia". (<http://www.icwc-aral.uz/>)

Iran Daily. 2004. Watershed management. December 02, 2004. (<http://www.iran-daily.com/1383/2154/html/focus.htm>)

Kangarani, H.M. 2005. Euphrates and Tigris watershed: Economic, social and institutional aspects in an integrated watershed management. FOWECA Working Paper, Forest Economics Service, FAO Forestry Department.

Kahveci G., Ok K. and Yılmaz E. 2003. Ecotourism and sustainable development of forests and forest villages in Turkey, Paper presented at the XIIth World Forestry Congress, Québec.

Madjidov M. 2003. Tourism infrastructure market for Uzbekistan, US and Foreign Commercial Service and US Department of State, <http://www.stat-usa.gov/>)

Ministry of Nature protection, Republic of Armenia. 2002. Armenia Natural Resources Management and Poverty reduction project.

Reich P., Eswaran H., Kapur S. and Akca E. 2000. Land degradation and desertification in desert margins, Türkiye Toprak Ilmi Derneği, Ana Sayfaya Dönüş, <http://www.toprak.org.tr/isd/isd>

Royal Society for the Conservation of Nature, Jordan. 2005. Website <http://www.rscn.org.jo/>

- Schaar E.** 2001. Central Asia's Dead Sea: The Aral Sea's Slow Demise, *Harvard International Review*, Vol. 23 (3) - Fall 2001. (Website <http://hir.harvard.edu/articles/934/>)
- Seddon P.J. and Khoja A.R.** 2003. Saudi Arabian tourism patterns and attitudes, *Annals of Tourism Research*, Vol 30 No.4, pp 957-959.
- Silayan A.** 2005. Equitable distribution of CDM projects among developing countries, HWWA – Report 255, Hamburg Institute of International Economics, Hamburg (<http://www.hwwa.de/Publikationen/Report/2005/Report255.pdf>)
- Special Committee on a Future Framework for Addressing Climate Change.** 2004. Sustainable Future Framework on Climate Change, Global Environmental Sub-Committee Industrial Structure Council, Japan. (<http://www.meti.go.jp/english/information/downloadfiles/cPubComFramework.pdf>)
- The International Ecotourism Society.** 2004. Definition of Ecotourism. (Website <http://www.ecotourism.org>)
- UNCCD.** 2003. Sub-regional Action Programme for the Central Asian Countries on Combating Desertification within the UNCCD Context. (Website <http://www.unccd.int/actionprogrammes/asia/subregional/2003/srapcd-eng.pdf>)
- UNDP, Kazakhstan.** 2003. IRIN News, 17 Jun 2003.
- UNEP - WCMC.** 2005. Extent of terrestrial protected areas (National IUCN I-VI Areas). (website <http://sea.unep-wcmc.org>)
- UNEP.** 2005 (a). Division of Early Warning and assessment (DEWA), Global Resource Information Database (GRID)- Europe, Balkhash Lake.
- UNEP.** 2005 (b). UNCED Part 1 World Status of Desertification (Website <http://www.na.unep.net/des/uncedp1.php3>).
- UNEP.** 2002. Urban areas: West Asia, GEO: Global Environment Outlook 3, Past, present and future perspectives. (website <http://www.unep.org/geo/geo3/english/435.htm>)
- UNEP.** 1997. West Asia, GEO: Global Environment Outlook 1, Regional perspectives. (website http://www.unep.org/geo/geo1/ch/ch2_13.htm)
- United Nations.** 2004. Environmental performance reviews, Azerbaijan, Economic Commission for Europe, Committee on Environment Policy, United Nations, New York and Geneva.
- United Nations Economic and Social Council.** 2003. Environmental Performance review of Georgia.
- United Nations Economic and Social Council.** 2000. Environmental Performance review of Kazakhstan.
- USAID.** 2001. Biodiversity Assessment for Central Asia: Regional Overview, Task Order under the Biodiversity & Sustainable Forestry IQC (BIOFOR) (website http://www.biofor.com/documents/CenAsia_RegionOverview.pdf)
- World Bank.** 2005 (a). Anatolia Watershed Rehabilitation Project. (Website <http://www.worldbank.org.tr/>)

World Bank. 2005 (b). Kazakhstan, Forest Sector in transition: The resource, the Users and Sustainable use (Website <http://www.worldbank.org/eca/kazakhstan/pr/foresteng.pdf>).

World Bank. 2005 (c). Forest Protection and Reforestation Project: Kazakhstan – PID.

World Resources Institute (Earth trends). 2004. Water Resources eAtlas. (http://www.earthtrends.wri.org/pdf_library/maps/watersheds/eu28.pdf)

World Tourism Organization. 2005 (a). Website <http://www.world-tourism.org/facts/eng/ITA&TR.htm>

World Tourism Organization. 2005 (b). Website <http://www.world-tourism.org/projects/silkroad/silkroad.html>

WWF. 2005. Kazakh upland (PA0811)
(Website http://www.worldwildlife.org/wildworld/profiles/terrestrial/pa/pa0811_full.html)