

Fragile ecosystems are important ecosystems, with unique features and resources. Fragile ecosystems include deserts, semi-arid lands, mountains, wetlands, small islands and certain coastal areas. Most of these ecosystems are regional in scope, as they transcend national boundaries. This chapter addresses land resource issues in deserts, as well as arid, semi-arid and dry sub-humid areas. Sustainable mountain development is addressed in chapter 13; small islands and coastal areas are discussed in chapter 17.

Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Desertification affects about one sixth of the world's population, 70 per cent of all drylands, amounting to 3.6 billion hectares, and one quarter of the total land area of the world. The most obvious impact of desertification, in addition to widespread poverty, is the degradation of 3.3 billion hectares of the total area of rangeland, constituting 73 per cent of the rangeland with a low potential for human and animal carrying capacity; decline in soil fertility and soil structure on about 47 per cent of the dryland areas constituting marginal rainfed cropland; and the degradation of irrigated cropland, amounting to 30 per cent of the dryland areas with a high population density and agricultural potential.

The priority in combating desertification should be the implementation of preventive measures for lands that are not yet degraded, or which are only slightly degraded. However, the severely degraded areas should not be neglected. In combating desertification and drought, the participation of local communities, rural organizations, national Governments, non-governmental organizations and international and regional organizations is essential.

A Strengthening the knowledge base and developing information and monitoring systems for regions prone to desertification and drought, including the economic and social aspects of these ecosystems

Basis for action The global assessments of the status and rate of desertification conducted by the United Nations Environment Programme (UNEP) in 1977, 1984 and 1991 have revealed insufficient basic knowledge of desertification processes. Adequate world-wide systematic observation systems are helpful for the development and implementation of effective anti-desertification programmes. The capacity of existing international, regional and national institutions, particularly in developing countries, to generate and exchange relevant information is limited. An integrated

and coordinated information and systematic observation system based on appropriate technology and embracing global, regional, national and local levels is essential for understanding the dynamics of desertification and drought processes. It is also important for developing adequate measures to deal with desertification and drought and improving socio-economic conditions.

Objectives

- a** To promote the establishment and/or strengthening of national environmental information coordination centres that will act as focal points within Governments for sectoral ministries and provide the necessary standardization and back-up services; to ensure also that national environmental information systems on desertification and drought are linked together through a network at subregional, regional and interregional levels;
- b** To strengthen regional and global systematic observation networks linked to the development of national systems for the observation of land degradation and desertification caused both by climate fluctuations and by human impact, and to identify priority areas for action;
- c** To establish a permanent system at both national and international levels for monitoring desertification and land degradation with the aim of improving living conditions in the affected areas.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Establish and/or strengthen environmental information systems at the national level;
- b** Strengthen national, state/provincial and local assessment and ensure cooperation/networking between existing environmental information and monitoring systems, such as Earthwatch and the Sahara and Sahel Observatory;
- c** Strengthen the capacity of national institutions to analyse environmental data so that ecological change can be monitored and environmental information obtained on a continuing basis at the national level.

Financing and cost evaluation \$350 million including about \$175 million from the international community on grant or concessional terms.

B Combating land degradation through, *inter alia*, intensified soil conservation, afforestation and reforestation activities

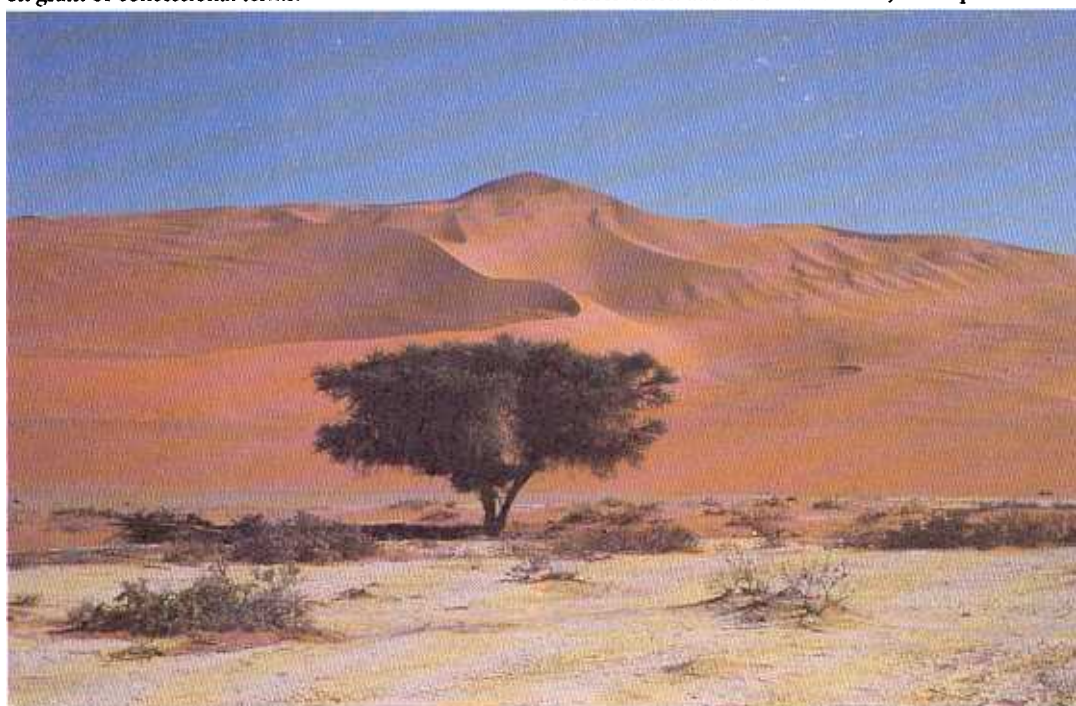
Basis for action Desertification affects about 3.6 billion hectares, which is about 70 per cent of the total area of the world's drylands or nearly one quarter of the global land area. In combating desertification on rangeland, rainfed cropland and irrigated land, preventative measures should be launched in areas which are not yet affected or are only slightly affected by desertification; corrective measures should be implemented to sustain the productivity of moderately desertified land; and rehabilitative measures should be taken to recover severely or very severely desertified drylands.

An increasing vegetation cover would promote and stabilize the hydrological balance in the dryland areas and maintain land quality and land productivity. Prevention of not yet degraded land and application of corrective measures and rehabilitation of moderate and severely degraded drylands, including areas affected by sand dune movements, through the introduction of environmentally sound, socially acceptable, fair and economically feasible land-use systems. This will enhance the land carrying capacity and maintenance of biotic resources in fragile ecosystems.

Objectives

- a** As regards areas not yet affected or only slightly affected by desertification, to ensure appropriate management of existing natural formations (including forests) for the conservation of biodiversity, watershed protection, sustainability of their production and agricultural development, and other purposes, with the full participation of indigenous people;
- b** To rehabilitate moderately to severely desertified drylands for productive utilization and sustain their productivity for agropastoral/agroforestry development through, *inter alia*, soil and water conservation;
- c** To increase the vegetation cover and support management of biotic resources in regions affected or prone to desertification and drought, notably through such activities as afforestation/reforestation, agroforestry, community forestry and vegetation retention schemes;
- d** To improve management of forest resources, including woodfuel, and to reduce woodfuel consumption through more efficient utilization, conservation and the enhancement, development and

Desertification affects about 3.6 billion hectares, one quarter of the global land area. Vegetation cover in areas such as Mali needs to be increased through soil and water conservation



Collecting woodfuel in (left) Mali, and (right) Burkina Faso, West Africa. The World Bank estimate woodfuel consumption at four and a half times the sustainable production level resulting in progressive deforestation.



use of other sources of energy, including alternative sources of energy.

Management-related activities Governments at the appropriate level, and with the support of the relevant international and regional organizations, should:

- a implement urgent direct preventive measures in drylands that are vulnerable but not yet affected, or only slightly desertified drylands, by introducing:
 - i improved land-use policies and practices for more sustainable land productivity;
 - ii appropriate, environmentally sound and economically feasible agricultural and pastoral technologies;
 - iii improved management of soil and water resources;
- b Carry out accelerated afforestation and reforestation programmes, using drought-resistant, fast-growing species, in particular native ones, including legumes and other species, combined with community-based agroforestry schemes. In this regard, creation of large-scale reforestation and afforestation schemes, particularly through the establishment of green belts, should be considered, bearing in mind the multiple benefits of such measures;
- c Implement urgent direct corrective measures in moderately to severely desertified drylands with a view to restoring and sustaining their productivity;
- d Promote improved land/water/crop-management systems, making it possible to combat salinization in existing irrigated croplands; and to stabilize rainfed croplands and introduce improved soil/crop-management systems into land-use practice;
- e Promote participatory management of natural resources, including rangeland, to meet both the needs of rural populations and conservation purposes, based on innovative or adapted indigenous technologies;
- f Promote in situ protection and conservation of special ecological areas through legislation and other means for the purpose of combating desertification while ensuring the protection of biodiversity;
- g Promote and encourage investment in forestry development in drylands through various incentives, including legislative measures;
- h Promote the development and use of sources of energy which will lessen pressure on ligneous resources, including alternative sources of energy and improved stoves.

Financing and cost evaluation \$6 billion including about \$3 billion from the international community on grant or concessional terms.

C Developing and strengthening integrated development programmes for the eradication of poverty and promotion of alternative livelihood systems in areas prone to desertification

Basis for action In areas prone to desertification and drought, current livelihood and resource-use systems are not able to maintain living standards. In most of the arid and semi-arid areas, the traditional livelihood systems based on agropastoral systems are often inadequate and unsustainable, particularly in view of the effects of drought and increasing demographic pressure. Poverty is a major factor in accelerating the rate of degradation and desertification. Action is therefore needed to rehabilitate and improve the agropastoral systems for sustainable management of rangelands, as well as alternative livelihood systems.

Objectives

- a To create the capacity of village communities and pastoral groups to take charge of their development and the management of their land resources on a socially equitable and ecologically sound basis;
- b To improve production systems in order to achieve greater productivity within approved programmes for conservation of national resources and in the framework of an integrated approach to rural development;
- c To provide opportunities for alternative livelihoods as a basis for reducing pressure on land resources while at the same time providing additional sources of income, particularly for rural populations, thereby improving their standard of living.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Adopt policies at the national level regarding a decentralized approach to land-resource management, delegating responsibility to rural organizations;
- b Create or strengthen rural organizations in charge of village and pastoral land management;
- c Establish and develop local, national and

Demonstrating the use of stone lines to control soil erosion in Kalsaka, Burkina Faso. Stones slow down rain running off the land, allowing it to nourish crops. Using this method crop yields increase by 50 per cent on average, more in dry years.



intersectoral mechanisms to handle environmental and developmental consequences of land tenure expressed in terms of land use and land ownership. Particular attention should be given to protecting the property rights of women and pastoral and nomadic groups living in rural areas;

d Create or strengthen village associations focused on economic activities of common pastoral interest (market gardening, transformation of agricultural products, livestock, herding, etc.);

e Promote rural credit and mobilization of rural savings through the establishment of rural banking systems;

f Develop infrastructure, as well as local production and marketing capacity, by involving the local people to promote alternative livelihood systems and alleviate poverty;

g Establish a revolving fund for credit to rural entrepreneurs and local groups to facilitate the establishment of cottage industries/business ventures and credit for input to agropastoral activities.

Financing and cost evaluation The Conference secretariat has estimated the costs for this programme area in chapter 3 and chapter 14.

D Developing comprehensive anti-desertification programmes and integrating them into national development plans and national environmental planning

Basis for action In a number of developing countries affected by desertification, the natural resource base is the main resource upon which the development process must rely. The social systems interacting with land resources make the problem much more complex, requiring an integrated approach to the planning and management of land resources. Action plans to combat desertification and drought should include management aspects of the environment and development, thus conforming with the approach of integrating national development plans and national environmental action plans.

Objectives

a To strengthen national institutional capabilities to develop appropriate anti-desertification programmes and to integrate them into national development planning;

b To develop and integrate strategic planning frameworks for the development, protection and management of natural resources in dryland areas into national development plans, including national plans to combat desertification, and environmental action plans in countries most prone to desertification;

c To initiate a long-term process for implementing and monitoring strategies related to natural resources management;

d To strengthen regional and international cooperation for combating desertification through, *inter alia*, the adoption of legal and other instruments.

Management-related activities Governments at the appropriate level, and with the support of the relevant international and regional organizations, should:

a Establish or strengthen, national and local anti-desertification authorities within government and local executive bodies, as well as local committees/associations of land users, in all rural communities affected, with a view to organizing working cooperation between all actors concerned, from the grass-roots level (farmers and pastoralists) to the higher levels of government;

b Develop national plans of action to combat desertification and as appropriate, make them integral parts of national development plans and national environmental action plans;

c Implement policies directed towards improving land use, managing common lands appropriately, providing incentives to small farmers and pastoralists, involving women and encouraging private investment in the development of drylands;

d Ensure coordination among ministries and institutions working on anti-desertification programmes at national and local levels.

Financing and cost evaluation \$180 million including about \$90 million from the international community on grant or concessional terms.

E Developing comprehensive drought preparedness and drought-relief schemes, including self-help arrangements, for drought-prone areas and designing programmes to cope with environmental refugees

Basis for action Drought, in differing degrees of frequency and severity, is a recurring phenomenon throughout much of the developing world, especially Africa. Apart from the human toll (an estimated 3 million people died in the mid-1980s because of drought in sub-Saharan Africa) the economic costs of drought-related disasters are also high in terms of lost production, misused inputs and diversion of development resources.

Early-warning systems to forecast drought will make possible the implementation of drought-preparedness schemes. Integrated packages at the farm and watershed level, such as alternative cropping strategies, soil and water conservation and promotion of water harvesting techniques, could enhance the capacity of land to cope with drought and provide basic necessities, thereby minimizing the number of environmental refugees and the need for emergency drought relief. At the same time, contingency arrangements for relief are needed for periods of acute scarcity.

Objectives

a To develop national strategies for drought preparedness in both the short and long term, aimed at reducing the vulnerability of production systems to drought;

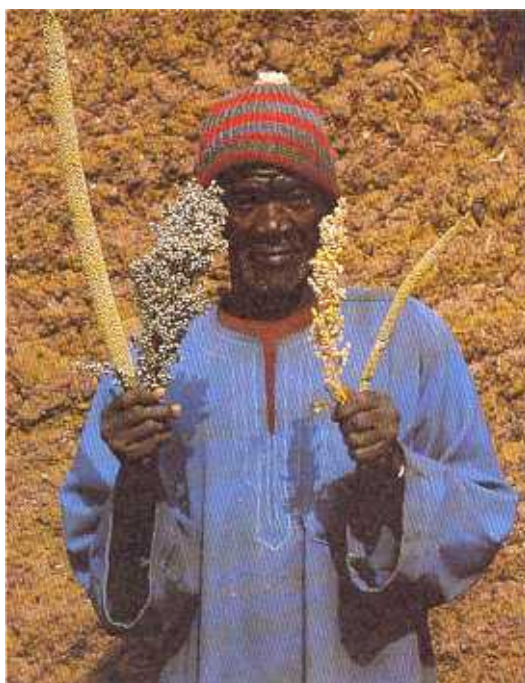
b To strengthen the flow of early-warning information to decision makers and land users to enable nations to implement strategies for drought intervention;

c To develop and integrate drought-relief schemes and means of coping with environmental refugees into national and regional development planning.

Management-related activities In drought-prone areas, Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

a Design strategies to deal with national food deficiencies in periods of production shortfall. These strategies should deal with issues of storage and stocks, imports, port facilities, food storage, transport and distribution;

Jean-Marie Sawadogo with crops from a dry year and a year when rain was plentiful. Right: A mother with her dead child, one of 300 Somalian refugees who died daily due to lack of food. Drought carries a high human cost and in economic terms it often involves diverting resources earmarked for development



- b** Improve national and regional capacity for agrometeorology and contingency crop planning. Agrometeorology links the frequency, content and regional coverage of weather forecasts with the requirements of crop planning and agricultural extension;
- c** Prepare rural projects for providing short-term rural employment to drought-affected households. The loss of income and entitlement to food is a common source of distress in times of drought. Rural works help to generate the income required to buy food for poor households;
- d** Establish contingency arrangements, where necessary, for food and fodder distribution and water supply;
- e** Establish budgetary mechanisms for providing, at short notice, resources for drought relief;
- f** Establish safety nets for the most vulnerable households.

Financing and cost evaluation \$1.2 billion including about \$1.1 billion from the international community on grant or concessional terms.

F Encouraging and promoting popular participation and environmental education, focusing on desertification control and management of the effects of drought

Basis for action The experience to date on the successes and failures of programmes and projects points to the need for popular support to sustain activities related to desertification and drought control. But it is necessary to go beyond the theoretical ideal of popular participation and to focus on obtaining actual active popular involvement, rooted in the concept of partnership. This implies the sharing of responsibilities and the mutual involvement of all parties. In this context, this programme area should be considered an essential supporting component of all desertification-control and drought-related activities.

Objectives

- a** To develop and increase public awareness and knowledge concerning desertification and drought, including the integration of environmental education in the curriculum of primary and secondary schools;
- b** To establish and promote true partnership between government authorities, at both the national and local levels, other executing agencies, non-governmental organizations and land users stricken by drought and

desertification, giving land users a responsible role in the planning and execution processes in order to benefit fully from development projects;

- c** To ensure that the partners understand one another's needs, objectives and points of view by providing a variety of means such as training, public awareness and open dialogue;
- d** To support local communities in their own efforts in combating desertification, and to draw on the knowledge and experience of the populations concerned, ensuring the full participation of women and indigenous populations.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Adopt policies and establish administrative structures for more decentralized decision-making and implementation;
- b** Establish and utilize mechanisms for the consultation and involvement of land users and for enhancing capability at the grass-roots level to identify and/or contribute to the identification and planning of action;
- c** Define specific programme/project objectives in cooperation with local communities; design local management plans to include such measures of progress, thereby providing a means of altering project design or changing management practices, as appropriate;
- d** Introduce legislative, institutional/organizational and financial measures to secure user involvement and access to land resources;
- e** Establish and/or expand favourable conditions for the provision of services, such as credit facilities and marketing outlets for rural populations;
- f** Develop training programmes to increase the level of education and participation of people, particularly women and indigenous groups, through, *inter alia*, literacy and the development of technical skills;
- g** Create rural banking systems to facilitate access to credit for rural populations, particularly women and indigenous groups, and to promote rural savings;
- h** Adopt appropriate policies to stimulate private and public investment.

Financing and cost evaluation \$1.0 billion including about \$500 million from the international community on grant or concessional terms.