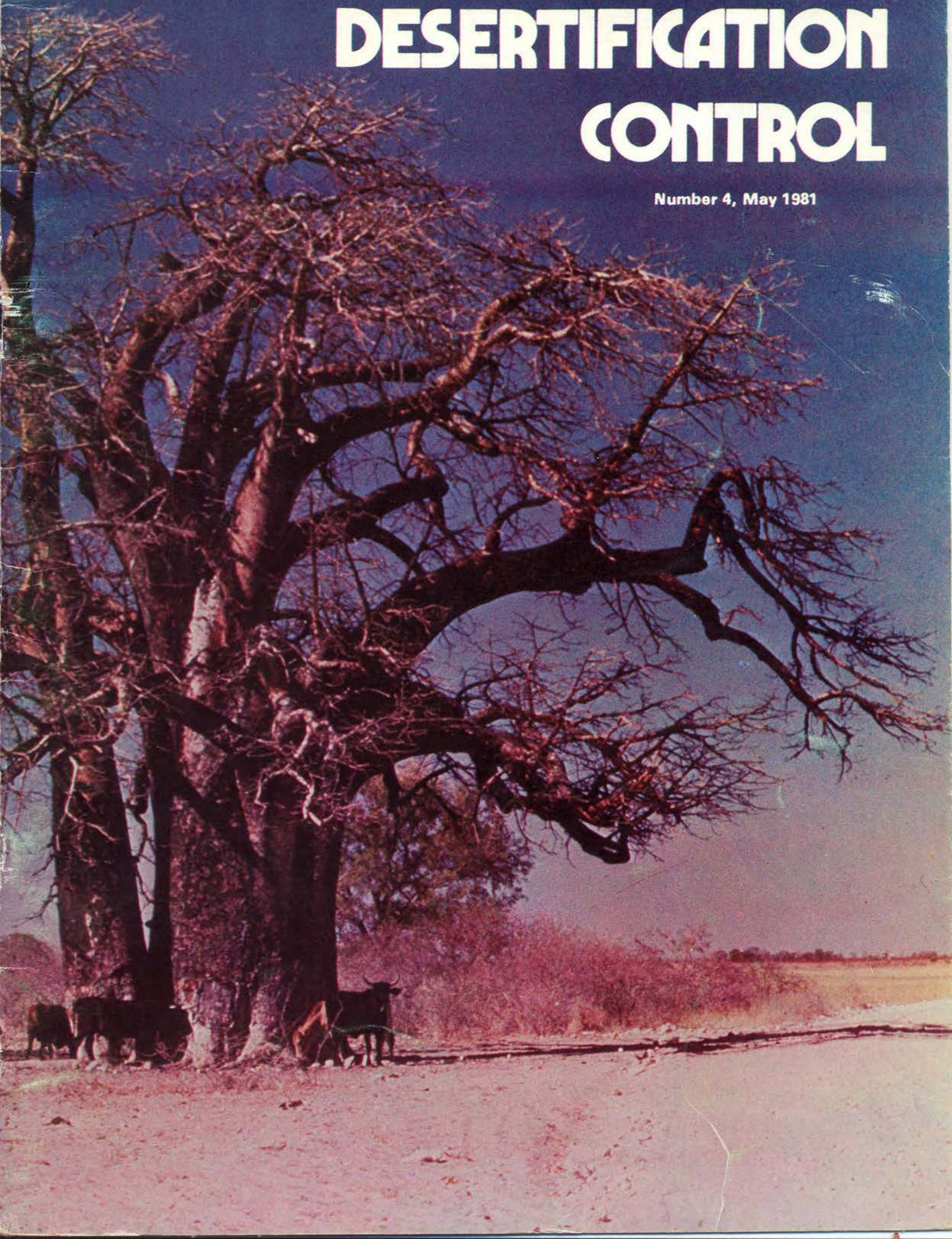




UNITED NATIONS ENVIRONMENT PROGRAMME

# DESERTIFICATION CONTROL

Number 4, May 1981



### **ABBREVIATIONS**

ALECSO	Arab League Educational, Cultural and Scientific Organization
CILSS	Permanent Interstate Committee on Drought Control in the Sahel
ECA	Economic Commission for Africa
ECWA	Economic Commission for Western Asia
EMASAR	Ecological Management of Arid and Semi-Arid Rangelands, FAO
FAO	Food and Agriculture Organization of the United Nations
IAEA	International Atomic Energy Agency
IFAD	International Fund for Agriculture Development
IILA	Instituto Italo-Latinamericano
ILO	International Labour Organisation
IPAL	Integrated Project on Arid Lands, UNEP/UNESCO
MAB	Man and the Biosphere Programme, UNESCO
OAU	Organization of African Unity
UN	United Nations
UNCOD	United Nations Conference on Desertification
UNDP	United Nations Development Programme
UNDTCD	United Nations Department of Technical Co-operation and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNSO	United Nations Sudano-Sahelian Office
WFC	World Food Council
WHO	World Health Organization
WMO	World Meteorological Organization

# DESERTIFICATION CONTROL



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*Cover: Cattle grazing in the arid lands of Eastern Botswana. Helen Van Houten*

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## CONSULTATIVE GROUP ON DESERTIFICATION CONTROL

- The United Nations Conference on Desertification (UNCOD) was held in Nairobi from 29 August to 9 September 1977.
- This was the first worldwide effort ever initiated to consider the global problem and responsibilities posed by the advancing desert. 95 States participated.
- 50 United Nations offices and bodies, 8 inter-governmental organizations and 65 non-governmental organizations participated.
- The United Nations Conference on Desertification prepared a World-wide Plan of Action to Combat Desertification with 28 specific recommendations.
- Immediately after the adoption of the Plan of Action the Executive Director of UNEP convened the Consultative Group for Desertification Control to assist in mobilizing resources for the activities under the Plan of Action. This Group is co-sponsored by UNEP, UNDP, FAO, WMO, UNIDO, WFC, UNFPA, IFAD and UNESCO.

# SUDAN



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## AN APPALLING SOUTHWARD MARCH OF THE SAHARA

*James Walls*

Chief Editor and Writer

United Nations Conference on Desertification

It was just five years ago that a team conducted an aerial reconnaissance in Sudan, the huge nation of the middle Nile, and made an appalling discovery. What the surveyors encountered was something already apparent to the people living there, although being inside the situation, the inhabitants could see the calamity only in bits and pieces. Aircraft and aerial photography were needed to show conclusively that across the full 1600-km width of Sudan, the great desert of the north was shouldering and pushing into the pasturelands of the south. Hugh Lamprey was the representative of the United Nations Environment Programme (UNEP) on the reconnaissance team. He reported that the Libyan and Nubian deserts, two parts of the Sahara, had advanced from 90 to 100 km southward across this vast front in only 17 years—that is, between 1958 and 1975.

In the rest of the world, little notice has been taken of this catastrophe that is portrayed, when it is portrayed at all, as a local problem. Places

like Darfur and Kordofan, whose northern rims have been invaded by dunes, are far away from the mainstream of events in the modern world. The same advancing desert also brought disaster to ancient Nubia, a place once close to the centre of human activity. But Nubia now lies far off to one side. If an event so dire occurred in what is now a centre, in the United States, for example, it would be as if the semi-arid parts of Nebraska, three quarters of the state, were transformed into empty dunes in less than two decades, and as if dust blew so thick in Omaha that the city would be virtually abandoned.

But there might be objections to making a comparison with the United States. Nebraska, it could be said, is rich, being part of a rich country, and desertification there would bring on losses that would have to be calculated in billions of dollars. Sudan, on the other hand, is desperately poor, a nation whose name appears on the United Nations' list of "least developed countries"

Losses to desertification in Sudan would not only involve much less in capitalized assets, but also far fewer people would be affected than the 750,000 persons who would be displaced by dunes forming over the dryer parts of Nebraska.

Yet it must be admitted that notions of "poverty" and concepts of "poor countries" are sometimes based on illusions. Even in places as poor as Sudan, assets when added one to another can reach unexpectedly high totals. The broad swath of Sudan that has so recently been desertified—150,000 km<sup>2</sup>—was home to a population largely consisting of nomadic pastoralists. These people long ago adapted to the arid and unstable conditions at the desert's edge with ancient techniques that enabled them to extract modest wealth from its thin, sparse pastures. The outsider's image of nomadic pastoralism is often a picture of bony cattle tended by raggedy, equally scrawny herdsmen, and in such an image the developed world's notions of third world poverty are confirmed.

*Firewood is becoming scarce, and as more and more is collected, tree cover diminishes and the desert advances.*  
A. Matheson, UNICEF



# SUDAN

Yet the nomadic pastoralist has never raised stock for the marketplace, so whatever assets he possesses have not been seen outside his isolated society. He has traditionally stood aloof from commerce, and only recently has he begun to supply meat and hides to the markets.

Some observers have pointed out that if wealth in stock were assessed along the Sahara's southern shore as it is elsewhere, using the same standards, the scrawny pastoralist would turn out to be surprisingly well heeled. In good times—which is to say, outside the recurring stress of drought—Mr. Average Herdsman, with his 20 camels, 200 head of cattle and accompanying flocks of goats, is the owner of stock that, if it were all placed fat and healthy on the market, would bring him close to \$50,000. In this total, a first hint appears that desertification in Sudan may have involved enormous losses. It would be difficult to state precisely how large these losses are, since the desertified areas conform to no census boundaries. The number of people who used to live there, as well as the size of their herds and flocks, can only roughly be estimated.

The carrying capacity of pastures at the desert's edge is so slight that ten hectares are needed to nourish one cow with calf. Indeed the term "desert" can be defined as designating a region of the earth where ten

hectares would fail to produce sufficient pasture to nourish one cow and a calf. To get a rough idea of what has been lost in the parts of Sudan newly desertified, one might estimate that this land had an average carrying capacity of five hectares per bovine unit when it was still usable pasture. Its 15 million desertified hectares would then have supported the equivalent of three million cows with calves. If each cow and calf are together valued at \$200, then a mere 17 years of desertification wiped out at least \$600 million worth of livestock in Sudan, since traditional herdsmen use pastures to their full capacity (and here may have been overgrazing). It would be difficult to reach a more precise estimate of the amount of assets blown away in the desiccating desert winds which are continuing to advance toward the swamps of the Great Sudd. Some interest nonetheless pertains to reasonable guesses. If we can estimate that an economy once had a foundation of \$600 million worth of livestock, then its total assets would easily soar to beyond one billion dollars. Additional income would arise from the gathering of wild gum arabic, from vegetable and grain plots in irrigable oases, from spinning and weaving, and from crafts of all kinds. But all this has been wiped out within just a few years by desertification.

What happened to one of the

poorest countries in the world when it was stripped of at least a billion dollars worth of assets in only 17 years? And, more important, what happened to the people whose livelihoods were linked to those assets? Precise answers cannot be given, but reasonable guesses can again be made, as there are only so many possibilities.

Desertification in Sudan caused the deaths of large numbers of people and livestock, but the mortality rate was probably lower than outsiders might have expected. Although desertification in Sudan occurred quickly, people and animals did have a little time to move away from previously fertile regions. When men and beasts crowded into areas already in use, they put additional pressure on the remaining good land and heightened the prospect of further desertification. When people emigrated to the cities, they increased the slum population and aggravated the problems of overcrowding and wretched living conditions that were already overwhelming Khartoum and other third world cities. Probably some of these displaced persons left the country, perhaps seeking jobs in Saudi Arabia, while some refugees from drought in the West African Sahel made their way to Europe. (Demographer John Caldwell has pointed out that displaced nomads are more likely to enroll in industrial labour, some types of which express another form of nomadism, than they are to take up farming.)

The Government of Sudan, which welcomed and encouraged the aerial survey, fully realizes the seriousness of the desertification problem. Like other African nations at the United Nations Conference on Desertification, held in Nairobi, Kenya, in 1977, Sudan would like to have seen an international fund established to meet this deadly threat. But there were several reasons why donor nations hesitated to establish such a fund, not least of which are the spotty results from previous development expenditure. So an international fund was not set up. "We are already paying for so much," the donor nations seemed to be saying. "How



*Burning the old grass leaves the soil unprotected from wind erosion. A. Matheson, UNICEF*



*The advance of the desert means less food for their flocks. UNEP*

can we be expected to pay for this, too?"

Nonetheless, a case can be made that the donor nations are indeed paying for desertification in Sudan—and elsewhere—and that it would be to their advantage economically to finance a direct assault on the problem of desertification, especially in the poor countries of the third world. An argument could be developed (and indeed should be developed for the benefit of the realists in the money capitals) that the loss of a billion dollars worth of assets in Sudan is the loss of those assets to the world and is something felt in New York and Moscow as well as in Khartoum. Sudan's unceasing confrontation with desertification is one of the reasons why this nation remains on the list of "least developed countries" and why, therefore, it continues to be a particular target of development assistance channeled through international agencies. A billion-dollar loss in Sudan sets waves in motion that ripple to the

ends of the earth. Many of these effects are long term and subtle, yet they ultimately accumulate into totals that would make the cost of combating desertification in Darfur and Kordofan seem minuscule.

Like all man-made deserts, the new dunelands in Darfur, Kordofan and Nubia exist where deserts should not exist from a strictly climatic point of view. This means that these desiccated regions can be healed, and time alone would undoubtedly repair these ravaged landscapes if only they could be isolated from human contact for two or three generations. The expense involved in letting time work the cure would be high, for costs classifiable as foregone income can surpass the totals involved in active campaigns against desertification. And cures of any kind, passive or active, are more expensive than preventing desertification from occurring in the first place.

Yet when political will musters the resources to repair damaged land,

wonders can be performed, as was strikingly shown by the case studies prepared for the Conference on Desertification. The results achieved in Soviet Turkmenia, in the Vale rangeland of south-eastern Oregon, and all across China's arid northlands provide convincing evidence that even serious degradation can be reversed and the land reclaimed, and that it all can be done at reasonable cost. In Sudan, remedial measures can reverse the tragic process in which trees, once encountered as far north as Atbara, can no longer be found even around Khartoum, 100 km to the south. In repairing this destruction, restoration would be made to one of mankind's ancient and fabled homes. And that aspect should not be forgotten when cold economic calculations are made. It should always be remembered that when desertification breaks out on land being used by people, this eruptive disease of the planetary skin demolishes not only human homes but human heritage as well.

*In the Atacama Plains  
there are places where  
rain has  
never been recorded.*

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## A SEARCH FOR SOLUTIONS IN CHILE

*Seifulaziz Milas*  
Information Officer  
United Nations Environment Programme



Chile's northern desert, the Atacama, is one of the driest in the world. Rainfall is almost unknown in the Atacama Desert, which is an arid plain stretching from the coastal mountains east to the Andes. Rainfall is also sparse throughout the arid Norte Grande or "Great North", the region extending from the Peruvian border south to Copiapó, over an area of some 180,000 km<sup>2</sup>. To the south, the adjoining Norte Chico, a mountainous region of some 148,000 km<sup>2</sup>, is almost as arid, with rainfall seldom exceeding 100 mm per year on the coast and much less in the interior.<sup>1</sup>

Because of the cold ocean currents flowing north along the coast, air moving inland from the Pacific can carry only a limited amount of moisture. As it passes over the coast, there is a rapid loss of relative humidity due to subsidence. Thus the formation of rain clouds is impeded with drastic results for the Atacama. At the same time, the high Andean mountain ranges to the east effectively block circulation of the air masses formed on their Pacific and Atlantic sides, cutting off the region from the benefits of the moisture-laden air masses moving west from the Amazon Basin.

The narrow coastal desert receives some moisture from the *camanchaca*, the thick fog that rolls in over the

coastal mountains and provides a source of water for isolated colonies of cacti and other well-adapted desert plants. Even the *camanchaca*, however, fails to reach most of the Atacama. The coastal range, with elevations of 800 to 1200 m above sea-level, catches most of the fog and so the Atacama Plains show little influence of the sea.

In the Atacama Plains there are places where rain has never been recorded. The little water found there consists of groundwater of varying quality and streams running down from the Andes which have cut deep canyons, called *quebradas*, across the desert on their way towards the coast. Often these streams do not reach the Pacific but become small, elongated oases, which have been cultivated since pre-Hispanic times. There are also flash floods called *avenidas de agua*, resulting from storms in the Andes, which at long intervals (sometimes as long as ten years) send sheets of flood water spreading over the plains.

In spite of the lack of rain, a unique tree called the tamarugo (*Prosopis tamarugo*), manages to survive in the Chilean deserts. Early Spanish maps show areas of the region as being densely forested, especially the vast area north of the Loa River known as the Pampa del Tamarugal or Tamarugo Plains. Settlement of the region and the introduction of nitrate

mining during the nineteenth century led to the destruction of large tracts of tamarugo forest and further desertification of the region. Tamarugo wood was the main source of fuel for the towns of Arica and Iquique and for the nitrate mines. The unlimited use of the tamarugo as fuel during the "nitrate era" denuded huge areas and caused the disappearance of the trees from much of the Atacama.

Concern over desertification and the waste of natural resources has resulted in recognition of the need for restoration of the tamarugo forests to reclaim or control the desert and make it economically useful. Now Chilean scientists are trying to promote growth of the tamarugo, which is a good source of fodder for sheep and goats. As early as 1970, a programme was reportedly initiated in Tarapaca, calling for the eventual reforestation of 200,000 hectares of land.<sup>2</sup>

### DESERTIFICATION IN OTHER AREAS

The Atacama, however, is not the only problem area. Desert-like conditions are spreading far beyond its limits. In many areas of northern and central Chile, deforestation and poor agricultural practices in the past have led to large-scale soil degradation and erosion. These conditions have appeared even in the southern





Valle de la Luna, the Valley of the Moon in the Atacama Desert. Embassy of Chile, Nairobi.

regions of the country, where there is adequate rain. There, the problems arise from clearing mountain forests to create pastures. The pastures are then quickly eroded as the soil is washed away by heavy rains.

In Chile, growing concern about desertification in the country's arid and semi-arid zones has prompted various institutions to include some of the affected areas in their research and development plans. The introduction of arid and semi-arid zone management as part of the National Environment Programme has been of special importance.

#### AFFORESTATION AND CONSERVATION

The National Forestry Corporation and other institutions are taking part in controlling the advance of the desert by carrying out research and implementing afforestation programmes, identifying and using species especially suitable for highly eroded soils and areas in the process of desertification. The species used include *Atriplex repanda* and *Atriplex numularia*, which allow for improved land use and increase of the land's livestock carrying capacity. From 1972 to 1978, this programme covered 31,114 hectares of land in the Fourth and Metropolitan regions of Chile.<sup>3</sup>

With regard to control of sand-

dunes, a problem which has caused significant economic damage in certain areas, the National Forestry Corporation has played an important role. Sand dune fixation has been carried out with both mechanical and vegetational methods, but the vegetational method is by far the more widely used due to its effectiveness and comparatively low cost. Once plant cover is established and the dunes are stabilized, forests are planted using tree species *Pinus radiata*, *Pinus pinaster*, *Acacia cyanophyllia*, *Acacia lophanta*, *Acacia melanoxylon*, *Robinia pseudoacacia* and *Populus* sp. During the past two years, approximately 4,000 hectares have been covered through these programmes.

In 1979, a project was set up for the city of Arica and the San Jose River Basin to provide protection against the effects of the "Bolivian winter" (flooding, erosion, etc., resulting from the rapid run-off of flood waters from the highlands along the border with Bolivia). The project is especially designed to control erosion through afforestation and the establishment of protected areas. It envisages the afforestation of some 10,000 hectares of land in the San Jose River Basin within a period of five years. At the same time, efforts will be made to motivate private interests and individuals to support similar activities to control soil erosion

and consequent desertification in the region.

#### RESEARCH PROGRAMMES

Among the important studies carried out with regard to the problems of soil degradation and desertification was an investigation of the possibility of an integrated rural development programme. The programme would be aimed at improving the living conditions of the 80,000 inhabitants of the Fourth Region and at reversing, or at least controlling, the desertification process provoked by them. The study was presented to the Regional Government, which was preparing the integrated development plan for this region in which the question of desertification is recognized as critical.

A study of the plant cover of the region has also been made. The study investigated more than 2,800,000 hectares of the Fourth Region in order to assess the rate of desertification in the area. The results were presented to the Seminar on the Cartography of Vegetation in Arid Zones of Latin America, held in Buenos Aires in March 1979, under the auspices of the Instituto Italo-Latinoamericano (IILA).

In southern Chile, an assessment of soil degradation is being carried out in the region of Aysén, with a view

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Left to right, from top: Plant introduction—drought-resistant fodder plants in the Western Negev • Cattle graze on drought-resistant fodder bushes introduced in the Western Negev (Ben-Gurion University) • Afforestation: a tree nursery in the sands near Palmahin (World Health) • Plants irrigated with sea-water near Eilat on the Red Sea (Richard Nowitz, Ben-Gurion University) • Grazing on drought-resistant fodder plants on trails in the Western Negev (Ben-Gurion University) • Garden near the Dead Sea, irrigated with saline water (Ben-Gurion University) • Ornamental plants near the Dead Sea, irrigated with saline water (Ben-Gurion University)

# THE NEGEV

## THE BIBLICAL WILDERNESS MADE PRODUCTIVE

J. Schechter

Director, Applied Research Institute  
Ben-Gurion University of the Negev

The processes associated with desertification of the Negev have been going on for many millenia. It is generally considered that there has been no ecologically significant climatic change since at least 4,000 B.C. The northern Negev border area has an extremely sharp rainfall gradient ranging from 400 mm 50 km north of Beer-Sheva to 100 mm only 20 km south of the town, a gradient of over 4 mm per km. Any slight change could easily cause a northward or southward shift of this isohyetal gradient which in turn would cause the northern border of aridity to fluctuate and the desert

to expand or contract, thus affecting the population of these fringe areas. Climatic changes undoubtedly had a strong impact on the prosperity of the region. However, over the centuries, there has been little net ecological change caused by fluctuation in climate.

Overgrazing has been one of the destructive influences leading to desertification. The Negev has been intensively grazed for thousands of years and some botanists believe that many palatable and nutritious plant species have been completely eradicated. While the long-term effects of grazing by domestic live-

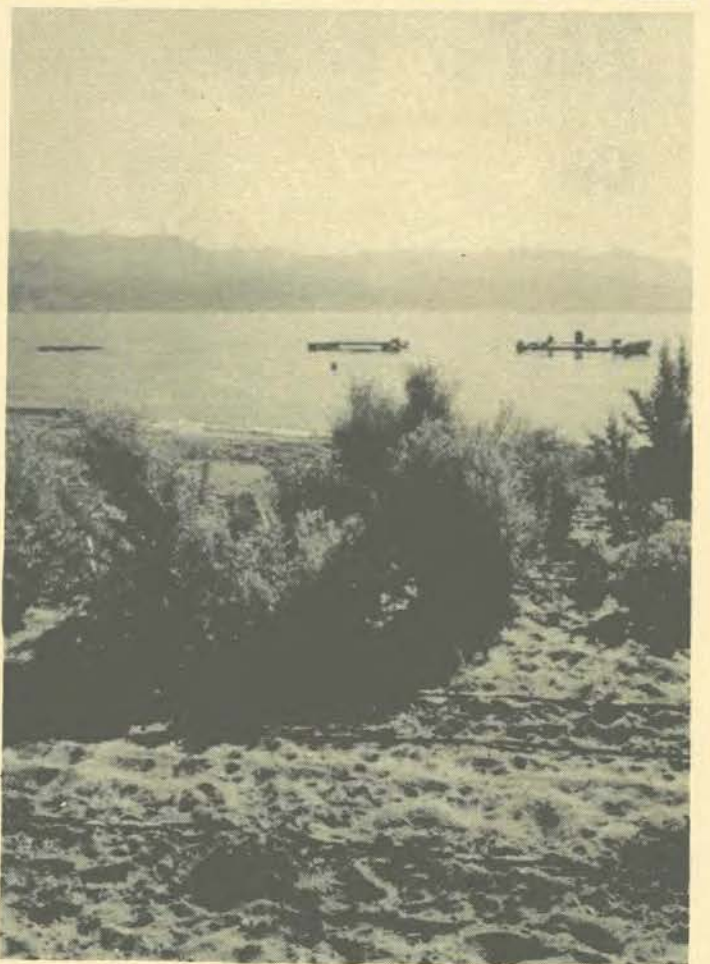
stock are complex and difficult to assess, there is evidence of greater decimation of vegetation where grazing pressures have been highest (around settlements, wells, etc.) compared to smaller loss in more remote areas.

The use of natural stands of bushes and trees for fodder, fuel and building material has resulted in the decimation of many plant communities. Firewood gathering was and still is an important factor in depressing the natural stands of trees and shrubs. This is especially true in those areas where human population is the largest and where settlement has been continuous over many centuries. It has resulted in a sparseness of trees, such as *Acacia raddiana* in the wadis and *Pistacia atlantica* in the Negev highlands. They may be remnants of large populations from the past. There is little doubt that trees were more abundant in former times than at present. It has been estimated that total shrub density has also been reduced and now stands at about one half to one fifth of previous densities.

Wildlife has been severely reduced by human pressures and reduction of plant cover. Several species of large herbivores and carnivores seem to have become extinct in historical times. Populations of small predators and birds have likewise suffered



Ploughing the sand of the Negev.



# THE NEGEV

considerable losses from hunting, especially since the introduction of firearms.

Some research has indicated that the eradication of natural vegetation increases the albedo of the ground, setting off a positive feed-back cycle which leads to even greater aridity and hence desertification.

Studies of the pressures on the Negev ecosystem which result in desertification must take into account several vital geographic factors relating to the history of the region. The frequent invasions and continual warfare with consequent political and economic instabilities were a major cause of environmental destruction of the Negev ecosystem in the past.

## SETTLED AGRICULTURE

The most characteristic feature of agricultural settlement in the semi-arid Negev has been the high level of input into the cropping systems. These inputs include irrigation water brought from the distant north, fertilizers, intensive mechanization, pesticides, supplementary animal feeds and sophisticated technology. The communal nature of agricultural organization helped settlers to overcome initial difficulties and increase the efficiency of resource utilization. In addition Government policies of drought compensation and price control have reduced the perils of crop failure due to drought or to unstable markets. Constant research activities have brought the farmers new high-yielding and disease-resistant cultivars. Suitable methods of cultivation and crop rotation have been introduced with special attention to erosion control practices. By such means the Negev has become one of the most productive cereal-producing areas in Israel. This combination of technological means with social and economic incentives was the basis for the excellent results achieved over the last 30 years.

Water is transported from the northern, more humid areas to areas in the south, where it is used for settlement and reclamation of this formerly inhospitable arid region. It is brought to the fields in a closed system of pipes, thereby reducing the problem of loss by evaporation or leakage. The major system of

irrigation is sprinkling. This technique gives good uniformity in water distribution and allows the farmer excellent control of the quantity of water to be delivered to any particular area. The technique is relatively simple to operate and requires less labour than surface irrigation methods.

The use of drip or trickle irrigation systems, an original Israeli development, has recently been expanded. Its great advantage is the reduction in evaporation since only a small area of the soil is wetted and the water is not sprayed into the air. The tricklers are run almost continuously so that soil around the root is never dry. Prevention of the wetting and drying cycles in the soil has resulted in exceptionally high yields per unit of water and of surface.

The installation of a modern irrigation system which afforded good distribution and regulation of water had to be accompanied by other technological inputs in order to optimize agricultural yields. This meant the development of a highly intensive farming system utilizing the most modern cultivation methods. By use of these methods Israel has increased its agricultural production over tenfold during the past 25 years. Many crops have even shown greater efficiency in water use. For example, cotton has shown a 50 per cent increase in yield over a period of six years. The availability of water combined with the mild winter climate has enabled the development of a lucrative export of winter vegetables and flowers to Europe.

Brackish water reservoirs occur in most deserts of the world, and in the Negev Desert, south of the 200 mm rainfall line, most of the underground aquifers are saline. Recent developments in agricultural technology, irrigation methodology and plant selection have made possible the utilization of brackish water for modern agriculture. The development of trickle irrigation in Israel extended the use of saline water for the cultivation of species previously not considered possible. These large saline resources can now provide the major water source for future development. All the settlements in the Arava Valley, south of the Dead Sea, use local brackish water with salt concentration between 700 and

3,000 ppm TDS (total dissolved solids) for irrigation of their out-of-season vegetable and flower crops. New settlements in the Negev highlands are based on the use of brackish water.

## ANIMAL HUSBANDRY

Ranges have been improved by fencing and installation of water points. This has resulted in a general improvement of pastures as compared with unfenced and uncontrolled areas. In the more rainy northern regions of the Negev with precipitation above 250 mm, some beef cattle are raised semi-extensively on non-arable land. Supplements are widely used. There is, however, little integration between livestock management and the surrounding semi-arid ecosystem. Many agriculturalists believe that such an integration will have to be developed in order to establish a more profitable and stable farming system. Other possible range improvements are the addition of nitrogen fertilizers and the establishment of perennial drought-resistant fodder bushes and shrubs, although neither of these has as yet proven economically feasible.

## NOMADIC PASTORALISM

Livestock densities for the year 1900 have been estimated at between 80,000 and 100,000 sheep and goats and 10,000–15,000 each of camels and donkeys. This is considered to be the average herd density over the last 3,000 years but with wide variations. These resources have supported a human population at various times of from 25,000 to 100,000 persons. Wheat and barley have been the major grains cultivated, and barley was preferred due to its better drought resistance. Usually a two-year rotation was used with a ploughed fallow being allowed to accumulate moisture for the next year's grain crop. There were no additional inputs of fertilizer or water, and yields, depending on the amount of precipitation, were relatively low. The straw and chaff were an important supplementary feed for the herds, and the harvested fields were a source of forage.

Changes in this traditional mode

started at the beginning of this century and greatly accelerated after the establishment of the State of Israel. Increased construction and industrial activity provided a new form of income for the Bedouin population. Income from wages enables the purchase of modern agricultural equipment, so Bedouin agriculture today is mostly mechanized. Other inputs to agriculture such as fertilizers are used. These developments have shifted the major activities of the Bedouin from nomadic pastoralism to wage labour and settled agriculture.

While the relative weight of livestock in the total Bedouin income has declined, there are many factors which have encouraged the increase in herd sizes. These include veterinary care, development of water supply, availability of additional pasture areas in the north and an increase in meat prices. Supplementary feeds such as grain, straw or hay are widely used. Due to these factors the herd population has more than doubled to approximately 200,000 head.

Availability of additional pastures in the north and the growing use of feed supplements have reduced the pressures on the land. It is

possible that further increase in herd size could in the future cause serious environmental damage. The combination of grain farming, pasture and feed supplements allows for flexible use of diverse resources. While more land has been pressed into mechanized grain culture, some signs of wind erosion have been witnessed and these are probably compensated for by the decrease in water erosion.

Natural growth of trees and shrubs is no longer available for fuel, and hence other sources have had to be found. These are usually wood from uprooted orchards or prunings brought in from irrigated areas. In new settlements the use of gas or kerosene is common.

In the mid-sixties the Government initiated planned settlement for the Negev Bedouin (and Bedouin elsewhere in the country). It was hoped that such inducements as planned modern facilities and services and favourable financial conditions for purchase would attract them and reduce semi-nomadism. The first planned Bedouin village in the Negev was Tel Sheva, established in 1968. It did not meet with the anticipated success. Many Bedouin

refused to move into the village for social rather than economic reasons. It is now realized that social structure and kinship ties are important factors in Bedouin settlement. Furthermore, Tel Sheva attracted mainly wage-earners able to undertake regular financial commitments. This suggested that future villages should be constructed with their own industrial areas or nearby potential sources of employment.

In 1974, it was decided, in the light of the reluctance of the outlying population to move in, to modify the original plans. The decision was taken to build no more houses but instead to parcel off plots of land which families could buy to build on themselves. The present plan is to develop neighbourhood clusters based on existing groups.

A village has been established at Shuval in the Western Negev at the request of the Bedouin themselves, based on a central nucleus of the Huzeil tribe with all its components. Occupying an area of 7,000 dunam, it is planned to absorb 5,000 inhabitants over the next few years. Emphasis has been placed on separate neighbourhoods for each sub-unit of a tribe, and each such neighbourhood has its own services with more complex services located in the centre. Tel Sheva will be expanded in a similar manner.

A third village is now being established north of Beer-Sheva, and another three are to be established in the region in co-ordination with the local tribes.

#### INDUSTRIALIZATION

Unfortunately, the Negev Desert is poor in major natural resources. If large numbers of inhabitants are to live in the Negev region, agriculture will not be sufficient to supply employment and sustenance to more than a small fraction of the population. Industry and mining have a role to play in this regard and there are several mining operations in the region including copper in the Eilat area, phosphates, clays and sand in addition to various minor building materials. The Dead Sea has proved to be a major source of raw materials, the largest ones being potash fertilizer, bromine and magnesia.

More important for the future development of the area is the use of these minerals for the manufacture of more sophisticated products.



*Checking soil moisture after the rain. Almasy.*

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# MALTA

## AN ANCIENT PROBLEM: SOIL EROSION

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### *Salvino Busutti*

Director, Division of Human Settlements and Socio-Cultural Environment, UNESCO

To Bernard Shaw, the Maltese landscape was a "heap of stones" Centuries before, a group of experts sent out by the Knights of St. John to survey Malta's possibilities as headquarters for their Order called it "a barren rock". But on this rock the Knights erected castles which were masterpieces of seventeenth and eighteenth century European

architecture. Rich as it is in cultural wealth, Malta has always suffered from the paucity and poverty of its soil. Indeed, there is reason to think that even prehistoric Malta was not self-sufficient since the soil-poor island could not produce enough crops to sustain its inhabitants.

Man has managed to live on Malta, because he has created his farming land. The archipelago, consisting mainly of Malta and Gozo, was for centuries practically a barren karstic waste as many large areas are today. Despite the labours of generations of farmers, only a couple of valleys have

been able to sustain terraced farming. There are also a few basins and plains where, with transported inorganic material coupled with humic additions and costly irrigation, some good farming has been developed. In addition some lowlands have been reclaimed, but they have problems arising from a thin artificial soil.

Lang established in 1957 that although on Malta gradient had little direct effect on the pattern of farmland and waste, it was directly related to the maintenance of a particular area of land under cultivation. "The problems of retaining a soil cover", he wrote, "are much less serious in steeply sloping districts where thick, heavy soils are derived from the Blue Clay, than in areas of similar gradient where the parent rock is of Globigerina limestone or Coralline limestone. In the latter case, soils are thin and coarse, *campi*

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**'THEIR PROLONGED FINGERS CORRIDORS  
FOR SCARABS DISPERSING  
ON THE FLAKED FLESH OF THE EARTH'**

- - *Maltese poem*

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*artificiali* are frequently found and the soil, once removed, is not easily replaced, either by natural or by human agencies".<sup>1</sup>

Apart from the difficulties attributed to the properties of the soil and to topographical characteristics, salinity, poor rainfall, salt spray and strong winds are additional factors which the hardy Maltese farmer has to contend with. Increasingly soluble salt content, overpumping of water tables, bad drainage and irrigation channels have caused irremediable damage to some of the soil. Moreover, high winds—notably the fierce *majjistral*—and occasional torrential rainfall lead to the collapse of the carefully erected stone boundaries between one field and another, especially on hillsides. In the exceptionally severe October 1979 floods, many of these *hitan tas-sejjieh* were carried away. Serious damage to most of the cultivated land on the island resulted, and some fields were subsequently abandoned. This process on Malta is particularly devastating in that the breaking down of even a single wall barrier quickly causes damage above and below the abandoned field, eventually putting a whole flight of terraced fields out of cultivation.

Even though the island of Gozo has had a more successful farming tradition than Malta, a study being undertaken for UNESCO by the University of Malta on the human ecology of Gozo demonstrates that the area under cultivation continues to decrease. Over the 1966–1976 decade, 440 hectares were lost to farming, the remaining arable land on Gozo standing, in 1977, at 2,486 hectares.

The study has also established that torrential rainfall has made soil run over steep slopes, and carbon dioxide (present in rain water) coupled with the calcium carbonate of the limestone has greatly increased (through the resulting calcium bicarbonate) the incidence of soluble content. Other factors contributing to soil erosion observed in this research project relate to the abandonment of fields by migrants (and Gozo has had thousands of

them), which has led to neglect of fertile slopes and eventual impoverishment of soil; the throwing of rubble outside the cultivated fields in the path of rain water which, remaining mostly unchanneled, heightens the gully-erosion effect; and loss of vegetation and attendant effects, due to young shoots and seedlings being eaten by goats.

Successive governments have tried to introduce remedies to meet the physical and chemical needs of Malta's soil. The present administration has embarked on an ambitious programme of land reclamation through the creation of a voluntary but disciplined corps of unemployed persons. This corps transports soil from building sites in accordance with the Fertile Soil Preservation Ordinance enacted in 1935. It also levels, and destones land, and builds windbreaks and boundary walls.

The damming of gullies, contour ploughing and especially the education of farmers may eventually control the soil destruction. Yet what Bowen-Jones wrote more than two decades ago is still very applicable today:

Maltese soil 12 inches deep needs, as a minimum amount, terracing at horizontal intervals of about 20 feet. Anything wider in the way of fields or a deeper soil makes essential increasingly higher and stronger retaining walls. The problem is such that considerable control is exercised by dip as well as gradient. The amount of labour involved in maintenance is heartbreaking by modern standards and yet, without it, erosion is quickly followed by the complete stripping away of the soil down to bare rock. The scale of farming operations often has to be very small—the planting of single rows of beans, of single trees, the sowing of chick-peas in rock crevices. Power and tool application is severely restricted. Small and light implements and single draught animals or more recently "rotavators" alone can negotiate this type of terrain and work very thin soils covering rock platforms. The dangerous effect of the abandonment of any land is obvious. The past has in fact enchained the present. If cultivation is to continue then in order to preserve the artificial ecological balance, created with such effort over the centuries, a social imbalance will become even stronger. Whatever the scale of farming the farmer will always have to grub for soil, build his terraces,

*next page*



*Left: Terracing is the key to agriculture in Malta, where every bit of hard-won soil is precious. Right top: "If man has managed to live in Malta, it is primarily because he has created his farming land." Below: The soil is thin, poor and saline. All photos, Erling Mandelmann, WHO*

# THE NEGEV

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Hence development of a chemical industry was planned and steps have been taken to get it started. Government and labour union investment companies were established to manufacture products based on the natural resources of the region. These included bromine compounds of various sorts, ceramics, refractories and pesticides. At a later stage phosphoric acid production was started, utilizing Negev phosphate deposits, and magnesia was produced from Dead Sea minerals. A large glass bottle plant was set up along with various plants producing various building components. In this way a second generation of industry was developed, based on the original mining operations.

Government incentives to investors who placed their manufacturing facilities in the developing towns of the Negev included grants, long-term low-interest loans, training of technicians and various tax advantages. New construction is under way, and it will double and triple industrial output within the next few years. Whereas agriculture pioneered the settling of the Negev, industry presents new horizons for the continuing conquest of the desert.

## TOURISM AND RECREATION

Tourism, with its attractive economic potential, has made rapid advances.

The coasts of the Dead Sea and Eilat are dotted with hotels, bathing centres and other facilities to attract tourists. The warm winters in these areas are especially attractive to tourists escaping from the rigours of the European winter. Possible therapeutic effects of the Dead Sea bring many visitors wishing to obtain relief from various skin ailments.

Several large areas have been set aside as nature reserves. There has been a continual effort to protect the natural wildlife of the region, and this has resulted in an expanded population of gazelles and other animals.

## DESERT RESEARCH

The desert continues to be the subject of some of Israel's most intensive research activities. The broad spectrum of areas under investigation extends from basic studies on desert ecology, physiology of desert plants and animals, and desert soils to more immediately applicable subjects, such as mineral exploitation, agricultural practices and desert architecture. A far better understanding of desert ecosystems has been obtained, and it will undoubtedly aid in preventing or mitigating environmental degradation in this dynamic development area. This knowledge will also aid in the rational development of the desert's natural resources.

Results of these research projects have already been applied in the

Negev economy. Some outstanding examples may be found in the field of agricultural research and in such areas as water desalination, mineral exploration and industrial development.

## CONCLUSION

In general, it can be concluded that "desertification" processes in the Negev are under control and do not today present an acute problem. Development strategies and activities are slowly rehabilitating this region, which is naturally arid and semi-arid and which has probably suffered severe environmental damage during the last few millennia.

However, the expansion of population and industrial development are producing new dangers which may place development policies in conflict with environmental conservation. Problems of air pollution and industrial waste disposal are already felt in certain areas and will undoubtedly become more severe as more industries are established. Additional areas of parks and nature reserves are needed. New military bases and training areas will present further environmental hazards for which solutions must be found. But the growing awareness of the environment by the local population and planners is a major reason for believing that the problems will be solved.

# MALTA

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carry his plough or manhandle his rotavator for long hours under conditions that will seem less attractive even than those of casual dockside and urban labour.<sup>2</sup>

As in other parts of the world, the struggle against erosion on Malta and Gozo is never ending. And for years to come the landscape and man's relation to it will still

remind the Gozitan poet that:

*The giants of my land  
are fossil sleepers  
beneath the Gozo hill that gave  
them birth,  
their prolonged fingers corridors  
for scarabs  
dispersing on the flaked flesh of the  
earth.  
Soil crumbles into dust  
around the dolmens...*<sup>3</sup>

## NOTES

1. H. Bowen-Jones, Dewdney and Fisher, *Malta* (Univ. of Durham, 1960), p. 99.
2. *Ibid.*, p. 351.
3. John Cremona (Chief Justice of Malta and a Judge of the European Court of Human Rights).



# UNEP SLIDE SHOW

## WOMEN OF THE DESERT

*Based on the slide show prepared by ENID BURKE for the United Nations Environment Programme for the UN Decade for Women Conference.*

FOR many women in the third world, life is a struggle to obtain the basic needs—food, water, shelter, fuel, clothing, education and health. For those who live in the desert and semi-desert regions of the world, the struggle is twice as hard.

There are almost 80 million people fighting a constant battle to survive in the harsh, unproductive environment of the world's deserts. Women are the centre of life in these marginal areas, bearing their children and striving to nourish them in areas where obtaining food and even water is difficult. For these women, the stark beauty of the desert, with its magnificent landscapes and almost theatrical setting, is lost in the daily struggle to exist.

In these desert regions, life is especially hard for women. They are the hewers of wood and drawers of water—where there are wood and water. Obtaining these two simple necessities—water and fuel—is not an easy matter in the deserts of the world. In the deserts and the semi-arid lands around their fringes, many women must spend long hours searching for a few bits of wood, or digging up the roots of desert shrubs, to get fuel for cooking. Water is scarce, and many women have to walk long distances to find it. In times of drought, conditions become even worse. Wells dry up and women must travel farther and farther to find the life-giving water.

Deserts affect every continent, from Death Valley in North America to the Sahara in Africa and the Gobi Desert in the Soviet Union and China. Deserts have been advancing and retreating throughout recorded time, as shown by the ruins of ancient civilizations around the Mediterranean. But they have spread more rapidly in the past 50 years with the help of man. Today, some 43 per cent of the earth's surface is either desert or threatened with desertification.



Desertification, the process of creating desert-like conditions, means many things: erosion, floods, loss of top-soil, reduced food production and malnutrition. It means that in times of drought, the little water that is normally available may disappear almost entirely, and the search for firewood may further damage the vulnerable environment, contributing to further desertification.

Trees and plant cover are vital factors in preventing the spread of deserts since they

help to retain the precious water near the earth's surface. Without plant cover, the dry soil cracks or disintegrates under the burning sun, making it almost impossible to use for planting or rearing livestock. It is lack of vegetation and ground cover that causes deserts, and for that human beings must take the responsibility. Trees have been cut down for housing, heating, cooking, for paper mills, and to make way for more human settlements and more

agricultural land. The result is soil erosion and a relative reduction in the productivity of the land.

Desertification is not inevitable. It can be controlled, and there are many ways in which women can work alongside their men to combat the spread of the deserts. In addition to preserving trees and bushes and maintaining the precious plant cover, they can irrigate their land. Irrigation, however, must be accompanied by effective drainage to prevent water logging and salinization of the soil.

Even when an irrigation system is well drained with canals, it can be clogged up with sediment brought down by rivers from eroded land—especially when trees have been cut down. Large dams are especially vulnerable and sometimes have to be abandoned after a few years. Dams and reservoirs totally change the local environment. People in the area to be flooded have to be resettled. What is needed, therefore, is a thorough environmental assessment before the dam is built.

Other preventive measures to ward off desertification include limiting the amount of livestock to avoid overgrazing and concentrating on quality rather than quantity of animals. Otherwise the land will steadily deteriorate and the consequences can be as tragic as those of the Sahel drought in the late 1960s and early 1970s, when thousands of animals died, not from thirst, but from starvation.

Many people also died then, especially women and children. The desert does not easily forgive mistakes. Others were displaced, losing their livestock or seeing their crops wither away; they had no alternative but to trek south to search for survival in the urban slums and shanty towns.

UNEP, together with other UN agencies and experts from many countries, is engaged in carrying out practical investigations to learn how the experience of societies living in arid and semi-arid regions can be applied to strategies to combat desertification.

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## FROM UNEP

### CONSULTATIVE GROUP FOR DESERTIFICATION CONTROL

*Second Session  
Nairobi  
12-14 March 1980*

THE Consultative Group for Desertification Control was established in accordance with General Assembly resolution 32/172 of 19 December 1977. The resolution authorized *inter alia* the Executive Director of UNEP to convene a Consultative Group to assist in mobilizing resources for activities forming part of the Plan of Action to Combat Desertification. The Group was to meet as and when required and to comprise representatives of relevant UN bodies, such other organizations as might be required, multilateral financial agencies and developing countries with a substantial interest in combating desertification.

The Consultative Group is co-sponsored by the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the United Nations Fund for Population Activities (UNFPA), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the World Food Council (WFC), the United Nations Department of Technical Co-operation and Development (UNDTCD), the United Nations Industrial Development Organization (UNIDO) and the Food and Agriculture Organization (FAO).

Core members of the Consultative Group are, at present, the following Governments and organizations: Australia, Bolivia, Federal Republic of Germany, India, Iran, Iraq, Japan, Libya, Mexico, Niger, Senegal, Sudan, Sweden, the United States of America, Upper Volta, Uruguay, the Arab Bank for Economic and Social Development, the Arab

League Educational, Cultural and Scientific Organization (ALECSO), the International Fund for Agricultural Development (IPAD), the Permanent Interstate Committee on Drought Control in the Sahel (CILSS), the United Nations Sudano-Sahelian Office (UNSO), the World Bank and the Commission of the European Community.

The first session of the Consultative Group, convened by the Executive Director of UNEP, was held in Nairobi from 2 to 5 May 1978. The meeting agreed on policy issues regarding the functions of the Group, the scope of its work, organizational matters, procedures for project submission, funding, reporting and follow-up. The session also considered six project proposals.

The second session was held in Nairobi from 12 through 14 May 1980 and was attended by 7 co-sponsors, 17 core members and 18 observers and invited participants. Twenty-seven project proposals were submitted to the Group. Of these, 20 proposals, covering 13 countries of the Sudano-Sahelian region, were submitted by the United Nations Sudano-Sahelian Office (UNSO), while 7 proposals from 5 countries were submitted by the Desertification Branch of UNEP. The project proposals included four main categories. These were the North African Green Belt, with projects from Libya, Tunisia and Egypt; the Major Regional Aquifer in North-East Africa, involving projects from Egypt and Sudan; the Desertification Monitoring Programme in South America, with a project in Bolivia; and project proposals for the Sudano-Sahelian region with projects from a number of countries in the region. All the project proposals submitted for consideration by the Consultative Group were supported by written assurances indicating the priority accorded to the projects as well as agreement to the costing and the level of financial commitment of the projects by the Governments. Most of the projects had 60 per cent or more of their cost secured before presentation. The total cost of all the project proposals was

\$417,157,755, of which \$371,451,397 had been secured in advance.

During the second session, *ad hoc* groups of interested parties were formed to discuss and identify those projects or project components that they wished to support. The reports of these *ad hoc* groups were later considered and adopted in a plenary session which also agreed on methods and procedures for following up and co-ordinating efforts to finance projects.

A draft report of DESCON-2 was circulated to all members for comment. The final report was then prepared in the light of the members' comments and distributed on 27 May 1980. Of the 27 project proposals presented to the Consultative Group, 26 received declarations of support. The various United Nations Resident Representatives were requested to convey the outcome of the session to Governments and to convene meetings as appropriate to organize follow up.

The detailed comments arising from discussions during the second session provided guidance for improving the presentation of project proposals. The points for improvement included detailed cost-benefit considerations, sociological consequences, institutional aspects and likely roles of intergovernmental bodies. The submission of project proposals to members of the Group and other possible donors not later than six months before any scheduled sessions of the Group was also requested. The discussions showed that donor countries preferred project funding to be on a bilateral

basis. However, this did not exclude such other forms of donor participation as joint ventures or consortiums for supporting national or transnational projects.

Before the second session, the Executive Director of UNEP sent missions to various co-sponsors, potential donor countries and institutions to consult on preparations for the Consultative Group on the projects presented and the general procedure of the work of the Group. This proved to be a very fruitful exercise. The missions were well received and at the highest level. The response of Government visits was positive and attendance at the meeting was very satisfactory.

The work of the second session moved the Consultative Group into the operational phase of its activities. In this regard, the Executive Director stated in his report to the Eighth Session of the Governing Council that "although no specific commitments had been forthcoming, the results of the Consultative Group's meeting in terms of projects could be considered a positive first step in mobilizing resources to combat desertification."

Up to now only the Desertification Unit and UNSO have taken the initiative to urge and assist Governments in preparation of projects for submission to the Consultative Group. In view of this experience, and recalling the contents of paragraph 18 of the Policy Statement of the Consultative Group, other bodies are expected to use this forum to obtain support for their anti-desertification projects. This, if done, will help to ensure more successful follow-up action and concrete results.

Experience shows that with the first and second sessions of the Consultative Group, the international community is finding its work increasingly satisfactory. This is indicated by the fact that between the two sessions of the Consultative Group, four countries and one organization have opted to change their status from observers to core members of the Group.

## **INTER-AGENCY WORKING GROUP ON DESERTIFICATION**

THE Inter-Agency Working Group on Desertification was established in September 1978 to co-ordinate the activities of the specialized agencies and other United Nations organizations and programmes concerned with implementation of the Plan of Action and with a view to organizing close co-operation among them on specific anti-desertification projects and programmes.

The Working Group on Desertification held its second meeting on 17 September 1979 at the World Health Organization Headquarters in Geneva. The session was chaired by the Assistant Executive Director of UNEP Mr. Sveneld Evteev, and attended by representatives of the following United Nations bodies: UNDP, UNDTCD, UNEP, UNESCO, UNIDO, FAO, WMO, WHO, ILO, UNFPA, ECWA, ECA and IAEA.

The meeting discussed matters related to implementation of the Plan of Action to Combat Desertification, as well as matters of interest to the individual organizations and bodies of the United Nations system and to the system as a whole. The discussions were based on a draft report on activities within the United Nations system aimed at implementation of the Plan of Action. This draft report, based on information provided by individual members of the Administrative Committee on Co-ordination (ACC), was a first attempt at showing the relationship between the activities of the members and the recommendations of the Plan of Action to Combat Desertification.

The Working Group identified a number of trends in the ongoing and planned activities of the United Nations system aimed at implementation of the Plan of Action. It was noted, for example, that a major emphasis appears to have been put on anti-desertification corrective measures, particularly in the arid and semi-arid regions of Africa and to a lesser degree in similar regions of South-West Asia and Latin America. These measures are generally related to management of arid and semi-arid ecosystems.

The Group recognized that a number of projects and programmes to aid countries faced with desertification problems were not originally conceived as anti-desertification measures *per se*. Many of them, however, could be brought to serve that objective through redesign or reorientation to ensure that not only socio-economic considerations but also their environmental consequences are given full attention. This effort would also be facilitated by increased attention to assessment of desertification, especially at country level.

Analysis of the draft report brought out a need for more emphasis to be placed on those aspects of the Plan of Action concerned with cultural conditions, socio-economic incentives and other factors relevant to bringing about active participation of the population in areas with desertification problems. Similarly, there is a need for more emphasis on strengthening national capacities in science and technology. In this regard, particular attention should be given to assisting developing countries towards better planning and management of their soil resources.

Some of the developing countries have valuable experience in desertification control which could be useful to other countries facing similar problems. The Group recognized that the planning and execution of desertification control programmes and plans are areas in which extensive use should be made of technical co-operation among developing countries, especially those with experience in combating desertification.

The Working Group also brought out the need for increased implementation of the recommendation of the United Nations Conference on Desertification on combining industrialization and urbanization with development of agriculture, with a view to improving agricultural production in arid areas. Similarly, more attention should be given to drought-loss management and particularly to preventive and protective strategies for minimizing the risks and combating the effects of drought, issues which were previously raised in the context of the United Nations Water Conference.

### **PRINCIPAL OBSTACLES TO THE FULL IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION**

BASED on findings, of the Inter-Agency Working Group on Desertification, the Administrative Committee on Co-ordination (ACC) considered the following factors to be the major constraints to the full implementation of the Plan of Action:

- Governments of countries faced with desertification problems or risks are confronted with conflicting demands and scarce financial and human resources. They appear unable at present to assign sufficiently high priority to desertification prevention or control, and have only to a limited degree included such measures in their national development plans.

- There is a need to strengthen co-operation within the United Nations system so as to ensure the proper multi-disciplinary approach to projects and to arrange for effective pooling of the efforts and

resources of various agencies and bodies, with a view to the most efficient utilization, in as many as possible of the geographical areas and subject matters concerned with desertification.

- Although there is a wealth of known technology in the area of desertification control, there is still a need to fill gaps in that knowledge, particularly in regard to integrated interdisciplinary approaches, including socio-cultural dimensions. Efforts towards teaching the existing knowledge to potential utilizers are far from sufficient, particularly at the level of extension agents and farmers/pastoralists.

- Insufficient financing is seriously limiting the efforts of the United Nations system to implement the Plan of Action to Combat Desertification. There is an urgent need for external sources of financing to increase their assistance to anti-desertification projects. The United Nations Conference on Desertification estimated that resources on the order of \$400 million annually, in addition to current development assistance, would be needed to halt desertification. Funds of such magnitude have not as yet been forthcoming.

## FROM UNSO . . . and from countries round the world

### NEWS FROM THE UNITED NATIONS SUDANO-SAHELIAN OFFICE (UNSO)

IN accordance with United Nations resolutions on measures to be taken for the benefit of the Sudano-Sahelian region and on implementation of the Plan of Action to Combat Desertification in the region, the United Nations Sudano-Sahelian Office (UNSO) has been given the responsibility to assist, on behalf of UNEP, in implementing the Plan of Action in the 15 countries of the region. A joint UNDP and UNEP venture was established to provide support to UNSO in carrying out this additional responsibility. A regional office of UNSO became operational in early 1979 at Ouagadougou, Upper Volta. The following is a brief account of UNSO activities up to the end of 1979.

As part of the effort for concerted and co-ordinated action against desertification in the Sudano-Sahelian region, the United Nations Sudano-Sahelian Office held a meeting in Dakar from 30 May to 1 June 1979. The meeting brought together the UNDP resident representatives of the countries of the region as well as representatives of the other relevant organizations of the United Nations system. Representatives of the Permanent Inter-State Committee for Drought Control also attended.

The meeting emphasized the importance of urgent and co-ordinated action by all parties concerned, to support and intensify the efforts of the Governments of the region to deal with the desertification problem. It also pointed out the need to adopt innovative approaches and to utilize the concept of technical co-operation between developing countries to make use of existing knowledge based on successful experience in the region and in other regions.

As envisaged in its work plan, UNSO carried out planning and programming missions to 13 countries of the Sudano-Sahelian region between March and June 1979, with the active assistance of the competent

agencies of the United Nations system. These missions, working closely with the relevant Government services, investigated problems of desertification, assessed ongoing activities related to the recommendations of the Plan of Action to Combat Desertification, and identified priority projects and programmes for which UNSO assistance may be requested. Emphasis was placed on projects which fall within the two transnational concepts of the Management of Livestock in Arid Regions and the Green Belt. In addition to its planning and programme work, UNSO has already initiated its resource mobilization efforts and has helped in raising funds for two desertification control projects in the Sudano-Sahelian region.

### NEWS FROM THE COUNTRIES

THE following brief accounts of some of the specific activities reported by various Governments indicate how implementation of the Plan of Action to Combat Desertification is developing at the national level.

#### AUSTRALIA

The Australian Government, which is already involved in various efforts at soil conservation, is now developing effective anti-desertification measures and has recently released the completed national collaborative soil conservation and water management programmes. The Australian anti-desertification programme is financed through a Ministerial Council having a large number of standing committees. The Ministerial Council's Standing Committee on Soil Conservation is expected to operate as the co-ordinating body for anti-desertification schemes in Australia.

#### AUSTRIA

The Austrian Government intends to support United Nations measures against desertification through increasing its development aid programme for the Sudano-Sahelian region. The programme will emphasize assistance to the countries concerned in implementation of the Plan of Action to Combat Desertification.

#### BOLIVIA

Bolivia has taken steps to improve the organization and effectiveness of its anti-desertification activities. The Director of Science and Technology of the Ministry of Planning and Co-ordination has been given over-all responsibility for follow-up and co-ordination within the country of the Plan of Action to Combat Desertification.

#### HOLY SEE

The Holy See is providing support for various projects undertaken by local churches against desertification. The support is provided through the Catholic Development and Relief Organizations in a number of countries.

#### JORDAN

The Jordanian Government, which has already initiated various anti-desertification activities, is preparing a comprehensive project to combat desertification in Jordan. It is hoped that the project may attract international financial and technical assistance.

#### KUWAIT

Kuwait is playing an active role in providing support to anti-desertification activities in the Sudano-Sahelian region. The Government has already participated, through its Fund for Arab Economic Development, in financing six projects which form the first-generation programme for the Sahel, as well as four projects in the Sudan (since 1975). The value of the soft-term loans involved is nearly \$165 million. Some of these loans, as well as the technical assistance grants that the Fund has extended to the Sahel region, have direct bearing on the problems of drought control and combating desertification. Other loans are structured to support the over-all strategy of the Club du Sahel and the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS).

#### NAMIBIA

*Information supplied by the United Nations Council for Namibia*

The Institute for Namibia, which carries out its activities under the auspices of the United Nations Council for Namibia, is to begin a study on the protection and restoration of the environment. In the course of the study it will collect data on environmental risks in Namibia with particular regard to desertification.

#### NEW ZEALAND

New Zealand hopes that the involvement of individual New Zealand consultants working in various United Nations programmes, in such areas as soil physics, irrigation, engineering and the establishment of stabilizing vegetation, will contribute to the global anti-desertification programmes.

## SPAIN

The Spanish Government is taking account of its desertification problems and is considering a programme to combat desertification in the Mediterranean region of the country. This may include the establishment of a regional North-Mediterranean centre at Murcia.

## SUDAN

As part of its effort to improve implementation of its anti-desertification activities, the Sudanese Government is establishing a Desertification Control Co-ordinating Unit under the Natural Resources Secretariat of the Ministry of Agriculture, Food and Natural Resources. The Ministry has also been made responsible for the implementation and co-ordination of activities in the Desert Encroachment Control and Rehabilitation Programme (DECARP), which has been drawn up by the Government in close collaboration with UNEP, UNDP and FAO.

## ZAIRE

The Government is developing programme to combat desertification in the region of Bas-Zaïre, which was seriously affected by recent severe droughts.

## YEAR-END REPORT (1979)

UNEP's *Desertification Control Bulletin* for June 1979

expressed the concern in one sentence: "The loss of arable soil is probably the greatest single environmental threat to the future well-being of the planet."

As world demand for food increases, so the total area of productive land—actual or potential—is reduced in what is seen as an eruptive "rash" of the desert, spreading "in blotches and spots like a skin disease".

The more formal definition of desertification is: *the diminution or destruction of the biological potential of the land that can lead ultimately to desert-like conditions*. The facts are as follows:

- Between 600 and 700 million people live in areas "at risk" and, of these, about 60 million are immediately affected by desertification;
- about one third of the earth's land surface is considered desert or semi-desert on the basis of climatic data. Based on soil and vegetation data, the figure rises to 43 per cent;
- in all, approximately 54 million square kilometres or 14 per cent of the world's land surface is potentially productive but threatened by desertification;
- every year, about 60,000 square kilometres of productive and fertile land are lost.

For the present, and for all practical purposes, the established desert zones are regarded as "a battleground already abandoned". The cost of bringing these hyper-arid lands back into production is prohibitive for all but a few countries. In a sense, the soil ahead of linear expansion of these deserts—where there is no green-belt defence—is a non-renewable resource, like fossil fuel. In the inevitable encroachment, it will be finally expended or lost irretrievably to production.

Thus the current Plan of Action to Combat Desertification concentrates on areas, often well away from the main deserts, where the fight might still be won; where livestock and

human pressures, together with periodic drought, cause the "rash" spread of increased aridity in more than a hundred countries.

The critical areas are semi-arid lands which still have the "potential for biological productivity" and are therefore vulnerable to exploitation by man for maximum short-term yields that cannot be sustained in the long term. However, a reversal of this trend is obviously possible at the national level if Governments are willing and able to make the necessary socio-political adjustments and financial commitments.

With this as a main objective, UNEP's Desertification Branch increased its efforts during the year to co-ordinate international and national co-operation on the implementation of the Action Plan. In particular, it played a central role in the work of two groups:

- an Inter-Agency Working Group on Desertification (IAWGD), which is compiling a compendium of current anti-desertification activities throughout the UN system and will oversee system-wide participation in implementing the Plan;
- a Consultative Group on Desertification, comprising national Governments, international organizations and financial institutions, which considered the resource/funding implications of 27 project proposals submitted to it.

A special account for financing the Plan from the voluntary contributions of States was opened in March 1979. However, no payments into the account had been received by the end of the year and, as a result, UNEP is committed to undertake financial studies and report in due course to the UN General Assembly.

*Among specific activities of the Desertification Branch in 1979 were:*

- participation in interagency/national development of projects in the Sudano-Sahelian region, mainly forestry, rangeland/livestock/water management and sand-dune fixation projects. A total of 108 projects, costed at \$598 million, are under consideration, 20 of which were presented to the Consultative Group;
- consultations with UNSO acting on behalf of UNEP in implementing the Plan as it relates to the 15 countries of this sub-Saharan region;
- consideration of the improvement and restoration of the Foutah-Djallon massif in Guinea/Guinea Bissau and the inclusion of a related project in the programme of action;
- finalization of five North African green-belt projects; and of two national components of a Major Regional Aquifer Project in North-East Africa;
- development and/or formulation with UNEP'S Global Environmental Monitoring System (GEMS) of desertification monitoring projects in South America, South-West Asia and the Sudano-Sahelian regions;
- evaluation of the UNEP-supported elements of the EMASAR (FAO) and the MAB-3/IPAL (UNESCO) projects; and study of the possible wider application of the IPAL (Kenya and Tunisia) projects for training and demonstration of integrated approaches to the management of arid lands;

- finalization of a UNEP/ USSR project proposal on combating desertification through integrated development including industrialization and urbanization;
- continuation of a Desertification Training Control Programme with the USSR for participants from developing countries;
- planning of a similar training programme with the Government of China;
- preparation of guidelines for a UNEP/FAO project on desertification assessment and mapping;
- planning of missions to developing countries throughout the world for the purpose of examining national desertification problems and the form of possible assistance to Governments;
- participation in a UN University workshop on training and management for arid lands; and in the Eighth World Meteorological Congress formulating, *inter alia*, a joint project with WMO on climate/desertification-related studies.
- consultations with regional organizations, including OAU, on joint project proposals such as the development of a hydrological map of Africa.

Through these and other activities, UNEP has contributed to the first-stage implementation of the Action Plan to Combat Desertification. However, it is evident that both national and international efforts must be intensified and additional resources found if the UNCOD/General Assembly goals for full implementation of the Plan by the year 2000 are to be achieved.

## PROJECTS—1979

- Cost to UNEP (US dollars)*
- Combating Desertification through Integrated Development ..... 7,172.21
  - Integrated Ecological Studies in the Arid Zone to Promote Rehabilitation and Development, Phase II: Establishment of Co-ordinating Unit and Launching of Initial Field Work ..... 348,747.58
  - Ecological Management of Arid and Semi-arid Rangelands in Africa, the Near and Middle East (EMASAR), Phase II ..... 78,111.07
  - UNCOD Co-ordination of Implementation of the Transnational Projects, Phase I ..... 2,925.19
  - Desert Control Training Seminar for Developing Countries at the Lanchow Institute of Glaciology, Cryopedology and Desert, China ..... 98,688.25
  - Programme Support to UNSO in Implementing the Plan of Action to Combat Desertification ..... 319,279.51
  - UNCOD Follow-up on Implementation and Financing the Plan of Action to Combat Desertification, Phase I ..... 237,295.56
  - UNEP-MAB Integrated Project on Arid Lands (IPAL) Section, Tunisia ..... 5,460.06
  - Implementation of the General Assembly Resolution 3337 (XXIX): International Co-operation to Combat Desertification ..... 15,286.05

## WOMEN . . .

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Women, as part of the desert community, need to be drawn into a more active role in helping to prevent desert conditions from taking over their environment. They have important roles to play: helping to prevent deforestation and making the most of the desert sun by learning to use solar energy instead of firewood, participating in the greening of the desert, accepting modern methods of irrigation, practising sand-dune fixation, and establishing mosaics of vegetation.

They can join their men in training and learning how to halt the encroaching desert, in the firm belief that someday the fields will be green, the water will flow from taps or in the streams, and the days of the desert will be more productive and more fruitful.

Control of desertification and the many factors such as deforestation, overgrazing and soil erosion that lead to it is essentially a question of motivation, of convincing and motivating both men and women. UNEP has developed a unique slide show to assist in this task. It will prove useful in your efforts to inform and effect change at various levels, from decision-makers to those working in the field, including women's organizations, teachers and extension workers.

Interested organizations or programmes may obtain copies of the slide show free of charge from the Information Service, United Nations Environment Programme, P.O. Box 30552, Nairobi, Kenya.

## CHILE

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to enhancement of resource development in the Eleventh Region. In Aysen indiscriminate deforestation is a principal cause of soil erosion and creation of desert-like conditions in areas that are neither arid nor semi-arid.

On a larger scale, a map of natural ecosystems is being finalized. The map is drawn on a scale of 1:500,000 and describes the country's soil conditions with special attention to levels of erosion and plant cover. It indicates priority areas for afforestation aimed at control of soil erosion where plant cover is inadequate.

Desertification is now recognized as a serious problem in Chile, both in the lands bordering on the Atacama Desert and in other less arid regions where desertification is taking place. With recognition of the problem has come an intensive search for solutions. This has taken the form of research and of increased efforts to slow or reverse the spread of desert-like conditions through afforestation and other soil-conservation measures.

## NOTES

1. "Chile: The Land and the People" *Américas* (Organization of American States), June-July 1976, p. 10.
2. Arturo T. Cornejo, "Resources of Arid South America", in *Arid Lands in Transition* (Washington, D.C., American Association for the Advancement of Science, 1970), p. 361.
3. Information on anti-desertification activities provided by the Embassy of Chile, Nairobi.

