

DESERTIFICATION

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The International Development Research Centre (IDRC) is a public corporation created by the Parliament of Canada in 1970 and directed by an international board of governors. Through funding of scientific research in Africa, Asia, Latin America, the Caribbean and Canada, IDRC helps communities in the developing world find solutions to social, economic and environmental problems. IDRC-supported projects are designed to alleviate poverty, maximize the use of local resources, and strengthen human and institutional capacity. IDRC has its headquarters in Ottawa and has seven regional offices worldwide.

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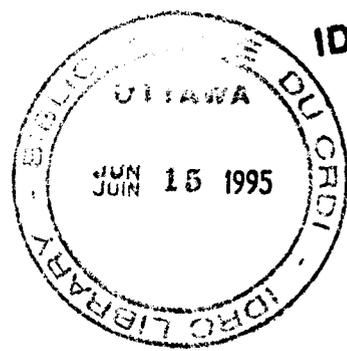
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This backgrounder is designed to assist media in covering the issues of desertification around the world. It outlines the definition, causes, symptoms and extent of desertification, as well as the history and content of the International Convention to Combat Desertification. Some of Canada's contributions to solving problems of desertification in developing countries are described. Canada's International Development Research Centre (IDRC), which produced this document, has supported research aimed at solving the problems associated with desertification in developing countries. Project examples from IDRC are included at the back to illustrate points in the text.

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Introduction

Sooner or later there's no way the international community can continue to be blind to the fact that urgent, substantial action is needed.

— Hama Arba Diallo, Executive Secretary
Intergovernmental Negotiating
Committee on Desertification.¹

After three all-night sessions, exhausted negotiators left UNESCO headquarters in Paris at 8:00 a.m. on June 18, 1994, having completed the last of five two-week marathon sessions to negotiate the International Convention to Combat Desertification. Success was theirs — the Convention was adopted and will be signed in Paris in October 1994.

The road leading to the signing of this Convention was difficult. Developing countries (the South), where the effects of desertification are dramatic, have been frustrated by a reluctance on the part of some developed countries (the North) to accept desertification as a phenomenon requiring global solutions. The 1992 Earth Summit in Rio was the setting for much of this debate. Developing-country delegates demanded that a recommendation for an international convention on desertification be included in Agenda 21. After some hard negotiating, their demand was met and the UN General Assembly struck the Intergovernmental Negotiating Committee for the Elaboration of an International Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa (INCD).

The negotiations for the Convention have taken longer than anticipated (the actual signing of the Convention was originally planned for June) and there was significant tension in the final session over financial mechanisms. The challenge now is to maintain the political will to support and implement the terms of the Convention.

The perception by many in the North that desertification is solely a Southern problem with no implications for the North is false. Desertification affects most countries, albeit to varying degrees. Desertification in any one part of the world does not just mean loss of economic productivity for the affected region, it means a loss of diversity (plant, animal, and human), a loss of the key seed and medical materials essential for global well-being and survival. And desertification will certainly translate into more environmental refugees fleeing from affected countries.

¹ From an exclusive interview for Panos' Down to Earth Desertification Special, Radio magazine. (Panos, London, fax: 071 278 0345)

Desertification: The Problem

What is desertification?

In a refugee camp on the Sudanese border a man, searching to express his anger and despondency, took a handful of dust in his hand and let it sift through his fingers. "This is why we left. Our land is like this," the refugee said. (Our Planet, Vol. 2, No. 4, 1990, UNEP).

An 84-year old Ethiopian says: "During my days as a young farmer, the land had been covered with natural grasses and trees. But all this is gone now and we have to bear the burden nowadays. (Down to Earth Desertification Special, Radio Magazine, Panos)

The term *desertification* conjures up images of expanding deserts, of sand encroaching upon fertile land. This popular myth of desertification has been discredited in most scientific circles. The deserts of Africa are not marching relentlessly southward, destroying everything in their path. Many of the Earth's deserts are natural ecosystems and their borders may expand or recede in different years. Desertification is now understood to be a primarily socioeconomic process by which natural resources are degraded through unsustainable land use practices and population pressure — a process that can lead eventually to the creation of newly desertified areas, of areas where the diversity of life is destroyed.

According to Agenda 21, desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Some people prefer the term 'land degradation' over 'desertification', as the latter brings to mind deserts and complete devastation and not the range of land degradation that actually exists.

Land, in this definition, means soil and water resources, the land surface as well as the natural vegetation or crops present. Land degradation, or the progressive weakening of the physical, biological and economic potential of the land, is a serious threat to overall productivity and therefore to the livelihoods of people who live on the land. Land degradation erodes diversity of plant and animal life. It also erodes the diversity of the people as it forces them to move and change their lifestyles, cultures, languages and knowledge.

Land degradation is characterized by such things as water and wind erosion of soil, changes in the physical and chemical properties of soil (salinization for example), a long-term loss of natural vegetation or a decrease in crop yield. The underlying cause of land degradation is considered to be the misuse of resources resulting from socioeconomic factors such as poverty, population pressure and unequal trade relations.

Desertification is often confused with drought. Droughts, unlike desertification, are natural hazards of dry climates that occur when water or moisture is so scarce, relative to demand, that the ecology of a region becomes severely unbalanced. Drought can last for one season or for many years and can affect, or be affected by, the course of desertification.

The damage caused by drought depends upon population and livestock pressure in the region, as well as the existence of early warning systems and the success of coping strategies. Droughts themselves are not caused by human activity; however, human activity, or rather the lack of preventive human activity, is often responsible for high death rates during droughts. The famous drought in the Sahel in the early 1970s is estimated to have killed up to 250,000 people, 3.5 million cattle, and countless sheep, goats and camels, in an area where livestock are the linchpin of survival for people.

Desertification is exclusively an African problem — Isn't it?

No. Although about 50% of the people most directly affected by desertification live in the Sahel, land degradation and desertification occur around the world, including in Canada and the United States. All land is susceptible to land degradation; but the Agenda 21 definition of desertification focuses primarily upon land degradation in the world's arid, semi-arid and dry subhumid areas or what can loosely be called the world's drylands. Drylands exist in all continents, making up a total of 41% of the total global land area (See Table 1). Since human activities on hyperarid areas or actual desert lands are minimal they were not considered by either Agenda 21 or the Convention as areas at risk.

It is generally a surprise to no one to hear that two-thirds of the land in Africa is dryland (32% of the world's total), but few people realize that one-third of the land in North America is dryland (12% of the world's total), most of this in the United States. More surprisingly — of the total agriculturally used dryland in North America, 74% is affected by some form of land degradation — making it the highest percentage among all the continents. Africa follows a close second with 73% of agriculturally used dryland being degraded. However, the intensity of land degradation in Africa is much more severe than in many other areas. Degradation can be more or less severe, but in all cases, without preventive or corrective measures, the threat easily translates into a shocking reality. (See Tables 2 and 3).

Almost 100 countries are affected by desertification, particularly in Africa and the Middle East, China, Pakistan, India, Australia, the Asian Republics of the former Soviet Union, the USA, Brazil, Chile and Peru as well as Portugal, Spain and Greece. Although Africa experiences the most severe degradation, Asia suffers from the largest area of degraded dryland, some 1.3 billion hectares. Twenty of these affected countries are NOT developing countries.

How bad is it?

The United Nations Environment Programme (UNEP) estimates that fully 30% of the Earth's land surface is threatened by desertification, and one-third of this dryland has already lost more than 25% of its productive potential. In human terms, this means that the livelihoods of 900 million people, or one-sixth of humanity, are at risk. The effects are more immediate and evident in regions such as parts of Africa, Asia and Latin America, where people are directly dependent upon the natural resource base for their survival. In 1991, one-quarter of Africa's population was threatened by chronic food insecurity. The United Nations Food and Agriculture Organization (FAO) projects that there will be 200 million

Table 1. World drylands in millions of hectares (*Desertification Control Bulletin*, No. 20, 1991, UNEP).

	Africa	Asia	Australia	Europe	North America	South America	World total	%
Hyper-arid	672	277	0	0	3	26	978	16
Arid	504	626	303	11	82	45	1571	26
Semi-arid	514	693	309	105	419	265	2305	37
Dry Sub-humid	269	353	51	184	232	207	1296	21
Total	1959	1949	663	300	736	543	6150	100
% world total	32	32	11	5	12	8	100	
% total global land area	13.1	13.0	4.4	2.0	4.9	3.6	41.0	
% continent area	66	46	75	32	34	31	41	

Table 2. Global status of desertification/land degradation in agriculturally used drylands.
(*Desertification Control Bulletin*, No. 20, 1991, UNEP)

Continents	Irrigated lands			Rainfed cropland			Rangeland			Total agriculturally used drylands		
	Total (m.ha)	Degraded (m.ha)	(%)	Total (m.ha)	Degraded (m.ha)	(%)	Total (m.ha)	Degraded (m.ha)	(%)	Total (m.ha)	Degraded (m.ha)	(%)
Africa	10.4	1.9	18	79.8	48.9	61	1342.4	995.1	74	1432.6	1045.8	73.0
Asia	92.0	31.8	35	218.2	122.3	56	1571.2	1187.6	76	1881.4	1311.7	69.7
Australia	1.9	0.3	13	42.1	14.3	34	657.2	361.4	55	701.2	375.9	53.6
Europe	11.9	1.9	16	22.1	11.9	54	111.6	80.5	72	145.6	94.3	64.8
North America	20.9	5.9	28	74.2	11.6	16	483.1	411.2	85	578.2	428.6	74.1
South America	8.4	1.4	17	21.4	6.6	31	390.9	297.8	76	420.7	305.8	72.7
Total	145.5	43.2	30	457.7	215.6	47	4556.4	3333.5	73	5159.7	3562.2	69.0

Table 3. Soil degradation degree by region in susceptible dryland areas (millions of hectares).
(*The World Atlas of Desertification* by Nicholas Middleton, UNEP, 1992, London)

Region	Aridity zone	Light and moderate	Strong and extreme	Total
Africa	Dry subhumid	25.2	12.1	37.3
	Semiarid	69.9	39.6	109.5
	Arid	150.2	22.3	172.5
Asia	Dry subhumid	70.6	7.7	78.3
	Semi-arid	124.2	17.2	141.4
	Arid	131.9	18.8	150.7
Australasia	Dry subhumid	4.2	0.6	4.8
	Semiarid	32.9	1.0	33.9
	Arid	48.9	0.0	48.9
Europe	Dry subhumid	59.0	2.3	61.3
	Semi-arid	30.8	2.6	33.4
	Arid	4.8	0.0	4.8
North America	Dry subhumid	15.0	3.2	18.2
	Semi-arid	50.9	2.3	53.2
	Arid	6.3	1.6	7.9
South America	Dry subhumid	21.4	2.3	23.7
	Semi-arid	43.9	4.0	47.9
	Arid	7.5	0.0	7.5
Total		897.6	133.7	1035.2

hungry and malnourished Africans by the year 2000. Although desertification is not the sole cause of this disaster, it plays a role.

According to UNEP's 1991 assessment, desertification is responsible for the loss of an estimated 10 million hectares per year (double the size of Nova Scotia) from the world's drylands, meaning it is no longer available for irrigated or rainfed agriculture or for use as rangelands. UNEP estimates that about 70% of the world's drylands are at least slightly affected by desertification or various forms of land degradation.

Such a loss means less land available each year for the production of food. The implications, in a world where populations are ever-expanding, are clear. Professor Richard Odingo of the Department of Geography at the University of Nairobi said, "A global drop in food production is bound to be felt at all levels of human society, hence the need to keep desertification as an important global issue of the United Nations agenda." (*Desertification Control Bulletin*, No. 18, 1990, UNEP).

Even more disturbing than the potential reduction in food productivity is the possible loss of plant, animal and human diversity that make up the building blocks of life. In the future, technological advances might enable society to produce more food despite the loss of arable land, but technology cannot yet create genetic material — it can only synthesize it. Once that material is lost, it is gone forever. The resilience of ecosystems (their ability to regenerate themselves) is still unknown; certain degraded ecosystems might prove to be quite resilient in the long term. The danger is that many ecosystems will be lost indefinitely or never fully regenerate.

Why do we use resources unsustainably?

The irony is that humanity is destroying the very resources upon which we depend for our survival. People's unsustainable use of land, through inappropriate agriculture and industrial practices, is causing or at least compounding desertification on all continents.

Why do people use resources unsustainably? In developing countries, part of the answer lies in poverty and market and trade practices that function as if natural resources are an infinite resource. The economies of most developing countries, as established during colonial days, were based upon extraction of their natural resources for export to the developed world. In many countries, this has not changed and will be very difficult to change with no viable income alternatives in sight. Poverty is not as much of an issue in developed countries, but destructive market and trade practices are realities.

The socioeconomic and political causes of desertification in developing countries are many. They cannot all be described here; however, a few can be outlined:

- Many rural communities are now expected to orient production toward national and international markets. At the same time, the market value of their products (usually primary commodities) is often being forced down while the cost of products they must buy is increasing. Rural communities also face significant barriers to international trade opportunities. These factors increase the unsustainable use of natural resources.
- Pressure to integrate into the global market has led development programs in several countries to encourage monoculture cash cropping (the planting of one major crop variety for export). Monocultures are more susceptible to pest and disease and therefore require more fertilizers and pesticides. This, along with the consequent expansion of farmland, often into marginal areas, reduce quality and availability of land and water and forces people to overuse the remaining resources.
- Conflict between groups, within and between communities, increases as land and water become scarcer. This conflict itself breeds further degradation and feeds a vicious circle.
- Local authority structures, once responsible for regulating the use of natural resources, are eroding under the pressures mentioned above. Most developing-country states are finding that the state apparatus does not have the knowledge or capacity to take the

place of traditional management systems. Lack of, or confusion over, regulation of the use of natural resources leads to further overuse of these resources.

- The lack of appropriate management in many developing countries is compounded by confusion over land-tenure arrangements. Traditional, colonial-based, and modern land-tenure practices often exist in the same place at the same time, creating management chaos.

What does desertification mean for people in the South?

A woman from Mali says: "...and there was rain and water everywhere. We farmed and harvested and we had everything. Now we have nothing. Sometimes we go ten days without food — twenty days without food. Our children die from hunger. (Panos, Down to Earth Desertification Special, Radio Magazine)

*In the Peruvian Sierra, people now spend one day a week gathering fuelwood. Over 1 million people now use llama- or cow-dung as fuel, depriving the soil of fertilizer. Houses are heated only when food is being cooked. An average of 1.3 meals only are cooked per day. Hot water is no longer used for bathing babies and washing clothes. (from *The Encroaching Desert*, a report for the Independent Commission on International Humanitarian Issues, 1986)*

Desertification wreaks havoc in people's lives, particularly in the poorer regions of the world, where people have no alternative resources to call upon. The following symptoms of desertification are taken from a 1991 UNEP assessment of the world status of desertification:

- Desertification means that farmers frequently experience crop failure or a reduction in productive yield. This translates into less income and less food for their families.
- The amount of perennial biomass (organisms) produced on rangeland, generally used for grazing livestock, is reduced through desertification. As a result, there is less food available for livestock, an important source of income and food for many families.
- Available woody biomass is also reduced through desertification. This means people, especially women and children, must travel long distances (sometimes many hours per day) to collect wood for fuel to cook with. This takes time away from other essential activities or may mean that families eat uncooked or partially cooked food — a serious health hazard.
- Increased flooding, sedimentation of water bodies, water and air pollution, all become greater hazards for people living in desertified areas. The effects may also extend to outlying areas. This translates into lower quality water for drinking, cleaning and cooking as well as for irrigation purposes.
- As life-support systems deteriorate through desertification, the quality of human life is severely affected; in some cases it may even lead to death on a large scale. The plight of environmental refugees and the problems caused by dependence upon relief aid cause even more difficulties.

Does desertification mean anything for us in the North?

What about impacts of desertification in the South upon those living in the North? Three major potential impacts are discussed in scientific and political circles:

1. Desertification greatly **stresses the world's food-producing capacity**; arable land in the drylands is being degraded at an astonishing rate (10 million hectares a year lost) while the world's population growth continues unabated (1.67% per year, or an expected global population of 10 billion by 2050).
2. The **global loss of biodiversity** has been on the global agenda in recent years (note the prominence of the Convention on Biodiversity during the Earth Summit). Estimates indicate that 27 thousand species — three per hour — are lost every year and some suggest the number may be much higher. Most of these species are lost in the wet tropics, but there is growing evidence of the loss of biodiversity in the drylands .

Some of our most important crops originated in the drylands (wheat, barley, sorghum, millet, many pulses, cotton), as have many animals upon which so much of humanity now depends for both food and labour (horse, sheep, goat, cow, camel, llama). The drylands continue to host many species and varieties integral to the survival of such fragile environments. A report entitled *Biological Diversity in the Drylands of the World* (preliminary and incomplete version), prepared in 1994 by the Convention's International Panel of Experts, states: "When we lose a dryland plant species or a dryland animal species, or soil microorganisms adapted to dry conditions, we have very likely lost something forever. And because species and genes well-adapted to the drier areas are so few, our loss is great...degradation of the biodiversity forms a threat to the stability of the physical landscape. And to the 1 billion people [who live in the drylands], and their neighbours who live in other ecosystems closely linked to the drylands."

The North is, of course, very dependent upon the South for many primary food commodities as well as for genetic materials which ensure the food security of everyone on the planet and provide key medicines. Agriculture, in its search for pest-resistant, high-yielding varieties of crops, has reduced the number of varieties we now grow. This has led to the loss of many plant varieties along with their genetic make-up or material. The new varieties, like any variety, are not immune to being destroyed by pest or disease; but when this happens, we are now left with fewer genetic resources from which to draw. The North therefore has a vested interest in ensuring that potentially important crop varieties and genetic material are not lost through desertification.

3. The plight of **environmental refugees** has caused disruption in the societies of several developing countries and some developed countries. The extra pressure created by the influx of large numbers of disenfranchised people upon the existing resources of a region can create economic, social (especially racial) and political problems. As populations continue to increase along with desertification (and other environmental disasters), the numbers of environmental refugees seeking entry into Northern states may increase.

A 1993 UN High Commissioner for Refugees (UNHCR) estimate of the global refugee population quotes the astonishing figure of 18.2 million — and the UNHCR definition of a refugee does not include environmental refugees. UNHCR also estimates that 24 million people are displaced within their own country. It is very difficult to estimate the numbers of environmental refugees in the world, as they do not fall under the official protection of the UN. In 1988, associate researcher Jodi Jacobson of the Worldwatch

Institute estimated that there were at least 10 million environmental refugees, over one-third of Canada's total population (*Environmental Refugees: A Yardstick of Habitability*, Worldwatch Paper No. 86). As environments around the world continue to degrade, one wonders what that figure might be like now, six years later.

What have we done so far?

Many past attempts to deal with desertification focused either upon technology aimed at extracting more resources, rehabilitating degraded resources, or curtailing people's access to resources. In many antidesertification programs over the years, little effort has gone into solving the underlying socioeconomic and political reasons for unsustainable land-use practices — the external factors that destabilized land-use practices generally sustainable over millennia. This generalization holds a basic truth for the past programs of multilateral aid agencies as well as most bilateral donors and many research institutes and other groups working in the field.

But lessons have been learned and are being applied. More recent projects to combat desertification are beginning to examine both technical and socioeconomic factors in desertification, a balance that seems to create better and longer lasting solutions. Projects are also being designed with greater participation by the local people, the ones who are directly affected in any one area and who are the closest to the resources being degraded. Hartmut Krugmann, an IDRC Senior Program Specialist who has been working in Africa for several years claims: "The war against desertification will be won or lost at the local level". This is certainly not a statement that was being applied in development aid circles 10 or 15 years ago. Now, however, it reflects the philosophy of many agencies working to combat desertification.

IDRC has been active in projects dealing with desertification since it was first established, in 1970, by the Parliament of Canada to provide support to research in developing countries, assisting the people themselves to acquire the tools by which to develop their own countries. In 1995, IDRC will have been supporting research to combat desertification for 25 years. IDRC has supported at least 138 research projects that touch directly or indirectly upon desertification; these total approximately \$40 million. Of these 138 projects, 53 are now active (\$16 million). Much has been learned during that time and there is a distinct difference in the approach of the research we support today compared with the 1970s. A typical project in the 1970s would have focused upon developing, for example, a tree variety that could be used to reforest a deforested area. Local participation probably would have been minimal and the socioeconomic causes underlying the original deforestation would not have been considered relevant to the project. As a result, the tree variety developed may have been scientifically sound and the project considered successful; however, the variety may not have been considered suitable by the local people and large-scale reforestation may not have occurred. An example of a typical 1990s project with positive results and hope for long-term success is the Water/Land Management project involving the Bedouin in Egypt (see List of IDRC Projects at the end of this document). The University of British Columbia and the University of Guelph are collaborating on this project.

Other Canadian organizations are supporting antidesertification efforts. Many Canadian non-governmental organizations (NGOs), like Solidarité Canada Sahel, have been active in this area for years. (See the list of Contacts at the back of this document). The Canadian International Development Agency (CIDA) has 27 bilateral projects currently active,

totalling \$190 million. CIDA also contributed about \$11 million per year through multi-lateral channels, for a yearly total of about \$43 million. In addition, \$5 million a year is disbursed through CIDA's Canadian Partnership Branch to NGOs and institutions to combat desertification.

Environment Canada, Foreign Affairs, the Department of Finance and CIDA are supporting the Global Environmental Facility (GEF). When the GEF was piloted in 1991, Canada committed \$25 million. In March 1994, Canada committed to replenish 4.28% of the global total (US\$2 billion) over an expected three years; this amounts to \$111 million. The new international convention provides for new and additional funding to combat desertification through the GEF, but only as desertification can be fit within the four already defined areas for which the GEF provides funds (protection of biodiversity, combating global warming, combating ozone depletion, and the protection of international waters).

At what cost?

In 1991, the UN estimated the global costs of preventative, corrective and rehabilitative antidesertification measures to be between US\$10 and 22.4 billion per year. This is close to half the income the world foregoes every year as a result of damage caused by land degradation (US\$42.3 billion) (see Table 4). This loss breaks down into US\$9.3 billion

in Africa, US\$21 billion in Asia, US\$3.1 billion in Australia, US\$1.4 billion in Europe, US\$4.8 billion in North America, and US\$2.7 billion in South America. These losses or costs are considered to be on-site or immediate losses (losses due to the reduction in productivity); off-site or indirect and social losses or costs (such as siltation of wells, the loss of education as children scavenge for fuelwood, or the cost of refugees or emergency aid) might be anywhere from 2 to 10 times higher.

In 1980, the cost of failing to stop desertification over the following twenty years was estimated at US\$520 billion; a similar estimate in 1990 gave a figure of US\$850 billion (all at 1990 prices). In a recent radio interview with Panos, Franklin Cardy, a Canadian who directs the Desertification Control Programme Activity Centre of UNEP, said: "In comparison to the annual amount UNEP estimates necessary to combat desertification [US\$10 – 22.4 billion], the cost to the northern OECD countries of agricultural subsidies, both in the form of direct subsidies and the cost to consumers, was US\$299 billion in 1990 alone."

Table 4. Comparison of global indicative sums and averages (in billion US\$) for annual losses and prevention/correction/rehabilitation costs. (*Desertification Control Bulletin*, No. 20, 1991, UNEP).

	Annual income foregone due to desertification	Annual cost of preventive measures	Annual cost of corrective measures	Annual cost of rehabilitation measures	Annual cost of of all measures
Irrigated lands	10.8	0.5 – 1.6	0.9 – 2.5	1.1 – 3.0	2.4 – 6.1
Rainfed croplands	8.2	0.6 – 1.8	0.9 – 2.8	1.1 – 3.0	2.7 – 7.5
Rangelands	23.3	0.3 – 0.9	0.7 – 1.9	2.0 – 6.0	5.0 – 8.8
Total drylands	42.3	1.4 – 4.2	2.4 – 7.2	6.2 – 11.0	10.0 – 22.4

What about Canada?

...in the south our heritage of fragile native grasses has been virtually eradicated, leaving behind a barren landscape that in places sickens the heart to see. The beauty of the prairie landscape, a gift that belongs to all of us, is being destroyed, and even the wildlife finds it hard to survive.

Susan Butala, *The State of Canada's Environment*,
Environment Canada, 1991

In a 1983 speech, Saskatchewan's ecologist Stan Rowe said: "Our society is uninformed and naive. It does not believe that civilizations are rooted in productive soils. It does not believe that in 50 years Saskatchewan could be a desert, and deserted."

(*Will the Bounty End?* by Garry Lawrence Fairbairn,
Western Producer Prairie Books, 1984)

In Canada, between 5 and 7% of the total land area is suitable for agriculture. About 72% of this area is located in the Prairies. Some 80 million acres of the Prairies fall technically under the definition of dryland (semi-arid and subhumid), most of this area being found in the southeast corner of Alberta and the southern portion of Saskatchewan. Much of the farming practiced in this region and in large parts of the midwestern USA is called dryland farming.

Soil degradation in the Prairies, in the form of water and wind erosion and salinization induced through irrigation or certain cropping practices, is a problem. In 1986, it was estimated that water erosion in the Prairies had an annual on-farm economic impact of \$155 – 197 million and wind erosion, \$213 – 271 million. The economic impact of dryland salinization was estimated at \$104 – 257 million annually. All these costs were expected to increase and do not count off-farm impacts and costs. Since settlement of the Prairies in the early 1900s, the original organic matter levels in prairie soils have been reduced by 40–50%.

Conservation activities since the mid-1980s have improved the situation. This does not mean the problem is solved, but there are many who feel that there are actually cases where Prairie soil is improving. Canada's new Green Plan provides for an extension of the existing National Soil Conservation Program as well as the establishment of permanent ground cover on environmentally sensitive lands, the development of shelterbelts and research on soil-conserving production systems. The use of minimum tillage on Prairie farms has increased greatly in recent years and significant changes in land use practices are evident.

Although technically Canada falls under the Convention's definition of an 'affected country', Canada was never actually considered as such by the negotiators. This is primarily because the amount of affected area in Canada is relatively small and also because Canada is considered to be already actively pursuing rehabilitative and corrective programs. As a signatory to the Convention, Canada would not be required to initiate any new programs. We may be required simply to pass on information about strategies and techniques used to date, and any reports or analyses on these.

Desertification: the Convention

The road to the Convention on desertification

A French scientist named André M. A. Aubréville is generally credited with popularizing the term desertification in 1949. (Another French scientist and explorer, Louis Lavauden, originated the term in 1927.) Aubréville was referring to the largely human-induced land degradation taking place in semi-arid and subhumid zones with annual rainfall totals ranging from 700 to 1,500 millimetres per year. Scientific and technological research on the problems of arid and semi-arid lands was carried out for decades, before and after Aubréville, and by the 1970s, the term desertification had become firmly entrenched in the vocabulary. The term was freely used during the first UN Conference on the Human Environment in Stockholm in 1972 for example. Its definition, however, was rather liberally interpreted by different people in different contexts.

Desertification became the focus of global attention during the tragic Sahelian drought of 1968–1973. In 1973, the Comité Permanent Inter-états de Lutte Contre la Sécheresse dans le Sahel (CILSS) was established, drawing expertise from international organizations such as UNESCO, FAO, the World Meteorological Organization and various multilateral and bilateral donors. In 1974, the UN General Assembly decided to convene the UN Conference on Desertification in 1977, a landmark conference which produced a Plan of Action to Combat Desertification (PACD) – a mandate for UNEP's antidesertification.

The PACD proposed twenty-eight measures to halt land degradation through a cooperative, transnational program. Unfortunately, global political and financial commitment was low and few of these measures were ever implemented. An assessment of the Plan of Action by UNEP in 1984 found that projects successful in controlling desertification were remarkably few and that the problems associated with desertification were continuing to get worse.

For all the lack of concrete success of the PACD, public awareness about desertification grew substantially during the 1980s, and the 1992 Earth Summit in Rio provided a forum for serious discussion of how to plan new action programs. The Earth Summit's Agenda 21 recommended an international convention on desertification as the appropriate basis for such future action. As a result, the UN General Assembly struck the Intergovernmental Negotiating Committee for the Elaboration of an International Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa.

The mechanics of the Convention

The Intergovernmental Negotiating Committee for the Convention on Desertification (INCD) met five times between May 1993 and June 1994. Each two-week session was attended by delegations from the member states of the UN and its specialized agencies, and the text of the Convention was gradually developed and agreed upon. The Chair of the INCD is Bo Kjellén of Sweden. The INCD is technically supported by a secretariat in Geneva; the Executive Secretary is Hama Arba Diallo of Burkina Faso. The 15 members of an International Panel of Experts on Desertification provide scientific assistance to the secretariat. Two working groups were formally established and further groups were set up ad hoc. For example, in the final two sessions Canada's Pierre-Marc Johnson and Bolong Sonko of the Gambia co-chaired a special group tasked with negotiating the articles on

financial resources and mechanisms — probably the most fractious articles in the Convention text.

While 104 countries sent representatives to the last session, the same countries or representatives did not always attend every session. More than 70 developing countries and over 20 industrialized countries sent representatives. Most were from appropriate government ministries. Nineteen intergovernmental agencies sent representatives, as did almost 50 NGOs.

Now that the convention has been adopted by the members of INCED, several heads of state or their representatives are expected to sign the convention October 14-15, 1994 in Paris. The invitation from President Mitterand says that France would be honoured if countries would send ministerial representatives. André Ouellet is expected to attend and sign on behalf of Canada. The convention will then be left open for signing by other countries in New York during and after the 49th session of the General Assembly. Signatory governments will then have to ratify the convention in their own countries. The Convention will come into force ninety days after the fiftieth state ratifies it. This process is expected to take about two years. Since the situation in Africa in particular is so serious, a resolution on "Urgent Action for Africa" was also adopted as part of the convention, to ensure that the problem can be addressed immediately.

A Canadian delegation attended all the sessions and was considered to be very instrumental in fostering consensus on a number of important Convention articles, particularly the articles on financial resources and mechanisms. The members of the delegation came from the Canadian International Development Agency (CIDA), the Department of Foreign Affairs, and IDRC. (For the names of some of the members, please see the List of Contacts at the end of this document).

Over 50 NGOs from around the world participated in the sessions. Solidarité Canada Sahel, an umbrella group of Canadian NGOs concerned with the issue of desertification, attended several sessions as an observer and contributed to the Canadian position.

IDRC supported a special project contributing to the Convention process. The Desertification Convention (Africa) project had several components. A series of three workshops was designed to provide African and other negotiators with key information and background about crucial issues in the fight against desertification, such as the role of indigenous knowledge, the problems of land tenure, and the impact of world trade, economic policies, and structural adjustment programs. The project is also providing assistance to key African NGOs to enable them to participate in the Convention process. Provision was also made for support to regional electronic networking and conferencing among the NGOs to facilitate interaction and information exchange.

The substance of the Convention

Article 2 of the Convention says:

The Objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

The 40 Articles and four regional annexes (Africa, Latin America, Asia, Northern Mediterranean) of the Convention go on to outline the principles for action, the general and specific obligations of the parties involved, approaches to National Action Programmes, the financial resources and mechanisms, and the means by which scientific and technical cooperation and the sharing of information will occur. Terms are defined and the legal mechanisms for implementation of the Convention are laid out. The recommendations for the establishment of a National Action Programme in each affected country form much of the core of the Convention text.

Developed-country Parties have agreed to ensure adequate financial resources to combat desertification, but there are few provisions for how this will happen. The Convention calls for the establishment of a Global Mechanism "to promote actions leading to the mobilization and channelling of substantial financial resources". (Article 21.4) The Mechanism will serve as an information broker and will not receive or manage funds. As mentioned earlier in this document (What We Have Done So Far), the only new and additional funding provided for is through the Global Environmental Facility (GEF), but it is limited to "agreed incremental costs of those activities concerning desertification that relate to [the GEF's already existing] four focal areas": the protection of biodiversity, combating global warming, combating ozone depletion, and the protection of international waters. (Article 20.2b)

The Convention also includes articles that stress the importance of providing for effective participation of local people in the design and implementation of National Action Programmes. This is considered to be a significant departure from previous recommendations (coming out of the 1977 UN Conference on Desertification, for example). There is certainly hope that this reflects an internalization of the statement that "The war against desertification will be won or lost at the local level."

The Earth Negotiations Bulletin (Vol. 4, No. 55), published by Canada's International Institute for Sustainable Development (and funded in part by IDRC), claims that this Convention has made four concrete gains:

1. Global awareness of the problem has been mobilized and the groundwork laid for "future partnership arrangements to combat desertification".
2. Many governments have now accepted that public participation in the development of National Action Programmes is crucial to their success.
3. At the first INCD session, 15 NGOs attended; by the fifth, over 50 NGOs were active participants in the negotiations and over 230 were accredited. The future role of NGOs in the development and implementation of National Action Programmes should now prove to be a key element of the public participation recognized as key to the success of these programs.
4. The negotiating process has stimulated changes in attitudes within the donor community:
Policymakers now understand the importance of socioeconomic dimensions in the desertification process and the need to incorporate these into the National Action Programmes. In the past, the focus tended to be solely upon technical and physical aspects of, and solutions to, desertification — with little success.

The process has also stimulated a new awareness of the need to coordinate action and aid programs. Negotiators hope that the Global Mechanism will serve to increase coordination and cooperation by better monitoring aid flows and increasing the flow of information sharing and networking between parties.

Points of major debate

The signing of the Convention was to have taken place at the latest session in June 1994, but delegates were still debating certain points. The greatest point of contention was between developing and donor countries over funding and funding mechanisms. Developing countries, especially African countries, were calling for new donor funds to deal with desertification, including a special fund aimed solely at desertification. OECD countries, on the other hand, said that considerable amounts of money were being allocated to the problem already. They suggested that existing donor programs should be better coordinated and used more efficiently and that stronger political will was needed in affected countries. Several developing countries fear that this proposed more efficient use of existing resources will not be sufficient to truly combat desertification or mitigate the effects of drought. Several African states in particular also fear that the proposed Global Mechanism will not catalyze new resources and may in fact divert resources to other regions.

Several non-African developing countries came to the table looking for assistance for their desertification problems and objected somewhat to the primary focus upon Africa, fearing it would translate into a dearth of funds for them. This created regional divisions within the Group of 77 (G-77), making it difficult to negotiate for the collective interest of the G-77. The regional annexes served further to deepen these divisions by focusing upon regional interests. In the final analysis, the Africans felt that the priority guaranteed them in the initial plans for the Convention was diluted.

Conclusion

Both friends and critics of the Convention are many. There are those who suggest it was not an unqualified success or it was perhaps not the best vehicle to accomplish the desired objective of combating desertification. Others hail it as step forward that served to further awareness about desertification. The ultimate success or failure of the Convention will only be revealed over time. Success will depend upon the political will of both developing and donor nations over the next several years to find, leverage and manipulate funds to develop and implement the programs recommended by the Convention.

George Greene, Head of Canada's delegation to INCED and Director General, Policy Development Directorate, Policy Branch, CIDA:

The results of the Convention provide potential for renewed emphasis and effort to address land degradation and desertification in the world's most affected regions. The Convention provides substantial guidance on policy measures and community-level action to address these concerns. What is essential is for the governments of affected countries to take the initiative in implementing the Convention and for the bilateral and multilateral donor community to respond more effectively, efficiently and in a coordinated manner to the priorities identified by these governments through their National Action Programmes. Time will tell. There is hope that the Urgent Action Plan for Africa will yield early and tangible results.

Canadian Pierre-Marc Johnson, participant in final two INCD sessions and Friend to the Chair in the last INCD session:

In spite of the tediousness and the apparent marginal political aspects of this Convention, it marks important breakthroughs. Firstly, it was a largely Africa-driven multilateral process with strong African leadership in a worldwide attempt to tackle desertification. Secondly, the financial mechanisms elaborated for the Convention's implementation should normally lead to rationalization, better focus, and better targeted use of both bilateral and multilateral deployment of resources on desertification issues.

Mohammed El Kassas, of the University of Cairo and the Head of the Egyptian Delegation, was asked during the negotiating process: Are we in a better position now [with the convention soon to be in place]?:

No. I am sorry to say. I don't see it coming. Everybody is playing the usual political tricks of everybody trying to be clever and the like. The donor community is saying, whether in words or deeds, that nothing more than business as usual, and the recipient countries are calling for more resources to be brought to them. (Panos, Down to Earth Desertification Special, Radio Magazine)

Camilla Toulmin of the Drylands Network Programme, International Institute for Environment and Development (UK) and a member of the International Panel of Experts on Desertification:

It's a long way from a giant, air-conditioned conference hall to the dusty field of an African farmer. Yet, it is encouraging to see the heavy emphasis placed within this convention on finding practical solutions to local level problems. This text provides a set of principles by which governments of north and south agree to be judged. The next challenge is to see how the rhetoric of participation and empowerment can be matched by practical action.

Ola Smith, Senior Program Officer, IDRC Regional Office for West and Central Africa in Dakar, Senegal, and member of Canadian delegation:

An important stage in the global struggle against desertification was reached on Saturday 18 June 1994, when the INCD finalized negotiations on the Convention text. In order for this long and tedious first phase to have been worth the effort, signatories to the convention must, during the implementation phase, remain faithful and committed not only to the letter (which is by no means perfect), but also and perhaps more importantly, to the spirit of the Convention, which is to raise awareness of the problem, and to take innovative and efficient steps at local, national and global level to alleviate it.

Examples of IDRC-supported projects on desertification

The Bedouin in Egypt Design their Future

The Bedouin population that inhabit the northwest coast of Egypt have gradually been shifting from a pastoral system entirely dependent on natural grazing to a system of partial cultivation with fruit gardens and barley production in selected areas. However, increased land use, the creation of new settlements, and other external factors, have created new and potential problems, including greater crop sensitivity to drought, loss of soil fertility and

soil erosion. This project is examining the key processes needed to develop models for sustainable land management in the coastal region.

The Bedouins are sitting with the researchers and telling them how they relate to the natural resources that they are dependent upon for survival including what they plant, where and when. The researchers put the collected information together in a model of the existing system and the Bedouins correct and add to the model. This process indicates the 'weak links' in the Bedouins' relationship to their environment. The researchers can then analyze how future assistance strategies should be designed. The results of these analyses are then disseminated to the Bedouins for their input.

Geographic Information Systems (GIS) are an important tool in this project. The Bedouins move a great deal and a thorough understanding of how they relate to their environment has to include knowledge about when they move, where and why. The Canadian partners on this project are providing theoretical and hands-on training to the Egyptian researchers in the use of GIS technology.

The project is already generating good results and the researchers have high hopes that the project will make a difference in the quality of life of the Bedouin population. An interesting recent development has the researchers excited — the World Bank heard about the participatory evaluation approach and is planning to use this methodology in a large desert-development project in the region.

Contact:

Dr. Hans Schreier, Resource Management and Environmental Studies, University of British Columbia. Tel: (604) 822-4401, fax: (604) 822-9250.

Dr. John Fitzgibbons, School of Rural Planning, University of Guelph. Tel: (519) 824-4129 ext. 6784, fax: (519) 767-1692.

Spreading Tree Seeds to the Sahel

This project enabled tree-nursery operators to produce better quality plants and cut production costs while increasing productivity in the nursery. The project team at the National Tree Seeds Centre (CNSF) then set out to let government technical services in the region know how to replicate their successes and how to use the Centre as a resource.

The Centre can now provide almost 70% of the country's seed requirements, and its equipment and stocks are sufficient to meet a considerable part of the demand in other Sahelian countries. The amount of money spent on importing seeds is greatly reduced, as is the waiting time once required to obtain tree seeds. The new seeds are also 'home grown' and therefore well-adapted to farmers' environment and practices.

In light of the project's success, the countries of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) (Burkina Faso, Cape Verde, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Chad) decided to make the CNSF a Sahelian Centre of Excellence for tree seed technology. This means the Centre will play a leadership role in implementing tree seed programs in the region. It will provide neighbouring countries with technical and scientific support while helping to train their managers and possibly supply them with plant material.

Contact: Le directeur, Centre national de semences forestières, 01 BP 2682, Ouagadougou, Burkina Faso. Tel: (226) 30 08 57, fax: (226) 30 12 32.

A Network of Studies on the Sahel

RESADOC is a regional coordination centre based at the Sahel Institute in Bamako, Mali, with national networks in each of the eight other member countries of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) (Burkina Faso, Cape Verde, Gambia, Guinea-Bissau, Mauritania, Niger, Senegal and Chad). RESADOC keeps a critical mass of scientists in touch with one another as they work on similar issues in the region. It should play a leading role in the information policy of CILSS.

Now fifteen years old, RESADOC's objective is to provide better access to scientific and technical knowledge of the Sahel and to use this knowledge effectively to find solutions to the region's development problems — the Sahel's own memory base of studies. In 1977, IDRC and several other organizations assisted in the creation of RESADOC and continued to provide support for many years.

The network is a cooperative, decentralized information system that links a variety of documentation systems to collect, process and disseminate information on the Sahel. Training has been provided for more than 400 specialists and technicians; national networks have now been established in most of the participating countries; eight subject bibliographies have been compiled and distributed.

Contact: Le Coordonnateur, RESADOC, Institut du Sahel, BP 1530, Bamako, Mali. Tel: (223) 23 02 37, fax: (223) 22 21 78, telex: INSAH 2432.

The Sweet Smell of Success on the Rangelands of Morocco

This project is finding ways to use wild aromatic desert plants, or herbs, to fight desertification while boosting the income of the people living on the rangelands. Some communities distil herbs to produce aromatic extracts but bad harvesting practices have led to the disappearance of many aromatic plant species and to the progressive desertification of an already fragile environment.

During Phase I of this project, two pilot distillation devices were built. Specific work was done on wild sage, artemesia, and verbana essential oils. In fact, verbana essential oil was produced and marketed in Morocco for the first time; growing verbana is now four times more profitable than it was before. In Phase II, which began in 1993, the plan is to identify, select, improve and cultivate aromatic plant species while also improving distillation methods. People's income from the sale of aromatic oil will improve and pressure on the wild species will be reduced, thus helping to halt desertification.

Contact: Dr. André Bélanger, Agriculture Canada, Laboratoire Plantes Aromatiques et Huiles Essentielles, Station de recherche de St-Jean-sur-Richelieu, 430 Boulevard Gouin, St-Jean-sur-Richelieu, Québec J3B 3E6. Tel: (514) 346-4494, fax: (514) 346-7740.

Canada's GlobeSAR in Tunisia

The worldwide Canadian initiative, Global Airborne Synthetic Aperture Radar Program (GlobeSAR '93), which involves cooperating institutions from countries around the world, was developed by the Canada Centre for Remote Sensing (CCRS), in cooperation with the Canadian Space Agency (CSA) and RADARSAT International Inc. — a Canadian consortium established by the private sector to process and distribute data that will be derived from Canada's RADARSAT satellite to be launched in 1995. IDRC's participation in this project lies in strengthening the capacity of researchers and practitioners throughout the developing world to benefit from the new radar sensing technologies that will be available to them through RADARSAT. Research activities will focus upon the use of the technology for the purpose of assessing, monitoring, and managing natural resources in fragile environments.

The Tunisia component of this project focuses on remote sensing applications in the areas of desertification and land-degradation processes (such as sand encroachment on olive orchards). This project is considered important since initiatives to counteract desertification require knowledge of the scope, magnitude, and position of natural resources, especially water resources. Remote sensing, including radar remote sensing, is one of the first steps (and, not-so-incidentally, one of the most cost-efficient tools) in the monitoring and conservation of natural resources under threat from desertification.

A fascinating computer-based hypermedia scenario has been developed to illustrate this Tunisian component of GlobeSAR; it describes the work and the achievements of the project and can be viewed through the CCRS.

Contact: Christian Prévost/Linda Syr, Canadian Centre for Remote Sensing, 615 Booth St., Ground 35, Ottawa, Ontario K1A 0Y7. Tel: (613) 996-7789/ 947-1817, fax: (613) 996-9843.

Growing Trees in the Dry Zone in Southern Zimbabwe

Unlike commercial farming in Zimbabwe, communal farming consists of scattered small farms, usually in the poorest and driest agricultural areas, owned by people of African origin and often used for subsistence farming. This project, implemented by the Forest Research Centre in Zimbabwe, was designed initially to provide these resource-poor farmers with fuelwood and building poles. It later evolved into the integration of multipurpose trees into the farmers' systems in general.

To accomplish this, the scientists conducted research in the communal areas with the cooperation of the farmers. They identified drought-tolerant, fast-growing multipurpose tree species and provided guidelines for the successful introduction of these species to the farmers. Through their contact and work with the local people, the researchers also learned about an innovative method of natural vegetative management (pruning of underbranches and thinning undergrowth) that had been developed by a local councillor — a method that had a positive effect on the conservation of natural vegetation in otherwise overgrazed lands.

Contact: Jeanette Clark, Project Leader, Social Forestry Research Unit, Forestry Research Centre, Harare, Zimbabwe. Fax: 263-4-47066.

Collecting Water from Fog in the Village of Chungungo, Chile

In May 1992, the Chilean Minister of Agriculture turned on a water tap in the square of the seaside village of Chungungo. The water that flowed was the result of work by Chilean and Canadian researchers who have learned how to draw water from the coastal mountain fog in the Andes in Chile. This northern region is one of the most arid regions in the world. The Pontificia Universidad Catolica de Chile (PUCC), the Corporacion Nacional Forestal, Environment Canada, and IDRC supported this project.

The fog-water collectors look like huge volleyball nets. As clouds pass over the mountains, the fog hits the fibres, forms beads, and runs down into gutters that lead into a 100,000 litre tank. A pipeline carries the water to the village. There are now 75 collectors, expected to produce an average of 11,000 litres of fresh water daily. The technology has already been exported to Peru where it is being tested; it may also prove to be useful in several other parts of the world such as Cape Verde, China, Ecuador, Haiti, Namibia, Yemen, and Oman.

Contact: Dr. Robert Schemenauer, Environment Canada, 4905 Dufferin Street, Downsview, Ontario M3H 5T4. Tel: (416) 739-4606, fax: (416) 739-4211.

Reforestation of the Badlands in India

The project is located in a dry, ravine-etched area known as Bundelkhand, where living conditions are extremely harsh and rugged. The area is now best known as a breeding ground for bandits (including the living legend, the Bandit Queen Phoolan Devi, currently the subject of a popular Indian motion picture). The project is concerned with developing a multi-tiered silvipastoral system (a land-use system which combines trees, shrubs and grasses). Such a system would ensure fodder (or food) for the different ruminants of the region: goats, sheep and cows. These animals are very important to the survival of the people living in the region. They provide food, milk and income. The trees planted as part of the project also serve to reforest this arid region.

A very prominent Indian NGO called Development Alternatives was involved, in disseminating the results of the project to the local people. The project has also been in touch with about 200 local farmers directly and there have been rather dramatic productivity increases as a result of the project. The normal silvipastoral productivity of the region has been exceeded by 10 – 20 times. There has also been a remarkable regeneration of the natural species of the region.

Contact: Dr. P.S. Pathak, Principal Investigator, Indian Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh, 284 003 India. Tel: 91-517-440833.

Glossary of terms

Agroforestry: The interplanting of farm crops and trees. In drylands, agroforestry helps control erosion and restores soil fertility, while also supplying valuable food and commodities.

Arid: See Arid under Drylands

Bedouins: Indigenous and traditionally nomadic and pastoralist people of the Arabian, Syrian, or North African deserts.

Bilateral Donors: Official government agencies that provide development assistance on a country-to-country basis. Bilateral aid (or government-to-government assistance) is provided directly by a donor country in response to a developing country's request for assistance in its economic and social development.

Minimum Tillage: To work land (plough) with implements in preparation for a crop in a manner that helps to conserve soil. Such a method involves less exposure of soil organic matter and is becoming more common across Canada.

Convention: A contract, agreement or treaty between or among states for the regulation of matters affecting them.

Desertification: Land degradation in arid, semi-arid and dry subhumid areas resulting from various factors, including climatic variations and human activities. Desertification is a primarily socioeconomic process by which natural resources are degraded through unsustainable land-use practices and population pressure — a process that can lead eventually to the creation of newly desertified areas, of areas where the diversity of life is destroyed.

Drought: Natural hazards of dry climates that occur when water or moisture is so scarce, relative to demand, that the ecology of a region becomes severely unbalanced. Drought can last for one season or for many years and can affect, or be affected by, the course of desertification.

Drylands: Areas characterized by aridity or a lack of moisture in average climatic conditions. Drylands are classified as hyperarid, arid, semi-arid or dry subhumid. The world's drylands total 41% of the total global land area (6.15 billion hectares). Of this total, 5.15 billion hectares are being used agriculturally. More than two-thirds (3.56 billion hectares) of the agriculturally used drylands are considered to be at least mildly degraded.

Hyperarid: Hyperarid environments cover 7.5% of the global land surface and have very limited and highly variable amounts of rainfall from year-to-year as well as from month to month. There is no seasonal rainfall regime. Variation from year to year can be up to 100%. In virtually all cases where data are available, year-long periods without rainfall have been recorded. These areas offer very limited opportunities for human activity.

Arid land: Mean annual precipitation up to about 200 mm in winter rainfall areas and 300 mm in summer rainfall areas, but year-to-year variability can range from 50 to 100%. Pastoralism is possible but, without mobility or the use of groundwater resources, it is highly susceptible to climatic variability.

Semi-arid: Highly seasonal rainfall regimes and mean annual values up to about 800 mm in summer rainfall areas and 500 mm in winter regimes. Year-to-year variability is nonetheless high (25-50%) so despite the apparent suitability for grazing of semiarid grasslands, this and other sedentary agricultural activities are susceptible to seasonal and year-to-year moisture deficiency.

Dry subhumid: Less than 25% rainfall variability from year-to-year and rainfed agriculture is widely practised.

G-77: Group of 77: The designation for the group of governments at the United Nations that functions as a caucus as well as a negotiating arm of the developing countries, particularly in UN forums on international development. While retaining its name, it has grown since its inception in 1964 to 124 members (in 1990).

Geographic Information Systems (GIS): An information technology designed to collect, structure, analyze and manage large volumes of spatial data and their attributes. It is similar to having a map library, statistical data, drawing, map overlay and analysis tools all at hand — and all of these on a computer. To become a GIS user, one must have training in spatial science (cartography, geography or another geography-based discipline) and a sound knowledge of information science.

Global Environment Facility (GEF): A facility housed in Washington and created as a partnership between the World Bank, UN Development Programme and UN Environment Programme in 1991 to provide grants to cover the additional costs of investing in efforts to protect the global environment. When the GEF was piloted in 1991, Canada committed \$25 million. In March 1994, Canada committed itself to replenish 4.28% of the global total (US\$2 billion) over an expected three years; this amounts to \$111.11 million.

Hyperarid: See Hyperarid under Drylands.

Indigenous Knowledge (IK): Indigenous, local or traditional knowledge is the knowledge of local people (who may or may not be "indigenous" by official definition, but have lived in an area for some time). IK pertains to people's specific environment and circumstances and is often accumulated over centuries of experience. IK is usually handed down between generations, often through oral tradition.

Land Degradation: The progressive weakening of the physical, biological and economic potential of the land. It is a serious threat to overall productivity and therefore to the livelihoods of people who live on the land. Land degradation erodes diversity of plant and animal life. As it forces people to move and change their lifestyles, it also erodes the diversity of the people who live in degrading areas, their cultures, languages and knowledge.

Monoculture: The cultivation of a crop of the same type for successive years to the exclusion of all other crop types. Monoculture cash cropping is the planting of one such crop type for export. Monocultures are more susceptible to pest and disease and therefore require more fertilizers and pesticides.

Multilateral Donors: International agencies that provide official development assistance to developing countries (World Bank, UN agencies, regional development banks). Multilateral aid is channelled by donor countries through these international organizations to carry out projects in developing countries that are too extensive to be undertaken by one country.

Rangelands: Grasslands and pasture lands, often used for grazing livestock.

Sahel: An Arabic term meaning the edge or shore of the desert. It is a belt of semi-arid land south of the Sahara Desert, 320 to 480 km wide, it stretches from the Atlantic coast of Mauritania and Senegal to Sudan and Ethiopia on the Red Sea.

Salinization: The accumulation of soluble mineral salts near the soil surface, usually caused by the flow of water from saline ground water. Where the rate of surface evaporation is high, irrigation can exacerbate the problem by moistening the soil and causing water to be drawn from deeper levels as water evaporates from the surface. The evaporation of pure water leaves the salts behind, allowing them to accumulate, and they can reach concentrations that are toxic to plants, thus sterilizing the land.

Sedimentation: Soil washed or blown into watercourses can either settle or be carried downstream, depending on the speed of water flow, eventually reaching the sea. Sedimentation is when the soil particles — or silt — settle, forming a sediment. Where a dam or other barrier restricts water flow, silt builds up and can cause flooding. It can also foul dams and prevent hydroelectric power units from working properly. In river deltas or other low-lying areas where embankments have been built to prevent flooding, the riverbed can quickly rise and the threat of breaches and flooding is magnified.

Semi-arid: See Semi-arid under Drylands

Shelterbelts: A line or barrier of trees, hedges or artificial materials can be used to protect or shield land, crops, buildings or roads from the effects of wind erosion. Shelterbelts of trees may also provide fuelwood, fodder and building materials for the local people.

Structural Adjustment Program: Structural adjustment loans are given by the multilateral development banks (such as the World Bank) with the objective of bringing about economy-wide reforms within recipient countries. The latter are known as structural adjustment programs and the reforms usually include reductions in import restrictions and the introduction or promotion of “free-market” policies, together with a relaxation of state controls on the economy. To qualify for the loans, many countries cut social services, privatize public industry, and occasionally devalue local currencies.

Subhumid: See Dry subhumid under Drylands.

Note: The above definitions were taken in part from:

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List of acronyms

CIDA	Canadian International Development Agency
CILSS	Comité Permanent Inter-états de Lutte Contre la Sécheresse dans le Sahel
FAO	UN Food and Agriculture Organization
GEF	Global Environment Facility (see Glossary of Terms)
GIS	Geographic Information System (see Glossary of Terms)
G-77	Group of 77 (see Glossary of Terms)
IDRC	International Development Research Centre (Canada)
INCD	Intergovernmental Negotiating Committee for the Elaboration of an International Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa
NGOs	Non-governmental organizations
OECD	Organization for Economic Cooperation and Development
PACD	Plan of Action to Combat Desertification
UN	United Nations
UNCOD	UN Conference on Desertification (1977)
UNDP	UN Development Programme
UNEP	UN Environment Programme
UNESCO	UN Educational, Scientific and Cultural Organization
UNHCR	UN High Commissioner For Refugees

Further reading

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