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An Ecosystem Approach to Drylands:
Building Support for New Development Policies

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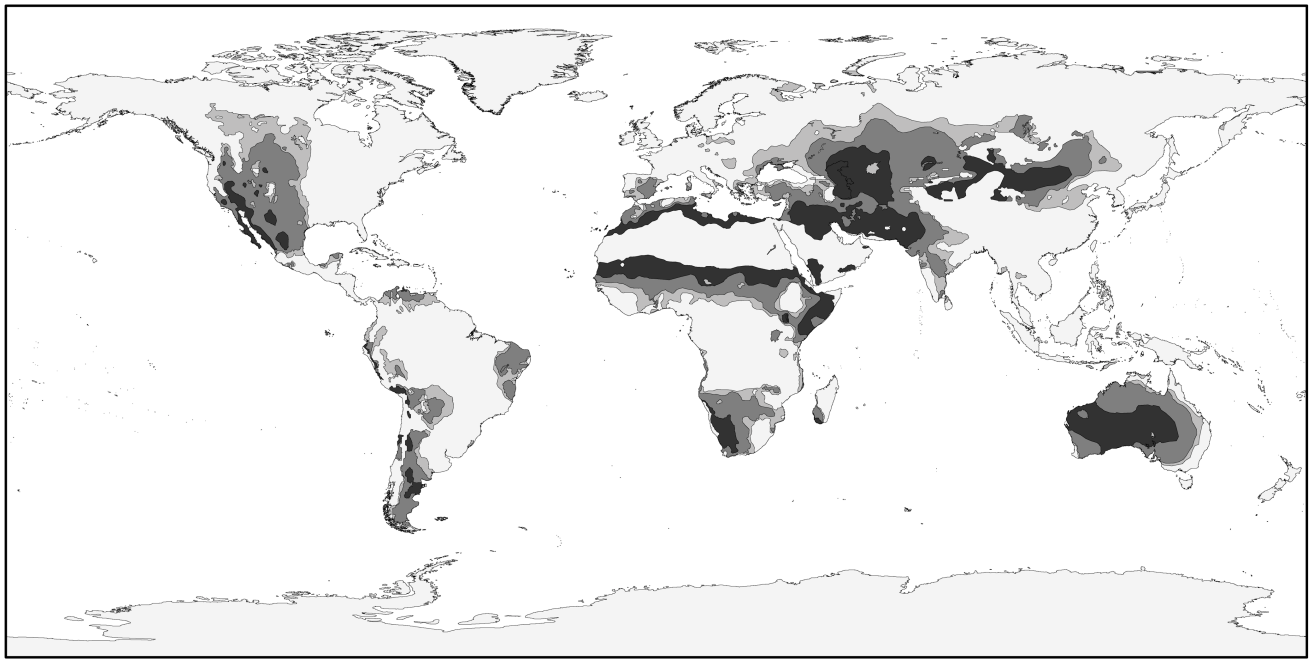
Introduction

The world's drylands are remarkable ecosystems. Encompassing grasslands, agricultural lands, forests, and urban areas, they make up about 40 percent of the world's land area. Drylands are home to nearly 2 billion people (**Map 1**). While many of these dryland dwellers are livestock herders and small-scale farmers, others live more urbanized lifestyles in growing urban centers such as Cairo, Cape Town, Mexico City, Phoenix, and Teheran.

Prepared by the World Resources Institute, this policy brief examines current issues surrounding dryland management policies and the livelihoods of people who live in dryland areas. For the purposes of this paper, we consider drylands as defined by the United Nations Convention to Combat Desertification (UNCCD 1999), comprising land within the arid, semi-arid, and dry sub-humid aridity zones (**Box 1**). Every continent contains land within these zones,

Map 1. Drylands of the World



Legend

Aridity Zones:

Arid | Semi-Arid | Dry/Sub-Humid | Other

Source: UNEP/GRID, 1991.
Projection: Geographic

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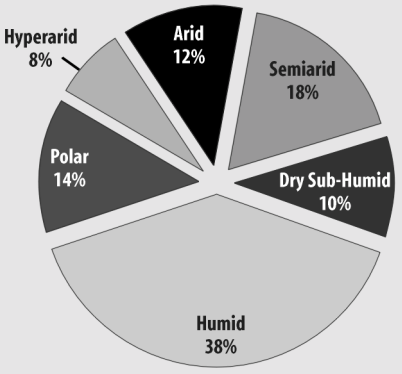
but drylands are most extensive in Africa (nearly 13 million km^2) and Asia (11 million km^2).

Box 1: Definition of Drylands

The United Nations Convention to Combat Desertification (CCD) has identified the world's drylands by determining the extent and distribution of aridity zones. The aridity zones are delineated based on an aridity index, which is determined by the ratio of precipitation to potential evapotranspiration (PE). PE is the amount of moisture that, if it were available, would be removed from a given land area by evaporation and transpiration (UNEP 1997).

Based on this index, the world can be divided into six aridity zones. The term "drylands," as used by the CCD and discussed by UNEP (1997), encompasses the arid, semi-arid, and dry sub-humid zones (excluding polar and sub-polar regions). In these zones, ratios of mean annual precipitation to mean annual potential evapotranspiration range from 0.05 to 0.65. (Other aridity zones include hyperarid environments [ratios less than 0.05] and humid areas [ratios are greater than 0.65].) Globally, drylands account for about 40 percent of total land area (see Map 1 and pie chart below).

Global Land Area by Aridity Zone
(Percent)



Source: UNEP, 1997

Drylands also can be defined using criteria based on soil moisture and agricultural production systems.

In the following paragraphs, we comment on recent initiatives and assessments affecting drylands management and development, and their attendant policy challenges. We then discuss the ecosystem approach to drylands assessment and management—an approach that accounts for the entire range of goods and services that humans depend on to survive and prosper. These include non-commodity, often non-market goods and services, such as recreation, wildlife habitat, biodiversity conservation, water quality, and carbon storage, as well as commodities such as food, fuel, and fiber. The ecosystem approach views management as successful only if it preserves or enhances the capacity of a given ecosystem to produce a diverse array of goods and services over time, allowing for sustainable production of crops and other commodities.

The paper reviews application of the ecosystem approach, outlining typical goods and services that might be included in an ecosystem-based drylands assessment and listing some of the human-induced pressures on drylands that could be addressed in such an exercise. We argue that the ecosystem approach promises to equip decision-makers with a powerful tool for creating and implementing more effective drylands policy. It would provide stakeholders with enhanced information for critical examination of the benefits and risks of development, investment, and management alternatives for dryland areas. We conclude with recommendations for action at the national, regional, and international levels aimed at generating momentum for widespread adoption of the ecosystem approach to drylands assessment and management.

Policy Challenges to Dryland Management

- *The UN convention established to combat desertification has struggled to attract sufficient funds at the national and global levels to improve livelihoods in drylands.*
- *More recent initiatives, such as poverty reduction and debt relief, have attracted global attention and financial resources, but have not focused on dryland ecosystems or how to manage these lands to improve poor people's livelihoods.*

The hardships for humans living in drylands are rarely disputed. Popular misconceptions hold that drylands are empty, barren places (**Box 2**). In reality, considerable numbers of people live in drylands. These people are frequently among the poorest in the world, with many subsisting on less than US$1 per day. And, living in regions

of highly variable rainfall and periodic drought, they experience high food insecurity.

For decades, national and international policy makers have been concerned that drylands are at risk of irreversible degradation, i.e., loss of their long-term capacity to supply goods and services. Such ecosystem degradation in drylands would exacerbate the conditions of poverty and threaten the livelihoods of those most dependent on natural resources. Policies to date have not been as effective as possible or uniquely focused in their attempts to address poverty and inequity issues in drylands.

United Nations Convention to Combat Desertification

The international community created the UN Convention to Combat Desertification (CCD), primarily to address problems associated with the condition of land resources in dryland ecosystems and to promote sustainable development in these areas. While 177 countries have ratified the CCD, its implementation has produced considerable disappointment. Critics charge that too much time has been spent on procedural issues and that very little has been done to address problems at the local level or to improve our understanding of desertification (Toulmin 2001). More importantly, critics suggest that the convention has not been able to generate broad-scale public support or increased funding to strengthen drylands management.

At the Fifth Conference of the Parties (COP 5) to the CCD, held in October 2001 in Geneva, Switzerland, some progress was evident, alongside continued criticism and disappointment. One notable focus of progress was the recommendation by the COP to designate land degradation as a Global Environment Facility (GEF) focal area. Subsequently, in December 2001, the GEF Council made a recommendation to the GEF Assembly to designate land degradation as a focal area. New funding for land degradation will be made available after the Second GEF Assembly in October 2002.

Often referred to as the "poor sister" of better-funded international environmental agreements, such as the climate change and biodiversity conventions, the CCD seemed to gain much-needed momentum from presentations to COP 5 made by five heads of state and many senior ministers. As one delegate observed (IISD 2001), "Their presence and commitment to the CCD recognizes the hard work we've put into this Convention over the years."

Box 2. Dryland Misconceptions

The term "drylands" often conjures up images of large, seemingly lifeless expanses. Many popular misconceptions surround the concept of drylands. Three common misconceptions are described below:

MISCONCEPTION:

Drylands are empty and unproductive places where people are unable to survive.

REALITY:

Drylands have supported people's livelihoods for thousands of years. Today, drylands are home to approximately two billion people worldwide and support many modern cities, such as Cape Town, Los Angeles, Madrid, and Teheran.

MISCONCEPTION:

Drylands cannot support plant and animal life.

REALITY:

Drylands present challenges to plant and animal survival, but many species have evolved with special adaptations that allow them to cope with the climate and variable water supply in drylands. One common plant adaptation is the development of deep and extensive root systems. Animals may adapt by becoming inactive, using shade, and taking cover underground during the hottest times of the day.

MISCONCEPTION:

All drylands are degraded due to misuse and overuse from human activity.

REALITY:

Drylands are sensitive but resilient environments. Overuse can lead to severe degradation; however, low productivity, sparse plant and animal life, and low soil fertility characterize some drylands, even without human influence.

Previously, at COP 3 in Recife, Brazil, the World Bank presented a report highlighting its support of the CCD and its efforts to mainstream dryland activities within existing Bank projects (World Bank 2000a).

Despite progress in these areas, criticism of the Convention still dominated COP 5 discussions. Many participants were hoping for more substantive interactions on funding mechanisms, the budget, and the committee for reviewing the convention's implementation. Although countries have prepared National Action Plans (NAPs) establishing priorities for drylands management and development, donors have not rallied to fund these plans. Discussions in the Committee on Science and Technology (CST) also seemed to be mired in process issues and failed to make progress on how to bring monitoring and science to bear on solving problems of land degradation.

Poverty Reduction

Poverty reduction initiatives undertaken by bilateral aid organizations could have an important impact on living conditions in drylands. In 1996, the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), which coordinates bilateral donor programs, selected three themes for establishing goals and targets and measuring the impact of aid programs. These themes were economic well-being, social development, and environmental sustainability. The target for economic well-being was "a reduction by one-half in the proportion of people living in extreme poverty by 2015" (with a base year of 1990) (OECD 2001).

Rural development and community-based natural resources management are potentially effective means of reducing poverty and improving living conditions in drylands. Closely tied to natural resources, livelihoods in drylands critically depend upon the sustainable management of these resources. Many poor countries also are dry countries. For example, over 40 percent of low-income countries are largely dryland.[1] The DAC Guidelines on Poverty Reduction (issued in Paris on April 25–26, 2001) identify the environment as a key policy area with important effects on poverty-reduction; however, drylands are not a specific focus. No mention is made of how drylands might be managed to help lift inhabitants out of poverty.

Debt Relief

A debt relief initiative launched by the international financial institutions has the potential to spur economic reform in heavily indebted countries, 40 percent of which (as noted previously) are predominantly dryland.[2] In 1996, the International Monetary Fund (IMF) and the World Bank responded to the large debt facing some of the world's poorest nations with the Highly Indebted Poor Countries Initiative (HIPC) (World Bank 2001). The ultimate goal was to relieve highly indebted nations of the burden of using major portions of their national budgets to repay borrowings, often at a disproportionately large cost to the poor and to social programs designed for their benefit.

Billed as the first international effort to provide comprehensive debt relief to the world's poorest countries, the initiative has been lauded for breaking new ground. Its aim is to remove the debt overhang for countries that pursue economic and social reform targeted at measurable poverty reduction. As of October 2001, 23 countries were receiving debt relief, projected to total approximately US$34 billion dollars. Here again, however, no specific focus on the development and use of drylands has been proposed.

Applying the Ecosystem Approach to Drylands

- *An ecosystem approach to drylands monitoring and assessment has been introduced in national and international assessments. This approach could serve as a powerful tool for decision-makers to address the needs of dryland populations.*
- *An ecosystem approach would provide stakeholders with integrated environmental and socioeconomic indicators to assess choices in development of, investment in, and management strategies for drylands.*
- *Use of an ecosystem approach and quantitative indicators would permit critical examination of both opportunities to optimize goods and services and risks associated with land degradation.*
- *An ecosystem approach would assess the goods and services of drylands across scales ranging from local to international. Thus, it can incorporate lessons learned around the world and link available dryland goods and services to demand in neighboring, more humid regions.*

Growing interest in debt relief and other international anti-poverty initiatives, along with the launch of a new GEF drylands focal area, presents important new opportunities for development in drylands that focus on ecosystem goods and services. The application of an ecosystem-based

approach to drylands monitoring and assessment inspired by these initiatives would provide integrated, quantitative environmental and socioeconomic indicators to enhance decision-making on investment and management choices. It has the potential to stimulate new interest in drylands development by appealing to a broader range of stakeholders and to infuse new energy in development proposals.

One such effort is the Millennium Ecosystem Assessment (MA), an integrated, global assessment based on ecosystem goods and services. Launched in June 2001, this 4-year, US$21 million project will evaluate the capacity of ecosystems worldwide to provide goods and services important for human development. The premise underlying this comprehensive assessment is that the ability of ecosystems to produce goods and services—from food and clean water to wildlife habitat and recreation—is fundamentally important for meeting human needs and building human capacity. Ultimately, the provision of goods and services influences the development prospects of entire nations. When the capacity to produce goods and services is diminished, the poor are often hardest hit, as they depend directly on forests, fisheries, and agriculture for their livelihoods. Thus, the poor tend to be most vulnerable to environmental problems resulting from ecosystem degradation (for more information, visit http://www.millenniumassessment.org).

What Is An Ecosystem Approach to Management and Development?

An ecosystem approach to management and development evaluates how human use of an ecosystem affects its functioning and productivity. This approach identifies specific objectives in relation to scale, social considerations, and management practices. The following are central characteristics of an ecosystem approach:

1. An ecosystem approach is integrated. It considers the entire range of goods and services and tries to optimize the benefits from a given ecosystem.
2. The approach attempts to make tradeoffs efficient, transparent, and sustainable.
3. It manages not only for the present but also for future generations.
4. It recognizes that ecosystems function as whole entities; they cannot be managed in pieces. Thus, it goes beyond traditional jurisdictional boundaries, since ecosystems often cross state and national lines.
5. An ecosystem approach includes people. It integrates social and economic information with environmental information about the ecosystem. With this approach, human needs are explicitly linked with the biological capacity of ecosystems to fulfill those needs.
6. An ecosystem approach focuses on protecting and conserving entire ecosystems. Rather than concentrating on production alone, this approach views management as successful only if it preserves or increases the capacity of an ecosystem to produce a diverse array of goods and services over time.

In contrast with an ecosystem-based approach, conventional techniques for monitoring and assessment of drylands do not adequately account for many non-commodity, often non-market goods and services that ecosystems provide to humans. The ecosystem approach is a strategy that examines drylands from a broader perspective. The objective is to develop and use information on dryland goods and services that people depend on to survive and prosper. In turn, communities are able to ensure that these ecosystems will continue to be sustained in the future (**Box 3**).

Examples of Important Dryland Goods and Services

Below is a list of typical ecosystem goods and services that may be incorporated in an ecosystem-based drylands assessment. Note that this list is meant to be illustrative rather than exhaustive; an actual assessment must be integrated across a comprehensive set of goods and services that are significant in a particular locale.

Forage and livestock from drylands

Land cover in drylands is largely grassland, including savannas and shrublands (**Figure 1**). Today, humans use drylands predominantly as a source of forage for domestic livestock. From cattle, sheep and goat herds, to horses and camels, drylands support large numbers of domestic animals, which become the source of meat, milk, wool, and leather products.

For example, in West Africa (home to 20 percent of all cattle and 30 percent of all sheep and goats in sub-Saharan Africa), well over half of the region's 175 million head of livestock are raised in arid/semi-arid rangelands and mixed cropping areas (**Table 1**). Drylands also support large numbers of wild herbivores that depend on drylands for year-round habitat and share the land with domestic herds.

Box 3. Drylands Management and Traditional Agricultural Production Contrasted with an Ecosystem Approach

Topic Area	Drylands Management and Traditional Agricultural Production	Drylands Management and an Ecosystem Approach
Objectives	▪ Maximizes commodity production ▪ Aims to maximize or increase yields ▪ Maximizes net present value	▪ Maintains dryland ecosystems as an interconnected whole, while allowing for sustainable commodity production ▪ Aims to sustain dryland productivity over time while simultaneously considering tradeoffs with other dryland goods and services ▪ Maintains future options
Scale	▪ Works within political or ownership boundaries	▪ Works at the ecosystem and landscape level
Role of Science	▪ Views dryland management as an applied science focused on natural resources	▪ Views dryland management holistically, combining science and social factors
Role of Management	▪ Focuses on preventing land degradation ▪ Emphasizes intensification of agriculture through more efficient use of land, labor, and capital ▪ Strives to avoid food insecurity and famine	▪ Focuses on protecting and conserving ecosystem goods and services ▪ Emphasizes maintaining or increasing the capacity of drylands to provide goods and services ▪ Strives to preserve the entire array of ecosystem goods and services

Source: Adapted from *World Resources Report 2000-2001*, Box 4.2, Page 227.

Food from drylands

Drylands, while not endowed with climate and soil regimes highly favorable to crop production, nevertheless are an important primary food source for local populations. Food crops produced in drylands include various cereals, roots, and tubers.

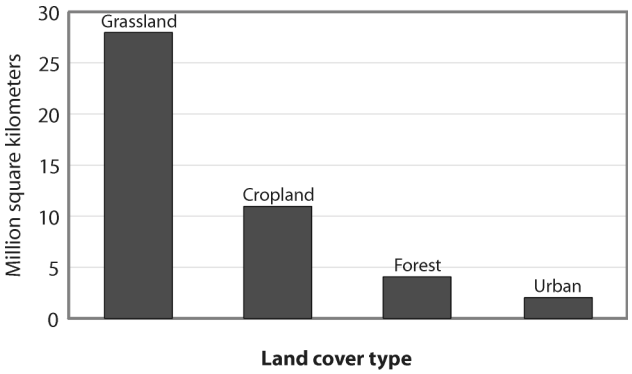
Wood fuel from drylands

Woody vegetation, although not abundant in many drylands, provides an important source of fuel for both heating and cooking.

Water resources from drylands

The relative lack of freshwater resources within drylands makes existing sources of surface water, groundwater, and wetland habitats critically important. Water is used for household purposes, industry, agriculture, and recreation. Wetland areas in dryland zones provide habitat for wildlife, and some are critical stopovers for migratory birds and mammals.

Figure 1. Land Cover in the World's Drylands



Notes and Sources:
Data are based on WRI calculations using GLCCD 2000; ESRI 1993; UNEP 1997; and NOAA/NGDC 1998. Grasslands include shrublands and savannas; forests include evergreen, deciduous and mixed forests, both broadleaf and needleleaf; croplands may include areas with natural vegetation. A category of "Other" covering approximately seven million square kilometers is not shown in the graph and includes predominantly barren and sparsely vegetated land.

Table 1. Livestock Systems in West Africa, 2000

Livestock System	Number of Cattle	Number of Cattle in Each Livestock System as a Percent of the Total Number of Cattle in West Africa	Number of Sheep and Goats	Number of Sheep and Goats in Each Livestock System as Percent of the Total Number of Sheep and Goats in West Africa
Arid/Semi-arid Rangeland	9,476,446	25	44,655,859	33
Arid/Semi-arid Mixed	16,175,171	41	42,209,943	32
Humid/Sub-humid Rangeland	4,550,284	12	12,786,981	10
Humid/Sub-humid Mixed	8,153,262	21	33,906,999	25
Highlands Rangeland	37,380	0	58,838	0
Highlands Mixed	264,298	1	376,321	0
Total	38,656,840	100	133,994,941	100

Notes:
Livestock/rangeland-based systems = areas with minimal cropping.
Mixed rainfed systems are mostly rainfed cropping, combined with livestock.
Highland/temperate zones are defined on the basis of temperature.
Arid/semi-arid zones are defined by the length of growing period (<180 days).
Humid/sub-humid zones are defined by the length of growing period (180 or more days).

Sources: Kristjanson et al. 2001; Wint et al. 2000; FAO 2001.

Table 2. Biodiversity Conservation in Drylands

Selected Dryland Areas Providing Biodiversity Conservation Services	Areas Providing Service, World Total	Areas Providing Service, Total Drylands	Percent of World Total
Centers of Plant Diversity	234	39	17%
Endemic Bird Areas	217	103	47%
Global Terrestrial Ecoregions [a]	138	31	23%
IUCN-Designated Protected Areas [b]	5,495	1,406	26%
TOTAL	6,084	1,579	26%

Notes:
a. The total number of ecoregions is 232; the terrestrial total of 138 is used in this table.
b. IUCN-Designated Protected Areas within Categories I-VI.

Sources: Davis 1994 and 1995; Stattersfield et al. 1998; WWF-US 1999; UNEP/WCMC 1999.

Biodiversity conservation in drylands

Dryland species must adapt to an environment known for its changeable climate, including variability in both temperature and water availability. Some areas have been identified as especially important to the survival of these uniquely adapted plants and animals (**Table 2**). Information on the condition of these conservation areas is being collected in some places, but is not yet available for many sites. For example:

- The IUCN-World Conservation Union, and World Wildlife Fund–US (WWF–US) have identified 234 Centers of Plant Diversity (CPDs) worldwide (Davis et al. 1994 and 1995). At least 39 are in drylands. These are areas with high levels of plant diversity, where conservation practices could safeguard a great variety of species.
- Some dryland areas provide habitat for large numbers of endemic bird species. BirdLife International has identified 217 endemic bird areas (EBAs) worldwide, of which approximately 103 EBAs are in drylands (Stattersfield et al. 1998).
- The World Wildlife Fund–US has identified 232 ecoregions as "outstanding examples of the world's diverse ecosystems and priority targets for conservation actions." Of the 138 terrestrial ecoregions within this "Global 200," 31 can be characterized as dryland ecoregions, containing some of the most important dryland biodiversity in the world today (Olson and Dinerstein 1997).
- Protected areas around the globe have been identified by IUCN-The World Conservation Union and mapped by the World Conservation Monitoring Centre (UNEP-WCMC 1999). Approximately 1,400 protected areas are located in drylands worldwide, accounting for about 22 percent of the global total.

Carbon storage in drylands

To limit rising concentrations of carbon dioxide in the atmosphere, countries are actively seeking ways to increase carbon storage capacity on land. Drylands, because of their extensive area, are able to store large amounts of carbon, most of it in the soil.

Tourism and recreation in drylands

Drylands are remarkable environments for viewing plants and animals. Tourists travel to dryland areas to view endemic species with special adaptations to these variable environments. Some recreationists rely on drylands for hiking and camping. Others regard dryland sites as culturally and spiritually important.

Global and Regional Linkages

Drylands are linked to global as well as local markets through international and regional trade of goods and services. Ties with adjacent humid lands occupied by pastoral populations during seasonal movements are particularly strong.

How Would We Measure Ecosystem Goods and Services?

Specific goods and services to be considered when assessing drylands will vary by region and by scale of analysis. Identifying indicators for each of the goods and services provided is crucial to understanding conditions and trends over time. The indicators selected will depend on data type and quality, as well as the periods for which information is available. The lack of data for many goods and services in drylands and the difficulty in measuring the value of certain services could be an obstacle to the rapid implementation of this approach (**Table 3**).

Pressures Affecting Drylands

Drylands—and the forests, grasslands, and other ecosystems they encompass—are highly dynamic systems. Characterized by inherent variability, these systems experience dramatic changes in rainfall that affect vegetative growth, habitats, and human livelihoods over periods of weeks and months as well as years and decades. In addition, drylands are subject to major impacts from human activities, often affecting the status of ecosystem goods and services and their availability to human populations in drylands.

An assessment of dryland conditions and trends based on an ecosystem approach should incorporate the effects of pressures stemming from human activities. Some human activities, such as agriculture and recreation, are sources of important goods and services as well as pressures on drylands. The use of quantitative indicators enables examination of opportunities for producing goods and services as well as risks associated with such pressures. Below are examples of pressures that could be addressed by ecosystem-based dryland assessments.

Agriculture

Dramatic changes in drylands are brought about by conversion to agriculture. Native vegetation is removed and replaced with crops; soil is exposed and becomes vulnerable to wind and water erosion. Water-holding capacity is altered and fertilizers and pesticides are added, changing soil composition. Excessive and inappropriate cultivation can be the most significant source of change and degradation in drylands.

Urbanization and Human Settlements

Human settlements and urbanization greatly alter the functioning of dryland ecosystems. Increased urbanization leads to increased demand for water and sanitation services. Roads dissect the landscape, altering drainage patterns. Paving and compaction of the soil produce increased runoff.

Desertification

Desertification, which may be influenced by climatological, social, political, economic, and cultural factors, can stress dryland systems and lead to decreased capacity to provide goods and services.

Climate Change

Over the next five decades, drylands will face significant challenges from climate change. The Third Assessment Report of the Intergovernmental Panel on Climate Change predicts a much drier and hotter climate for large areas in Africa. This would reduce agricultural potential and could significantly alter livestock and crop production systems in drylands. Biodiversity, water supplies, and wood fuel production all could be negatively affected

Mining

Mining activities can entail major excavation of soils and geologic formations producing considerable environmental impacts. The health of human populations as well as plants and animals in drylands can be impaired by these activities.

Fire and Biomass Burning

Despite providing important services for maintaining drylands, fire can be harmful. When very hot and frequent, fire can destroy vegetation and increase soil erosion. Fire also releases atmospheric pollutants. Biomass burning, such as the burning of forests, savannas, and agricultural lands after harvest, is recognized as a significant source of atmospheric emissions

Domestic Livestock Grazing

In high densities, and with highly static grazing patterns, domestic livestock can change floristic composition, structural characteristics of vegetation, reduce biodiversity, and increase soil erosion; in extreme situations, grazing may eliminate vegetation cover.

Table 3. Dryland Goods and Services: Indicators and Possible Global and Regional Data Sources

Goods	Indicators	Possible Global and Regional Data Sources
Forage and Livestock		
	Livestock production	FAO; ILRI
	Soil condition	GLASOD; ASSOD, USDA
	Vegetation condition	USGS; UMD, Geography
Food		
	Crop yields	FAO
	Variation in cereal production	FAO
	Food aid	FAO
	Amount of irrigated land	FAO
	Soil fertility	IFPRI; FAO
Woodfuel		
	Amount of woody vegetation	UMD, Geography
	Use of traditional energy sources	IEA
Freshwater Resources		
	Watershed characteristics	WRI, USGS, others
	Water quantity	FAO
	Wetland locations/characteristics	Ramsar, WCMC

Services	Indicators	Possible Global and Regional Data Sources
Biodiversity Conservation		
	Centers of Plant Diversity (CPDs)	IUCN; WWF-US
	Endemic Bird Areas (EBAs)	Birdlife International
	Global 200 ecoregions	WWF-US
	Protected areas	UNEP-WCMC
Carbon Storage		
	Potential stores in vegetation	USGS
	Potential stores in soils	ISRIC, USDA
	Fire and biomass burning	ESA; NOAA
Tourism/Recreation		
	Number of international tourists	WTO
	Tourism revenues	WTO

Notes and Sources:
Abbreviations: ASSOD: Assessment of the Status of Human-Induced Soil Degradation in South and Southeast Asia; ESA: European Space Agency; FAO: United Nations Food and Agriculture Organization;
GLASOD: Global Assessment of Human-Induced Soil Degradation; IEA: International Energy Agency
IFPRI: International Food Policy Research Institute; ILRI: International Livestock Research Institute;
ISRIC: International Soil reference and Information Centre; IUCN: World Conservation Union;
NOAA: National Oceanic and Atmospheric Administration; UMD, Geography: University of Maryland, Geography Department; UNEP-WCMC: United Nations Environment Programme - World Conservation Monitoring Centre;
USDA: United States Department of Agriculture; USGS: United States Geological Survey; WRI: World Resources Institute; WTO: World Tourism Organization; WWF-US: World Wildlife Fund-United States.

Fragmentation

Fragmentation of dryland ecosystems, from agriculture and road building, can have negative effects on native dryland plants and animals. It can lead to genetically isolated and reduced populations, which are more prone to inbreeding and extinction.

Non-Native Species

Non-indigenous species can be important sources of food crops, pets, ornamental plants, pets, and biological control agents, and as such, are usually considered beneficial. The introduction of some non-native species, however, can change the composition of ecosystems and affect their capacity to sustain biodiversity.

Conclusions and Recommendations

- *Overall, the ecosystem approach could provide support for management, development, and investment in drylands by focusing on preserving dryland ecosystems as an interconnected whole, striving to maintain capacity to produce an entire array of ecosystem goods and services while allowing for sustainable commodity production.*
- *Quantitative indicators of dryland ecosystem goods and services would help institutions and stakeholders to communicate and use this information in policy dialogues, environmental reporting and monitoring, and impact assessment.*

Despite concerted efforts, dryland issues have failed to capture sufficient global attention to propel rapid progress in curbing land degradation and alleviating poverty in drylands. We believe that the implementation of an ecosystem approach to drylands monitoring and assessment holds great promise for building greater support for enhanced management, development, and investment in drylands.

For example, the application of an ecosystem approach could significantly strengthen the Land Degradation Assessment of Drylands (LADA). Spearheaded by the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Program (UNEP), and the CCD Secretariat, the LADA will assess land degradation in drylands through analysis of both environmental and socioeconomic issues. The main objective is to provide basic, standardized information and methodological tools for evaluating land degradation and its biophysical and socioeconomic impacts at national, regional, and global levels.

At COP 4 in Bonn in 2000, the CCD Secretariat noted the importance of the LADA and asked the Committee on Science and Technology to provide guidance to this assessment on behalf of the Convention. The application of an ecosystem approach to LADA would help to quantify the effects of land degradation and substantiate its impacts on human welfare. It is the loss of goods and services such as water, food, biodiversity, and carbon storage that make land degradation such an important development issue. An ecosystem approach could provide similar benefits to the current efforts to reduce global poverty and provide debt relief, by infusing new energy in development proposals and creating renewed interest in solving dryland problems.

A quantitative ecosystem approach to dryland monitoring and assessment has the potential to attract and sustain the interest of development agencies, national delegates to the CCD and other international conventions, and the general public. Appealing to what people care about in dryland areas, the ecosystem approach recognizes problems at the local level as well as across multiple scales and time dimensions.

Although quantitative indicators of ecosystem goods and services are an integral part of the ecosystem approach, we acknowledge that the development of these indicators by themselves is not sufficient to stimulate a change in drylands development. Changes in policies and institutions to spur development of indicators must be combined with measures to encourage communication of this information and its use in national policy dialogues, environmental reporting, environmental impact assessment, and emergency relief. Ensuring that stakeholders have access to information needed for meaningful participation is critical if policies are to be reformed and implemented.

Support for management and development in drylands could benefit from immediate application of the ecosystem approach. The Millennium Ecosystem Assessment and the Land Degradation Assessment of Drylands, also could benefit from as well as encourage the use of quantitative indicators of dryland goods and services. To gather momentum for widespread adoption of the ecosystem approach to dryland assessment, we present four specific recommendations.

1. Dryland countries should undertake integrated ecosystem assessments at subnational, national, and regional levels, taking into consideration the needs of principal stakeholders. This requires identifying ecosystem goods

and services; compiling and analyzing indicators; identifying and measuring pressures, particularly those pressures resulting in diminished capacity to produce the goods and services; and engaging stakeholders in policy dialogues on tradeoffs and management approaches.

2. The Convention to Combat Desertification should adopt an ecosystem approach to setting broad goals and objectives. Focusing principally on land degradation has not generated the enthusiasm and investment needed to address the difficult problems facing dryland countries. The Committee on Science and Technology should encourage parties to adopt an integrated ecosystem approach at national and subregional levels as an integral part of their national action planning process. The CST should provide guidance and information on indicators of ecosystem goods and services and undertake studies on ways to improve governance and stakeholder involvement.
3. Development agencies should encourage use of an ecosystem approach to better align priorities on dryland issues, poverty alleviation, economic development, and debt relief. The development agencies should encourage integration of the ecosystem approach within each of the major environmental conventions and promote synergy across conventions to enhance the long-term capacity of drylands to provide key ecosystem goods and services.
4. Countries and subregions should embrace the World Summit for Sustainable Development as a valuable opportunity to share experiences in monitoring and assessing drylands using an ecosystem approach. International exchange of experiences and open discussions should provide recognition for practical, effective approaches to producing and maintaining ecosystem goods and services valued by humans.

Notes

1. Poor countries, or low income countries are defined by the World Bank as having US$760 or less GNP per capita in 1998 (World Bank 2000b); largely arid is defined as over 50 percent of terrestrial land area within the arid, semi-arid, and dry sub-humid aridity zones (UNEP 1997).

2. See endnote 1 for definition of predominantly dryland.

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