

## FACTS

- ✓ The Earth is the largest ecosystem and can be divided into terrestrial and aquatic ecosystems.
- ✓ Boreal forests are the largest terrestrial storehouses of carbon on Earth.
- ✓ Fertilizer use has grown tenfold since 1950 - to 141 million tonnes in the year 2000.
- ✓ The collapse of the North Atlantic cod fishery put 30,000 Canadians out of work and ruined the economies of 700 communities.
- ✓ Forests house approximately 50% of global biodiversity, and at least 300 million people are dependent on forests' goods and services to sustain their livelihoods.
- ✓ The worth of pollinators in the United States is estimated at US\$ 20-40 billion at least, based on the value of crops that wouldn't exist without the help of pollinators.
- ✓ By 2025, at least 3.5 billion people - nearly 50% of the world's population - are projected to face water scarcity.
- ✓ Forest area has increased slightly since 1980 in industrial countries, but has declined by almost 10% in developing countries. Tropical deforestation probably exceeds 130,000 square kilometres a year.
- ✓ 40% of the world's population lives within 100 kilometres on a coastline, an area that accounts for only about 20% of the landmass.

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## MANAGING EARTH'S "PRICELESS" ASSETS

"Bees pollinating flowers in a garden. Clean water flowing into your sink. A hiking trail that leads to a mountain vista unobstructed by development and untainted by smog. A snorkelling site resplendent with hundreds of colourful fish. If asked what these ecosystem goods and services are worth, many people would simply say, "they're priceless", writes Public Broadcasting Service reporter Bill Moyers in his feature 'Earth on Edge'.

Biological resources provide the basis for life on Earth. The fundamental social, ethical, cultural and economic values of these resources have been recognized in religion, art, and literature from the earliest days of recorded history.

However, in the past four decades, ecosystems have been sending ever louder distress signals. Many of the statistics are shocking: half of the world's wetlands have been destroyed in the past century; some 27% of coral reefs have been lost and many more are imperiled by human activity; 80% of grasslands are suffering from soil degradation; 70% of the world's drylands are threatened by desertification; and groundwater is being depleted almost everywhere.

**Unless we manage these valuable assets wisely, we will jeopardize our own existence. Ecosystem management ensures that the flow of environmental, economic, and social goods and services is maintained. It also requires interventions ranging from strict protection through to controlled harvesting.**

Most of today's environmental and human problems cannot be understood or addressed in isolation from each other. The 'Wellbeing of Nations' report, published in cooperation with IUCN in 2001, confirms that human and ecosystem wellbeing are intimately entwined, and validates the need to plan and manage for ecosystem protection and human development simultaneously.

**The Convention on Biological Diversity unified around the 'ecosystem approach' as the central organizing concept: one that is "holistic, flexible, socially-oriented, scientifically-based, and respectful of cultural preferences, usage and traditions."**

## WHAT ARE THE THREATS?

All countries and communities are grappling with the challenge of meeting growing demand for food, clean water, health, and employment. In many cases, social and economic development is given priority over conservation, leading to unsustainable use of ecosystems, which perpetuates the downward spiral of environmental degradation and economic hardship.

Ecosystems are being impaired and destroyed by a wide variety of human activities. Foremost among the immediate threats are the continuing destruction of natural habitats and the invasion of alien species. The most irreversible of human impacts on ecosystems is the loss of biodiversity. The 2003 IUCN Red List of Threatened Species reveals that over 12,000 animals and plants worldwide are threatened with extinction.

Other imminent threats include the alteration of the Earth's carbon, nitrogen, and other biogeochemical cycles through the burning of fossil fuels and heavy use of nitrogen fertilizer; degradation of farmland through unsustainable agricultural practices; squandering of freshwater resources; toxic pollution of land and waterways; and over-harvesting of fisheries, managed forests, and other theoretically renewable systems.

This is just a snapshot of the pressure our ecosystems are put under and a clear indication that human alteration of Earth is substantial and growing.

## How many ecosystems?

Ecosystems vary enormously in size: a temporary pond in a tree hollow and an ocean can both be ecosystems. It is therefore virtually impossible to say how many ecosystems there are on our Planet, except for the Planet Earth itself: the largest ecosystem!

The global Millennium Ecosystem Assessment, a UN effort to analyse the well-being of the world's ecosystems, uses the following "reporting categories":

1. Marine
2. Coastal
3. Inland water
4. Forest
5. Dryland
6. Island
7. Mountain
8. Polar
9. Cultivated
10. Urban

## Millennium Assessment

The Millennium Ecosystem Assessment (MA) is the most extensive study ever of the linkages between the world's ecosystems and human well-being. The MA is a 4-year, US\$21 million effort. It is designed by a partnership of United Nations agencies, international scientific organizations, and development agencies, with guidance from private sector and civil society groups.

The Millennium Assessment focuses on how humans have altered ecosystems, and how changes in ecosystem services have affected human well-being, how ecosystem changes may affect people in future decades, and what types of responses can be adopted at local, national, or global scales to improve ecosystem management and thereby contribute to human well-being and poverty alleviation. The program was launched by United Nations Secretary-General Kofi Annan in June 2001, and the primary assessment reports will be released in 2005.

The first 245-page report 'Ecosystems and Human Well-being' lays out the approaches, assumptions, processes, and parameters scientists are using in the study. It offers decision-makers a mechanism to identify options that can better achieve core human development and sustainability goals and better understand the trade-offs in decisions about development and the environment.

## WHAT HAS THE INTERNATIONAL COMMUNITY DONE TO SUSTAIN OUR ECOSYSTEMS?

**A puzzling concept in the beginning, ecosystem management has since gained terrain and has been endorsed by international agreements, national policies, and regional planning processes.**

At the Second Conference of the Parties to the **Convention on Biological Diversity (CBD)**, the State Parties reaffirmed that "conservation and sustainable use of biological diversity and its components should be addressed in a holistic manner, taking into account the three levels of biodiversity (the wide variety of plants, animals and microorganisms, genetic differences within each species and the variety of ecosystems) and fully considering socioeconomic and cultural factors. For this the ecosystem approach should be the primary framework." In 2000, the ecosystem approach, comprising 12 over-arching principles and 5 points of operational guidance was endorsed as the primary framework for action under the Convention.

Other multilateral environmental agreements also call for a more significant contribution from ecosystem management. **The Convention to Combat Desertification (UNCCD)** notes that actions to combat desertification (or land degradation in arid, semi-arid, and dry sub-humid areas) should be undertaken within the framework of an integrated approach that can contribute to sustainable development.

**The United Nations Convention on the Law of the Sea (UNCLOS)** was initiated in 1982, entered into force in 1994, and is regarded as the benchmark international agreement from which national and regional marine protocols can be built and implemented in the future. The Parties to the Convention called, in particular, to protect fish habitats and incorporate ecosystem considerations into fisheries management.

**The Ramsar Convention on Wetlands**, founded in 1971, is the first of the modern global intergovernmental treaties on conservation and wise use of natural resources. It also puts the ecosystem approach centre stage, through the concept of "wise use" that emphasizes that human use on a sustainable basis is entirely compatible with wetland conservation in general. Furthermore it is recommending its Parties to integrate wetland restoration into their national nature conservation, land and water management policies and to take steps to restore, as far as possible, habitat quality in all key sites so identified.

## ECOLOGISTS: THE NEW MANAGEMENT ELITE?

**When one thinks of a manager, one probably imagines a pin-striped suit. But Ecosystem Managers are a different breed! At least some 350 members of the Commission on Ecosystem Management (CEM), one of IUCN's six volunteer commissions, are.** The CEM is a network of experts for the integrated management of ecosystems; it provides expert guidance on integrated ecosystem approaches to the management of natural and modified ecosystems. The Commission has four priority activity areas: promotion of the ecosystem approach; understanding and promoting ecosystem restoration; development and application of indicators of ecosystem status; and development and dissemination of ecosystem management tools.

## USE'EM BUT DON'T LOSE'EM!

**All organisms modify their environment, and humans are no exception. As the human population has grown and the power of technology has expanded, the scope and nature of ecosystems' modification has changed drastically. At the same time, millions of people who lack social safety nets of developed countries continue to rely heavily on the goods and services provided by ecosystems.**

**Nam Et Phou Loei Protected Area** lies in the poorest district of the poorest province of Lao PDR, which, in turn, is one of the poorest countries in the world. Here the average economic value of forest resources in local livelihoods is between one third and one half of per capita GDP (\$486-734 per year).

Overall, biodiversity-based sectors in Lao PDR contribute nearly three quarters of GDP, over 90% of national employment, 60% of exports and foreign exchange earnings, and one third of government revenues.

## How Clean is Clean?

During the 20th century, more than 200 petrol tankers have sunk, many of these resulting in ecological disasters. When a large oil spill occurs in coastal waters, the immediate injury to marine ecosystems can in some cases be massive, especially if the oil washes ashore. Plants and animals living in the intertidal zone, as well as animals that use the sea surface, are the most vulnerable to spill injury, and large numbers can be killed in a short time.

The *Exxon Valdez* Oil Spill in 1999 is among the most contentious and extensively studied spill in history. Although the spill was smaller than many (i.e. *The Prestige* which sank off the Spanish coast in 2002 was carrying 2x more oil than the *Exxon Valdez* had spilled), it occurred in an area of high marine productivity and diversity. Oil spill cleanup started shortly after the accident. By 1992, Prince William Sound in Alaska, the site of the oil spill, was declared clean.

Disagreement persists today as to the magnitude of the harm caused by the spill to marine ecosystems and the extent of ecosystem recovery. Small amounts of oil from the *Exxon Valdez* can still be found in the area; most is present in the upper intertidal "splash zone" of rocky shores and has the appearance of hard asphalt.

## QUOTES

*"Protecting human health may be one of the most compelling reasons for pursuing environmental improvements, especially in conditions of poverty."* – Dr. Gro Harlem Brundtland, former Director-General of the World Health Organization (WHO)

*"Achieving global sustainable human development will depend on how well Earth's ecosystems are managed and maintained."* – Hillary Masundire, Chair of the IUCN Commission on Ecosystem Management.

*"Unless we find a way to sustainably manage the environment, poverty will grow more entrenched, and even peace may remain out of reach"* – Kofi Annan, UN Secretary General

*"Society has a poor appreciation of the limits of growth."* – Tim Gray, Canadian Wildland League

## IUCN'S RESPONSE

**Restoring and maintaining ecosystem integrity is one of IUCN's conservation goals; that's why the Union adopted the ecosystem approach as an overall framework for its activities worldwide.**

The ecosystem approach places human needs at the centre of biodiversity management. It aims to manage the ecosystem, based on the multiple functions that ecosystems perform and the multiple uses that are made of these functions. The ecosystem approach does not aim for short-term economic gains, but aims to optimize the use of an ecosystem without damaging it.

**The world's drylands offer an especially fruitful opportunity for the application of the ecosystem approach, and IUCN is working to seize it through its Drylands Initiative.** Nearly 40% of the Earth's people, most of them poor, reside in arid and semi-arid ecosystems on which they are dependent for their daily needs; yet, up to 70% of the world's drylands is susceptible to desertification, threatening billions of hectares of rangelands and croplands.

**Under its Arctic Strategy, IUCN is planning to collaborate closely with the Arctic Council established amongst the eight nations which include the Arctic within their political jurisdiction; the Inter-Regional Arctic Programme will emphasize empowerment and institutional capacity building in the Russian High North.** About 3.5 million people live in the Arctic region, mostly in cities in the northern part of the Russian Federation; about 0.5 million are indigenous people. The environmental conditions in the Arctic are of concern mainly because of degradation caused by the exploitation of timber, coal, oil, natural gas, and other mineral resources.

**IUCN assists in the recovery of ecosystems that have been degraded, damaged or destroyed, through its Ecosystem Restoration Working Group.** In partnership with the UN Refugee Agency, UNHCR, IUCN is helping in the rehabilitation of refugee-impacted areas in the Horn of Africa. At least a million refugees in Eastern Africa had been moved from their countries of origin because of conflicts and had been staying in dense refugee camps in countries such as Sudan, Ethiopia, Tanzania, or Kenya for several years, causing heavy impacts on the environment in those areas.

**However, prevention is always better than cure, so IUCN promotes implementation of sustainable community management plans, based on the ecosystem approach.** In the Bocas del Toro Island in Panama, the rise of tourism has resulted in the unplanned development of the area, creating pressures on the ecosystems and causing environmental problems such as over-fishing of the lagoon and coral reef destruction. Local communities realised that their heritage is threatened by unregulated practices and put forward suggestions to the government to regulate the access to fishing grounds and to set certain areas aside for conservation, and IUCN has been called upon to offer its technical expertise to this project.

**Protected areas are often seen as "hermetically sealed bubbles" or "islands of conservation in an ocean of destruction". But unless protected areas are part of well-managed landscapes/seascapes, there will be nothing to protect.** To help park managers around the world achieve this outcome, the IUCN Ecosystem Management Programme is helping "reconnect" protected areas to surrounding lands, looking at ecological, economic, institutional, and cultural aspects. In the wake of the Vth IUCN World Parks Congress, the document called 'THE DURBAN LINK' lists ten target areas for action to strengthen protected areas - while solving other pressing social and environmental issues.

**From field projects to the international policy arena, and across environmental, social and economic sectors, IUCN is working to ensure that the ecosystems continue to deliver the vital life-support services to burgeoning human populations.**

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## A WEB OF EXPERTISE

The IUCN Ecosystem Management Programme and the Commission on Ecosystem Management, bringing together some 350 experts worldwide, cooperate in the pursuit of four priority activity areas: Promotion of the Ecosystem Approach; understanding and promoting ecosystem restoration; development and application of indicators of ecosystem status; and development and dissemination of ecosystem management tools.

IUCN is a Union of over 70 member States, over 100 government agencies, 750 NGOs and over 10,000 internationally recognised scientists and experts from more than 180 countries.

IUCN is the world's largest environmental knowledge network and has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. IUCN is a multicultural, multilingual organization with 1000 staff located in 62 countries. Its headquarters are in Gland, Switzerland.

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## ECOSYSTEM GLOSSARY

**Ecosystem:** An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit. Humans form an integral part of ecosystems.

**Ecosystem services** (e.g. purification of air and water) and goods (such as food, drinks) are the benefits that human society directly or indirectly derive from ecosystem functions. Ecosystem functions are defined as the capacity of natural processes and components of natural or semi-natural systems to provide goods and services that satisfy human needs. Four types of ecosystem functions are considered:

- Regulation functions
- Carrier functions
- Production functions
- Information functions

**Biological diversity:** "Biodiversity" means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species and of ecosystems.

**Ecosystem approach:** a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.

**Ecosystem integrity:** There are several definitions of ecosystem integrity, and they all reflect the capability of a system to support services of value to humans. According to Noss in De Leo, G. and Levin, S., it is: "the capability of supporting and maintaining a balanced, integrated, adaptive, community of organisms having species composition, diversity, and functional organisation comparable to that of natural habitats of the region."

**Ecosystem management** is a process that integrates ecological, socio-economic, and institutional factors into a comprehensive strategy in order to sustain and enhance the quality of the ecosystem to meet current and future needs.

## TO LEARN MORE

IUCN Commission on Ecosystem Management: [www.iucn.org/themes/cem](http://www.iucn.org/themes/cem)

Millennium Ecosystem Assessment: [www.millenniumassessment.org](http://www.millenniumassessment.org)

Convention on Biological Diversity: [www.biodiv.org](http://www.biodiv.org)

Ramsar Convention on Wetlands: [www.ramsar.org](http://www.ramsar.org)

World Resources Institute about the Ecosystem Approach:  
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[www.ncseonline.org/NLE/CRSreports/Biodiversity](http://www.ncseonline.org/NLE/CRSreports/Biodiversity)

Sustainable Development website of the United Nations: [www.un.org/esa/sustdev](http://www.un.org/esa/sustdev)