

Ecosystems and Human Well-being



Millennium Ecosystem Assessment

Millennium Ecosystem Assessment Board

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Message from the Board

It is easy in an era of constant technological advance to forget that our lives remain dependent on the health of the natural world – easy but perilous.

People depend on Earth's living systems for both life and livelihood. The benefits that human beings extract from nature are the foundation of all economies, the basis of major industries, sources of knowledge, and central to many cultures. Croplands, forests, grasslands, rivers, wetlands, lakes, and oceans provide the food we eat, the water we drink, and a wide array of other products, cultural benefits, and spiritual values.

With explosive speed, the scale of human impact on ecosystems underwent a radical change in the past century. Human beings have changed the biological, physical, and chemical features of the planet at an unprecedented pace and scale, and these changes are continuing or accelerating today. While many of these changes, such as increased agricultural production, have greatly enhanced human well-being, many others – such as the loss of fisheries, degradation of water resources, and increased soil erosion – have not.

It is therefore imperative that we make wise choices in the use and conservation of these ecosystems. But whether it is a corporate CEO deciding on business strategies, a minister of planning weighing



UNDP photo



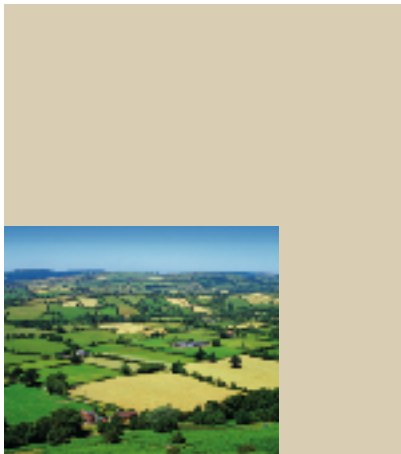
The Fraying Web

What is the problem?

People and ecosystems are bound together by the strands of a web of life that is both resilient and complex. Ecosystems are the productive engines of the natural world, providing us with food, water, and the fiber used for clothing, paper, and lumber. Yet accelerating human demands for nature's goods and services are degrading nature's capacity to provide them.

There is a tendency to think that human needs and a healthy environment are at odds – that providing for people somehow requires environmental degradation.

“ This reasoning is exactly upside-down,” writes biologist Jared Diamond. “ Human needs and a healthy environment...are inexorably linked by chains of cause and effect. We need a healthy environment because we need clean water, clean air, wood, and food.” The most vulnerable among us are poor people, who cannot afford to import resources from elsewhere when their ecosystems fail.



The very technologies that have allowed farmers to nearly triple global food production since 1960 (the world's population doubled over the same period, to more than 6 billion) have also degraded the health of agricultural and other ecosystems. Pesticide use, which reached 2.5 million tons in 2000, kills beneficial species as well as pests. And fertilizer use has increased crop yields and helped offset the effects of depleted soils, but overuse has polluted lakes and streams throughout the world and created dead zones barren of marine life where some major rivers reach the sea. Fertilizer use has grown 10-fold since 1950 – to 141 million tons in 2000.



Three great rivers – the Yellow, the Amu Darya, and the Colorado – no longer reach the sea in dry seasons, as they are entirely

consumed by irrigating crops and meeting industrial demands and urban needs. Human-kind now uses half the available surface water on Earth, and water use is growing twice as fast as population. These patterns of water use cannot be sustained, given growing populations and growing economies, and they already create serious problems for downstream water users as well as for biodiversity.

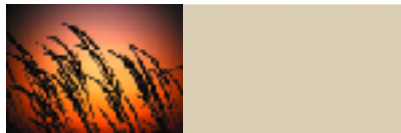
Ocean fisheries support a \$56-billion dollar industry and provide protein to much of the globe, but high-tech fishing fleets are

stripping the ocean with bottom-scouring trawlers and fishing lines that have thousands of hooks and sometimes stretch for 50–60 miles. The populations of nearly all large ocean fish – tuna, cod, swordfish, marlin, halibut, and so on – have dropped by 90 percent since 1950, according to a recent report in the journal *Nature*. Shrimp farms have destroyed coastal mangroves in a score of countries, eliminating critical habitat for fish reproduction and adding other pressures to marine ecosystems.

In hundreds of places, in myriad ways, the web of life is fraying. Tropical forests, arctic tundra, coral reefs, agricultural lands, and scores of other vital living systems show symptoms of the stress caused by meeting the growing needs of the human species.

But nature is resilient. Ecosystems constantly change. Are the pressures of human use causing short-term disruptions or real damage to the capacity of ecosystems to meet human needs? And if the damage is real and long term, is it avoidable? Or is it the inevitable consequence of providing food, clothing, shelter, and employment for 6.2 billion people?

In his Millennium Report to the General Assembly, responding to the concerns of scientists and world leaders, United Nations Secretary-General Kofi Annan called for a Millennium Assessment of Global Ecosystems to provide definitive information on the state, productivity, and future of global ecosystems.



New Pressures on Ecosystems

New studies tracking thousands of species conclude that significant impacts of global warming are already discernible in animal and plant populations. The studies find that warming temperatures around the world have pushed plants and animals toward formerly cooler climes. On average, species ranges have shifted more than 6 kilometers per decade toward higher latitudes and more than half a meter per decade upward in elevation. Ominously, these changes have been sparked by a relatively small average warming of less than 1 degree Celsius.

Growing Demand for Ecosystem Services

Global water consumption rose sixfold between 1900 and 1995 – more than double the rate of population growth – and continues to grow rapidly as agricultural, industrial, and domestic demands increase. Humans now withdraw about 4,000 cubic kilometers of water a year – about 20 percent of the base flow (the average dry-weather flow) of all the world's rivers. The environmental impacts of our water consumption are growing rapidly as well. For example, the enormous increase in the number of dams has fragmented and seriously altered the flow of roughly 60 percent of the world's major river basins, such as the Mississippi, Danube, Volga, and Nile – with significant impacts on coastal ecosystems, rates of sediment flow, biodiversity, and fisheries.



“ The Millennium Ecosystem Assessment provides information that will help us take decisions meeting pressing development needs while protecting the environment on which we depend. It also provides a framework that we are already applying in assessments here in China.”

- Xu Guanhua, Minister of Science and Technology, China



investments in natural resources, or a citizen activist pressing for more-effective actions to alleviate poverty, decision-makers still lack understanding and foresight in relation to the natural resource base for socioeconomic development that could help them act responsibly on behalf of current and future generations. Furthermore, the challenge of effectively managing Earth's ecosystems and the consequences of failure for the well-being of future generations will continue to increase during the twenty-first century.



For that reason, we have created a unique partnership involving public and private institutions, scientists, and concerned citizens that seeks over a five-year period (2001–2005) to increase dramatically the understanding, information, and tools available to guide decisions that may affect or be affected by Earth's ecosystems.

We invite you to join us in this effort.

- Members of the Board of the
Millennium Ecosystem Assessment



Information and Tools to Support Action

What is the Millennium Ecosystem Assessment?

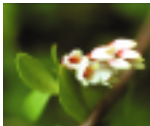
The Millennium Ecosystem Assessment (MA) was established by international organizations and a consortium of stakeholders – policy-makers, civil servants, nongovernmental groups, indigenous peoples, business leaders, and scientists – to provide a sound foundation of information on which decision-makers, both public and private, could base their actions.

The MA's findings could, for example, help an insurance company executive determine how risks of environmental disasters may change over the next several decades, or help a minister of finance weigh the costs and benefits of a rural development strategy, or help an environmental organization establish priorities for conservation projects. New data from remote sensing, new research findings, and new ecological and economic models have greatly improved understanding of both problems and solutions, but only a small fraction of this information currently makes its way out of the research community and into the hands of decision-makers.

How will the MA address the problem?

The MA breaks new ground by assessing not just the environment, but especially the consequences for human well-being of changes in nature. And while challenges such as food production, clean water, fisheries, and biodiversity conservation have traditionally been approached issue by issue, the MA instead examines the entire range of benefits humans obtain from ecosystems and provides information that will allow us to better understand the trade-offs that often exist when making decisions concerning ecosystem services. Progress toward an objective such as increasing food production, for example,

FAO photo / T. Janssen



UN/WHO photo



can be at the cost of progress toward such other objectives as improved water quality or soil or biodiversity conservation.

► **The MA will identify priorities for action.**

What regions are of highest priority for international conservation investments? What environmental management strategies could best contribute to poverty alleviation programs? "The MA will be the most comprehensive look at the state of the global ecosystems ever produced," says David Kaimowitz, Director-General of the Center for International Forestry Research. "It will provide an important basis for priority-setting within international and national organizations."

► **The MA will provide tools for planning and management.**

What methods can be used to assess the economic benefits provided by ecosystems? What methods and indicators can be used to assess and monitor ecosystem conditions? The MA includes more than a dozen regional, national, and local ecosystem assessments that serve as models for how the MA tools and approach can be applied to address specific needs at these scales.

► **The MA will strengthen the capacity of institutions and individuals to undertake integrated ecosystem assessments and to act on their findings.**

Through training workshops, dissemination of data and methods, a young scientist fellows program, local and regional assessments, and the involvement of experts from around the

world, the MA will create a network of expertise that can help meet needs today and in the future and will establish mechanisms to better link research and analysis to decision-making.

► **The MA will provide foresight concerning the consequences of decisions that may affect ecosystems.**

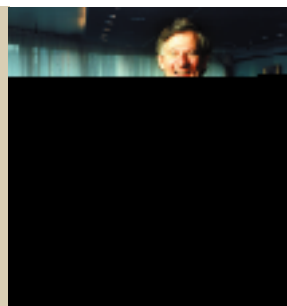
Using state-of-the-art models and scientific information, the MA will explore plausible scenarios for changes in ecosystems and the impact of those changes on people and economies. "The scientific information and understanding provided through the MA can enable the general public to make use of the information to hold decision-makers accountable," says M.K. Prasad, MA board member and a pioneer of grassroots environmental movements in India.

► **The MA will analyze potential solutions.**

The MA will give decision-makers state-of-the-art information on the strengths and weaknesses of various options to enhance the conservation of ecosystems and their contribution to human well-being.

"Our future business depends on fertile soil to produce food, as well as clean water to use products such as toothpaste and soap. If we base business strategies on the wrong assumptions concerning the world's ecosystems, we will make mistakes, which are not only bad for business but more importantly, we will irreversibly erode the welfare of our planet."

- Antony Burgmans,
Chairman, Unilever N.V.



Organization and Products

How is the MA being conducted?



“ The Global Environment Facility, the largest multilateral grant financier of biodiversity projects worldwide, needs baseline information to understand whether its programs of investments in a number of key ecosystems are having the benefits expected. The GEF needs state-of-the-art information on the current condition of ecosystems that will enable it to measure progress.”

- Mario Ramos, Biodiversity Program Manager, Global Environment Facility



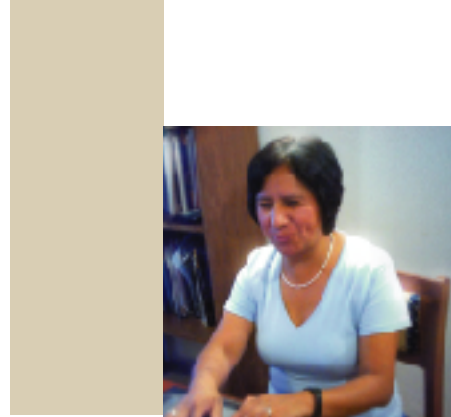
The MA is governed by a board representing international conventions, UN agencies, scientific organizations, the private sector, indigenous organizations, and civil society. A 13-member Assessment Panel of leading social and natural scientists oversees the technical work of the assessment, supported by a secretariat with offices in Europe, North America, Asia, and Africa and coordinated by the United Nations Environment Programme.

More than 600 scientists from every part of the globe are involved in expert working groups that are examining: (1) Condition and Trends in Ecosystems and Human Well-being; (2) Scenarios for Future Changes in Ecosystems and Human Well-being; (3) Responses to Better Conserve Ecosystems and Enhance Their Contributions to Human Well-being; and (4) Sub-global Assessments of the Consequences of Ecosystem Change for Human Well-being. Hundreds more are undertaking more than a dozen sub-global assessments in Canada, Chile, China, India, Papua New Guinea, Peru, Philippines, Portugal, Southern Africa, Sweden, Viet Nam, and elsewhere. The MA synthesizes information from the scientific literature, datasets, and scientific models and makes use of knowledge held by the private sector, practitioners, local communities, and indigenous peoples. All of the MA findings will undergo rigorous peer review.

The approach used in the MA is described in *Ecosystems and Human Well-being: A Framework for Assessment* (Island Press, September 2003), which is also available on the MA web site. Four technical assessment reports will be released in 2005 along with short syntheses that distill the overall findings for ready use by decision-makers in different sectors. The MA will work in close partnership with other organizations to distribute widely the findings, methods, datasets, and tools that can be used in decision-making and planning processes.

“ Cultural diversity and the biodiversity of ecosystems are intimately connected to our view of the land – to the use and management of that biodiversity. Any assessment of knowledge must include this traditional and indigenous knowledge and should strengthen the ability of these local communities to manage their resources.”

- Esther Camac, Asociación Ixä Ca Vaá de Desarrollo e Información Indígena



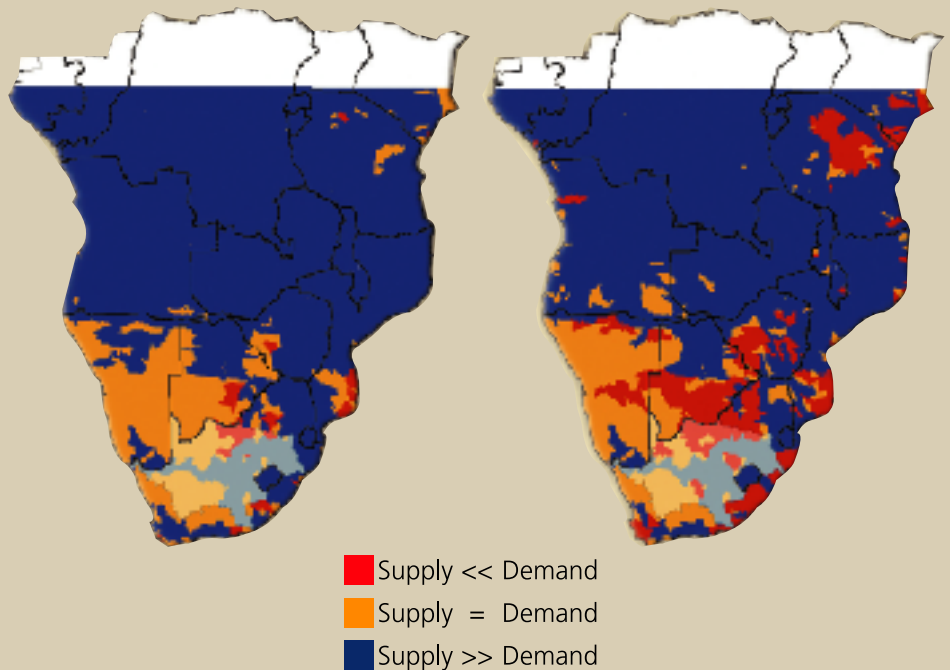
Southern Africa Millennium Ecosystem Assessment

The Southern Africa component of the MA undertook a pilot assessment in 2002, exploring how the region’s food, wood fuel, and water resources might be affected under two scenarios: the New Partnership for Africa’s Development and persistence of current trends. These scenarios help to identify priority areas for action to protect valuable ecosystem services.

Regional Scale

Annual availability

Availability in the driest month



While countries north of 15° S have annual water supplies far in excess of demand, countries south of 15° S either already experience permanent water shortages or have just enough supplies to meet current demands. In some areas, water availability may appear adequate when averaged across the year, but when “zooming in” to conditions in the driest months, severe shortages may be found (e.g., Rift Valley, Tanzania). Unless consumption patterns change, areas shown in yellow are likely to experience water shortages in future. The regional assessment is based on global datasets of runoff and population. Source: Southern African Millennium Ecosystem Assessment.



Join the quest to shape the future web of life; get involved with the Millennium Ecosystem Assessment today.

www.millenniumassessment.org

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