

# ecosystems and human well-being: the millennium ecosystem assessment

People depend on earth's living systems (called ecosystems) for both life and livelihood. Nature provides the foundation for economic activity, the primary source of human knowledge, and plays a central role in many of the world's cultures. This dependence brings up several important questions.

How have ongoing global transitions—urbanization, industrialization, and technological development—affected the services that ecosystems provide? What options exist to better conserve and restore ecosystems? What are the trade-offs and synergies involved in managing ecosystems and their services?

To investigate, the United Nations sponsored the Millennium Ecosystem Assessment (MA), an international collaboration of more than 1300 experts from 95 countries. From 2001 to 2005, natural and social scientists worked together to collate and synthesize the largest ever assessment of the linkages between ecosystems, the services they provide and human well-being. The MA has interlinked assessments at local watershed, national, regional and global scales.

The MA found that over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. While these changes have improved the lives of billions, they have also weakened nature's ability to deliver key services such as purification of air and water, protection from disasters, and the provision of medicines. Unless addressed, these problems will substantially diminish the ecosystem services available to future generations.

Of the 24 ecosystem services examined by the MA—provisioning services such as capture fisheries, regulating services such as climate regulation, and cultural services such as recreation—60 percent are being degraded on a global scale. Abrupt changes, such as the creation of “dead zones” in coastal waters, are increasing in likelihood.

Many options exist to conserve or enhance specific ecosystem services in ways that can reduce negative trade-offs or provide positive synergies with other ecosystem services. Assessing 74 response options, the MA found that actions that address one or more indirect drivers of change will be imperative. Among these drivers are: population change (including growth and migration), changes in economic activity (including economic growth, disparities in wealth, and trade patterns), socio-political factors (including factors ranging from the presence of conflict to public participation in decision-making), cultural factors, and technological change.

The Millennium Assessment found the following policy responses to be promising:

- Develop and facilitate adoption of technologies designed to increase resource efficiency or reduce negative impacts. For example: technologies to enable increased crop yields without harmful impacts related to water, nutrient, and pesticide use; and also, technologies to increase energy efficiency and reduce greenhouse gas emissions.
- Create economic and financial incentives to regulate the use of ecosystem goods and services. Examples include: greater use of economic instruments, such as taxes or user fees for activities with ecosystem impacts; mechanisms to enable consumer preferences to be expressed through markets, such as certification schemes; elimination of subsidies that promote excessive use of ecosystem services and, where possible, transfer of these subsidies to payments for non-marketed ecosystem services; compensatory mechanisms for poor people who are adversely affected by the removal of subsidies, along with actions to minimize adverse impacts in developing countries
- Strengthen governance frameworks that provide for effective ecosystem management. Examples include: integration of ecosystem management goals within broader development planning frameworks; increased coordination among environmental agreements and other international economic and social institutions; and, increased transparency and accountability of public and private sectors in decisions that have an impact on ecosystems.
- Support individuals in their efforts to improve ecosystems and human well-being through exercising their procedural or democratic rights in efforts to improve ecosystems and human well-being such as: measures to reduce aggregate consumption of unsustainably managed ecosystem services, behavioral changes that could reduce demand for threatened ecosystem services, promotion of demand-side management, commitments by industry to use raw materials that are from sources certified as being sustainable, and improved product labeling, communication, education, and empowerment of groups that are particularly dependent on ecosystem services, such as indigenous peoples.

Effective management of ecosystems is constrained both by the lack of information and by our failure to use the information that does exist. We need to incorporate non-market ecosystem values into resource management decisions, to recognize the value of traditional and practitioner knowledge, and to enhance the capacity for assessing the consequences of ecosystem change and acting on such assessments.

These policies will require significant changes in institutions and practices, both nationally and internationally.

