Overview of the Milliennium Ecosystem Assessment

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What is the Millennium Ecosystem Assessment (MA)?

The Millennium Ecosystem Assessment (MA) was called for by the United Nations Secretary-General Kofi Annan in 2000. Initiated in 2001, the objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The MA has involved the work of more than 1,360 experts worldwide. Their findings, contained in five technical volumes and six synthesis reports, provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources) and the options to restore, conserve or enhance the sustainable use of ecosystems.

What are the main findings of the MA?

1. Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth.
2. The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes, and the exacerbation of poverty for some groups of people. These problems, unless addressed, will substantially diminish the benefits that future generations obtain from ecosystems.
3. The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals.
4. The challenge of reversing the degradation of ecosystem while meeting increasing demands for services can be partially met under some scenarios considered by the MA, but will involve significant changes in policies, institutions and practices that are not currently under way. Many options exist to conserve or enhance specific ecosystem services in ways that reduce negative trade-offs or that provide positive synergies with other ecosystem services.

The bottom line of the MA findings is that human actions are depleting Earth's natural capital, putting such strain on the environment that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted. At the same time, the assessment shows that with appropriate actions it is possible to reverse the degradation of many ecosystem services over the next 50 years, but the changes in policy and practice required are substantial and not currently underway.

What is new about the MA findings?

The MA, like the Intergovernmental Panel on Climate Change (IPCC), assessed current knowledge, scientific literature, and data. Thus, at the most basic level, assessments of this nature synthesize information that has previously been available, and do not present new research findings. Nevertheless, three aspects of the MA do represent important new contributions.

- First, the findings of this assessment are the consensus view of the largest body of social and natural scientists ever assembled to assess knowledge in this area. The availability of this broad consensus view of scientists is an important contribution to decision-making. The assessment identifies where broad consensus exists on findings but also where the information is insufficient to reach firm conclusions.

- Second, the focus of this assessment on ecosystem services and their link to human well-being and development needs is unique. By examining the environment through the framework of ecosystem services, it becomes much easier to identify how changes in ecosystems influence human well-being and to provide information in a form that decision-makers can weigh alongside other social and economic information.
- Third, the assessment identified a number of 'emergent' findings, conclusions that can only be reached when a large body of existing information is examined together. Four of these stand out:
- The balance sheet. Although individual ecosystem services have been assessed previously, the finding that 60% of a group of 24 ecosystem services examined by the MA are being degraded is the first comprehensive audit of the status of Earth's natural capital.
- Nonlinear changes. Nonlinear (accelerating or abrupt) changes have been previously identified by a number of individual studies of ecosystems. The MA is the first assessment to conclude that ecosystem changes are increasing the likelihood of nonlinear changes in ecosystems and the first to note the important consequences of this finding for human well-being. Examples of such changes include disease emergence, abrupt alterations in water quality, the creation of "dead zones" in coastal waters, the collapse of fisheries, and shifts in regional climate.
- Drylands. Because the assessment focuses on the linkages between ecosystems and human well-being, a somewhat different set of priorities emerge from it. While the MA does confirm that major problems exist with tropical forests and coral reefs, from the standpoint of linkages between ecosystems and people, the most significant challenges involve dryland ecosystems. These ecosystems are particularly fragile, but they are also the places where human population is growing most rapidly, biological productivity is least, and poverty is highest.

- Nutrient loading. The MA confirms the emphasis that decision-makers are already giving to addressing important drivers of ecosystem change such as climate change and habitat loss. But the MA finds that excessive nutrient loading of ecosystems is one of the major drivers today and will grow significantly worse in the coming decades unless action is taken. The issue of excessive nutrient loading, although well studied, is not yet receiving significant policy attention in many countries or internationally.

Has the MA identified major gaps in knowledge?

Yes, many. For example, at a local and national scale, relatively limited information exists about the status of many ecosystem services and even less information is available about the economic value of non-marketed services. Moreover, the costs of the depletion of these services are rarely tracked in national economic accounts. Basic global data on the extent and trends in different types of ecosystems and land use are surprisingly scarce. Models used to project future environmental and economic conditions have limited capability for incorporating ecological "feedbacks," including nonlinear changes in ecosystems, or behavioral feedbacks such as learning that may take place through adaptive management of ecosystems.

Where are the uncertainties too large to provide useful input to decision-makers?

Assessments play a useful role in clarifying where scientific uncertainties remain. While uncertainties can be used to argue for a ‘wait and see’ approach, they can equally well be used to argue for a precautionary approach. Among the MA findings, the certainty of the global findings is generally relatively high. Perhaps the greatest uncertainty associated with a critically important feature of ecosystem change at a global scale surrounds the knowledge of the extent of land degradation in drylands. Even so, using relatively conservative estimates of land degradation (10-20% degraded) the area and the number of people involved is still large. Where uncertainty is the greatest problem, however, is at the local or national scale. For example, at the local scale there is typically insufficient information on the full economic costs and benefits of alternate uses of ecosystems to fully inform decisions. This assessment shows both the value of obtaining that information and how it can be obtained (and the MA sub-global assessments provide a model for one mechanism to undertake that more detailed local or national assessment).

What impact does the MA hope to have?

The overall aims of the MA were to contribute to improved decision-making concerning ecosystem management and human well-being, and to build capacity for scientific assessments of this kind. The ultimate impact of the MA will depend on the extent to which the MA findings are used by decision-makers, both at the global level (e.g., conventions) and at sub-global scales. Significant assessment capacity has already been built worldwide through participation in the MA. It is also expected that there will be substantial adoption of the MA conceptual framework, approaches, and methods in the ongoing initiatives and programs of the various institutions that have been partners in the MA process.

How did the MA start?

See History of the Millennium Assessment

When did the MA begin? How long did the assessment take?

The core MA process took 4 years, between 2001 and 2005. The MA officially began in April 2001, with the first technical design workshop held at National Institute for Public Health and the Environment (RIVM), the Netherlands. It was formally launched by UN Secretary–General Kofi Annan, on June 5, 2001, coinciding with World Environment Day. The first year of the MA was primarily concerned with designing the methodology for the global and sub-global assessments. The core assessment work, including drafting of the technical reports by the MA working

groups, was carried out in the second and third years. This was followed by two rounds of review of the draft reports by experts and governments, which took place in 2004. The assessment findings were formally approved by the Board on March 23, 2005. Some of the MA sub-global assessments were initiated after 2002, and will be completed in 2006 or later.

How was the MA governed?

A Board was established to represent key "users" of the findings of the MA. The Board includes representatives of the CBD, CCD, Ramsar, and the UN Convention on Migratory Species (UNCMS); national governments; UN agencies; civil society representatives (including indigenous peoples); and the private sector. Board members representing institutions were selected by those institutions. In addition, 10 "at-large" members were selected by the Steering Committee and an additional 10 members were chosen by the Board at its first meeting. Other members were also selected by the Board to ensure appropriate geographical and sectoral distribution among Board members.

How was the work of the MA done?

The MA was undertaken by an international network of scientists and other experts, with a process modeled on the IPCC. More than 1300 authors from 95 countries were involved in the MA, organized into 4 working groups. Three of these working groups (Condition & Trends; Scenarios; Responses) carried out the global assessment component of the MA. The fourth working group (Sub-global) involved all of the MA sub-global assessments. The MA working groups involved both natural and social scientists, many of whom are leaders in their fields. Due regard was given to ensuring sufficient geographical and gender balance among the experts involved in the MA. The Assessment Panel, comprising the co-chairs of the working groups and a few additional scientific experts, oversaw the technical execution of the assessment work. Each working group was assisted by a Technical Support Unit (TSU) to help coordinate the network of scientists and experts involved. The TSUs and the Director’s office formed a distributed secretariat across a network of co-executing agencies that managed logistical, administrative, and technical support for the MA.

The MA’s four technical volumes underwent two rounds of review by experts and governments. Together with 44 governments and 9 affiliated scientific organizations, over 600 individual reviewers worldwide provided around 18,000 individual comments. The review process was overseen by an independent Board of Review Editors, composed of Chapter Review Editors who ensured that all review comments were adequately handled and responded to by MA authors.

What institutions were involved in the MA’s distributed

secretariat?

UNEP provided overall coordination for the MA, specifically through the administration of more than half of the core financial support for the MA, and by employing the MA Director. The MA Director's office was based in Malaysia at the WorldFish Center, as was the TSU for the Sub-Global Working Group. UNEP's World Conservation Monitoring Center (UNEP-WCMC) hosted the TSU for the Condition and Trends Working Group, and the International Council for Science's (ICSU) Scientific Committee on Problems of the Environment (SCOPE) supported the Scenarios Working Group. (The Scenarios Working Group was a joint activity of the MA and SCOPE.) The Institute of Economic Growth in Delhi supported the Responses Working Group. The World Resources Institute, in partnership with the Meridian Institute, supported the MA's outreach and engagement activities, and coordinated the publications process.

How much did the MA cost, and who funded it?

The overall MA budget was approximately US$24 million. Of this amount, around $7 million was provided through in-kind contributions for the MA sub-global assessments. Major donors included: the Global Environment Facility (GEF), the UN Foundation, the David and Lucile Packard Foundation, and the World Bank. Additional support was provided by Consultative Group on International Agricultural Research (CGIAR), the Food and Agriculture Organization (FAO), Government of Norway, Rockefeller Foundation, UNDP, UNEP, and the US National Aeronautic and Space Administration (NASA). The exploratory phase was funded by the Avina Group, David and Lucille Packard Foundation, Government of Norway, Swedish International Development Authority (SIDA), Summit Foundation, UNDP, UNEP, Wallace Global Fund, and the World Bank. In addition, significant contributions of data, time and expertise was made through in-kind contributions by such groups as the International Food and Policy Research Institute and WRI.

What products are available from the MA?

See Overview of Reports

What were some of the innovations of the MA?

The MA was designed as an integrated assessment to cut across sectors, involving natural science and social science perspectives. The MA was also a multi-scale assessment, which included component assessments undertaken at multiple spatial scales – global, sub-global, regional, national, basin and local levels. Another important feature of the MA was the emphasis on including different knowledge systems, apart from "scientific knowledge". To explore this topic, the MA organized an international conference "Bridging Scales and Epistemologies" in

March, 2004, in Alexandria, Egypt.

The MA also had an innovative governance structure that was representative of not only scientists and experts, but also UN conventions, civil society groups, and indigenous peoples. The MA Board, the Assessment Panel, and Working Groups were co-chaired by representatives of both developed and developing worlds.

Where are the sub-global assessments? How were they selected?

See Sub-Global Assessments

Did the MA conduct new research?

The MA did not conduct new research, but it is the first assessment to focus on the impacts of ecosystem changes for human well-being. As with the IPCC, the MA primarily synthesized the findings of existing research, to make them available in a form that is relevant to current policy questions. The MA synthesized information from the scientific literature, data sets, and scientific models, and included knowledge held by the private sector, practitioners, local communities and indigenous peoples. Among the sub-global assessments, however, particularly those at local scales, the lack of data and literature did lead some sub-global assessment to undertake some new research and data collection. In all cases, the assessment findings have been useful in identifying information gaps and priorities for future research.

What happens next? Will the MA be repeated?

There are plans for various activities to capitalize on the momentum created by the MA. These include further outreach and communication to ensure that the MA's findings and messages reach as broad an audience as possible; the production of a report focused on the MA's methodology; training and capacity-building on the MA's integrated ecosystem assessment approach; and continued coordination of the sub-global assessments that are still underway. Until the MA's impacts are fully evaluated, it is still too early to determine whether such an exercise should be repeated in the future.

How was the MA related to other international assessments, such as the Global Environment Outlook (GEO), IPCC and the Global International Waters Assessment (GIWA)?

Both the MA and GEO are integral parts of the environmental assessment activities undertaken

in connection with the UN system. The MA serves a role similar to IPCC – it is designed to respond to the needs of a particular user audience (the ecosystem-related conventions) on a particular set of environmental issues; it is intended to provide a summary of the “state of the science" for that audience. In contrast, GEO reports every two years on all aspects of the environment to a broad audience. Just as GEO would turn to the IPCC reports for the “state of the science" on climate, GEO is expected to be able to use the MA findings as a means of enhancing the information that it is able to report on ecosystem-related issues. Similarly, while GIWA includes an assessment of biodiversity in oceans and in transboundary freshwater systems, it is focused on a subset of the overall assessment needs related to ecosystems.