



Fate of the World Redux: Assessing the Millennium Ecosystem Assessment

By Steven F. Hayward

The United Nations' Millennium Ecosystem Assessment (MA), a multiyear project designed to improve our knowledge of global environmental conditions, released several more supplemental volumes in January. It is difficult to get a grip on this substantial report, and people on all points of the environmental spectrum can find something to like and dislike in the MA. The MA strikes familiar notes about resource depletion and potentially terminal environmental degradation, but its inclusion of human resiliency and adaptation suggests that the MA may represent a turning point from old-style Malthusian fatalism.

Several large reports from the UN's Millennium Ecosystem Assessment made one-day headlines last year and then disappeared.¹ The MA, as it is called in UN shorthand, is an immense undertaking, involving the efforts of more than 1,300 scientists around the world, and its first series of reports total more than 2,000 pages. Like the UN Intergovernmental Panel on Climate Change (IPCC), the MA has to grapple with the difficulty of addressing a global issue with myriad dimensions. The January release of the final four volumes from the first phase of the project (bringing the total published so far to twelve, with more on the way in due course) provides a good occasion for an overview.

The MA, which is modeled after the IPCC, is intended to be "policy relevant," as distinct from a scientific review. "The MA did not aim to generate new primary knowledge," the report explains, "but instead sought to add value to existing information by collating, evaluating, summarizing, interpreting, and communicating it in a useful form." This effort at synthesis is well done in several areas, especially when it draws our attention to the problems of water supplies and the unhealthy growth in the nitrogen cycle. But as with any report a large group of authors compose, there is much repetition and

jargon.² The authors have struggled mightily to complement the massive text with user-friendly flow charts, stylized curves, tables, matrices, color maps, and other vivid graphics. But will the MA succeed in being useful to policymakers? Its bulk brings to mind Churchill's quip to an overly verbose civil servant: "This report, by its sheer length, defends itself against the risk of being read." It is doubtful that very many of the scientists and experts associated with the MA have read the entire product.

The tick-like reflex of the old doomsaying themes of conventional environmental thinking distorted much of the media coverage of the initial release of the MA last year, which tended to portray it as a linear successor to the Club of Rome's *The Limits to Growth* report of 1972 or the *Global 2000* report of 1980. The MA disappeared from view almost as quickly as the newspaper ink dried, chiefly because the public is simply tuning out eco-apocalypticism as another example of crying wolf. Both the media coverage and public indifference to the MA were unfair. The Malthusian viewpoint at the core of doomsaying is partially defensible. The twentieth century experienced a nearly four-fold increase in world population—an unprecedented gain whose impact on both the planet's resources and human consciousness was bound to

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be equally large. In fact it is possible to marvel that the impact—and the panicky reaction to it—was not worse than it was. The important point to bear in mind is that the end of the population bomb—which has turned out to be more like a wet firecracker—is in sight. To be sure, world population growth is going to continue for several more decades before likely reversing (perhaps dramatically so), at which point global environmental strains will begin to ease. Looked at from the long-term point of view that the population boom of the twentieth century was a one-time phenomenon based on advances in medicine and agriculture, the environmental stresses that alarmists bemoan begin to look less inexorable.

The larger question is how we manage the transitional period of the next few decades, as the drive to increase living standards for the world's poorest will result in increased consumption of water and other basic resources. There is no doubt that there will be significant environmental stress from this process. Many problems will get worse before they get better.

But whether these stresses come together to produce a global environmental collapse depends on how or if discrete environmental problems are aggregated. Where individual cases of unsustainable resource use can be identified, such as overdraws of groundwater, collapse of fisheries due to overfishing, and net deforestation, an uninterrupted trend will lead to environmental calamities. Most synthetic attempts at summing up individual trends into a macro-model have been wildly wrong in the past, and the new attempts to remedy this problem, such as the very popular “human footprint” models currently in vogue, are rife with methodological problems.³ The MA represents an alternative approach to global environmental assessment that deserves to be considered seriously.

Despite its length, the essence of the MA can be distilled to two main things. The first is the delineation of twenty-four broad “ecosystem services,” including such traditional categories as food and fiber production, genetic biodiversity, land cover, and water and air pollution, but also including “cultural, spiritual and aesthetic” services we enjoy from our ecosystems. The MA attempts to render judgment on the current status of these twenty-four categories and what conditions will be like in the year 2050, with assignment of high, medium, and low certainty. The second main aspect of the MA is four scenarios of how these twenty-four ecosystem services might play out under different institutional and policy regimes. There are strengths and weaknesses in both of these efforts.

Same Old Tune in a New Key?

On the surface, the MA appears susceptible to the criticism that it is merely the latest iteration of the worn-out Malthusian perspective of doom and gloom about our ecological future. The preface contains some familiar-sounding themes, such as the “stark warning” about the future of the planet because “human activity is putting such strain on the natural functions of Earth that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted.”⁴ Other gifts to editorial writers who work in the subjunctive mood include the statement that the planet has “much more red than black on the balance sheet,” and “it is literally a matter of living on borrowed time.” And what global environmental report would be complete without adding that things look bad “unless human attitudes and actions change”? This phrase and its equivalents should be a macro keystroke in environmental word processing programs, if they are not already.⁵

The idea of assessing ecosystems around the world and aggregating them into a global picture, is a worthy and necessary undertaking because it can provide us with the information to set intelligent priorities and a baseline to judge future progress. The effort is fraught with obvious conceptual problems, starting with defining what an ecosystem is. The idea of an ecosystem appeals to a common-sense understanding of environmental problems: Walden Pond might be thought of as the archetypal layman’s ecosystem. An ecosystem can be as small as a single-cell organism that depends on the balance and interplay of proteins and enzymes, but it is also fashionable to think of the Earth as one large ecosystem. The contrast between the single cell and the planet suggests the problem of scale in this kind of inquiry. Even intermediate forms of ecosystems will present difficulties in understanding, such as the oceans, which constitute an ecosystem that nonetheless has remarkable variation: for example, a warm-water coral reef will have different strengths and vulnerabilities than a cold-water kelp bed.

Of the twenty-four “ecosystem services” that the MA sets out to evaluate, fifteen show worsening trends, four show improvement, and the remaining five show no change.⁶ Before looking at these twenty-four indicators more closely, the MA should be contrasted with the Heinz Center’s 2002 report on *The State of the Nation’s Ecosystems*, an ambitious evaluation of ecosystem conditions in the United State alone.⁷ The Heinz Center

report identified 103 indicators of ecosystem condition, noting the lack of data available for establishing trends for over half of the indicators, and declining to make synoptic judgments about overall ecosystem health, or even of the condition of many specific indicators.⁸ This more detailed focus, willingness to let the data sets speak for themselves, and the restraint in making sweeping generalizations contrast markedly with the gloomy conclusions of the MA's summary for policymakers. (The sobriety of the Heinz Center's report also meant that it received even less media coverage than the MA.)

One reason the forthcoming subglobal assessments are necessary is that there will be wide variance in ecosystem condition from one nation or region to the next, depending on all the usual factors. For example, while the MA finds only four improving trends and fifteen deteriorating trends for the globe as a whole, if these indicators were examined just for the United States, it would probably report seventeen improving trends, seven with no change, and none with deteriorating trends. The real value of the MA will come if its supplemental subglobal assessments provide detailed information that allows people and governments on the national and local levels to identify top priority problems.

One difficulty with the MA's assessment of ecosystems on the global scale is the limits or absence of data, which the MA forthrightly acknowledges:

Relatively few ecosystem services have been the focus of research and monitoring and, as a consequence, research findings and data are often inadequate for a detailed global assessment. Moreover, the data and information that are available are generally related to either the characteristics of the ecological system or the characteristics of the social system, not to the all-important interactions between these systems. Finally, the scientific and assessment tools and models available to undertake a cross-scale integrated assessment and to project future changes in ecosystem services are only now being developed.⁹

At this point the lay reader may scratch his head and wonder, just how, then, is the MA reaching these sweeping conclusions and offering projections for the year 2050? Are they just making it up?

In the absence of comprehensive and scalable data on many of the twenty-four individual ecosystem services the MA identifies, the forecasts of the MA rely heavily

on climate change as the primary "driver" of ecosystem changes over the next fifty years. In other words, the MA is susceptible to the criticism that it has become an adjunct to the IPCC—that it is merely a climate change brief in fancy dress. While climate change is a significant factor in future ecosystem dynamics that obviously cannot be left out or shunted aside, the prominence of the issue in the MA assures that the effort will get caught in the undertow of existing climate science and policy controversies.

Not Your Grandfather's Environmentalism

A closer reading of the MA, however, calls to mind Mark Twain's quip that "Wagner's music is better than it sounds." Of course the devil is in the details, but as a general matter the MA is not your grandfather's limits-to-growth environmentalism. There are some notable differences between the MA and *The Limits to Growth* or *Global 2000*. Unlike those previous forecasts that essentially projected current trends in a straight-line fashion and whose margin of error over a much shorter forecasting period that sometimes approached an order of magnitude, the MA does not assume that present trends will continue unchanged into even the near future.

This is where the MA gets interesting and frustrating at the same time. The encouraging aspect of the MA's assumptions and analytical framework is that they are not static, which was the downfall of previous synoptic reports about our eco-future. There is also no misanthropy here: the MA notes that the changes humans have made to ecosystems have improved the lives of billions of people. There is an encouraging emphasis on "reforms that focus on global trade and economic liberalization [that] are used to reshape economies and governance. There is an emphasis on the creation of markets that allow equitable participation and provide equitable access to goods and services. These policies, in combination with large investments in global public health and the improvement of education worldwide, generally succeed in promoting economic expansion and lifting many people out of poverty into an expanding global middle class."

Other glimmers of sound thought include the recognition that the absence of markets plays a large role in environmental degradation, and the MA calls for the wider use of markets and market-like mechanisms (such as "cap and trade") for alleviating environmental

problems. The MA also singles out agricultural subsidies for special criticism, noting that the \$324 billion in subsidies OECD nations spend per year represents one-third of the total value of global agricultural output, which not only exposes shocking waste and inefficient allocation of resources, but also contributes to the unnecessary degradation of land. Along with the criticism of subsidies is a related call for removing trade barriers. There is a welcome emphasis on local knowledge: “Measures to conserve natural resources are more likely to succeed if local communities are given ownership of them, share the benefits, and are involved in decisions.”

There are also sensible acknowledgements of the limits of political or administrative remedies for ecological problems, such as this: “Most of the problems with command and control arise when it is applied to complex, nonlinear systems that show low levels of predictability. Unfortunately, many ecosystems (and most ecological problems) fit this description. Societal recognition of the weaknesses of command and control approaches to natural resource management, and the degree to which the search for alternatives is successful, is a key aspect of the MA scenarios.”¹⁰

Scenarios, Scenarios . . .

The MA’s dominant scenario component is supposed to make up for the gaps in data and incompleteness of our knowledge of ecosystem dynamics. Despite the report’s massive length, the MA’s four scenarios are remarkably unspecific as to either institutional form or policy design. Again, the MA forthrightly draws back from such an ambition: “The MA scenarios were not designed to determine optimal policies for any specific locale, nation, international bloc, or Earth as a whole.” There are no calls for specific international laws, treaties, or protocols like Kyoto, or for any formal institutions like a wistfully imagined World Environment Agency.

The four scenarios have vivid and suggestive titles:

- “Order from Strength,” which represents “a regionalized and fragmented world concerned with security and protection, emphasizing primarily regional markets, and paying little attention to the common good, and with an individualistic attitude toward ecosystem management.” This frankly nationalistic perspective might be thought of colloquially as the “Rumsfeld Way,” and naturally the world’s ecosystems fare worst under this scenario.

- “Global Orchestration,” in which “global economic and social policies are the primary approach to sustainability.” This scenario places emphasis on reducing poverty and inequality, confident that “improved economic well-being will create both the demand for and the means to achieve a well-functioning environment” on an ad hoc basis. “Supra-national institutions are well-placed to deal with global environmental problems.” (This is as close as the MA comes to endorsing a formal institutional approach.) Under this scenario, the MA believes the results for ecosystem services will be mixed.

- “Adapting Mosaic” is something in-between “Order from Strength” and “Global Orchestration,” in which “local and regional management [are] the primary approach to sustainability.” Under this scenario, there is “a lack of faith in global institutions, combined with increased understanding of the importance of resilience and local flexibility lead to approaches that favor experimentation and local control of ecosystem management.” This, the MA judges, will also have mixed results for ecological performance.

- “TechnoGarden,” which sounds more like a 1980s heavy-metal band than an eco-governance scenario, emphasizes the dispersion of technological approaches to ecological problems. The MA casts a skeptical eye at the promise of technology, seeing it as less resilient than other approaches, with more vulnerability to surprises.

None of these scenarios is presented as mutually exclusive of the others (except perhaps “Order from Strength”), and the MA explicitly says the future might involve some mixing of elements from each. Which leaves readers and policymakers exactly where?

Although the MA offers projections of ecosystem outcomes in the year 2050 based on each scenario, these scenarios are driven less by rigorous models than by narrative imagination. All the scenarios—except the “Rumsfeld Way”—seem to indulge in the synoptic fallacy that the interconnections of environmental factors cannot only be understood but also rationally controlled if only we had the raised consciousness, the “will,” and the institutions to do so.¹¹

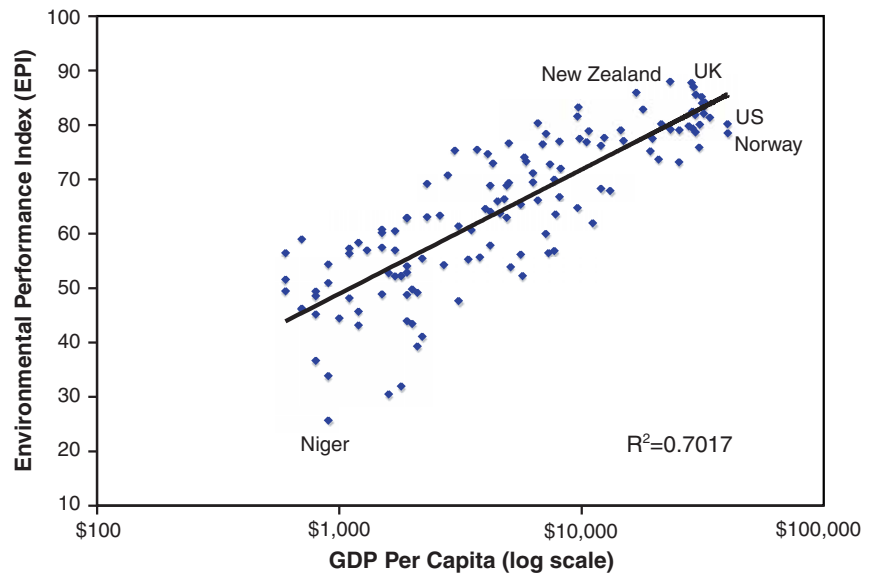
As mentioned at the outset, the MA has attracted little attention and even less controversy, which on the surface is surprising since the MA is potentially more all-encompassing in its political and policy implications than the IPCC's periodic climate reports. The difference is that the IPCC effort is connected to an actual policy dispute—greenhouse gas emission caps and the Kyoto process— involving large economic costs. By comparison the MA is merely an intellectual exercise. The MA's restraint and reticence about calling for specific institutional and policy strategies is ironically its undoing; a more specific policy document would have attracted more attention—and criticism.

Instead, the MA is likely to collect dust on a shelf alongside *The Limits to Growth* and *Global 2000*. Perhaps what it really needed was a good editor.

This makes one wonder whether the outcome of the MA is commensurate with the massive effort—not to mention paper—put into it. But perhaps attempting to marry scientific assessment of ecosystem conditions under conditions of limited data with a scenario exercise is destined to be an exercise in futility. A potentially more usable framework for evaluating our capacity for managing environmental problems on a global scale is the *Pilot 2006 Environmental Performance Index* (EPI), produced by the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network (CIESIN) at Columbia University.¹² The EPI is the successor to the *Environmental Sustainability Index* that the Yale/CIESIN consortium has been producing for the World Economic Forum for several years, and it contains a number of refinements of the previous methodology.

In contrast to the MA or the various “ecological footprint” models that attempt to aggregate global environmental conditions, the EPI tries to provide objective metrics of environmental performance on a country-by-country basis. As the authors describe it: “The EPI focuses on current on-the-ground outcomes across a core set of environmental issues tracked

FIGURE 1
Relationship of 2006 EPI and GDP Per Capita



SOURCE: *Pilot 2006 Environmental Performance Index*

through 16 indicators in six policy categories for which all governments are being held accountable.” Under this framework, New Zealand received the top mark on the EPI rankings, with a composite score of 88; the United States was ranked twenty-eighth, with a score of 78.5, just ahead of Cyprus and just behind the Netherlands. (The EPI ranks 133 countries in all.)

Perhaps the most significant finding of this revised methodology by the Yale/CIESIN team is the more robust correlation between wealth and environmental performance, which is displayed in figure 1. The curve showing the relationship between the EPI score and per-capita income is much steeper than the curve generated by the same comparison under the previous Yale/CIESIN *Environmental Sustainability Index*.

The EPI's framework and findings are not incompatible with the MA, but it is a much simpler, shorter, and more user-friendly document. It allows us to make year-over-year judgments of the all-important question of whether our institutions and policies are adapting to the unfolding challenges of environmental protection, even as we work on building up our monitoring capabilities and understanding of how complex ecosystems work on all scales. If you think of the MA and the EPI as ecosystems themselves, there is little doubt which model is more sustainable.

AEI editor Scott R. Palmer worked with Mr. Hayward to edit and produce this Environmental Policy Outlook.

Notes

1. Millennium Ecosystem Assessment, *Living beyond Our Means: Natural Assets and Human Well-Being* (New York: Millennium Ecosystem Assessment, 2006), available at <http://www.millenniumassessment.org/en/index.aspx>.

2. A random example, from page 453 of “Scenario Analysis”: “Examples of deep uncertainties are nonlinear responses of complex systems, emerging properties and path-dependencies, and generally unpredictable behavior that emerges due to branching points, bifurcations, and complex temporal and spatial dynamics.”

3. See, for example, the Global Footprint Network website at <http://www.footprintnetwork.org/index.php>. For a review of this issue, see Steven F. Hayward, “Sustainable Development in the Balance,” *Environmental Policy Outlook* (September–October 2002), available at www.aei.org/publication14200/.

4. The four main findings are summarized as follows:

“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.

“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.

“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.

“The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA has considered but these 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 tradeoffs or that provide positive synergies with other ecosystem services.” Millennium Ecosystem Assessment, “Experts Say that Attention to

Ecosystem Services Is Needed to Achieve Global Development Goals,” news release accompanying the synthesis report, March 30, 2005.

5. An example of the long pedigree of this kind of environmental unctuousness can be found in Fairfield Osborn’s 1949 book *Our Plundered Planet*, in which Osborn warned “Do we need another catastrophic warning from nature to stir us to further action, or can we not now accept the many evidences of approaching crisis and take steps to ward it off?” Fairfield Osborn, *Our Plundered Planet* (Boston: Little and Brown, 1949), 199.

6. The twenty-four ecosystem services are: food and fiber (broken down into eight subcategories), genetic resources, biochemicals, water, air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation, spiritual and religious values, aesthetic values, and recreation/ecotourism.

7. For a review of the Heinz Center report, see Steven F. Hayward, “The State of the Nations Ecosystems: A Review,” *Environmental Policy Outlook* (November 2002), available at www.aei.org/publication14447/.

8. The MA’s synopsis report also acknowledges data gaps: “Many research needs and information gaps were identified in this assessment, and actions to address those needs could yield substantial benefits in the form of improved information for policy and action” (39).

9. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Scenarios*, vol. 2 (New York: Millennium Ecosystem Assessment, 2006), xvi.

10. *Ibid.*, 60.

11. Jared Diamond’s new book *Collapse*, for example, concludes with several decontextualized paeans about having “the courage to practice long-term thinking, and to make bold, courageous, anticipatory decisions at a time when problems become perceptible but before they have reached crisis proportions” and “the courage to make painful decisions about values.” This is not very helpful. Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York: Viking Books, 2004), 522–523.

12. Yale Center for Environmental Law and Policy and Columbia University’s Center for International Earth Science Information Network, *Pilot 2006 Environmental Performance Index* (New Haven, CT: Yale Center for Environmental Law and Policy, 2006), available at <http://www.yale.edu/epi/>.