

led to a reduction in ship strike mortalities. The risk of fishing gear entanglement has been addressed by selective area closures and gear modifications (9). These closures do not adequately encompass the seasonal movements of right whales, and gear modifications implemented thus far have not reduced entanglement rates. Eight dead right whales in the past 16 months provide clear evidence that management efforts have been woefully inadequate, and much stronger measures are needed to reverse the right whale's decline.

Accordingly, we urge immediate changes to the management of right whales, focusing on reducing human-induced mortality. Some of the following recommendations will also benefit other marine species that face similar threats, such as the endangered leatherback sea turtle (*Dermochelys coriacea*) (10). First, emergency measures should be implemented to reduce speeds and reroute commercial and military ships as recommended in the NOAA Fisheries Advanced Notice of Proposed Rule-Making

(11). Second, the amount of fixed fishing gear in the water column should be eliminated or minimized. There are many steps that could be taken to do this, including (i) mandating changes in the pot-fishing industry (lobster, crab, hagfish, etc.) that will reduce gear in the water; (ii) requiring use of alternative rope types (e.g., sinking ground lines) to minimize entanglement deaths; (iii) developing and implementing fishing methods that do not use vertical lines attached to surface buoys; and (iv) developing a fast-track process for permitting and experimenting with conservation-focused fishing gear modifications and implementation. This means streamlining the current rule-making and National Environmental Policy Act (NEPA) process for right whale research and gear modifications, which now takes years.

Given the slow speed of the regulatory process, interim emergency measures to reduce shipping and fishing mortality in right whales should be implemented immediately. Delays in implementation would be

ignoring both scientific and legal mandates and could consign North Atlantic right whales to extinction.

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#### SUSTAINABILITY

# Millennium Assessment of Human Behavior

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**A** growing scientific consensus says that global society is under increasing threat from the impact of human activities: Climate change, loss of biological diversity and ecosystem services, and changes in patterns of land use and land cover are among the more troublesome problems (1–3). Some of these problems require attention from governments and other social institutions. But it is the collective actions of individuals that lie at the heart of the dilemma. Analysis of individual motives and values should be critical to a solution. Yet society has no prominent international forum in which such issues (like how we should treat our environment and each other) are publicly discussed.

In some countries, quite different views have surfaced recently about the ethics of governmental restrictions on the rights of landowners designed to protect endangered species and about legal provisions that permit “open space” set-asides of long duration. Even in nations with cultures as similar

as those of the United States and the United Kingdom, issues of land care, debates over related subsidies, and the responsibilities of private citizens versus their governments can take very different shapes. In approaching sustainability, one needs to determine how the rights of people in the current generation to consume natural capital should be balanced against the rights of future generations. Preservation of animal life and the ethics of various kinds of human interference with “natural” systems are viewed differently by those whose cultural traditions differ. The steps that most members of the relevant scientific community believe are necessary (e.g., reduction of human-caused greenhouse gas emissions, establishment of marine reserves, limiting human population growth and per capita consumption) are disconnected from those measures the rest of society, and especially politicians, are willing to undertake.

We propose to promote the establishment of an ongoing global discussion of key ethical issues related to the human predicament—a Millennium Assessment of Human Behavior (MAHB). The time seems ripe, with the experience gained from the Intergovernmental Panel on Climate Change (IPCC) and the Millennium

Ecosystem Assessment (MEA), to start discussing what to do. In the IPCC and the MEA, sociopolitical issues and policy changes that might lessen the chances of catastrophic consequences are considered. But we need an institution to conduct an ongoing examination and public airing of what is known about how human cultures (especially their ethics) evolve, and about what kinds of changes might permit transition to an ecologically sustainable, peaceful, and equitable global society.

Such a process could begin by asking behavioral scientists and laypeople to explore how their own values relate to environmental sustainability and to ask themselves whether their values, if shared by 6.4 billion people, would really lead to the sort of world they want for their descendants. Citizens of the rich nations should ask themselves whether their “way of life” should really be, as the first President Bush once said to Americans, “not negotiable” (4). They need to discuss possible lifestyle changes in a framework not limited merely to what is possible for citizens of powerful nations, but enlarged to evaluate what is ethical with respect to a more global view of needs and opportunities.

The MAHB could consist of an ongoing series of open, transparent forums. The MAHB could be modeled on the IPCC but would be focused mainly in the social sciences. It would include a deeper consideration of the ethical dimensions of how we treat each other and our life-support systems. It would also involve broader participation than the IPCC, encourage the involvement of politicians, and focus on public outreach at

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nontechnical levels. Because knowledge of public opinions and attitudes will be essential, such communication devices as deliberative polling (5) would be built in from the start. What we are asking for is a cultural change; we know that cultures evolve, and our hope is that the very process of debate will speed that process and encourage change in a positive direction.

The MAHB will need to establish working groups to cover particular segments of the broad agenda. They could include exploration of (i) what social scientists and others know about mechanisms of cultural evolution and how changes in direction might be steered democratically; (ii) how scarce and unevenly distributed nonrenewable resources are used and some of the ethical connections between distribution, economic opportunity, and access; (iii) ethical issues related to the world trade system; (iv) conflicts between individual reproductive desires and environmental goals; and (v) economic, racial, and gender inequity as contributors to environmental deterioration.

War, national and international governance, and health maintenance and care are other topics that would clearly require intensive discussion. Certainly many such topics have been under consideration in various forums, including the World Bank and the United Nations. But they have not been addressed in the context of the entire spectrum of the human predicament in a “broadened IPCC” kind of effort.

One central task would be to integrate the results of the working groups on a continuous basis and to make recommendations for action. The MAHB might, for example, help generate public support for mechanisms to constrain corporate power under certain circumstances. Large-scale private activity may be part of the solution, but many analysts think that some limitation is crucial (6, 7).

That open forums and face-to-face negotiation in working groups can produce positive change is clear from many examples. The Montreal Ozone Protocol was put together through the cooperation of representatives of the academic scientific community, government laboratories, and industry (8), interacting with corporate decision-makers and politicians. The resulting agreements marked a major change in attitude on the part of governments and even of the manufacturers of ozone-depleting substances. There are other examples on a somewhat smaller scale. In the United States these include establishment of marine protected areas (9); development of the Sierra Forest Plan (10, 11); the Forest Stewardship Council’s negotiations with timber companies that led to more sustainable harvesting (12); and the negotiations resulting in

Habitat Conservation Plans in which environmental advocates and developers have reached accord (13). The literature on mediation and alternative dispute resolution should also be explored.

Diamond (14) has listed several possible causes of “collapse” of past societies. He

**“...our hope is that the very process of debate will ... encourage change in a positive direction.”**

cites cases in which decisions were rooted in maladaptive cultural tradition or an unwillingness to count the clearly measurable costs of their actions. However, other peoples have created stable, sustainable societies under equally unfavorable conditions (15). Modern literature (16) has revised the discouraging message of the “Tragedy of the Commons” by demonstrating how even primitive societies can organize fair and sustainable rules for extracting common-pool resources.

Much of the MAHB program will have to focus on the way in which people make decisions about resource allocation and risk. The discipline of “rational-choice” economics, in which people are expected to make choices in ways predicted by the mathematics of self-interest, has been challenged by data demonstrating anomalies and contradictions (17, 18). We also need more information about the circumstances under which groups come together to form alliances and develop loyalty to them. The growing literature on religious organizations, clubs, and associations [for example (19, 20)] suggests that changing social circumstances influence the degree to which individuals make common cause.

There is much more to learn about behaviors, relationships between individual and societal goals, and institutional arrangements that lead to success or to failure. That will require active participation from groups with different traditions that often do not communicate. The professional societies and community of ecologists are already doing more than most, and we hope that other academic disciplines will do more. Part of the problem is that the disciplines have been historically segregated in universities, and only a few institutions are encouraging interdisciplinary engagement. The MAHB could help by stimulating regular symposia and panel discussions that link different specialties. One subject would be the ethics of time and task allocation by scholars in a world facing increasingly serious problems.

This effort will require support from a variety of sectors. Once an idea gathers

interest, the natural starting-points for implementation are the major elements of civic society—in particular, nongovernmental organizations (including scientific and other professional societies), foundations, and other philanthropic entities. The growing international network of funders and civic organizations will need to be involved in the first phase. The United Nations, the World Bank, and other international transgovernment institutions would be natural candidates. Eventually, governments will have to be the decision-makers.

In this and other respects, the MAHB courts criticism for naïveté. But that charge, often levied against new ideas, has been overcome in the past. The goal is too important to be set aside as politically infeasible.

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