

The state of the planet

More than 2,000 experts will be involved in a four-year effort to survey the health of the world's ecosystems and threats posed by human activities. Virginia Gewin profiles the Millennium Ecosystem Assessment.

In March last year, Harold Mooney scribbled a flow chart on a napkin as he and Walter Reid sat in a Montreal bar. The magnitude of the task they had embarked on was really starting to sink in.

Instead of evaluating how ecosystems respond to just one environmental concern, such as climate change, they were talking about providing a complete planetary health check, determining the impacts of changes in land use, loss of biodiversity, the application of agricultural fertilizers, and many other factors — a truly colossal endeavour.

Reid, formerly a zoologist with the World Resources Institute (WRI) in Washington DC, and Mooney, an ecologist at Stanford University in California, are now executive director and assessment-panel co-chair, respectively, of the Millennium Ecosystem Assessment (MEA). This is a US\$21-million, four-year effort to determine the state of the Earth's ecosystems that will seek input from more than 2,000 leading natural and social scientists. Its financial backers include

the David and Lucile Packard Foundation, the United Nations' Global Environment Facility, media mogul Ted Turner's UN Foundation, and the World Bank.

Reid first conceived the project as a proposal for one of the biennial reports on the environment compiled by the WRI, together with the UN Development Programme,



Groundwork: satellite images will reveal deforestation and other changes in land use.

the UN Environment Programme (UNEP) and the World Bank. The result was the Pilot Analysis of Global Ecosystems (PAGE), which provided the technical underpinning for the *World Resources 2000–01* report, released in June last year. PAGE, which involved 500 contributors, concluded that the capacity of ecosystems to meet human needs for food and clean water is diminishing, and warned of threats to biodiversity and human health.

Need to know

But Reid's brainchild had by then outgrown the scope of a WRI report, and in July 2001 the MEA was launched. Ecologists and policy-makers had been murmuring about the need for a comprehensive planetary health survey for some time. With 60% of the world's major fisheries being overfished, some 14 million hectares of forest disappearing each year, and habitats from wetlands to coral reefs under threat, credible guidance on how to manage these resources is invaluable.

Ecosystems are often managed to obtain one product or service, often at the expense of others. For example, increasing the food sup-

ply can entail converting forest to agriculture, which can reduce biodiversity and the supply of timber and clean water. But no one has previously tried to work out how all of these conflicting pressures interact. "The trade-offs and interactions are crucial," says Mooney.

Crucial, but also fiendishly complicated. Arguments about how to deal with scientific uncertainties have dogged the Intergovernmental Panel on Climate Change (IPCC), often cited as a model for the MEA. But in some respects, the climate panel had it easy. Baseline data on the oceans and atmosphere are reasonably good, as are the global circulation models used to examine how the climate system will respond to different atmospheric levels of greenhouse gases.

The MEA enjoys no such luxury. In many cases, data on ecosystems are sketchy, and models of how human activities affect hydrology, biogeochemistry and biodiversity are not so well developed. Even tougher is trying to determine how changes in ecosystems will influence human well-being. "This is about five times as big as the IPCC," concludes Prabhu Pingali, an economist at CIMMYT, the International Maize and Wheat Improvement Center in Texcoco, Mexico, and co-chair of the MEA's Scenarios Working Group.

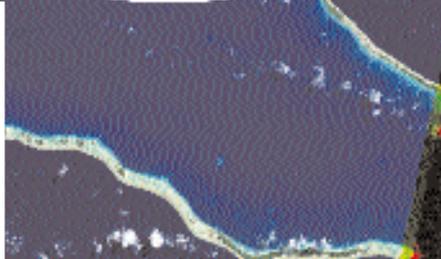
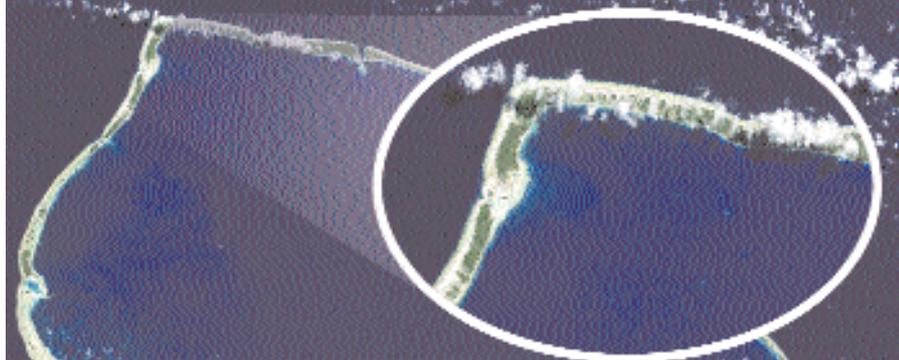
C. REID



Walter Reid is now the assessment's director.

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All at sea: overfishing and coral bleaching threaten the health of marine ecosystems.

Having established its secretariat at ICLARM, the World Fish Center in Penang, Malaysia, in January this year, the MEA is now gathering existing data on ecosystems and the services they provide — such as food, water purification, nutrient cycling and income from tourism. Volunteer scientists are creating a baseline data set that will detail the condition and geographical extent of the world's terrestrial, marine and freshwater ecosystems.

They will have to trawl far and wide. Remote-sensing data will come from donated or public sources. The US government, for instance, has made land-use data from a variety of satellite projects available to the MEA. Smaller research projects, national governments and organizations such as the UN Food and Agriculture Organization (FAO) and the World Conservation Union also possess vital data on demography, biodiversity and agriculture. Any relevant peer-reviewed science will be thrown into the mix. Data on road networks — a key factor in environmental degradation — will also be crucial.

Like the IPCC, the MEA will seek to forecast potential outcomes for a variety of scenarios. Pingali's group is currently working on as many as four story-lines. Narrowing down the range of predictions — optimistic, pessimistic and variations in between — is no small task. Pingali and his colleagues must first identify plausible scenarios for demographic, technological, economic and social changes. They will then use this information to forecast changes in pollution, land use and other key variables.

The task facing Harold Mooney is immense.

The parallels with the IPCC are legion: not only has the MEA followed the climate panel's division into specialist working groups, it has also snared Robert Watson, who until last month was chair of the IPCC, to serve as co-chair of the 40-member board that oversees the MEA's work. Watson, the World Bank's chief scientist, is widely credited with facilitating the scientific consensus on climate change that emerged in the IPCC's reports. "It is important to show a range of views, not just one view," he says. "You must explicitly say what is known and what is not known."

Avoiding meltdown

Defining where science ends and policy begins will be difficult. The MEA aims to detail the likely implications of different policy options, but its leaders want to avoid any perception that they are urging the adoption of specific policies. This is wise, agrees William Clark, a Harvard University ecologist who leads the Global Ecosystem Assessment, an effort to determine how the MEA and smaller assessments can be most effective. "It's when science tells policy-makers what to do that you have a meltdown," he says.

The IPCC's success shows that it is possible to get the balance right. But the MEA differs from the climate panel in one important respect: whereas governments asked scientists to form the IPCC, the MEA is a grassroots initiative from scientists who saw a need to fill the world's ecological data gaps.

Reid is aware of the difficulty of getting governments to pay attention to reports that they haven't commissioned. In March 1992, he attended a preparatory meeting in New York for the UN Conference on Environment and Development, held in Rio de Janeiro later that year. At that meeting, Wen Lian Ting, Malaysia's representative to the FAO and UNEP, rallied developing nations against the Global Biodiversity Assessment (GBA), a biodiversity inventory proposed by scientists and UNEP to provide support to negotiations

for the UN Convention on Biological Diversity (CBD). As countries preparing to sign the convention, which was launched in Rio, had not specifically requested the GBA, Ting viewed it as another example of the rich North telling the developing South how to use its resources.

The scientists involved in the GBA completed their work anyway — but the hostility stirred up by Ting ensured that its report has remained a reference work, rather than a genuine contribution to the political process. "I don't think any of the scientists really understood how significant it was that governments didn't accept the GBA," says Reid.

Having learned this lesson, the MEA's leaders have worked hard to win political legitimacy, seeking authorization from relevant international conventions. Signatories to the CBD, the Convention to Combat Desertification and the Ramsar Convention on Wetlands have each endorsed the MEA. Following a request from the CDB, the MEA will include specific chapters on biodiversity.

Questions and suggestions

Reid says that Ting kept popping up in his thoughts, causing him to ask: "What would it take for her to accept it?" With this in mind, MEA officials have courted individual governments, listening to their suggestions. They have also made the project more attractive to governments by conducting local assessments alongside the global effort. Six of these 'subglobal' assessments — for western China, Norway, Sweden, India, southern Africa and Papua New Guinea — are already scheduled. Most are bankrolled by the countries involved, but the MEA offers seed funds for surveys in developing nations, and the Papua study is funded by the UN Development Programme. More subglobal assessments may be added, as long as they follow technical guidelines and engage target users.

Industry has also been involved in the MEA's consultations, and its board includes Anthony Burgmans, chief executive of the Anglo-Dutch consumer-products manufacturer Unilever. "For this to work it has to have a broad acceptance in society," he says.

Whether the MEA will work will not be known for several years. Its success will be judged on whether it can gain the high credibility enjoyed by the IPCC and become the *de facto* scientific advisory body for the conventions that have endorsed its work.

For the time being, the reactions of the key players to the MEA's progress are positive. "The MEA is a timely and worthwhile exercise which needs the support of all who demand a fair, honest and constructive appraisal of the state of our natural resources," says Ting. Coming from a self-proclaimed sceptic who has shown that she can make or break such efforts, that is a significant endorsement. ■

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