Response

Berman's letter represents a difference of opinion that is no less valid than my own. But, perhaps, that difference is more in the shading than in the lines. Given that we both agree that the book's subtitle is a misnomer, I may, perhaps, be forgiven for not having noticed that the book, sent to me for review by *Science*, is supposed to be more about people than science.

The only point in Berman's letter with which I cannot agree, is that solar energy can be delivered at no charge to the user. Were this so, there would be no need for Perlin to have emphasized the role of so many "marketers" for whom, incidentally, I have more appreciation than Berman gives me credit.

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Social "Mentalizing" Abilities in Mental Patients

In their review article "Interacting minds—A biological basis," Chris Frith and Uta Frith postulate that so-called "mind-blindness," an inability to conceive others' mental states (or "mentalize"), is a central feature of both autism and schizophrenia and, as such, is associated with demonstrably impaired function in the medial prefrontal cortex and posterior superior temporal sulcus (*Science*'s Compass, 26 Nov., p. 1692). But one also sees the opposite of this in clinical practice, individuals with social and mentalizing abilities that are strikingly spared—or heightened—especially in contrast to a gross impairment of other capacities. This is not uncommon, for example, in some demented patients, who may preserve all of their previous social insight and sensitivity until very late in their illnesses; and in individuals with Williams syndrome, who tend to show extraordinary social precocity and acuteness despite being severely impaired in other cognitive areas. One wonders whether such individuals, in contrast to the individuals discussed by the Friths, show preserved or heightened activity in the medial prefrontal cortex and superior temporal sulcus?

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Response

In our article we tried to be more cautious than Sacks suggests. Although we believe that a problem with mentalizing is a feature of autism and schizophrenia, we are not yet convinced that this is the central feature, and we await further evidence about the impaired brain function that underlies the problem. Sacks makes the interesting point that patients can be found in whom mentalizing is preserved when other abilities have been lost. This is further evidence for the idea that mentalizing depends on a relatively circumscribed brain system that can remain intact when other parts of the brain are damaged. Additional evidence for the independence of mentalizing from other abilities comes from a study by Francesca Happé (*1*) showing that mentalizing ability continues to increase in old age at a time when other abilities tend to decline.

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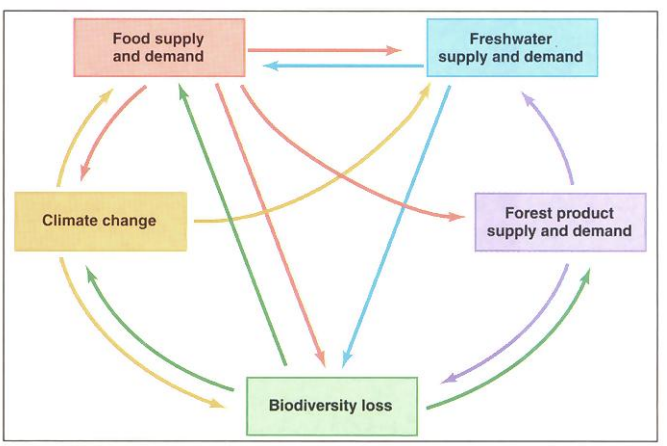
References
1. F. Happé *et al.*, *Dev. Psychol.* **34**, 358 (1998).

Biosphere Management: Some Tools of the Trade

In their Policy Forum "International ecosystem assessment" (*Science*'s Compass, 22 Oct., p. 685), Edward Ayensu *et al.* point out that future human welfare requires an integrated, predictive, and adaptive approach to ecosystem management, and they identify the types of information needed to support such an approach.

In response to these imperatives, Ayensu *et al.* call for a worldwide ecosystem assessment that might cost $5 million to $20 million, occupy 3 to 4 years, and be repeated at 5- or 10-year intervals. This assessment would build on other international activities and would ultimately be complemented by detailed local monitoring and assessment.



The linkages between various ecosystem goods and services must be taken into account in ecosystem assessment and management.

CREDIT: MODIFIED FROM R. T. WATSON *ET AL.*, *PROTECTING OUR PLANET—SECURING OUR FUTURE* (U.N. ENVIRONMENT PROGAMME, NASA, AND WORLD BANK, WASHINGTON, DC, 1998)

The authors identify two requirements: a new approach to ecosystem management, and development of an information base to support that approach. However, their proposed international assessment may not be the best long-term enterprise for meeting those needs. A more appropriate enterprise might be one that is ongoing and draws upon contributions from many more institutions and individuals.

The major obstacle to sustainable management of the biosphere is a lack of broad-based public understanding and political will. To build the necessary public understanding, biosphere management tools such as ecosystem assessment should invite the participation of numerous stakeholders. This would complicate the provision of peer review and quality control, but those functions would also be difficult to perform in the assessment proposed by Ayensu *et al.* Techniques such as the tagging of data with information about its originator could perhaps be helpful in this respect. Also helpful could be a worldwide consensus on a comprehensive conceptual architecture for ecosystem information.

Over time, ecosystem assessment at global and local scales could become a function that is routinely performed by a host of institutions as one of their normal functions. This arrangement could harness vast human and institutional resources to the assessment task, while building public understanding and political will. The assessment proposed by Ayensu *et al.* could, if properly designed, lay the groundwork for that arrangement.

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Response

We agree with Thompson's suggestion that ecosystem assessments should be ongoing and must invite the participation of numerous stakeholders. We believe, however, that an international process repeated at 5- to 10-year intervals, which would include catalytic local, national, and regional ecosystem assessments as we suggested, could be the most effective way to stimulate ongoing assessments at multiple scales. An international assessment can demonstrate the utility of the integrated approach, develop and test methodologies that could be used at multiple scales, and build the capacity to undertake such ongoing assessments at local and national scales. Stakeholder participation does complicate the provision of quality control, but as Thompson notes, this

is not an insurmountable obstacle and, indeed, the involvement of stakeholders, particularly at the local scale, is essential. Even so, important elements of the assessment can and should be subjected to traditional peer review as part of a broader strategy to ensure the integrity and credibility of the findings.

E. Ayensu, D. van R. Claasen, M. Collins, A. Dearing, L. Fresco, M. Gadgil, H. Gitay, G. Glaser, C. Juma, J. Krebs, R. Lenton, J. Lubchenco, J. A. McNeely, H. A. Mooney, P. Pinstrup-Andersen, M. Ramos, P. Raven, W. V. Reid,* C. Samper, J. Sarukhán, P. Schei, J. G. Tundisi, R. T. Watson, Xu Guanhua, A. H. Zakri

The authors are members of a Steering Committee exploring the merits of launching a Millennium Assessment of the World's Ecosystems.

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Ayensu *et al.*'s Policy Forum is right on the mark. A critical inclusion is consideration of resources essential to buffering vital life-supporting conditions for our species.

I have described a resource buffer theory: For every resource essential to a life form where a very small proportion is directly used for life processes of individuals, the vast remaining proportion of the resource is indispensable to maintain conditions under which the population as a whole can survive (*1*). For instance, although we need only about 1.5 or 2 liters of water per person per day to stay alive, the total human population needs the balance of the water resources in the atmosphere, oceans, ice, wetlands, and aquatic systems to buffer exigencies. These masses of water provide crucial functions by absorbing and redistributing energy and waste products from life forms; by shielding us against the atmosphere's fluctuations in gaseous content; and by transportation of and provision of conversion sites for nutrients. If such resources are despoiled, conditions for human life will inevitably deteriorate—my 1.5 to 2 liters of water won't save me.

Other resources that are disproportionately distributed in this manner include the atmosphere, oxygen, space, carbon, and even biodiversity itself. This broader view of the role of the "unused" portion of the resources critical to our continued existence must be included in the percentages of resource use, as Ayensu *et al.* suggest. International ecosystem assessment must include buffer reserves so that natural-resource policies recognize their role; accounting for resource buffers will substantially reduce the carrying capacity of the planet. Because we do not know specific quantities that constitute a sufficient buffer, policies must reflect and be built on the natural distribution and use of the world's resources.

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CORRECTIONS AND CLARIFICATIONS

As described in the report "Identification of a mating type–like locus in the asexual pathogenic yeast *Candida albicans*" by C. M. Hull and A. D. Johnson (20 Aug., p. 1271), the *C. albicans* **a**1 sequence trace (330 base pairs) used in this work was obtained from the Stanford *C. albicans* Sequencing Project. The proper citation should have read, "Sequence data for *C. albicans* was obtained from the Stanford DNA sequencing and Technology Center website at http://www-sequence.stanford.edu/group/candida. Sequencing of *C. albicans* was accomplished with the support of the National Institute of Dental and Craniofacial Research and Burroughs Wellcome Fund." The authors apologize for this oversight.