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Article in *Science* · September 2009

DOI: 10.1126/science.1175035

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# Biodiversity Conservation and the Millennium Development Goals

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The Millennium Development Goals (MDGs) are designed to inspire efforts to improve people's lives by, among other priorities, halving extreme poverty by 2015 (1). Analogously, concern about global decline in biodiversity and degradation of ecosystem services (2) gave rise in 1992 to the Convention on Biological Diversity (CBD). The CBD target "to achieve by 2010 a significant reduction of the current rate of biodiversity loss" was incorporated into the MDGs in 2002. Our lack of progress toward the 2010 target (3, 4) could undermine achievement of the MDGs and poverty reduction in the long term. With increasing global challenges, such as population growth, climate change, and overconsumption of ecosystem services, we need further integration of the poverty alleviation and biodiversity conservation agendas.

The links between poverty and the environment are, unsurprisingly, complex (5, 6) (Fig. 1). Some attempts have been made to identify a relation between development and biodiversity, but these have yielded mixed results (5). Action is urgently needed to identify and quantify the links between biodiversity and ecosystem services on the one hand, and poverty reduction on the other, while taking into account the global, regional, and local drivers of biodiversity loss in poor areas.

Tackling the root causes of both biodiversity loss and poverty can lead to complementary positive results. For example, reducing population pressure by promoting voluntary reductions in fertility in impoverished regions could support conservation of biodiversity and faster poverty alleviation (7). However, there

may be complex trade-offs, especially in the short term. Trade liberalization, for instance, might increase the supply of food commodities and could reduce prices in food-importing countries, which would remove some pressure on these countries' natural habitats. But reductions in trade barriers might also lead to increased production in food-exporting countries where commercial agriculture could increase vulnerability to deforestation, pests, diseases, and/or natural disasters, and might reduce the availability of ecosystem services (8, 9). Nevertheless, countervailing efforts to maintain biodiversity must be sensitive to human needs if they are to retain public support (10).

The scientific and development policy communities should focus on jointly articulating and addressing the critical research questions that, when answered, will help ensure that poverty alleviation and conservation efforts produce win-win outcomes, or at least minimize harm to either agenda. To ensure greater synergies, we suggest the following actions. Attention must focus on constructing and meeting a new biodiversity target for the remaining MDG period and beyond. The next target should be more specific, similarly time-limited, reasonably achievable, and should address the consequences of biodiversity loss globally and for the most vulnerable people and societies.

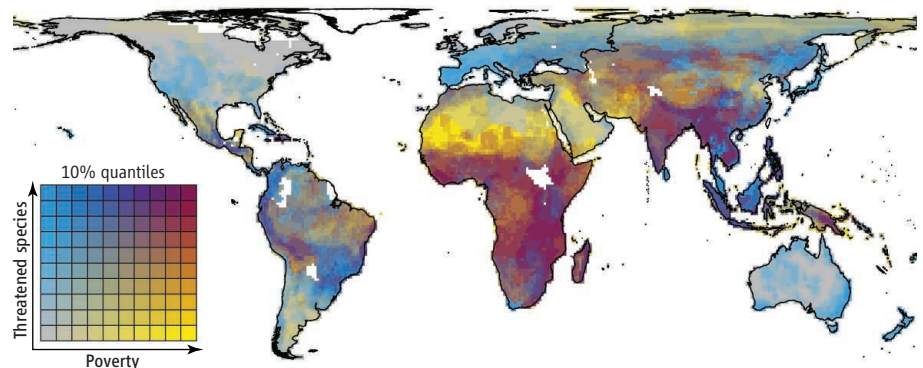
Any near-term gains in reducing extreme poverty will be maintained only if environmental sustainability is also achieved.

It should be supported by a small set of indicators (11) that measure trends in the state of biodiversity and ecosystem services, drivers of biodiversity loss and activities to safeguard biodiversity.

We need evidence-based interventions that can address both poverty reduction and environmental sustainability. In agriculture, for instance, we can use existing land more efficiently; we can pursue development that protects or enhances biodiversity; and we can improve productivity in ways that maintain ecosystem services, through institutional changes to secure better access to seeds, markets, and expertise, combined with adaptive applications of technologies (12). Similarly, finance and technology for adaptation, disaster management, and reduced emissions from deforestation and forest degradation (13) are particularly important in helping developing countries deal with climate change.

Future projects should explicitly monitor the impact poverty alleviation efforts have on ecosystems and their services; similarly, conservationists must better document the impact their interventions have on the poor. Ideally, interdisciplinary science that helps to identify the most cost-effective solutions will ensure that future environment and development projects are implemented, not just simultaneously, but in an integrated fashion.

Poverty alleviation and biodiversity agendas need to be jointly presented to policymakers. Establishment of a proposed Intergovernmental Platform on Biodiversity and Ecosystem Services to complement the existing Intergovernmental Panel on Climate



**Fig. 1.** Map of poverty and potential biodiversity loss, showing the level of poverty (proxied by the log rate of human infant mortality) combined with the log number of threatened species of mammals, birds, and amphibians per one-degree grid square (Behrmann equal-area projection). White areas represent missing data. Data from (14) and (15).

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Change may provide a means to enhance the quality and timeliness of the interactions between scientists and policy-makers at national scales and above. The GLOBE International Commission on Land Use Change and Ecosystems, made up of senior legislators from the G8+5 and several developing countries, provides another opportunity to bring policy-makers and scientists together. Similar initiatives will also be needed at the subnational scale.

The United Nations will convene a summit in 2010 to consider the second 5-year review of the MDGs and to catalyze action ahead of the 2015 MDG target year. We must

advise policy-makers and civil society organizations on the most critical initiatives needed to achieve the MDGs while preserving biodiversity and ecosystem services.

#### References and Notes

1. U.N. Millennium Project, *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals* (Earthscan, New York, 2005).
2. G. M. Mace, H. Masundire, J. E. M. Baillie, in *Ecosystems and Human Well-Being: Current State and Trends: Findings of the Condition and Trends Working Group* (Millennium Ecosystem Assessment Series, Island Press, Washington, DC, vol. 1, 2005), chap. 4.
3. B. Collen *et al.*, *Conserv. Biol.* **23**, 317 (2009).
4. G. M. Mace, J. E. M. Baillie, *Conserv. Biol.* **21**, 1406 (2007).
5. S. Dasgupta, B. Laplante, H. Wang, D. Wheeler, *J. Econ. Perspect.* **16**, 147 (2002).
6. P. Dasgupta, in *Handbook of Environmental Economics:*

*Environmental Degradation and Institutional Responses*, K.-G. Maler, J. R. Vincent, Eds. (Elsevier, London, 2003), pp. 192–240.

7. M. Q. Dao, *J. Stud. Econ. Econometr.* **32**, 47 (2008).
8. J. D. Sachs, *The End of Poverty: Economic Possibilities for Our Time* (Penguin, New York, 2005).
9. R. E. Green, S. J. Cornell, P. W. Scharlemann, A. Balmford, *Science* **307**, 550 (2005).
10. W. M. Adams, J. Hutton, *Conserv. Soc.* **5**, 147 (2007).
11. M. Walpole *et al.*, *Science* **325**, 1503 (2009).
12. W. M. Adams *et al.*, *Science* **306**, 1146 (2004).
13. B. Strassburg, R. K. Turner, B. Fisher, R. Schaeffer, A. Lovett, *Glob. Environ. Change* **19**, 265 (2009).
14. Poverty maps, <http://sedac.ciesin.columbia.edu/povmap>.
15. R. Grenyer *et al.*, *Nature* **444**, 93 (2006).

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10.1126/science.1175035

## ECOLOGY

# Tracking Progress Toward the 2010 Biodiversity Target and Beyond

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In response to global declines in biodiversity, some 190 countries have pledged, under the Convention on Biological Diversity (CBD), to reduce the rate of biodiversity loss by 2010 (1, 2). Moreover, this target has recently been incorporated into the Millennium Development Goals in recognition of the impact of biodiversity loss on human well-being (3). Timely information on where and in what ways the target has or has not been met, as well as the likely direction of future trends, depends on a rigorous, relevant, and comprehensive suite of biodiversity indicators with which to track changes over time, to assess the impacts of policy and management responses, and to identify priorities for action. How far have we come in meeting these needs, and is it sufficient?

In 2006, the CBD adopted a framework of 22 cross-disciplinary headline indicators with which to measure progress toward the

target at a global level (4, 5). Countries are being encouraged to report progress at the national level using this framework, which is also being applied in regional initiatives such as “Streamlining European Biodiversity Indicators” (SEBI 2010). Other global multilateral environmental agreements, including the Ramsar Convention on Wetlands, the Convention on Migratory Species, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora, are also adopting and adapting relevant subsets of the indicators.

However, with 2010 fast approaching, the indicator set is by no means complete. This is unsurprising given the short time since the framework was agreed upon. Of the 22 headline indicators, 5 are not being developed at a global scale, and there will be none to measure the status of access and benefit sharing, one of the three objectives

Biodiversity indicators used by policy-makers are underdeveloped and underinvested.

of the CBD. The remainder has been subdivided into 29 actual measures, of which only 9 can be considered well-developed, with established methodologies, reasonable global coverage (all continents except Antarctica, tropical and temperate regions, and developed and developing countries), and sufficient time-series data (at least three data points spanning at least 10 years) to demonstrate changes over time [(Table 1) and supporting online material (SOM)].

Even for these well-developed global indicators, there are challenges in terms of data availability, consistency, and relevance. Some indicators are only weak proxies for biodiversity, because the urgent need for indicators has often meant relying on existing measures designed for purposes other than tracking biodiversity change. For example, forest cover may be an acceptable proxy for timber stocks, but says less about the condition of forest biodiversity. Likewise, protected area coverage signals government commitments but does not in itself measure effectiveness in reducing biodiversity loss. These subtleties are beginning to be explored but require further effort.

Patchy data are another challenge, including gaps in data submissions for indicators compiled from national reports (6–9) and incomplete taxonomic and geographic coverage of indicators compiled directly from data. The most well developed direct measures of biodiversity are species indicators, such as the IUCN Red List Index (RLI) (10) and the Living Planet Index (LPI) (11). They are being used to inform and underpin a variety of other indica-

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