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Threatened Ecosystems

Join a global network for developing an IUCN Red List for imperiled ecosystems

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For decades, the International Union for Conservation of Nature (IUCN) has led the creation of red lists of threatened species. The first Red Data Books for birds and mammals were published in 1966 (Scott et al. 1987), gradually expanding both taxonomically and geographically (Rodríguez 2008). Three fundamental milestones were reached during the last four decades.

First, in the early 1990s, IUCN transformed the process for listing threatened species (Mace & Lande 1991, IUCN 2001), by adopting quantitative criteria that separated the assessment of extinction risk, which is a scientific data-driven process, from the definition of conservation priorities, which is a societal process that in addition to risk, must consider the biological attributes of the species, the degree to which it already is protected, the availability of funds, and the preferences of the public, among other variables (Miller et al. 2007). This allowed for risk assessments that were transparent, objective and repeatable, recognizing that scientists and society must go hand in hand in the definition of conservation priorities for threatened species.

Second, the IUCN Red List of Threatened Species is no longer a repository of information on threatened species only, but a data base on the status of biodiversity as a whole (Vié et al. 2009). Species under any level of threat may be assigned a category, including those that have not yet been assessed (IUCN 2001). Although current assessments are biased towards higher vertebrates, calls have been made to significantly expand the taxonomic base of the IUCN Red List (Stuart et al. 2010). By the time of writing this article, 52,017 of the 1,727,386 known species vertebrates, invertebrates, plants, fungi and protists had been assessed, about 3% of all described species. Of these 52,017 species, 17,934 (34%) were considered threatened, but the IUCN Red Lists provides information on all of them (IUCN 2010). As assessments continue to accumulate, data on a growing proportion of all species would be available for consultation at the IUCN Red List website (www.iucnredlist.org).

Coral reefs are among the most threatened ecosystems in the world. Shumann Island, Kimbe Bay, Papua New Guinea. Photo © Ingrid Visser

Third, interest in the application of the IUCN Red List at the national level has significantly grown. Only in Europe, 3,562 current and historical red lists are known (Köppel et al. 2003), while more than 250 national red lists for various taxonomic groups have been developed in more than 100 countries (Zamin et al. 2010). Their impact on international conservation policy has been highlighted by the adoption of the Red List Index (Butchart et al. 2007) as one of the indicators to measure progress towards achieving the targets set forth by the Convention on Biological Diversity (2010) and the Millennium Development Goals (2009).

A key characteristic of this "red list process" has been a wide participation of the IUCN membership, including governments and governmental agencies, national and international non-governmental organizations, academics and the private sector. More than a decade passed since the call for transforming the IUCN Red List categories and criteria (Fitter & Fitter 1987), and the adoption of a global standard (IUCN 2001). During that time, several drafts were widely circulated and updated, the criteria were tested and the participation of anyone interested was encouraged (Mace et al. 2008). The success of the IUCN Red List speaks for itself.

In contrast, no equivalent global standard exists for ecosystems. Several protocols have been developed, but they differ in how they define ecosystems and their extinction, the quantitative criteria they use in the

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assessments, how they take into account loss of ecological function, the scale at which they are applied, and how they consider uncertainty in the data (Nicholson et al. 2009). In recognition of this gap, at the 2008 World Conservation Congress, IUCN launched a "consultation process for the development, implementation and monitoring of a global standard for the assessment of ecosystem status, applicable at local, regional and global levels." Building on the experience of the IUCN Species Survival Commission, the establishment of the IUCN Red List of Ecosystems is now one of the central themes of the IUCN Commission on Ecosystem Management (http://www.iucn.org/about/union/commissions/cem/).

The first step of the consultation was the delineation of a research agenda, and the proposal of draft categories and criteria for developing a red list of ecosystems (Rodríguez et al. in press). During the next two years, we expect to converge on a unified system that meets the following criteria:

1. Easily understood by policy-makers and the public.
2. Logically consistent with the species-based approach.
3. Transparent, objective, and based on sound science.
4. Applicable to terrestrial, marine, and freshwater systems.
5. Applicable at multiple spatial scales (local to global) and resolutions (coarse to fine).
6. Able to use historic and current data.
7. Explicit about how risk assessments can inform conservation priorities.
8. Criteria with thresholds that reflect varying levels of risk.

Based on the hypothesis that ecosystem risk is a function of the risk of its component species, a set of four initial working criteria have been proposed:

- Criterion A: *Short-term decline in distribution or ecological function*.
- Criterion B: *Historical decline in distribution or ecological function*.
- Criterion C: *Small current distribution and decline or very few locations*.
- Criterion D: *Very small current distribution*.

As a global community of conservation professionals, the Society for Conservation Biology is ideally positioned to actively engage in the development of this new policy tool. Ecosystem red lists would complement species red lists, and when used together provide a powerful indicator of the status of biological and abiotic diversity. In addition to testing the application of the draft criteria in a wide variety of ecosystem types, geographical regions and institutional settings, numerous conceptual challenges still remain to be solved. Some of the pressing scientific questions are: 1) What is the basic unit of assessment? Is there a natural scale for assessments or do different ecosystem definitions or classifications work? 2) What is ecosystem elimination risk? How does one judge that an ecosystem has irreversibly disappeared? 3) What thresholds, and of which variables, reflect different levels of extinction risk? Particularly, how can one quantify loss of ecological function? (Rodríguez et al. in press).

Ample experience exists with the establishment and implementation of the IUCN Red List of Threatened Species. Computers, software and data for assessment of land cover change have become increasingly available, inexpensive and user friendly. There is growing concern of the fate of the ecosystems on which humans depend. What we now need is an active engagement of the world's conservation professionals in the development of the IUCN Red List of Threatened Ecosystems. The membership of SCB could surely play a pivotal role in this process.

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References

Butchart, S. H., H. R. Akçakaya, J. Chanson, J. Baillie, B. Collen, S. Quader, W. R. Turner, R. Amin, S. N. Stuart, and C. Hilton-Taylor. 2007. Improvements to the Red List Index. PLoS ONE **2**:e140. doi:110.1371/journal.pone.0000140.

CBD 2010. 2010 Biodiversity Target Indicators. Convention on Biological Diversity (http://www.cbd.int/2010-target/framework/indicators.shtml), Montréal, Canada. Accessed 11 March 2010.

Fitter, R., and M. Fitter, editors. 1987. The Road to Extinction. IUCN/UNEP.

IUCN 2001. IUCN Red List Categories and Criteria: Version 3.1. Species Survival Commission, World Conservation Union (IUCN), Gland, Switzerland and Cambridge, U.K.

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. http://www.iucnredlist.org. Downloaded on 12 October 2010.

Köppel, C., F. Jansen, J. Burton, M. Schnittler, and N. Hirneisen. 2003. A statistical survey on European red lists. Pages 59-75 in H. H. D. Iongh, O. S. Bánki, W. Bergmans, and M. J. van der Werff ten Bosch, editors. The harmonization of Red Lists for Threatened Species in Europe. The Netherlands Commission for International Nature Protection, Leiden.

Mace, G. M., N. J. Collar, K. J. Gaston, C. Hilton-Taylor, H. R. Akcakaya, N. Leader-Williams, E. J. Milner-Gulland, and S. N. Stuart. 2008. Quantification of extinction risk: IUCN's system for classifying threatened species. Conservation Biology **22**:1424-1442.

Mace, G. M., and R. Lande. 1991. Assessing extinction threats: toward a reevaluation of IUCN threatened species categories. Conservation Biology **5**:148-157.

MDG. 2009. Millennium Development Goals, Goal 7: Ensure Environmental Sustainability (http://www.un.org/millenniumgoals/environ.shtml), New York, USA.

Miller, R. M., J. P. Rodríguez, T. Aniskowicz-Fowler, C. Bambaradeniya, R. Boles, M. A. Eaton, U. Gärdenfors, V. Keller, S. Molur, S. Walker, and C. Pollock. 2007. National threatened species listing based on IUCN Criteria and Regional Guidelines: current status and future perspectives. Conservation Biology **21**:684-696.

Nicholson, E., D. A. Keith, and D. S. Wilcove. 2009. Assessing the threat status of ecological communities. Conservation Biology **23**:259-274.

Rodríguez, J. P. 2008. National Red Lists: the largest global market for IUCN Red List Categories and Criteria. Endangered Species Research **6**:193-198.

Rodríguez, J. P., K. M. Rodríguez-Clark, J. E. M. Baillie, N. Ash, J. Benson, T. Boucher, C. Brown, N. Burgess, B. Collen, M. Jennings, D. A. Keith, E. Nicholson, C. Revenga, B. Reyers, M. Rouget, T. Smith, M. Spalding, A. Taber, M. Walpole, I. Zager, and T. Zamin. in press. Establishing IUCN Red List criteria for threatened ecosystems. Conservation Biology:DOI: 10.1111/j.1523-1739.2010.1598.

Scott, P., J. A. Burton, and R. Fitter. 1987. Red Data Books: the historical background. Pages 1-6 in R. Fitter, and M. Fitter, editors. The Road to Extinction. IUCN/UNEP.

Stuart, S. N., E. O. Wilson, J. A. McNeely, R. A. Mittermeier, and J. P. Rodríguez. 2010. The Barometer of Life. Science **328**:177-177.

Vié, J.-C., C. Hilton-Taylor, C. Pollock, J. Ragle, J. Smart, S. Stuart, and R. Tong. 2009. The IUCN Red List: a key conservation tool. Pages 1-14 in J.-C. Vié, C. Hilton-Taylor, and S. N. Stuart, editors. Wildlife in a Changing World - An Analysis of the 2008 IUCN Red List of Threatened Species. IUCN, Gland, Switzerland.

Zamin, T. J., J. E. M. Baillie, R. M. Miller, J. P. Rodríguez, A. Ardid, and B. Collen. 2010. National red listing beyond the 2010 target. Conservation Biology **24**:1012-1020.