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Global Ecology and Biogeography, Vol. 10, No. 3. (May, 2001), pp. 225-227.

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Biodiversity hotspots: hot for what?

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ABSTRACT

In complex areas of international policy, such as biodiversity conservation, there is a risk that well-promoted strategies will be received by decision makers as a cure-all. The U.S.-based Conservation International is promoting biodiversity hotspots as a 'silver bullet' strategy for conserving most species for least cost. We assess the degree to which this goal is compatible with four social values that char-

acterize the conservation movement. We find that biodiversity hotspots provide only a partial response because conservation does not treat all species as equal. We argue that explicit recognition of such values is fundamental to a structured debate contributing to the development of a common strategy for biodiversity conservation.

Key words biodiversity hotspots, biodiversity policy, conservation ethics, systematic conservation planning.

The Biodiversity Hotspot approach (macro-scale identification of areas containing at least 0.5% of the world's plant species as endemics combined with 70% loss of primary vegetation) (Myers *et al.*, 2000) is being promoted by the U.S.-based non-government organization, Conservation International (hereafter CI) as a 'silver bullet' strategy for conserving most species for least cost. The approach has been endorsed by eminent American ecologists as a central pillar of an ambitious agenda to counter the problem of biodiversity loss (Dalton, 2000).

A risk with all well-promoted strategies is that they are received by decision makers as a cure-all. This is particularly so in complex areas of international policy, such as biodiversity conservation, where strategies need to be applied in different ecological, political and cultural situations, against a background of urgency, irreversibility and scientific uncertainty. The notion of a 'biodiversity crisis' combined with such complexity increases the appeal of conceptually simple strategies such as the hotspots scheme. It is appropriate for CI, a private organization with a global vision, to choose a single strategy as their focus. However, public bodies are charged with delivering values to which society aspires (e.g. peace, economic growth, nature conservation), and should therefore evaluate carefully

such strategies before incorporating them in their own policy. In short, focusing conservation effort on twenty-five 'biodiversity hotspots' globally may be a valid approach for ensuring the survival of the greatest number of species, but we question whether this is the single objective of biodiversity (nature) conservation. We ask to what extent will retaining the greatest number of species *per se* deliver the goals of conservation as generally understood by society?

Conservation only has meaning in the context of human intention. It is a social movement working to develop and maintain (sometimes impose) values in society concerning the human-nature relationship. Consequently, the science of setting spatial priorities must be values-based. In the present paper we assemble current social values relating to species conservation and assess the degree to which conserving most species for least cost meets these concerns.

Based on Ehrlich & Ehrlich (1992) we group these values according to four themes: (1) aesthetic and intellectual contemplation of nature is integral to the biological and cultural inheritance of many peoples (Wilson, 1984); (2) humans lack the right to cause knowingly the extinction of another life form (Leopold, 1949); (3) species are critical components of the healthy ecosystems necessary to support economic and social development (Ehrlich &

Ehrlich, 1992); and (4) it is prudent to maintain the Earth's genetic library from which society has derived the basis of its agriculture and medicine (Myers, 1979).

The first value, expressed as nature observation and contemplation, has been pursued in the context of our spiritual, artistic and intellectual traditions through the ages. This has attached cultural meaning to some species and also landscapes and natural phenomena. Distribution of such species will reflect patterns of human civilization, trade and recreation. Conserving species with cultural value, which is analogous to conserving works of art, is a valid criterion for prioritization of conservation investments. It was for this reason that the first nature monuments and reserves in Europe were designated during the early decades of the 20th century (Conwentz, 1909). When applied to spectacular landscapes and linked with cultural nationalism it became an important motivator of the national park movements in North America (Sellars, 1997). Biodiversity hotspots identify areas that are 'biologically spectacular' by virtue of species richness, diversity and endemism. These elements of nature contain aesthetic as well as scientific qualities. Although they hold particular fascination for biologists, societies are more eclectic in their appreciation of the spectacular in nature. As a consequence, biodiversity hotspots capture only a part of this value.

From a position of ethics or compassion (the theme of our second value), society attaches greater importance to sentient or 'charismatic' species. The general view among environmental philosophers is that this is valid (Elliot, 1995). It is an expression of two deeply held beliefs: (a) that humanity exists within a greater 'other' and this prohibits authority to knowingly cause the extinction of other products of evolution, or God's creation (Nasr, 1993); and (b) that compassion is a definer of our special human identity, which is brought into question by unnecessary cruelty to animals (Lowe, 1983), especially those with whom we perceive a kinship by virtue of their sentience, beauty or other 'noble' qualities.

Conservation of 'charismatic' species contains elements of themes one and two and is a traditional motivator of conservation action, yet biodiversity hotspots omit famous centres of mega-fauna in Africa and North America and coincide with others (e.g. in Indochina, India and Sulawesi) by chance rather than design. In short, the biodiversity

hotspot approach has a limited ability to represent aesthetic and ethical reasons for protecting species spatially, because the methodology treats all species as equal units of analysis and uses non-sentient species (plants) as the primary identifier.

The ecosystem consequences of altered diversity are poorly understood but considered profound (Ehrlich & Ehrlich, 1981). In a recent review, Chapin *et al.* (2000, p. 234) conclude that 'the number and kinds of species present determine the organismal traits that influence ecosystem processes', and that the 'sixth major extinction event' will alter ecosystem processes and ecosystem resilience to environmental change. This will jeopardize the services that humans derive from ecosystems and, by implication, society should take action to avoid what has been dubbed the 'largest experiments in the history of earth' (Ehrlich & Ehrlich, 1981). Such prudence is the basis of our third value (above), and appears to be the primary concern of proponents of biodiversity hotspots (see www.defyingnature.org). The question is, could the biodiversity hotspots approach protect or deliver ecosystem services where we want them? As hotspots are predominantly tropical forest landscapes (fifteen of twenty-five) under threat, successful conservation of these areas will benefit global ecosystem service (e.g. climate regulation). However, the services humans require at the local scale are ignored. Because the boundaries of causal relationships within which species function, and within which the world's major population centres are embedded, are predominantly local and regional, land-use planners everywhere need to take action. The hotspot approach by itself does not offer a blueprint to guide such efforts.

By contrast, focusing conservation effort on biodiversity hotspots may well maximize maintenance of Earth's genetic library (our fourth value), as the approach emphasizes areas high in unique species. However, the fact that biodiversity hotspots coincide with only two of the five Vavilov (1987) centres of origin of cultivated plants suggests that they capture only part of the genetic library with direct value to humanity.

In conclusion, we have briefly reviewed four value-based reasons for conserving species, and contend that the biodiversity hotspots approach provides only a partial response. We have shown that conservation does not treat all species as equal. As a result, spatial priorities and public policy

cannot be determined on the basis of simple species counts, which is the foundation of Myers *et al.*'s (2000) approach.

In response to the Biodiversity Hotspots scheme, Mace *et al.* (2000) called for 'a structured debate to identify common goals' of biodiversity conservation as a first step in developing a 'commonly adopted blueprint for action'. We endorse this position but argue that explicit recognition of all conservationist values is fundamental to this debate. We believe this is necessary for several reasons. First, it will expedite the difficult task of identifying commonly held views about the goals of conservation. Secondly, it maintains the public appeal of conservation and guards against this becoming an abstract scientific pursuit. Thirdly, it helps to ensure that new and well-promoted strategies do not overshadow or undermine important and valid pre-existing schemes. Finally, it promotes public transparency and accountability in the biodiversity strategies and policies of public and nongovernment organizations.

The four values that we have briefly discussed are universal but operate differently in different cultures and at different scales. The proposition that nature (biodiversity) conservation embraces cultural and scientific values with origins in a variety of world views demands a pluralism in conservation strategy and approach. As others have argued before, an armoury, not a 'silver bullet', is what is required.

ACKNOWLEDGMENTS

We thank Tony Cunningham, Susanne Schmitt, Jack Tordoff and two anonymous referees for useful discussions and/or comments on earlier drafts of this sounding.

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BIOSKETCHES

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