

EDITORIAL

Confronting the costs and conflicts associated with biodiversity

J. D. C. Linnell¹, D. Rondeau², D. H. Reed³, R. Williams⁴, R. Altwegg^{5,6}, C. J. Raxworthy⁷, J. D. Austin⁸, N. Hanley⁹, H. Fritz¹⁰, D. M. Evans¹¹, I. J. Gordon¹², B. Reyers¹³, S. Redpath¹⁴ & N. Pettorelli¹⁵

1 Norwegian Institute for Nature Research, Trondheim, Norway

2 Department of Economics, University of Victoria, Victoria, BC, Canada

3 Department of Biology, The University of Mississippi University, MS, USA

4 Marine Mammal Research Unit, The University of British Columbia, Vancouver, BC, Canada

5 South African National Biodiversity Institute, Claremont, South Africa

6 Animal Demography, Department of Zoology, University of Cape Town, Rondebosch, Cape Town, South Africa

7 American Museum of Natural History, Central Park West at 79th Street, New York, NY, USA

8 Wildlife Ecology and Conservation, University of Florida, Gainesville, FL, USA

9 Division of Economics, University of Stirling, Stirling, UK

10 University of Lyon I, Villeurbanne, France

11 Department of Biological Sciences, The University of Hull, Hull, UK

12 CSIRO Davies Laboratory, Aitkenvale, Qld, Australia

13 University of Stellenbosch, Bellville, South Africa

14 Aberdeen Centre for Environmental Sustainability (ACES), University of Aberdeen & Macaulay Institute, Aberdeen, UK

15 Institute of Zoology, Zoological Society of London, London, UK

Correspondence

John Linnell, Norwegian Institute for Nature Research (NINA), Tungasletta 2, N-7485 Trondheim, Norway

Email: john.linnell@nina.no

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As the International Year of Biodiversity progresses, it is a good time to take stock of where we are with respect to the global objectives of halting the loss of biodiversity. It is clear that the 2010 goals have not been reached (Walpole *et al.*, 2009). However, the conservation community is already making plans for the years ahead and formulating new goals and designing roadmaps for achieving them. One recent development of note is the formulation of the Busan Outcome Document (<http://ipbes.net/>) which calls for the formation of an International Science Policy Platform on Biodiversity and Ecosystem Services (IPBES), along the lines of the Intergovernmental Panel on Climate Change. The question remains, however, if noble intentions and good science can be translated into policies and actions that benefit biodiversity? The IPBES's very title explicitly furthers the links between biodiversity and ecosystem services – which builds on the Millennium Ecosystem Assessment (<http://www.millenniumassessment.org/>) and which is becoming one of the dominant discourses in 21st century conservation. Although there is little doubt in the scientific community that there is a broad link between biodiversity and human well-being, the relationship appears to be complex (Redford & Adams, 2009). However, in the public's perception not all biodiversity is beneficial to human well-

being and there are many situations where it can come into conflict with human activities leading to costs that need to be incorporated into conservation policies (Bostedt, 1999).

The costs and conflicts associated with biodiversity conservation are diverse, but can be grouped into three main categories. Firstly, there are the direct costs where certain biodiversity components come into direct conflict with human interests causing material and economic damage. Examples of these conflicts include the destruction of crops by birds, primates and herbivores, depredation on livestock and pets by large carnivores, predation on game by predators, vehicle collisions with large herbivores, disease transfer from wild species to domestic relatives and direct loss of human life to large carnivores, large herbivores, venomous reptiles and zoonosis (Woodroffe *et al.*, 2005).

Secondly, there are a wide range of social conflicts. On one level, these include issues like fear for personal safety or of economic loss in the face of living with potentially dangerous or damage causing species. However, there is also a range of deeper social and cultural issues that come into play when the conservation of challenging or symbolic species is concerned. Rural communities can feel threatened by conservation activities when they are perceived as endangering deeply held values, world views or lifestyles

(Niemi *et al.*, 2005). Rural people often view their landscapes as managed ‘cultural landscapes’ (Paloniemi & Vilja, 2009) – a vision that may be compatible with the conservation of many types of species and ecosystems but which will often be incompatible with many other types of biodiversity, for example large carnivores, old growth forest or natural disturbance regimes. Conflicts between rural people and conservation activities can often lead to poaching, habitat destruction and political pressure to undermine conservation as a goal (Dickman, 2010). There can also be many conflicts between different stakeholder groups in deciding how best to utilize resources (Brown *et al.*, 2001).

Finally, we must consider the opportunity costs that biodiversity conservation represents. While conserving relatively intact ecosystems may benefit global society in the long term, and there are many examples of win–win situations (Rosenzweig, 2003) the associated constraints on using or developing land are likely to cause significant economic costs in the form of lost economic opportunities (Naidoo & Ricketts, 2006). These opportunity costs may fall on society as a whole; however the brunt of the costs is generally felt on a local level.

We believe that a failure to explicitly acknowledge the costs and conflicts associated with biodiversity presents a major obstacle to its conservation. Focusing only on the benefits of biodiversity is naïve. Acknowledging the costs may open a way for targeted research to find solutions to prevent, minimize or mitigate their impacts and find practical solutions (Sale *et al.*, 2005; Brown *et al.*, 2001).

Luckily, there is a lot of experience at dealing with conflicts and many examples of successful compromises being made (Woodroffe *et al.*, 2005). The material and direct conflicts can be dealt with through a range of technical measures, such as fencing, improved animal husbandry, and veterinary and medical care. These methods can however have some unintended side effects and can be expensive. Dealing with social conflicts is much harder, because they often represent a clash of fundamental values where compromise is hard. However, considerable experience exists with minimizing these issues through the adoption of participatory decision making and management processes that are perceived as being open, fair and that ensure a real possibility for dialogue, local influence and empowerment (Brown *et al.*, 2001; Skogen, 2003). When it comes to costs, there are many economic models in existence that try to redistribute costs and benefits in practical and fair ways, for example through the payment of compensation, incentives, tax easements and subsidies (Jack *et al.*, 2008). These models vary greatly from country to country and desperately need to be compared, evaluated and validated to see if they actually achieve their objectives.

One great challenge to the implementation of effective biodiversity conservation measures is the unequal distribution of costs and benefits. The burden of conservation measures is often felt locally by individuals and communities who are deeply attached to the land and its resources, and who hold the key to the success or failure of a conservation program. In contrast, the benefits of biodiversity conservation are typically broadly diffused, both spatially and over time, making it difficult to build coalitions and muster the

political and financial means of deploying effective conservation strategies at the local level.

While there is an increasing recognition that local communities are key determinants of the success or failure of conservation programs, it seems opportune to once again encourage the inclusion of a serious focus on local benefits and costs in the biodiversity and ecosystem service discourse. This needs to be supported by multi-disciplinary research involving social scientists, economists and political scientists from the outset (Dickman, 2010). Understanding the links between biological and social systems can only bring us closer to effective conservation measures and better approaches to mitigate conflicts. Ultimately, our research objects should be the socio-ecological systems as a whole, and our focus the determinants of the coexistence between biodiversity and humans rather than conflicts.

Capturing the global benefits of biodiversity requires sacrifice from us all, not only in financial terms (e.g. higher taxes and foregone profits) but also in terms of personal risk, material losses, freedom of action or convenience. Our common task should not only be to focus on research, but also on communicating to non-scientists both the merits and challenges of maintaining biodiversity and presenting the practical measures that can be deployed to achieve this goal (Vejre *et al.*, 2010). Open dialogue of the trade-offs involved in biodiversity conservation actions leads to the types of democratic decision making, increased sense of community and social justice, and respect for indigenous, rural and local ways of life that are hallmarks of successful conservation programs.

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