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Comment on De Meester & Declerck, 2005 (target review)

Linking science and policy for biodiversity

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De Meester & Declerck (2005) present several research pathways for the study of biodiversity in freshwater habitats and discuss the relevance of biodiversity research for solving societal problems. In particular, they underline the difficulty of combining economic development and biodiversity conservation. They also highlight that, in addition to scientific knowledge, both political will and technical solutions are needed to progress towards sustainable development.

On all of these points, I agree with the authors. There is an urgent need for solid fundamental science, complemented by applied research and regular monitoring of biodiversity. My main concern relates to their polarization of scientists and policy makers, as belonging to conflicting worlds with incompatible interests. This oversimplification may prove counterproductive when making suggestions for science policy, especially in a field such as biodiversity where environmental, economic and societal aspects are closely interlinked.

Since the Rio Earth Summit and the signature of the Convention on Biological Diversity (CBD), in 1992, there have been major changes in the way biodiversity is conceptualised and studied, with the development of a more dynamic and integrated approach. As summarised by the International Council for Science (2002a), we have 'moved from a static and descriptive approach of biodiversity, with the design of enclosed parks as a conservation goal, to the emergence of a strong awareness of the functional role of biodiversity in maintaining life on earth, and of the dependence of our economic and social development on biological diversity'. Scientific findings have led to the acceptance of new concepts at the policy level, while new ideas and methods have emerged over the past decade under the influence of a new political awareness. For example, increased knowledge of the complex processes in ecosystem functioning helped to formulate and to acknowledge the 'ecosystem approach' in a number of international fora, the first of which the CBD.

As endorsed by the CBD, the ecosystem approach is a 'strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way'. It should be noted that this definition goes far beyond the study of ecosystems, as could be interpreted from a scientific perspective. It is good illustration of how an international policy process builds on improved knowledge to define its framework for action. Because the understanding of ecosystem functioning is still incomplete, the ecosystem approach calls for adaptative management and does not preclude other approaches, such as protected areas or single-species conservation programmes. It rather aims to integrate all of them (Secretariat of the Convention on Biological Diversity, 2001).

The adoption of the ecosystem approach is definitely a prominent achievement of the Convention. However, it is true that more than 10 years after signing the CBD, there are still weaknesses in the linkage between knowledge on biodiversity and the development of policy (whether scientific, environmental or economic). De Meester & Declerck (2005) point out some of the reasons, but do not attempt to explain why and suggest solutions. I would like to highlight two of their comments. Firstly, they state that policy makers, who are often suspicious that environmental problems are overemphasised in order to attract public attention, are largely ignoring scientists. I see several reasons for this lack of dialogue, among others: many policy makers lack time and resources to read the scientific literature, scientists often make little effort to disseminate or explain their work to a non-specialist audience, and scientists do not always ask the questions

politicians want answered. This last remark directly links to the authors' second comment – and concern – that policy-driven research will lead to biased research rather than to innovative and 'sound science'.

There is vital need for a strong partnership between science and society in order to solve 'real-world problems' such as feeding a growing population or halting the loss of biodiversity. The ability to carry out elegant fundamental research purely for the sake of scientific curiosity is an essential cradle of new ideas. However, this should remain the privilege of only a fraction of the scientific community. The magnitude of ecological issues facing society makes it essential for researchers to contribute appropriately to those concerns. This does not mean that policy-relevant research should be limited to applied research or monitoring of biodiversity, as suggested by De Meester & Declerck (2005). Good fundamental research programmes can deliver usable knowledge to policy makers, managers, stakeholders and 'simple' citizens, especially in areas where knowledge to underpin management is still inadequate (e.g. effects of biodiversity changes on overall ecosystem functioning, as underlined by Gessner et al. (2004) and other contributors in the same proceedings issue).

Research undertaken with these questions in mind does not undermine the ability of researchers of achieving 'sound science', as feared by the authors. No one would dispute that policy should be based on sound science. The disagreement arises probably over what the expression implies in practice and how it is used by various stakeholders, including policy makers. It is not the aim of this note to define what sound science is, but minimal requirements include science that should be reliable and valid (use adequate reasoning and methodology, be peer-reviewed, be repeatable) and transparent (be readily available for review). In the US, the expression has been used by recent American presidents to describe the basis of their administrations' regulatory decisions; sound science has come to be associated with absolute certainty regarding a particular problem. As biological systems are complex and will always present unexpected behaviour, this is unrealistic and inappropriate. As stated by Carroll (1994) 'scientists must learn how to better communicate to policy makers the important but arcane fact that processes in the natural world are best described as a series of conditional probabilities. We do not live in the ''balance of nature'', we live in a complex world of uncertainty, risk and environmental change'. Nonetheless, it should remembered that, even with the best scientific information available, policy makers can still face difficult decisions when having to take societal aspects into consideration.

When De Meester & Declerck (2005) write that 'policy-driven research [. . .] may lead to the culturing of a kind of researcher that accommodates to the needs of policy makers in a very flexible way, but does not care too much for high scientific standards' they tend to confuse two issues. Achieving high scientific quality is a question of appropriate methodology, as highlighted in the previous paragraph. This is true not only for fundamental research, but also for applied research and for the monitoring of biodiversity. The issue of relevance (i.e. asking the right questions), albeit extremely important, comes in addition to scientific excellence. How to determine what is relevant and on what basis this decision will be made is in itself a complex process that is influenced by the underlying socio-economic-political context.

One way to improve relevance for society, without loosing in scientific quality, is to move beyond the traditional 'three-pillar' assessment framework – i.e. economic, social and environment – and to have a better integration between scientific disciplines (International Council for Science, 2002b). Much of the ecological and conservation research is rooted in particular natural sciences disciplines: zoologists, botanists or geneticists each have their own research domains. However, as real-world issues are not bounded by such disciplines, collaboration with economic, political, and social scientists is essential. A closer integration of these disciplines will also help to find better ways of communicating scientific results, including scientific uncertainty, to a non-specialist audience. In this regard, the publication of research results in high-ranking journals as suggested by De Meester & Declerck (2005), while essential from a scientific perspective, is of little direct use to society. It requires additional ways of communication, in order to translate the scientific results into information more readily usable by the wider society. The

approach will depend on the issue and the audience, as well as on the context of which they are part.

Exciting new developments are happening in biodiversity research. Initiatives at the European and international level are now in place to build on this new progress, and to bridge the gap between the scientific community and society at large. By encouraging communication, they will help to bring scientific knowledge on biodiversity to the forefront of policy discussions. To list but only a few examples, DG Research of the European Commission addresses science and society issues in general,[1] the US-based Union of Concerned Scientists has launched a Sound Science Initiative,[2] the International Council for Science has published a series of reports on science for sustainable development,[3] while DIVERSITAS is an international research programme promoting, among others, integrative biodiversity science.[4] The Secretariat of the Convention on Biological Diversity provides information on many international programmes linking science and policy for biodiversity on its website. More specifically, freshwater ecosystems are dealt with under the thematic programme on 'inland water biodiversity'.[5] Making these initiatives more visible to the scientific community will help to enhance their coherence and effectiveness. It will also help the ultimate goal of biodiversity conservation, by transforming knowledge into action.

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[1] http://europa.eu.int/comm/research/science-society/index_en.html.

[2] http://www.ucsusa.org/global_environment/global_warming/page.cfm?pageID = 939.

[3] http://www.icsu.org/2_resourcecentre/Resource.php4?rub = 8&id = 29.

[4] http://www.diversitas-international.org/.

[5] http://www.biodiv.org/programmes/areas/water/links.aspx.