9. Introduction

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1. THE LOSS OF BIODIVERSITY POLICY FIELD

Biological diversity is defined by the Convention of Biological Diversity (UNEP, 1992) as:

> the variability among living organisms from all sources including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

The importance of maintaining this diversity can be summed up as follows: (i) it is the basis for the stability and sustainability of natural ecosystems, (ii) it has a great range of potential and unexplored uses for humans, and (iii) it has existence values such as the amenity values of protected areas.

The available evidence on species numbers and stress on ecosystems within Europe points to a decline of biodiversity within ecosystems (loss of habitats), within habitats (loss of species) and among species (decline of species abundance) (EEA, 1995). The causes of these declines are wide-ranging and complex, and this was reflected in the variety and number of proposed pressure indicators received in the first PIP expert questionnaire.[1] This list of proposed indicators covered a range of 38 'sub themes' such as habitat fragmentation, agricultural practices, loss of genetic resources, pollution and urban development. For the second-round questionnaire the list was reduced from an original total of 258 proposed Loss of Biodiversity indicators to the 28 that were considered to be the most relevant and compatible with established sources of data.

2. RESULTS OF THE SECOND-ROUND QUESTIONNAIRE

Figure 9.1 gives the top core-ranked indicators expressed as percentages of experts who included the indicator in their top five list, together with the

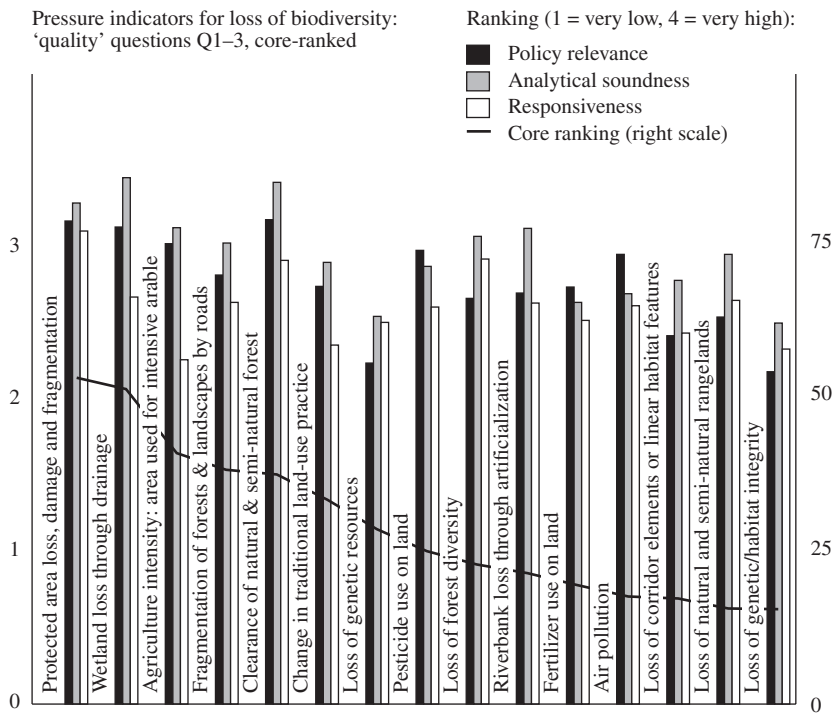

Figure 9.1 Results of second-round questionnaire for the Loss of Biodiversity policy field

corresponding rankings for the three quality questions. The top five rankings for each question were as follows:

- Core-ranked indicators: protected area loss, damage and fragmentation, wetland loss through drainage, agricultural intensity: area used for intensive arable agriculture, fragmentation of forests and landscapes by roads/intersections, clearance of natural and semi-natural forests.
- Policy relevance indicators: protected area loss, damage and fragmentation, clearance of natural and semi-natural forests, wetland loss through drainage, agricultural intensity: area used for intensive arable agriculture, pesticide use on land.
- Analytical soundness indicators: wetland loss through drainage, clearance of natural and semi-natural forests, protected area loss, damage and fragmentation, riverbank loss through artificialization, agricultural intensity: area used for intensive arable agriculture.

- Response elasticity indicators: protected area loss, damage and fragmentation, loss of forest diversity, clearance of natural and semi-natural forests, loss of natural and semi-natural rangelands, wetland loss through drainage.

In general, there is quite close correlation between the quality question rankings and the core rankings. Protected area loss, damage and fragmentation, clearance of natural and semi-natural forests and wetland loss through drainage are ranked highly in all four questions, while agricultural intensity is ranked highly in all questions except for the response elasticity question. In common with other policy fields, the main differences in top five rankings exist between the response elasticity question and the other three questions.

3. RELATIONS TO OTHER POLICY FIELDS

The broad nature and complexity of issues covered by the Loss of Biodiversity policy field means that it has strong links with a number of the other policy fields. Since overlaps are inevitable, the following delimitations were applied to avoid double counting in very closely related policy fields. First, biodiversity issues related to marine and coastal areas were included in the Marine Environment and Coastal Zones policy field. Second, forest ecosystem issues were included in Loss of Biodiversity while wood consumption was seen as a Resource Depletion issue. Third, in matters of land use, factors affecting the existence of biological systems were included under Loss of Biodiversity while factors affecting non-biological resources were grouped under Resource Depletion.

Particularly close links exist with the Climate Change policy field centred on the issue of deforestation. This issue is one of the main contributors to climate change as a result of the decrease in forest areas and reduction in the existing sinks of carbon dioxide, and the increase in emissions of greenhouse gases due to the burning of wood. However, any change in the area of tropical forests also has effects on biodiversity. Therefore, measures to protect biodiversity are likely to have a positive effect on climate change.

Biodiversity is also affected by air pollution and acidification. In particular, acidification often occurs at a rate faster than the ability of species to respond, thus resulting in the loss of some species. A further close interrelationship exists with the Water Pollution policy field since issues such as eutrophication and soil degradation are clearly relevant to biodiversity.

4. APPROACH OF THE CONTRIBUTIONS

The chapter by Pierre Devillers gives an enlightening general overview of 'The biodiversity crisis' structuring his contribution to address the central questions set out in the editor's introduction to this handbook. The introduction explains the human causes of the crisis and potential consequences. The consequences are categorized as the destabilization of ecosystems, the loss of vital resources and cultural amputation.

The chapter by Marianne Lefort concentrates on her specialist interest in the consequences of the loss of genetic diversity for domestic species, and the actions needed to reduce this loss. She explains that the concentration of selection efforts on a very limited genetic base is often associated with the lack of interest in, and loss of, that genetic diversity which is not exploited. The chapter argues that the maintenance of genetic diversity, more than biological diversity, is indispensable for the maintenance of the adaptive potentials of species, and to provide for the future needs of mankind, whether social, cultural, agricultural or industrial. Lefort's chapter is structured to address the same central questions as the Devillers chapter.

Role of Central Political Intervention

Devillers stresses the importance of central political intervention for conservation of biological diversity at the scale of the European Union, stating that 'Nature conservation is clearly a matter in which Community competence is indispensable to insure fulfilment of common goals and reciprocal responsibilities'. He explains that the nature of biological diversity means that conservation policy objectives are best set at international conventions, and that European legislation and policy should encapsulate these and establish the minimum results for Member States to achieve. It is then for the Member States to establish the framework and create the necessary instruments for implementation of the directives. However, the disparity of biological diversity between northern and southern Europe makes cash flows from north to south indispensable if the whole of the Union is to participate in the preservation of the natural heritage.

Lefort argues that a concerted European approach to the conservation of genetic resources is necessary for technical, political and socio-economic reasons. In particular, since the erosion of genetic diversity is not contained within national boundaries, it makes sense for intervention to be at the EU level.

Actions

Devillers stresses that, since the main threats to biodiversity are habitat destruction, fragmentation and degradation, short-term conservation strategies should concentrate on the establishment of 'coherent networks of areas under diverse levels of protection, adapted to the conservation of the biological values targeted'. These networks may be supplemented by overall conservation measures applied in the rest of the environment, protecting less sensitive species and less fragile communities. In the longer term, however, networks of protected areas will not be capable of fulfilling their role as reservoirs of biological diversity if the environment that surrounds them continues to degrade. Devillers points to two approaches to conserving the biological diversity of the surrounding environment: rational exploitation of natural resources and land stewardship.

The chapter by Lefort makes a number of technical proposals for short- and medium-term action and identifies some indicators to allow the monitoring of these actions.

For plants, she urges the establishment of a genetic reserve comprising a collection of genetic resources to be maintained in long-term *ex situ* conditions. This should be complemented by the establishment of networks of genetic resources that are of interest to agriculture, preserved in *in situ* conditions. Actions to favour the diversification of production by increasing numbers of cultivated species and genetic variability are also outlined.

For animal species traditionally selected by humans, Lefort recommends actions including: monitoring the number of races, the genetic diversity between these races and the evolution of genetic diversity within major races, and the establishment of stocks of semen and embryos for the most endangered races.

Lefort recognizes that, in the long term, for both plants and animals, we should consider establishment of production systems involving a less intensive and more balanced use of agricultural and forest lands.

Pressure Indicators

Devillers explains that, in the case of both protected area networks and non-protected areas, the need to orientate action and ensure its acceptance makes monitoring and communication to the decision-makers and the public concerned indispensable. Indicators of environmental pressure are a useful tool for such monitoring and communication functions. They have the advantage of a direct relation to corrective action and many of them can be relatively easily calculated from existing administrative statistics.

He concludes that, whether based on pressures, habitats or indicator species, indicators do yield results that are timely, compatible and comparable.

Moreover, he argues that the recent trend towards multiplication and redistribution of levels of decision-making has made the availability of easily understood and transparently developed common measuring standards all the more necessary.

In her chapter Marianne Lefort argues that pressure indicators related to genetic diversity can be beneficial for a number of reasons. The wide distribution of indicators for genetic diversity in agriculture will raise the awareness of the public and politicians about the risks of the erosion of genetic resources, lead to a better management of these resources within Member States and inspire collective EU action. An analysis of the evolution over time of the indicators should, moreover, help to target legislation and regulation towards a better long-term preservation of genetic resources.

Lefort stresses the importance of the 'intensification of agriculture' indicator (LB-1) which, in time, could have significant impacts on the environment. She recognizes that there are difficulties in envisaging concrete actions to reduce this indicator, as well as the 'changes in traditional land-use practice' indicator (LB-2). However, the chapter concludes that there are now some positive examples in the agricultural field where the importance of conservation in order to achieve sustainable development is now emphasized.

5. INTERNATIONAL FRAMEWORK

International policies on biodiversity have, in general, concentrated on the protection of species and sites through the agreement of international conventions and programmes, and within EU legislation. The principal international initiatives of relevance to Europe are outlined below.

- The Ramsar Convention on Wetlands of International Importance was signed in 1971 and includes 70 countries. Under the convention 362 wetlands sites have been designated in Europe.
- UNESCO's 'Man and the Biosphere' programme (MAB) has developed Biosphere Reserves which aim to combine preservation of ecological and genetic diversity with a viable local economy, and research and education functions. Since its inception in 1971 the MAB programme has established over 120 reserves in Europe.
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was signed in 1973. It aims to restrict such commercial trade in order to prevent extinction of endangered species. Most European states have now joined the convention and it has been ratified by over 110 countries worldwide.
- The Convention on the Conservation of European Wildlife and Natural

Habitats (Berne Convention) was signed in 1982, and includes EU countries and some other European and African states. It aims to protect flora and fauna and their habitats and promote international cooperation in resolving transboundary issues, especially those concerning the protection of endangered and vulnerable species.

- The Convention on Biological Diversity was signed at the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro, and enacted in December 1993. Nearly all European states have signed the convention, which requires signatories to prepare national plans for the conservation of biodiversity and sustainable use of biological resources. The convention is seen as a major step forward in efforts to structure international action for preservation of biodiversity.

There are a number of European Union-based initiatives which promote biodiversity across Member States. These include: Biogenic Reserves (promoted since 1975), The Bird Directive (1979), and The Habitats Directive (1992). Other recent European initiatives include the European Ecological Network (EECONET) and the IUCN Action Plan for Protected Areas.

NOTE

1. First questionnaire: December 1995; second questionnaire: October 1996. See Editors' introduction.

REFERENCES

EEA (1995), *Europe's Environment: The Dobříš Assessment* (Copenhagen: European Environment Agency).
UNEP (1992), *Convention on Biological Diversity* (Nairobi, Kenya: United Nations Environment Programme).