The **RUBICODE** Project

Rationalising Biodiversity Conservation in Dynamic Ecosystems

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Integrating ecosystem services, ecosystem dynamics and biodiversity conservation

Introduction

This edition of the RUBICODE Newsletter focuses on work undertaken to evaluate the effectiveness of existing habitat management strategies and conservation policy in Europe and how these might be improved to take better account of ecosystem dynamics and ecosystem services.

Current conservation strategies

Existing habitat and species management strategies for biodiversity conservation have been evaluated. It is recognised, in particular, that while protected areas have formed the backbone of current conservation strategies, most of the land in Europe is not protected and many countries are comprised of heavily human-influenced habitats providing many services to society, such as pollination, water purification and pest control. Thus, there is a need to also manage and conserve these areas more effectively. This will mean working cooperatively with other sectors, such as agriculture, forestry and water management. Increasingly this is being recognised and adopted in, for example, the Pan-European Biodiversity and Landscape Diversity Strategy (PEBLDS), dealing with both biological and landscape diversity.

The implementation of conservation policy in Europe

An analysis of EU, national and delegated regional institutional structure and responsibilities for biodiversity conservation policy has shown that all countries have their own structure for the organisation of biodiversity policy. European Directives are interpreted in each country according to their own political setting, institutional structure, and conservation, political and economic history. This means that the size of nature conservation areas might differ across borders, the responsible authorities differ and there are large differences in budget and acceptance of political obligations. European policies have to be developed not only by the 27 Member states, but also by many regions that have the executive power in countries such as Germany, Spain, Belgium and the UK. In some countries there is joint responsibility between regional and national governments, whilst others have a more centrally organised policy.

EU agricultural policy and conservation

About 40% of European land cover is agriculturally cultivated. Hence, farmers could be considered to be one of the most important land manager groups. Depending on their farming practices, they have the ability to significantly impact all levels of biodiversity, i.e. landscape, species and genetic material. Where habitat for a diverse range of flora and fauna is provided it is known as High Nature Value (HNV) farmland. Approximately 15 to 25% of the European countryside could be considered HNV farmland, with a higher occurrence in eastern and southern Europe. The main threats to farmland biodiversity are land abandonment, intensification and land use change (other than agriculture). A survey of seven member states suggested that land abandonment is a major threat to farmland biodiversity in Hungary, Ireland, Lithuania and Sweden, while intensification is particularly a problem in the Netherlands, Veneto (Italy) and England (Table 1). Therefore, opportunities must be sought for agricultural and conservation policies to work together to safeguard biodiversity and the services it provides.

Table 1: Overview of major threats to farmland biodiversity.

	Land abandonment	Intensification	Land use change
Hungary	xx		
Ireland	xx	x	
Italy: Veneto		xx	x
Lithuania	xx	x	
Netherlands		xx	x
Sweden	xx	x	
UK: England		xx	

x: challenge limited to certain areas
xx: major challenge

The effectiveness of current conservation strategies

Interviews with experts in nature conservation policy in France, Germany and Hungary highlighted that current policies were seen as generally sufficient by most interviewees, with the conservation of mountain ecosystems in France, preservation of certain species in all analysed countries, as well as wetland and water courses restoration in Hungary and Germany, being regarded as success stories. Most interviewees considered establishing connectivity between protected and designated areas, as well as the effective management of the Natura 2000 system, to be very important challenges for the near future. Sceptical opinions were expressed concerning the achievement of the goal to stop biodiversity decline by 2010, with some interviewees noting that the extent of conservation action was fairly low compared to the magnitude of the threats. Marine ecosystems and invasive species were mentioned as 'neglected' issues in official conservation institutional arrangements. Further, the integration of nature conservation policy with other relevant policy areas was regarded as unsuccessful in all analysed countries. Political obstacles were considered to be the main reason for this ineffectiveness, as nature conservation has a low status and is considered a low priority compared to other social and economic issues.

Taking account of the dynamic nature of ecosystems

Ecosystems are naturally dynamic and management needs to ensure that this dynamism is maintained, but increasingly humans are modifying or regulating the types and rates of ecosystem change. Habitat management, therefore, must take into account the effects of these environmental pressures to protect against, or otherwise mitigate, adverse effects, facilitate adaptation, or restore habitats after adverse impacts. This is particularly the case when considering interactions between land use change and climate change. The EU Birds and Habitats Directives both require Member States to avoid deterioration of, maintain or restore, natural habitats. This gives some flexibility, but there is debate about whether it is sufficient. Also it means that we will need to acquire new abilities to deal with projected changes. This will be particularly true for Europe's mountains as habitats and species run out of suitable climate space in the future.

Habitat management for biodiversity and ecosystem services

Previously, nature conservation was undertaken solely for moral, ethical, or aesthetic reasons - the "cultural services" of the Millennium Ecosystem Assessment (MA), but now, there is a strong interplay between conservation and economics in all of the other MA service groups (i.e. provisioning, regulating and supporting services). So, managing habitats to protect service provision, while at the same time encompassing the needs of biodiversity conservation, may offer a potentially highly effective means of improving present habitat management strategies for biodiversity maintenance. Perhaps the greatest difference between this and more conventional approaches to conservation arises from the definitions of the target units to be conserved. Whereas conventional conservation strategies tend to involve protecting single species, populations or entire habitats, strategies to conserve ecosystem service provision involve a spectrum of types and sizes of target units, from single populations to functional groups

to entire species assemblages and habitat complexes at the landscape level, and how they change in space and time. Thus the approach is intrinsically dynamic, particularly as it is not always spatially fixed – service provision must follow environmental change. While it is not intended that the ecosystem service provision approach should replace present conservation management strategies it does provide a "value-added" strategy for biodiversity conservation.

Integrating framework

An integrating framework has been developed to highlight relationships between present conservation approaches (yellow boxes) and wider societal needs, the provision of ecosystem services and dynamic ecosystems (blue boxes) (Figure 1). Thus in the conventional approach, it is our aesthetic/cultural values that provide the stimulus for conserving nature. Policies and management strategies arising from this during the last century have led to the present system of protected areas (PAs). Visiting these or seeing photographs of them reinforces our aesthetic appreciation and the value of feeling somehow "close to nature".

But societal needs from nature are broader and require the supply of provisioning, regulating and supporting services at levels relevant for beneficiaries, as shown in the outer loop. This involves appropriate management and policy for service provision in different sectors being integrated with ecosystem sustainability, integrity and health to provide conservation within the framework of a Social-Ecological System. Such conservation strategies must also encompass management for sustainable ecosystem services, whilst still maintaining ecosystem integrity. This then reflects, and may influence, changing societal needs. Thus the loop represents a continuous, iterative process with dynamic and adaptive properties.

However, it is of utmost importance that *both* loops are maintained and that the loops not be considered in isolation, but must be closely linked in all appropriate places (red arrows) and at all scales of organisation. This ensures that services whose provision will be antagonistic to conservation interests or to other services do not have severe detrimental effects on biodiversity.

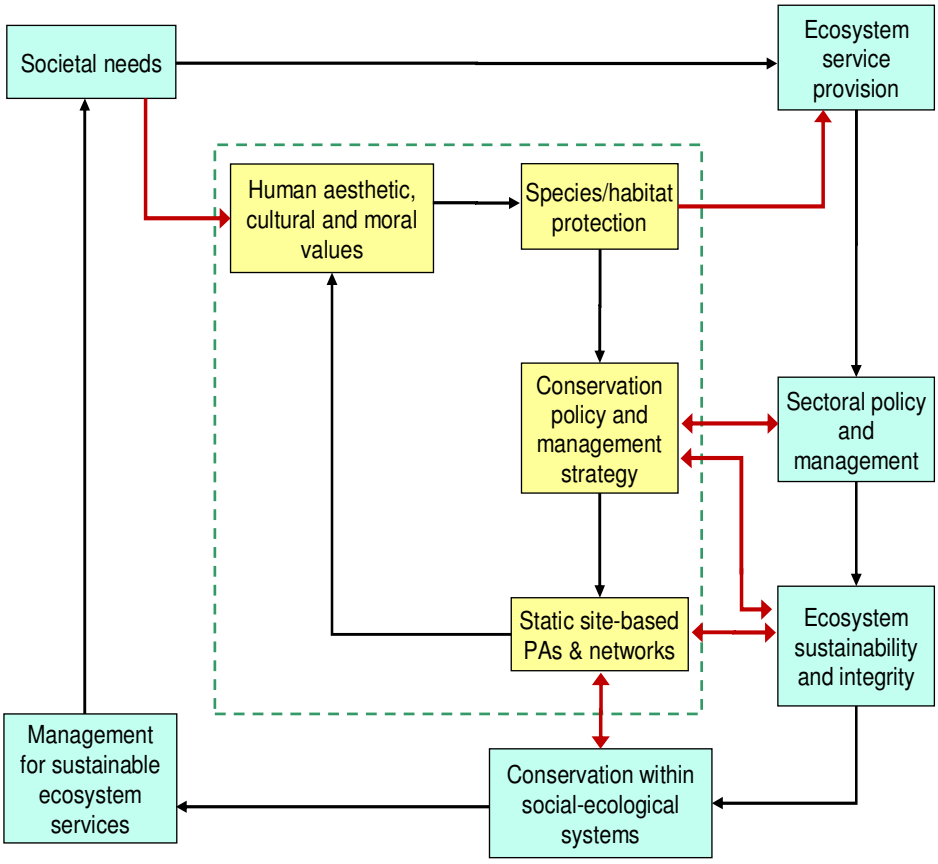

Figure 1: A framework for conservation in Europe integrating ecosystem services. Source: Haslett et al. (in press)[1].

A precautionary approach

Given the various changing dynamics and scenarios that arise because the world is made up of often unpredictable, complex, interactive and non-linear dynamic systems, conservation and ecosystem service provision must build in contingency plans. Such a precautionary approach means that ecosystems are maintained intact, as far as possible, to ensure continued service provision in the face of changing environmental conditions and biotic interactions, even if there is presently insufficient supporting scientific evidence. This approach also caters for many possible services that have not yet been identified, including a supporting role for the identified main players in an already recognized provision of service. A precautionary approach to biodiversity conservation is advisable too in the case of a lack of future projections of ecosystem services needs and supplies, in order to best safeguard supply.

Future conservation policy and strategy

RUBICODE research and discussion with policy-related stakeholders has shown that many present European strategies and policies for biodiversity conservation need changing and adapting to include the elements of ecosystem dynamics and service provision. Some existing legislation can be interpreted as implying ecosystem service protection, but it is not explicit (e.g. the EU Birds Directive and European Plant Conservation Strategy). We need strategies and policies that have "on the ground" flexibility to deal with such dynamic systems, which is closely interlinked with service provision. A more flexible interpretation of existing legislation and instruments in order to allow for ecosystem dynamics may be part of the answer. For example, the current 6-yearly review process in the EU Birds and Habitats Directives allows for some consideration of dynamics and is certainly a step in the right direction.

To incorporate an ecosystem services approach into conservation policy requires a focus on governance and institutions and increased communication and integration across the different sectors. Some integration is starting, as in the case of the integration of biodiversity in the Soil Directive and the Water Framework Directive, but not necessarily in an ecosystem service context. In addition to the adaptation of existing policies, new policy, perhaps in the form of a new EU Directive that focuses on the conservation and management of important ecosystem services in Europe, may also be an effective route to follow.

The challenges facing biodiversity conservation management strategies and policy remain considerable. There is an urgent need to accept, and deal with, the requirements of protecting species, habitats and ecosystems and their services that are all continuously changing in space as well as time and a systematic approach encompassing all this would appear to be the challenge for the near future.

Other project activities

The final RUBICODE workshop took place on 12-14 January in Leipzig, Germany. This workshop presented the final results from the project and discussed future research priorities for ecosystem service assessment. The workshop report and a roadmap describing research needs can be downloaded from the "Outputs" page of the RUBICODE website (www.rubicode.net).

Further information on the work described in this newsletter can be obtained from John Haslett (john.haslett@sbg.ac.at). Further information on the project in general can be obtained from the Project Co-ordinator: Paula Harrison (paharriso@aol.com).

[1] Haslett et al. (in press). Changing conservation strategies in Europe: A framework integrating ecosystem services and dynamics. *Biodiversity and Conservation*.

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