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**FOOD FOR THOUGHT
SOME INDEPENDENT VIEWS**

The Challenge of halting the loss of biodiversity

Author: Pierre Hunkeler

2010 is a key reference date with regard to the conservation of biodiversity in Europe. Nine years after the formal commitment of 2001 to halt its loss, it is time to take a clear stand on the present situation and to agree on the steps to be taken to meet this commitment, even belatedly.

Europe has a highly valued natural common heritage, often very closely linked to its cultural heritage. It has also a very long tradition of conservation, with highlights such as the European Years of Nature Conservation of 1970 and 1995, the Berne Convention, the Pan-European Biological and Landscape Diversity Strategy, the development of a very diverse networks of protected areas, including the European Diploma, one of the oldest scheme, and the more recent Natura 2'000 and Emerald networks.

These progresses were largely due to the active work of conservation pioneer institutions and individuals. But their deep dedication could only partially compensate the limitation of the means at their disposal.

The situation has significantly evolved recently; with biodiversity conservation being more and more fully recognised at all levels of European governments, institutions and organisations.

Such major change in the recognition of the value of biodiversity should have had a significant and visible concrete impact on its conservation. Unfortunately politicians, governments and the public, though generally well aware of the situation, do not yet act according to the accepted facts and pronouncements.

Some good progresses should of course be noted. For example the development of ambitious national strategies for biodiversity conservation in several European countries and the overall increase in the coverage of protected area, which now include a more significant proportion of the European natural heritage.

Progress in knowledge of the real situation are also significant, with recent initiatives such as the project Streamlining European 2010 Biodiversity Indicator (SEBI) and regional reports such EEA Report 4/2009 Progress towards the European 2010 Biodiversity Target.

On the negative side, the inclusion of biodiversity conservation in agriculture policies has often remained at a prescriptive level, without clear definitions of objectives. Hence, the decline of birds in agricultural lands, of butterflies in grassland and of local races and varieties continues unabated.

The ideal multi functionality of forest and agriculture is still very unbalanced in favour of productivity, at the expense of other interests such as landscape and nature protection. Destruction of ecosystems is still largely free, while ecosystem services are not paid for. Long term outlook is rather bleak if the situation remains unchanged (OCDE Environmental Outlook to 2030, published in 2008).

Exploitation of marine resources is still largely not sustainable, while good example in freshwater show that the productivity of aquatic natural systems, when properly managed, can provide long term and interesting benefits.

It is evident that, if present trends continue, European people will not be able to benefit fully on the middle and long term from nature's multiple values and will lose the advantages they can gain from them. It is time therefore to really recognise and reward the value delivered to society by the natural environment and make more visible the interest of ecosystems and biodiversity.

This will require major efforts or raise public awareness and knowledge to change the present situation where a majority of people still have a vague notion of what biodiversity means, where few know the meaning and value of the Natura 2000 network and where young people can easily list the strange names of Pokémons but not those of a few common local plant and animal species.

There is little excuse for inaction in view of the mass of knowledge accumulated, especially recently, and of the numerous well thought out declarations of intentions and action (see for example the Ministerial Declaration of the Fifth Ministerial Conference "Environment for Europe, Kiev, May 2003", the Message from Athens issued by the European Union in April 2009 and Conservation for a New Era, by J.A. McNeely and S.A. Mainka, just published by IUCN.

Coming with a complex system of protected Areas in Europe

Author: Robert Brunner

Background

Europe is the continent with the largest concentration of countries and therefore also of borders. Effective habitat protection, the establishment of networks which can serve as corridors for migrating species or the creation of large effective protected areas quickly come up against borders if protection is not regulated across borders by bi- or multilateral agreements.

NATURA 2000 is the main and most famous network of protected areas obligatory for EU states. This network should ensure the sustainable protection of European natural habitats. The Bern Convention of the Council of Europe, which the European Union also ratified, laid its foundations. The Emerald Network, based on the Bern Convention, is the equivalent of the NATURA2000 network and is valid for the non-EU-countries.

However, European states are not only bound by these two protected area systems. The ratification of conventions such as Ramsar, the Alpine Convention or the Convention on Biological Diversity also commits member states to implement the relevant objectives.

Besides the obligatory categories of protected areas, there are several initiatives which build networks and thus support pan-European nature protection across borders (e.g. Green Belt, Danube Parks, Dinaric Arc Initiative, ICPDR). These initiatives, that are often promoted by NGOs, draw on existing protected areas from other systems, but enlarge and complement them at a regional level.

Whereas the objectives of international protected area systems are quite similar, those of national programmes for protected areas in states which have developed one are strongly influenced by national characteristics and are not always comparable in their terminology and contents. A national park in England does not correspond to one in Finland, an Austrian protected area cannot be compared with a Russian zapovednik.

Protected area systems are often erroneously equated with protected area categories. The commendable division by the IUCN of protected areas by management categories is merely a classification of protected areas in order to better compare them. This categorisation only results in a legal obligation when its definitions are also transferred into national legislations.

Examples

Natura 2000 is the main element of European nature protection policies. The aim is to establish an EU-wide system of protected areas in order to guarantee a sustainable protection of European natural and cultural landscapes with their characteristic fauna and flora. It is based on the Flora-Fauna-Habitat Directive (FFH) and the Birds Directive of the European Union.

The protocol on Conservation of Nature and the Countryside of the Alpine Convention demands a commitment to conserve and identify protected areas, create ecological networks and protect habitats and biodiversity.

Similar formulations can also be found in other protected area concepts, whether these are promoted by governmental organisations or NGOs. As an example of NGO one can mention EECONET. A primary concern of EECONET is to secure a pro-active approach to preserve what remains of Europe's natural values increasing the biological and landscape diversity of the continent. Concrete measures aimed at enhancing the functions of natural systems are the identification of core areas to ensure the conservation of habitat types and species, the

provision of corridors or stepping stones to enhance the coherence of natural systems, providing new habitats and facilitating dispersal and migration (EECONET).

Coherence of goals

Safeguarding and promoting habitat and species diversity are key elements of all protected area systems. One reason being the Convention on Biological Diversity that was signed by many states. Connectivity is requested and promoted in almost all systems as well as the development of network systems and corridors, in particular with regards to migrating species but also for the exchange with other populations (genetic pool).

The analysis of shortcomings, the completion of protected areas in order to cover all habitats, species and populations deserving protection or the sustainable use of natural resources within the relevant protection category are among the common objectives.

This leaves the question of why there are so many systems of protected areas in Europe. One reason may be the large number of states which adopted regulations long before common protected area systems. Another reason may be found in the small structure of the continent which does not facilitate general regulations as can be seen from the long development history of Natura2000. And there are many NGOs in Europe which engage in the creation of protected areas and systems of protected areas, also across borders.

This variety of protected area systems can be confusing. Even experts have difficulties in keeping track of all acronyms such as Natura2000, PEEN, PEBLDS, CBD, EECONET, etc. There a harmonization or unification of systems could increase efficiency. At the same time, many systems guarantee broad and diverse public information activities which can contribute to disseminating information on protected areas among the public and thus help in achieving an acceptance of protected areas.

Integrating public and private efforts for protected areas

Author: IUCN

Background

Protected areas are essential tools for biodiversity conservation. While they obviously focus more on conserving the diversity of nature by preserving species and habitats, they are increasingly recognised as crucial providers of ecosystem services and biological resources, key components in climate change mitigation strategies, and in some cases are also regarded as vehicles for protecting threatened human communities or sites of great cultural and spiritual value.

Protected areas embrace a wide range of different management objectives and approaches. This ranges from strict nature reserves (IUCN category Ia) that are managed for science and monitoring, to protected landscapes or seascapes where human actions have shaped cultural landscapes (IUCN category V), to areas that are managed to ensure the sustainable use of natural resources (IUCN category VI).

Many systems of protected areas and other related supporting initiatives exist in Europe. Such systems include the Natura 2000 network, recognised as the cornerstone of biodiversity conservation efforts in the EU, with ca. 25,000 sites, covering an area of around 750,000 km² (representing 17% of the total land area of the EU) plus 150,000 km² of marine environment); and the Emerald Network, a network of Areas of Special Conservation Interest that is based on the same principles as Natura 2000 but in non-Community countries. Recently, efforts are also underway to apply a Natura 2000 type system to the EU Outermost Regions (ORs) and Overseas Countries and Territories (OCTs) which do not fall under EU legislation.

Furthermore, the Pan-European Ecological Network (PEEN) is one of the most important implementation tools of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). PEEN aims to link the different European and national protected areas and ecological networks with the goal of ensuring favourable conservation status for Europe's key ecosystems, habitats, species and landscapes.

The importance of protecting the remaining wilderness and wild areas in Europe is now being increasingly appreciated, in particular, after the high level Conference held in Prague in May 2009 that resulted in the 'Message from Prague', that calls for improved protection for wilderness areas through policy development, awareness raising, research and capacity building. These areas are important for a wide variety of reasons, not only for the protection of species and habitats, but also for the numerous and diverse range of economic, social and other environmental benefits that they provide. Other international protected area initiatives in Europe include the European Green Belt Initiative, the Dinaric Arc Initiative, the Carpathian Network of Protected Areas and the ecological networks in the Alps.

Despite these initiatives and the resources invested into them, Europe's biodiversity continues to decline as made evident by the first assessment on the conservation status of habitats and species protected under the Habitats directive ('Article 17 reporting'), IUCN Red Lists, reports from the European Environment Agency and other sources of information. Part of the explanation for this decline lies in the fact that to a large degree, these initiatives are being implemented in a disjointed manner without the benefit of a unifying vision. There is an urgent need to optimise synergy between these diverse conservation initiatives and to ensure that shared goals are realised through collaboration. Europe should look towards a broad partnership approach to conservation, one that is considerate of the needs and objectives of key stakeholders and presents solutions and alternatives under the umbrella of an overall guiding vision.

Management of private protected areas in Europe

Aside from those protected areas that are managed by governments, many others are owned or managed by private individuals, companies, organizations, communities and faith groups.

Similar to public protected areas, private protected areas also provide a variety of important conservation benefits and other services. These include providing safe havens for humans and animals alike, the breeding of endangered species in the wild for subsequent re-introduction, ecological tourism and the sustainable use of wildlife. The contribution of private conservation areas to the overall effort, especially in Europe, is crucial.

In Europe 75% of the land is privately owned. Thus there is a great need to engage both land owners and the private sector and consequently to explore possibilities for integrating their efforts in enhancing landscape resilience and connectivity.

Opportunities for integrating habitat restoration as an important component of the overall conservation effort have to be pursued as well, wherever possible. For instance, there are 28,000 aggregate extraction sites in the European Union, whose restoration can be directed so that they provide the best possible contribution to the creation of natural infrastructure, improvement of ecological connectivity and enhancement of landscape resilience. Indeed, the sector's commitment and willingness to protect and restore biological systems have been demonstrated on the ground with many examples that include Natura 2000 sites.

Greater awareness within the private sector of its potential contribution to the conservation of biodiversity should help strengthen and increase its involvement in conservation initiatives, especially where this makes good business sense. The business case for conservation needs to be articulated and demonstrated to a greater degree and biodiversity offsets along with environmental compensations might provide an innovative mechanism for increasing investments in conservation management and action.

In particular, individual private land owners could be stimulated to make their own contributions through the provision of innovative financing mechanisms as there is a constant shortfall in necessary funding for effective management of protected areas from state budgets. It is therefore time to develop financing mechanisms that will increase the affectivity of public investments in rural areas and will generate opportunities for private investment in natural infrastructure. In this regard, it is necessary to encourage the private owners of conservation areas to refine the use of their land in order to support the protection of its biodiversity values or to maintain the quality of the products they expect to obtain from the sustainable use of their property. The land owner may agree to self-imposed restrictions on the use of the land through the designation of easements on their land that specifically allows the use of the land in perpetuity. Benefits will emerge from the positive public perception associated with this kind of conservation activity and consequently there exists the possibility of taking advantage of reduced taxation of the land. In this manner, the perception of nature will change from a 'cost' to society, to an economic opportunity that will also be of social and ecological benefit to society and the people living in or adjacent to protected sites.

Land owners also have a great contribution to make in maintaining high nature value farmlands, as most farmed land in Europe is in private hands and a large part of Europe's protected areas are under farming systems that are beneficial for biodiversity. We must maintain the low-intensity land uses that favours the dynamics of natural processes and creates opportunities for biodiversity to flourish across large, contiguous areas of land. This is the basis of High Nature Value farming of the semi-natural grasslands, scrublands and woodlands that dominate extensive areas of Europe's marginal rural regions.

However, there is increasing and very justifiable pressure to take proper account of human needs when setting up protected areas and these sometimes have to be 'traded off' against conservation needs. Whereas in the past, governments often made decisions about protected areas and informed local people afterwards, today the emphasis is shifting towards greater discussions with stakeholders and joint decisions about how such lands should be set aside and

managed. Such negotiations are never easy but usually produce stronger and longer-lasting results for both conservation and people.

The role of European NGOs is key in the management of both public and private protected areas. At present, many European NGOs perform an intermediary role in the management of protected areas. In many cases when a protected area belongs to the government, NGOs are asked to develop a protected area management plan and therefore advise on the best management approach. NGOs are usually trusted and are sometimes asked to lead on stakeholder consultations to ensure public support.

NGOs are in many cases in charge of establishing monitoring systems to evaluate the effectiveness of the management of protected areas. They also provide training to strengthen the capacity and effectiveness of protected area managers through the provision of guidance, tools and information.

In addition a further threat to the European protected area system is climate change. Yet, to a certain extent it could also provide new opportunities in increasing the contribution of the private sector towards biodiversity conservation. Forced changes in land use will provide a window of opportunity to engage land owners and the private sector in land use and management practices that offer additional benefits for biodiversity.

There exists a range of options and opportunities for the private sector and land owners to contribute to the sustainable management of protected areas in Europe but it is clear that more could be developed to ensure optimal integration with public efforts and the promotion of Europe's green infrastructure and its landscape resilience agenda.

Applying in Europe the CBD Programme of work on Protected Areas

Author: Mart Klvik

The Millennium Ecosystem Assessment reveals that ecosystem functioning which maintains a living planet is being undermined by human transformation. Analysts such as Norman Myers and Edward O. Wilson claim that restoring the species lost and their eco-settings could take as much as a million years. Yet human intervention is now so systematic that these restorative processes may no longer be working effectively, so the healing period could be much longer.

The content and targets of the Workshop 2 should be seen in the context of this background. It addresses the scope for knowledge-based designation and planning of protected areas and ecological networks, to halt the loss of biodiversity beyond 2010. What came out uniquely important from the presentations and discussion in this Workshop is rigorous evidence base that tells us that we must act to retain most valuable species, habitats and landscapes in their ecological integrity while providing a viable livelihood for people living in these areas.

As the WP2 aims regard, PoWPA has set the targets mainly in the Programme Element 1: Direct actions for planning, selecting, establishing, strengthening, and managing, protected area systems and sites.

According to the Draft review of the implementation of the CBD programme of work on protected areas (PoWPA)¹, which synthesizes the information, inter alia, contained in annex III of 65 fourth national reports, on progress towards achieving targets of the programme of work.

On target 1.1 "To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals (timeline 2010 for terrestrial and 2012 for marine)", the report shows that Good progress to date globally for terrestrial areas but very little progress for marine areas has been made. More than 15 countries worldwide (including Finland and Germany as examples from EU) have completed a comprehensive ecological gap analysis and are in the process of implementing the results, whether by establishing new protected areas, extending existing protected areas, or by other means. Under the UNDP GEF "Supporting Country Action on the CBD Programme of Work on Protected Areas" project, Albania, Armenia, Bosnia and Herzegovina, as cases from Europe are currently undertaking the gap analysis. Following the results of the analysis, the under-represented ecosystems typically include: coastal areas, cave systems, karsts, grasslands, rivers and river canyons, marshes, and most significantly, marine systems.

On target 1.2 "By 2015, all protected areas and protected area systems are integrated into the wider land- and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity / and the concept, where appropriate, of ecological networks" the report indicates that Some progress to date has been made. Can possibly be achieved by the target date provided more systematic efforts are put in place in the next five years

In the worldwide context the progress towards achieving this target is more evident in Europe. The majority of countries indicated enabling legislative, policy measures and tools for integrating protected areas into broader land and seascapes and sectoral interests. Examples include the Protected Areas Act in Albania; Directives under beyond sites requirement of the European Commission Bird and Habitat Directives -Natura 2000 in European Community member States; Article 3 of the Federal Nature Conservation Act in Germany; the National Natural Heritage Plan in France; and the Ecological Network Act in Ukraine. In many countries, protected areas are integrated into surrounding areas through regional development planning,

¹ Draft review of the implementation of the CBD programme of work on protected areas, September 2009, wspotpa-
cee-01-draft-review-en.doc

spatial planning, including establishment of ecological corridors, core areas, buffer zones and Biosphere Reserves.

Many reporting countries indicated they had taken steps to improve connectivity and ecological networks. Some European examples include green corridors in Hungary; eco-tunnels and eco-passages in Belgium. However, in practice the sectoral interests and competing land uses make it difficult to integrate protected areas into broader land and seascapes. Information on efforts to integrate marine and coastal protected areas into surrounding seascapes has not been well reported.

On target 1.3 to “Establish and strengthen by 2010/2012 transboundary protected areas, other forms of collaboration between neighbouring protected areas across national boundaries and regional networks, to enhance the conservation and sustainable use of biological diversity, implementing the ecosystem approach, and improving international cooperation” the report shows that fair to good progress to date globally, 34% increase in number of transboundary protected areas complexes, could be achieved partially worldwide.

Nearly all reporting countries indicated collaboration with neighbouring countries in establishing transboundary protected areas and regional networks, as well as cross-boundary management agreements. Multilateral environmental agreements such as the Convention on Migratory Species, the Convention on International Trade on Endangered Species, the Ramsar Convention on Wetlands, along with the Convention on Biological Diversity, as well as many other regional instruments, including the Protocol Concerning Specially Protected Areas and Wildlife, the Barcelona Convention, and the Alpine Convention provided suitable frameworks for regional cooperation that facilitated the achievement of this target.

Important European regional transborder protected area networks mentioned in the CBD report include the Alpine Protected Area network, the Pan European Ecological Network, Transnational River Basin Districts on the Eastern Side of the Baltic Sea Network, Danube Delta and Prut river initiative between Romania, Ukraine and Moldova; Eastern Carpathian migratory corridor (Polish-Slovak-Ukrainian Biosphere Reserve); the intercontinental Biosphere Reserve of the Mediterranean Andalusia (Spain) established in 2006 and The East Asian-Australasian Flyway.

In addition to development and standardization of the methodologies of ecological domain and natural sciences, there is a significant lack of methods for systematic social scientific assessment of human-environment relationships in protected area networks. In general, more interdisciplinary research and monitoring are needed.

The designation of protected areas as well as different zones with management restrictions of ecological networks, is usually considered an “outside intervention”. The zonation of core areas or other restrictions in the use of natural resources may conflict with local property rights, commercial interests, or local people’s perceptions of the main problems in the region.

If protected areas networks planners and managers want to become an accepted partner, all relevant stakeholders and the local people should have the opportunity to get their voices heard. Designation and planning process should improve participation and inter-sectoral cooperation for mutual learning.

Ecological networks can become one of prototypes of integrated planning and, in such, achieve a goal of being model areas for sustainable development.

Integrating socio-economic aspects and building alliances with users

Author: Lawrence Jones-Walters, ECNC

Context

It has been mainly in the latter part of the 20th Century that Europe has moved to identify nature reserves, national parks and other sites and protected areas with special value for wildlife. Thus, in many countries the adoption of the Bern Convention on the Conservation of European Wildlife and Natural Habitats in 1979 resulted in the strengthening of existing or the introduction of new legislation; giving many of their natural areas and endangered species statutory protection for the first time. The subsequent implementation of the 1979 EC Birds Directive and the 1992 EC Habitats Directive provided for the establishment of a representative system of legally protected areas throughout the EU, known as Natura 2000. These directives further strengthened existing protected site series at national level, or stimulated countries to define lists of protected sites where they did not already exist.

One of the consequences of the legislation is a requirement to inform the people who own, occupy, live and work in these special areas of the new designation and its implications for their activities. At this point the process of site protection moves from being a policy driven, science and evidence-based exercise of evaluation and selection, into the realm of stakeholder and public consultation and involvement. It introduces the uncertainty of human reaction and interaction, provides a forum for potential conflict and requires the application of a whole range of new skills based on communication, human relations and social and political interactions.

Not only this, but by defining boundaries around protected areas and using this as a means for exercising control over their use and management, or by providing protection for certain species independent of location, the debate quickly moves into the arena of finance and economics. The present and future use and management of land, for example by local people, for agriculture or for domestic, business and industrial development, power generation and infrastructure, has a monetary tariff associated with it. The resulting juxtaposition of nature, land management, development and use has begged many questions about the monetary value of nature; a discussion that has broadened in scope with the growing recognition that ecosystems provide a range of goods and services that are essential for the long-term well-being of individuals and society as a whole.

The integration of socio-economic aspects and the requirement for building alliances with key stakeholders can therefore be seen as a major challenge for those charged with the responsibility for ensuring the future, sustainable use and management of Europe's protected areas.

Dealing with socio-economic issues

The process of site selection and designation is highly institutionalised. Enabling legislation is framed by policy experts, often with the help of the legal profession; site selection and boundary definition is usually carried out by specialists in the field of ecology. In both cases the involvement of those who are most likely to be affected by the legislation, the owners, users and managers of land, has been limited. The reasons for this are well understood; there is little perceived contribution that non-specialists/professionals could make in these areas, and so they are not asked to make an input, and the language used and the subject matter is in any case impenetrable and highly jargonised.

For many of the people who receive the paperwork and formal contact from the Ministry or agency charged with process of site designation it is the first that they will have ever heard of it. Little wonder that they rapidly become alarmed at the heavy judicial language and apparent sanctions that may be meted out to them should they fail to comply with the stipulations of the notice. Anger and frustration, directed at the bureaucracy, the institutions

and the individuals with whom they have had to deal is commonplace. In many cases this has been shown to be replaced by a feeling of powerlessness when they attempt to confront 'the system'. They are not equipped to argue against the science-based ecological rationale through which the site was identified and they have little knowledge and understanding of the complexities of the legislation and the associated documentation.

The net result of this approach (with one or two notable exceptions) has been a disenfranchisement of the key stakeholders from the process and a lack of ownership and commitment to achieve any of its objectives. A good example of this was the designation of a series of nationally important wildlife sites in the United Kingdom. Although initiated in 1981, it was 10 years before the steady loss of protected areas slowed to a halt. The reason for this was that it took officers of the state institute for nature a number of years to establish effective working relationships with the managers of the special sites such that they were willing to co-operate and collaborate over the maintenance and introduction of favourable management techniques. Their initial reaction in many cases had been to reject the designation and to continue on a "business as usual" basis; which in this case meant the widespread intensification of agricultural practice resulting in the loss of natural and semi-natural habitat. This effect has been mirrored across Europe.

The example given above provides a clue to finding a solution to the problem of stakeholder disenfranchisement that has resulted from the approach that has been applied to date. Building on now well accepted principles, based on a wealth of sociological research and empirical evidence, including from the field of nature conservation²³, a number of clear principles apply some of which are listed below:

- Identify and involve stakeholders as early as possible in the process.
- Support clear and effective written communication and information with face-to-face contact.
- Ensure that the staff charged with making face-to-face contact with stakeholders have the necessary skills and experience.
- Strategic partnerships with trusted and influential stakeholders should be created; these key stakeholders should be actively involved in the planning and implementation process from an early stage.
- Where possible use local knowledge and experience.
- Quantify the economic benefits of the protected area/ecological network and make them explicit to stakeholders at all levels.
- Ensure equal access to relevant information for all stakeholders and begin any consultation processes in time in order to enhance voluntary compliance.
- Try to avoid conflict in the first place; this is better than having to manage or resolve it.
- Use neutral experts to facilitate the process if necessary.

Another major factor in establishing the cooperation of key stakeholders is the availability of financial support. In relation to land management this may arrive in the form of agri-environment or other similar funding, targeted at the maintenance or establishment of favourable management. When an owner or manager of land decides to change existing, favourable management, financial support may be offered in the form of compensation for losses forgone as a result of the restrictions imposed by the legislation. Otherwise money can be made available to reintroduce traditional forms of management or to support the maintenance of uneconomic agricultural practices. By inference, the introduction of funding schemes implies a societal value for biodiversity and for the ecosystem services provided by the land. Without the provision of such funding the process of protecting and managing the end becomes increasingly difficult; the absence of agricultural subsidy or poorly targeted

² European Commission Project: ENV.B.2/SE/2008/0035. Preparatory Actions for Natura 2000. Lot 3: Dealing with conflicts in the implementation and management of the Natura 2000 network. Best practices at the local/site level. Alterra/ECNC/Eurosite.

³ Jones-Walters, L., M. Snethlage, K. Civic, A. Cil and I. Smit (2009) *Making the connection! Guidelines for involving stakeholders in the implementation of ecological networks*; ECNC, Tilburg, the Netherlands.

agricultural subsidy, combined with other socio-economic factors, can result in land intensification or even abandonment.

The failure or absence of agri-environment funding to support protected area management and a medium to long-term perspective that suggests, based on human demography and population structure, state support for nature conservation can only decline, has led to a serious examination of alternative economic mechanisms for supporting positive management for nature. A number of pilot schemes are now in operation across Europe to explore the possibilities for 'Pro Biodiversity Business'; usually micro, small to medium-sized enterprises whose business profitability is based on biodiversity. Examples include ecotourism, utilisation of medicinal herbs, honey production and aquaculture. A number of examples now show that premium prices can be obtained by producers who utilise 'natural branding' by linking their products to protected areas, including Natura 2000 sites.

The promotion of such schemes in conjunction with the designation of protected areas can actually be seen as a positive incentive for key stakeholders to become more involved with the process of site protection and management. Another advantage of such an approach is that it can potentially disconnect positive management from the need for state subsidy. It also requires a new skills set on the part of nature conservation professional (or that they import such skills) but it also helps to bring groups of similar enterprises together within and between sites, thereby enhancing communication and the potential for positive engagement.

The result of providing formal protection for biodiversity is also that when any development is proposed that would have an effect on a protected species or area, it should be judged in terms of the 'significance' of that effect. As a response to this, ecologists and environmental economists have developed a range of tools and methods to quantify and monetize the value of protected species and sites, shifting their focus in recent years to whole ecosystems and the goods and services that they provide. However, Pavan Sukhdev in his preface to the recent and highly influential publication: "The economics of ecosystems and biodiversity: an interim report" (TEEB - European Communities, 2008), states that "we are still struggling to find the value of nature" and that this lack of valuation is "an underlying cause for the observed degradation of ecosystems and the loss of biodiversity".

The Economics of Ecosystems and Biodiversity⁴ (TEEB) process is the most recent and topical initiative which has addressed the economic value of ecosystem services; it also seeks to develop a range of economic tools and policies to take proper account of this value. It is based on the argument that while nature provides human society with the vast diversity of benefits (ecosystem services), they are predominantly public goods with no markets and prices so are rarely detected by our current economic approach. As a result (in essence, of having no explicit financial value) biodiversity is declining, ecosystems are being degraded and humanity is suffering the consequences.

TEEB is clearly timely for a number of reasons; not least the current financial crisis which is acting as a driver for governments to develop economic stimulus packages that could lead to larger national budget deficits and smaller budgets to manage and invest in "public goods" such as nature areas. There is an opportunity to factor-in investments in ecosystems as part of these packages and the United Nations Environment Programme has responded by launching the Green Economy Initiative, which aims to build the case for including investments in ecosystems, renewable energy and sustainable building and construction. However, without having an adequate understanding of the net economic benefit of nature areas, a proxy for our global environmental infrastructure, and how many jobs are directly and indirectly sustained, it will remain difficult for governments to justify and incorporate investments in ecosystems and nature areas as part of these packages.

It is therefore to be hoped that the approaches that will be made available through the TEEB process may establish new tools that can provide policymakers with easily digested information that they can trust (and which can contribute to the overall effort in relation to the

⁴ http://ec.europa.eu/environment/nature/biodiversity/economics/index_en.htm

valuation of ecosystem services). Better informed decision making will assist in the delivery of increasingly sustainable development and should result in an improvement in the outlook for biodiversity, ecosystems and the provision of goods and services, well beyond 2010. Significantly, the recent Athens conference⁵ on the future direction of EU policy on biodiversity protection addressed "economics and finance", "biodiversity and business" and "biodiversity protection beyond 2010" in separate working groups in order to stimulate target discussions.

⁵ From 27 to 28 April 2009, the European Commission organized a conference in Athens to consider the future direction of EU policy on biodiversity protection. Extensive information on the materials presented and discussed in the conference are available on the DG ENV web-site http://ec.europa.eu/environment/nature/biodiversity/conference/index_en.htm

From Protected Areas to Ecological Networks: the key role of connectivity

Author: Graham Bennett

Introduction

Until well into historical times, most ecosystems were characterised by a high level of connectivity. However, the ever-increasing extent and intensity of human exploitation of natural resources has led to widespread ecological fragmentation in most of the world's regions. Indeed, habitat fragmentation is now one of the most important causes of the decline in biodiversity.

This is not to say that the absence of connectivity is a serious and immediate threat to all forms of biodiversity. For many species, such as most plants, linkages with other patches of their habitat are not the most important determinant of their survival in the short term. For viability in the longer term, however, ecological coherence is important to a wide range of species. Specifically, there are six main reasons why connectivity can increase the viability of species populations:

1. It allows individual animals access to a larger area of habitat – for example, to forage, to facilitate the dispersal of juveniles or to encourage the recolonisation of “empty” habitat patches.
2. It facilitates seasonal migration.
3. It permits genetic exchange with other local populations of the same species (although this only requires very occasional contact).
4. It offers opportunities for individuals to move away from a habitat that is degrading or from an area that is suffering environmental stress (which will become increasingly important as climate change progresses).
5. It facilitates the survival of a full complement of species within an ecosystem (on which individual species can be dependent).
6. It secures the integrity of physical environmental processes that are vital to the requirements of certain species, such as periodic flooding.

Ecological Networks

Although the way in which the ecological network model is elaborated and applied reflects certain conceptual, methodological and instrumental variants, the various approaches share two generic goals, namely:

1. Maintaining ecosystem functions as a means to facilitate the conservation of species and habitats
2. Promoting the sustainable use of natural resources in order to reduce the impacts of human activities on biodiversity and/or to increase the biodiversity value of man-managed landscapes.

In achieving these goals, the programmes are characterised by a number of common elements, as follows:

- a focus on conserving biodiversity at the landscape, ecosystem or regional scale
- an emphasis on maintaining or strengthening ecological coherence, primarily through providing for connectivity
- ensuring that critical areas are buffered from the effects of potentially damaging external activities
- restoring where appropriate degraded ecosystems
- promoting the sustainable use of natural resources in areas of importance to biodiversity conservation.

Ecological networks also share a common understanding of how this model should be applied on the ground, namely through the allocation of specific functions to different areas depending on their ecological value and their natural-resource potential. These functions are reflected in a coherent system of areal components:

- Core areas, where the conservation of biodiversity takes primary importance, even if the area is not legally protected
- Corridors, which serve to maintain vital ecological or environmental connections by maintaining physical (though not necessarily linear) linkages between the core areas
- Buffer zones, which protect the network from potentially damaging external influences and which are essentially transitional areas characterized by compatible land uses
- Sustainable-use areas, where opportunities are exploited within the landscape mosaic for the sustainable use of natural resources together with maintenance of most ecosystem services.

It is now clear that climate change poses a serious threat to ecosystems worldwide. For example, climate-related changes to a wide range of biomes have been measured, such as freshwater lakes and highland rainforests, and data show that climate change has already altered range boundaries and phenology. The IPCC's recent Fourth Assessment Report identified a wide range of impacts, including species extinctions, shrinking ecosystems and shifting biomes. The IPCC even concluded that, from 2050, climate change will probably be the primary cause of global biodiversity loss.

These findings have far-reaching implications for the sustainability of ecosystem services. Many regions will increasingly be faced with the need to develop and implement adaptation measures in order to ensure that ecosystem services are maintained in a changing climate. Strengthening the coherence of ecosystems is therefore essential if the biodiversity impacts of climate change are to be minimised, and particularly for biomes and species populations which are likely to shift geographically in response to climate change.

Ecological Networks And Protected Areas

In practice, land tenure and management frameworks in ecological networks vary widely. Some of the land may include protected areas, particularly those parts designated as core areas in the network. Protected areas can therefore play a special role in strengthening the integrity of ecological networks. Indeed, through their proximity and environmental interrelationship, some protected areas may effectively function as networks. Conversely, because ecological networks can reduce fragmentation, retain opportunities for the movement of wildlife and promote nature-friendly forms of land use, they also have a role to play in supporting the long-term viability of protected areas. Indeed, this interdependence is central to the CBD's Programme of Work on Protected Areas, which aims to integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.

The Ecosystem Approach

It is interesting to note that, when viewed in terms of management models, the Ecosystem Approach is closely aligned to the principles of the ecological network model. The Ecosystem Approach, which in 2000 was identified by the CBD Conference of the Parties as the primary framework for implementing the Convention on Biological Diversity, is a broad-based strategy for managing natural resources with the aim of promoting biodiversity conservation and sustainable use in an equitable way. At the heart of the approach is the awareness that, without the effective management of ecosystems, there can be no economic development that generates sustainable human and social welfare; equally, without the full engagement of diverse sectors in the economy and society in the management of ecosystems, there can be no effective biodiversity conservation. Realising the Ecosystem Approach is achieved through the application of 12 principles and five points of operational guidance. These show a high level of correspondence with the characteristics of the ecological network model, since both focus on maintaining ecosystem functions in the long term and securing the sustainable use of natural resources.

Lessons From Experience

Substantial experience with programmes that aim to strengthen coherence and connectivity has been gained over the past decades. A number of conclusions can be drawn from this experience:

- The increasing body of evidence from well-documented and monitored programmes shows that appropriately designed linkages generally meet the expectations of how they will function in practice.
- The documented cases show very few instances where connectivity programmes cause damaging conservation effects, such as establishing a route for an invasive alien species. This is not to say that such examples do not exist, but on the basis of the literature it can be concluded that they are the exception rather than the rule.
- Most of the documented examples suggest that strengthening connectivity was the most cost-effective means of achieving the conservation objective. Moreover, in many cases the linkage was demonstrably the only feasible option to achieve the conservation objective; in other cases, alternative courses of action – such as enlarging a protected area – would have involved serious problems.
- The complexity of the factors that determine how each specific linkage functions make it difficult to generalise practical experience. Although conservation biology offers useful theoretical insights into the value of connectivity, there is no substitute for good local understanding of how ecosystems function and of the specific problems that need to be solved.
- One aspect of the connectivity debate that is often overlooked is that an improved understanding of connectivity can help prevent the damaging fragmentation of relatively pristine regions when their natural resources are opened up to exploitation. Understanding how the ecosystems function enables us to ensure that critical linkages are maintained, which is an essential condition for securing the sustainable use of biodiversity.

Challenges

Despite this progress, several challenges remain if we are to ensure that ecological network programmes meet their full potential:

- Institutional requirements. Because ecological networks require a long-term management process and operate across an array of administrative units with the involvement of a large number of stakeholders, their development and realisation place high demands on the institutional framework. Specifically, this requires robust zoning arrangements, effective enforcement procedures, financial security for corporate stakeholders and clearly defined public and private ownership patterns. Moreover, it is also important that a particular vision of conservation and economic development be shared across the political spectrum and by successive governments.
- Process management. This long-term, broad-based process also requires a substantial investment in management resources and the adoption of an integrative approach. Each ecological network has to meet strategic objectives, collect and assess a complex array of data, ensure the commitment of local communities, attract long-term funders and effect a programme of implementing actions.
- Short-term needs versus long-term objectives. A major challenge for ecological networks is to find ways of meeting short-term needs while implementing measures that contribute to securing long-term objectives. Urgent issues that demand immediate action, such as highly threatened species populations or rural deprivation, have to be balanced against the necessity to invest in measures that will secure ecosystem management and sustainability in the longer-term.
- Building stakeholder and community support. No programme with the breadth and ambition of an ecological network can achieve results without the active support of local communities. There is clearly a tension between the necessity to develop a coherent programme at the regional scale and the need to ensure that the main measures are driven by local needs and perceived as providing a solution to local problems. A particularly difficult issue that confronts all such initiatives is how to ensure that all relevant stakeholders can be persuaded to become fully involved in the programme and committed to achieving its goals. The appropriate balance has clearly not been found in all the programmes. Where local support has been secured, it is almost invariably through projects that offer direct and tangible benefits to communities.

The challenge of climate change for protected Areas

Author: Yves de Soye

Introduction

Mitigation is to avoid the unmanageable, Adaptation to manage the unavoidable.

Climate change is widely expected to become the greatest threat to global and European biodiversity over the coming decades. Protected areas and ecological networks with the biodiversity they contain, and connect, may suffer like the surrounding land or seascapes; and yet they will continue to play a key role in the long-term preservation and adaptation of biodiversity. This workshop will summarise the diverse aspects of the climate change-biodiversity-protected area networks interface, explore the resulting risks and opportunities, identify the changes necessary in biodiversity and protected area network management, and formulate concrete action points that will help Europe secure its biodiversity and natural habitats while benefitting from the ecosystem services these provide.

The linkages between biodiversity and climate change

Comprehensive global overviews of the multi-faceted linkages between climate change and biodiversity have recently been provided for the Convention on Biological Diversity by its Ad Hoc Technical Expert Group (CBD 2009) and by Campbell *et al.* (2009). The relationship between biodiversity and climate change comprises the following distinctive elements:

Impacts of climate change on biodiversity and protected areas

Direct impacts

The direct impacts on biodiversity and ecosystems of increasing average temperatures, changing precipitation patterns, climatic extremes, rising sea levels, the acidification of the world's oceans, and so forth. The evidence for impacts on European species and habitats in particular is amongst the best studied in the world, and has been reviewed, e.g., by Olofsson *et al.* (2008) and Bertzky *et al.* (2009). They found changes such as in species and ecosystem composition; distributional ranges; phenology; the synchronisation of events; disturbance regimes; and in hydrological and carbon sequestration regimes. However, important knowledge gaps remain, particularly on the role of ecological interactions, and with regard to data from eastern and southern Europe, the Outermost Regions, and the EU's Overseas Countries and Territories.

Forecasts using climate models are available for a good number of European species. Up to 52% of European vertebrates and plants species are forecasted to lose suitable climate space within existing protected areas by 2080, and up to 58% of Habitat Directive species in Natura 2000 areas (Araujo 2009). Moreover, climate space/envelope modelling commonly disregards essential elements defining a species' vulnerability: its inherent capacity to move and adapt to climate change, and the barriers to dispersal it may encounter in the process. Vos *et al.* (2008) and Bertzky *et al.* (2009) show how the constraints imposed by adaptive capacity and dispersal barriers increase the proportion of species at risk from climate change even further.

Indirect impacts

Climate change adaptation and mitigation measures may be maladaptive and impact negatively on biodiversity and natural ecosystems, including in protected areas if the degree of protection afforded is inadequate. Key reviews are provided by Berry *et al.* (2008) and Keeder & Galt (2009). Of primary concern are (a) impacts arising from unsustainable uses of biomass (crops, wood) for energy purposes; (b) the development of tidal barrages and further hydro dams for electricity production and/or water management, affecting vulnerable and threatened freshwater, riparian and coastal habitats in Europe; (c) increased farmland irrigation leading to reduced water tables; (d) increased pesticide use to control pests; and (d) the risk that climate

change adaptation and mitigation investments will lead to reduced funding for protected area networks and landscape permeability measures.

Indeed, in the short term such indirect impacts of climate change on biodiversity will be more severe than the direct impacts, such that adequate safeguards must be put in place.

Biodiversity adaptation to climate change

Huntley (2007), Harley (2008), Vos *et al.* (2008), CBD (2009) and Tucker & de Soye (2009) provide useful analyses and guidelines on how to best promote the adaptation of biodiversity to climate change. Harley (2008) for instance lists the following overall principles:

1. *Take Action Now.* Uncertainties surrounding the precise nature of future climate change and its impacts on biodiversity should not delay practical conservation action.
 - Reduce other sources of stress and harm not directly linked to climate change.
 - Maintain existing conservation activities in protected areas and intervening habitats.
 - Deliver current biodiversity policy and legislative commitments and agreements.
2. *Maintain and increase ecosystem resilience.* The ability of ecosystems to absorb and recover from change whilst maintaining and increasing biodiversity should be enhanced.
 - Maintain and restore ecosystem function and, where appropriate and cost effective, relocate and create new habitats.
 - Conserve the range and variability of species, habitats and ecosystems.
 - Establish buffer zones with ecologically sensitive management regimes around conservation areas.
 - Control and limit the succession of invasive species.
3. *Accommodate the impacts of climate change.* As both gradual change and extreme weather events will be experienced.
 - Increase understanding of climate change and acceptance that it is unavoidable.
 - Work with ecological succession and not against it.
 - Adopt the principle of 'potential native' species.
 - Establish networks of interconnected protected areas (terrestrial, freshwater and marine) and intervening habitat mosaics to increase permeability and aid gene flow.
 - Plan future conservation areas to ensure that vulnerable species groups and habitats types are protected.
 - Allow for the changing configuration of coasts and rivers by avoiding development in these areas.
 - Consider the role of species translocation and ex-situ conservation, especially for threatened species.
4. *Facilitate knowledge transfer and action between partners, sectors and countries.* Successful adaptation requires that biodiversity conservation is integrated with other land and water management activities.
 - Strengthen existing relationships and build new partnerships.
 - Ensure that policy and practice are integrated across sectors and borders.
 - Coordinate adaptation and mitigation measures to avoid mal-adaptation within and across sectors.
 - Increase awareness of the benefits that biodiversity provides to society and its role in adaptation strategies across all sectors.
 - Communicate best practice and exchange information on successful adaptation.
5. *Develop the knowledge/evidence base and plan strategically.* To effectively plan for an uncertain future, it is essential that the best available evidence is used to develop techniques that allow biodiversity to adapt.
 - Continually review the evidence base and identify knowledge gaps and research opportunities.
 - Undertake vulnerability assessments of biodiversity and associated ecosystems.
 - Undertake scenario assessments and identify 'no regrets' actions.
 - Pilot new approaches through demonstration projects.
 - Develop 'win-win' adaptation measures and use them to build resilience and accommodate change
6. *Use adaptive conservation management.* Effective conservation in a changing climate will require a flexible approach.

- Continual monitoring and re-assessment of adaptation actions as new information and research becomes available.
 - Amendments to biodiversity policy, legislation and agreements to ensure that conservation objectives reflect the challenges presented by climate change.
7. *Monitoring and indicators.* Monitoring is a key contributor to the evidence base and, as such, existing schemes must be strengthened and new requirements incorporated.
- Identify indicators to monitor the impacts of climate change on biodiversity and to assess vulnerability and adaptation.
 - Continue to monitor the observed impacts of climate change on biodiversity and establish procedures to validate projections.
 - Monitor the occurrence and dispersal of 'potential native' species.
 - Monitor the effectiveness of adaptation measures and adaptive conservation management in maintaining and increasing ecosystem resilience and accommodating change.

Effective ecological networks play an essential role in biodiversity adaptation to climate change, reducing the effects of fragmentation and eliminating movement and dispersal barriers between cornerstone protected/natural areas. Indeed, the demands on ecological networks as regards their functional connectivity will increase drastically over the coming decades as more and more species will attempt to follow their shifting climate space if they cannot "stay and adapt". It should therefore be kept in mind that: structural, apparent connectivity may be or become increasingly insufficient; standard ecological network management may need updating; the habitat parameters facilitating dispersal will vary according to species and circumstances, i.e. there is no "one-size-fits-all connectivity"; priorities may need to be identified for the most vulnerable and threatened species; cost-effective solutions are required.

At the same time, biodiversity adaptation requires the redoubling and speeding up of current conservation efforts, inside and outside protected area networks, to protect and manage habitats and species populations, with the aim of maximising the resilience of species and habitats.

"Natural Solutions" to the climate change challenge

Natural ecosystems yield a wide array of services of use in the context of climate change adaptation and mitigation. Publications gathering the relevant concepts and evidence to promote these services, in particular towards the climate change constituency, have been steadily increasing over the past year; most notable are the World Bank report "Convenient Solutions to an Inconvenient Truth: Ecosystem-based Approaches to Climate Change" (2009) and the workshop paper "Natural Solutions: Protected Areas helping People cope with Climate Change" (2009).

Protected areas play an important role in this context as essential core zones providing much of the relevant ecosystem services. In addition, opportunities may exist to increase the extent of high quality habitats, thus enhancing connectivity and the outlook for biodiversity conservation.

Managing and protecting natural ecosystems to support societal adaptation: ecosystem-based adaptation

Climate change impacts may include drought, crop failures, sea-level rise and extreme weather events which are already being felt across the world. Terrestrial, coastal and marine ecosystems can yield significant opportunities for reducing the vulnerability of human communities towards these impacts and helping them adapt in an often cost-effective way. Ecosystem-based approaches to adaptation should hence be part of the portfolio of adaptation measures that stakeholders at all levels and across all sectors can opt for when building their adaptation plans. Solutions can help a variety of sectors, including coastal defence, flood or landslide control, water and energy management, and disaster risk reduction; a typical example being the restoration of natural flood plains along the River Danube to reduce the incidence of flooding.

Protected area networks will in many cases provide the core services required by ecosystem based adaptation schemes. They are also a proven governance system where required.

Managing and protecting natural ecosystems to reduce greenhouse gas emissions and enhance carbon sequestration: ecosystem-based mitigation

Roughly 50% of greenhouse gas emissions are being sequestered by the world's natural ecosystems. At the same time, 20% of anthropogenic emissions come from land use, notably from forest degradation and agricultural practices. Protecting natural ecosystems and using ecosystem management to prevent carbon emissions, secure carbon stocks and maximise carbon sequestration at the same time is hence an obvious solution. This has already been recognised under the ongoing UNFCCC climate negotiations, where the inclusion of a so-called REDD (Reducing Emissions from Deforestation and Forest Degradation) scheme in the post-2012 framework is widely expected. "REDD+" in addition comprises the conservation, sustainable management of forests and the enhancement of forest carbon stocks. Now, REDD/REDD+ will almost certainly be limited to developing countries with great but diminishing forests; also the scheme does not look at storage and sequestration in other ecosystems.

Europe must hence seek to develop other mechanisms to fully use the emission reduction opportunities that natural ecosystems can provide by sequestering carbon and securing the permanence of existing carbon stocks. Important ecosystems in this context are peat lands, forests, grasslands - and soils which bind by far the largest share of terrestrial carbon. An emerging concept here is that of AFOLU (Agriculture, Forestry and Land Use) emissions.

Healthy natural ecosystems in protected areas are a valuable carbon stock and also sequester carbon. Theoretically, however, the restoration of semi-natural or degraded areas inside or outside protected areas may offer greater opportunities for carbon sequestration, while at the same time offering opportunities for enhancing ecological connectivity between protected areas; however this will likely depend on the particular habitat types and conditions and deserves further study.

Interestingly, recent data has revealed the huge carbon sequestration potential of coastal *marine* habitats (the "missing sinks"), with for instance *Posidonia* sea-grasses being the most effective sink known to date (Laffoley & Grimsditch 2009). The maintenance and restoration of such carbon sinks also in the marine realm calls for the designation of coastal marine protected area networks.

A good number of ecosystems services useful for climate change mitigation offer multiple benefits – such as for adaptation, biodiversity conservation and adaptation, or disaster risk reduction; a prime example being the restoration of degraded watersheds with natural forests.

The principal legal framework and policy context

- the United Nations Framework Convention on Climate Change (UNFCCC, 1992) and its Kyoto Protocol (1997). The UNFCCC text already in its introductory paragraphs expresses the concern that "human activities ... will result on average in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind". In reality, however, the negotiations have never so far recognised the full magnitude of the anticipated impacts of climate change and ocean acidification on the world's ecosystems. In the negotiations, ecosystems are valued mainly through the services they provide in the context of mitigation and, to some degree, adaptation. The post-2012 climate framework resulting from the currently ongoing negotiations will be a key policy element, as it should further strengthen the foundation for ecosystem-based approaches to mitigation and adaptation.
- the Convention on Biological Diversity (CBD, 1992), with its Programme of Work on Protected Areas; its Ad Hoc Technical Expert Group on Biodiversity and Climate Change, destined to reach out to the UNFCCC constituency; and the expectation that the climate change-biodiversity interface may play a prominent role also in the post-2010 biodiversity framework.
- EU: the implementation of the 2009 Climate & Energy Package and the 2009 EU White Paper on Adapting to Climate Change; the continuing implementation of the 2006 Biodiversity Communication and Action Plan, especially the management and monitoring of

the Natura 2000 network; a potential EC Communication on Biodiversity and Climate Change in 2010; as well as sectoral policies especially agriculture, forestry, fisheries, maritime, transport, energy, and spatial planning. At EU level, the issue of biodiversity and climate change has been dealt with prominently in the 2009 conferences in Athens, Prague and Liège.

- National policies of EU and other Pan-European countries.