European Biodiversity Research Strategy 2010-2020

Adopted by EPBRS at its meeting in Palma de Mallorca,

13th to15th of April, .2010

Version 1 (1)

This strategy is intended to

Generate and share the knowledge necessary to bring human societies into a sustainable and mutually beneficial relationship with the living world.

1 Background - The biodiversity research challenge

Biodiversity is the diversity of genes, species, populations, communities, and ecosystems, and interactions between them. Biodiversity has intrinsic value, as well as it is essential for generating services that are crucial for humans, as outlined again recently by the Council of the European Union². These ecosystem services include provision of food, regulating climate and water flows, supporting soil formation and cultural values, all based on the genetic capital of biodiversity. Without the ecosystem services, there would be no economies, no societies - and no human life.

Human societies everywhere have benefited from using and exploiting biodiversity and converting or often simplifying ecosystems, manipulating them to provide services for human needs. Humans are part of biodiversity, but our activities, imperfect knowledge, and unsustainable uses of natural resources are, directly or indirectly, the main causes of the loss of diversity and ecosystem

¹ The strategy has been developed over 18 months by a task group within EPBRS, taking up input from the participants of the EPBRS meetings in Paris, Visby and Palma de Mallorca as well as a research conference on biodiversity in the European parliament in October 2009 and a number of comments from an open consultation in late 2009. Its development was supported by the EU-project BioStrat. For details, see www.epbrs.org

² EU council conclusions on Biodiversity beyond 2010: 3002nd Environment Council Meeting, Brussels, 15th of March 2010



European Platform for Biodiversity Research Strategy (EPBRS) – Promoting Knowledge for Sustainability

degradation. In a globalized world, actions in Europe may affect biodiversity in developing countries. The loss of diversity often goes hand in hand with the loss of ecosystem functions and services, leading to major difficulties for societies in achieving or maintaining human well-being. It is therefore vital for human societies to secure these services by protecting the biodiversity that supports them. This is a 'Grand Challenge' on a par with climate change, food security, energy security, health, and others³, as it is reflected in major policy documents like the Convention on Biological Diversity (CBD) and European policies⁴.

Meeting the Grand Challenge of biodiversity loss – one of the biggest challenge humans have ever faced – requires a major research effort as a basis for effective action and societal change. Governments, society, and enterprises need to have access to the knowledge and innovations necessary to establish sustainable relationships with the living world, in which benefits from ecosystem services are secured and the intrinsic value of biodiversity is respected.

Research on biodiversity and ecosystem services stands at the crossroads of social, economic and ecological issues and requires innovative trans-disciplinary approaches. The understanding, conservation, and sustainable use of biodiversity are fundamental issues, which cannot be considered as incidental to other challenges. Appropriate consideration of biodiversity and ecosystem services must be included in other related areas of research, such as climate change and food security or technological developments.

Over the last decades, research has delivered essential information and knowledge for tackling this challenge. It has already created significant benefits ranging from an understanding and reduction of large-scale environmental risks for biodiversity posed by climate change, biological invasions, pollinator loss, land conversion and habitat fragmentation, overexploitation, environmental chemicals, and socio-economic pressures to improved knowledge of the composition, structures, functions, and dynamics of marine (from deep-ocean to coastal environments), terrestrial and freshwater ecosystems in Europe. Many different disciplines, from basic research to applied, and from natural to social sciences, have contributed to this knowledge.

³ As described in the Lund Declaration, www.se2009.eu/polopoly_fs/1.8460!menu/standard/file/lund_declaration_final_version_9_july.pdf

⁴ As outlined by COM (2010) 4 final, COM (2006)216final and in the Birds, Habitats, Marine Strategy Framework and the Water Framework Directives, and most recently in the EU council conclusions on Biodiversity beyond 2010 (3002nd Environment Council Meeting)

Major conceptual and technological breakthroughs have occurred in biodiversity and ecosystem services research over the past decade and brought about new approaches and provided new tools and options, e.g.:

- The "ecosystem service" concept has significantly contributed to understanding important components of sustainable development and to improving the integration of social and natural sciences.
- New methods and tools in taxonomic, genetic and molecular research, new modelling approaches, improved data collection techniques and new infrastructure relying on innovative e-technology have boosted the ability of basic research to contribute to this area.

These new concepts and methods provide the basis for rapid growth and innovation in this research field to contribute further to the Grand Challenges and objectives outlined below.

2 The objectives for European research on biodiversity and ecosystem services

In order to achieve the strategy's intention and to inform policy and management decisions, new investments in research focused on developing the evidence base and creation of knowledge are needed to:

2.1 Ensure the long-term survival of species, their genetic diversity, and the ecological integrity and functionality of habitats and ecosystems

Further research is needed to

- Assess status, trends, and functional relationships;
- Improve the understanding of drivers and mechanisms of change, including evolutionary processes,
- Improve understanding and develop guidance for effective management, conservation and restoration of biodiversity and ecosystem services.

This research is fundamental to delivering the other objectives of this strategy as core elements of the evidence base to inform decisions for policy nad management to conserve biodiversity.

2.2 Ensure the long-term provision of ecosystem services

Further research is needed to

- Define, measure, and value ecosystem services and their use by human societies, including potential conflicts;
- · Understand relationships between the functioning of complex systems and our



capacity to extract services without degrading them as well as to identify and restore services that have been degraded;

• Improve the sustainable management and use of ecosystems, land- and seascapes, and their biodiversity.

2.3 Adapt to global change (including climate change)

Further research is needed to

- Increase understanding of the effects on the living world, and ways to
 mitigate and adapt to pressures such as climate change, land- and sea-use
 change, pollution, over-exploitation, and invasions of non-native species and
 their underlying socio-economic drivers;
- Increase understanding and forecast tipping points and resilience of ecosystems under the interaction of these drivers of change in order to avoid non-reversible changes of ecosystems.

2.4 Contribute to meeting other Grand Challenges (water, food, energy security, population growth, human health)

Further research is needed to:

- Provide knowledge on the living world to support policies for a sustainable future. For example, human health policy could benefit from the understanding of the link between ecosystem integrity and emergent diseases;
- Increase the understanding of the global ecological footprint of European energy consumption and other European policies.

These are major challenges for biodiversity research to further link with other research areas to provide key guidelines to policy makers.

2.5 Foster technological and product innovation

Further research is needed to:

- Develop innovative technology and products derived from living systems and learning from nature. This includes soft engineering, optics, acoustics, communication and other areas.
- Improve the benefits of agriculture and aquaculture to human well-being and survival in the context of likely changes due to climate change and energy production. Lessons from the living world will be of paramount importance in these areas to improve the capacity and sustainability of food provision and development of an integrated approach to resource management.



3 Integrated research

There is a need for greater integrated and transdisciplinary approaches to generate the knowledge necessary to bring human societies into a sustainable and mutually beneficial relationship with the living world. This must include a constructive mix of natural and social science expertise. Depending on the particular research challenge, this may include disciplines like taxonomy, ecology, genetics, economics, political sciences and sociology, and others to jointly approach research on the objectives mentioned above. The investment needed for fostering these approaches will have to complement the work within the disciplines and not replace the means for it.

The objectives for this interdisciplinary approach broadly fall within three research areas, following the pressure-state-response model (Figure 1⁵):

- Area A: To assess the status and trends of biodiversity, and associated
 ecosystem services, the exploitation of these services, and the benefits
 accruing from them and the costs and consequences of not adequately
 protecting them, complemented by improving our knowledge of human
 perceptions, attitudes and values towards biodiversity and the services
 provided by ecosystems.
- **Area B**: To improve the understanding of the indirect and direct drivers of biodiversity change and their influence on the functioning of ecosystems and the services they provide.
- Area C: To improve implementation and evaluation of policy, governance, and specific measures for the conservation of biodiversity and ecosystem services as well as the sustainable use of natural resources.

Areas A (the way things are), B (What threats biodiversity) and C (Meeting the Challenges) are strongly inter-linked, and for this reason many research approaches within them may require active participation from different disciplines. This includes especially modeling approaches and the development of scenarios on the future of biodiversity and the capacity of ecosystems to deliver services.

Improved understanding in one field is often required before work can progress in another one. All three areas are equally important: Research projects will be needed to investigate what is there, why it is changing, and what to do about it in an integrated way, addressing thus ecological, societal and economic aspects.

⁵ as supported by the DIVERSITAS science agenda, see DIVERSITAS Science Plan, 2002: DIVERSITAS Report No1, 37pp., online at http://www.diversitas-international.org/?page=strategy

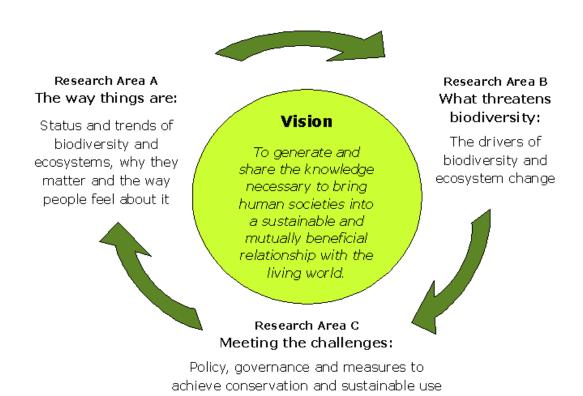


Figure 1: Biodiversity Research Areas

4 Developing the research environment

Over recent decades, integrated research on biodiversity and ecosystem functioning and services has contributed to shaping the European Research Area (ERA). The ERA-Net BioDivERsA⁶ has significantly improved the coordination of national research efforts on biodiversity and will further develop this cooperation. The Networks of Excellence and Integrated Projects in biodiversity have contributed essential components of the ERA by enhancing effective knowledge sharing, fostering development of world-class research infrastructures, and coordinating programmes and priorities across institutions and countries⁷.

To ensure that the research programmes and projects carried out under this strategy provide results and policy inputs that can contribute effectively to the objectives outlined above and to the ERA on biodiversity the following development objectives need to be taken into account:

⁶ www.eurobiodiversa.org

⁷ Green Paper "The European Research Area: New perspectives", see http://ec.europa.eu/research/era/consultation-era_en.html#greenpaper



- Further develop close collaboration and cooperation with all appropriate stakeholders;
- Further develop links between science and public engagement networks like natural history museums, science centres and citizen science programmes
- Devotion of significant resources devoted to appropriate communication of research results and their applications in cooperation with stakeholders, at all scales, including the global;
- Further develop, network and deploy infrastructure for monitoring and assessment, open access databases, and virtual institutes for data exchange and analyses and other elements of modern infrastructure.

These four development objectives require the following actions:

4.1 Continuous identification, review and horizon scanning of research priorities

Develop a set of clearly specified research priorities and integrate them into the European Research Action Plan for Biodiversity. EC and Member States should apply an approach to integrated research that involves European and international leading scientists and public and private actors in the programming, funding, implementation, monitoring, and evaluation of biodiversity research. The link to other relevant research fields should be made explicit.

4.2 Support common infrastructures and platforms – on the European as well as the international scale

Building on Europe's major contributions to global efforts in this field, ensure that research complies with and further contributes to global efforts to develop a coherent biodiversity monitoring system (e.g., via GEO Bon, ILTER, Nature Directives monitoring), data information platforms (e.g., GBIF, LifeWatch) and their use to develop coherent scenarios of future biodiversity development. These European and international programmes require financial support to become operational. Resource mobilisation and networking are pivotal, and links should be developed for these programmes with citizen science networks and NGOs active in this area.

4.3 Promote education and career in the field of biodiversity

Build capacity to improve the structures that train and provide mobility for junior researchers across Europe to equip Europe with sufficient numbers of appropriately educated scientists and practitioners. The efforts should include capacity building for experts and students from developing countries.

As with infrastructure, progress has been made in the integrative education of researchers in recent years. However, in many European countries basic education is being reduced, especially in ecology and taxonomy.

4.4 Build the links between science and policy

Europe is actively engaged in the development of the Intergovernmental science-policy Platform for Biodiversity and Ecosystem Services (IPBES)⁸. European scientists will provide vital knowledge in this field and swill certainly engage into global efforts in this area, including capacity building⁹. To foster this process, COM (2006)216 proposed a "Mechanism on Biodiversity Expertise" for Europe. The EPBRS proposes to base this mechanism on its concept of a "network of knowledge" ¹⁰.

4.5 Evaluate biodiversity research in Europe and monitoring its use

Steps need to be taken to improve the evaluation of biodiversity research at individual, programme and project levels in ways that better balance "scientific excellence" and "research relevance". Funding bodies and programme managers should report systematically on the use of the results of scientific research in policy, in biodiversity management and in society, and use the results of these evaluations to coordinate programming of new research.

⁸ See for example COM (2010)4 on Options for an EU vision and target for biodiversity beyond 2010

⁹ See also point 20 in EU council conclusions on Biodiversity beyond 2010: 3002nd Environment Council Meeting, Brussels, 15th of March 2010

¹⁰ See http://www.epbrs.org/epbrs/news/show/13

5 The path for implementing the strategy

The revised biodiversity target of Europe towards 2020 will increase rather than decrease the need for a sound and substantial support from the research community. The main lines for this work described in this document will have to be continuously updated by the research community and funding bodies and other stakeholders on the national and European level.

The following implementation actions are essential cornerstones to achieve the strategies' targets:

1. Integrate the five objectives given in section 2 into biodiversity research action plans, checking them against current scientific knowledge and societal needs through an inclusive discussion process including international collaboration (see 4.1)

<u>Players</u>: EPBRS, research funding bodies, thematic experts and stakeholders <u>Tasks</u>: Develop Research Action Plans for the objectives

2. Maintain the collaborative approach in the forthcoming 8th framework programme (FP8) and raise the visibility and budget of "biodiversity and ecosystem services" in FP8 at least to the level of climate change

<u>Players</u>: European Commission, FP8 member states

Tasks: Development of suitable elements in FP8

3. Enhance national efforts to improve the coherence between the European research programmes and national research funding, e.g., by further developing the ERA-Net approach on biodiversity Players: National research ministries, research funding bodies Tasks: Check existing research programmes for biodiversity research elements, develop joint activities between national funding bodies

4. Revise the strategy on a regular basis (every 3-4 years), to accommodate emerging issues and recent achievements Players: EPBRS, research funding bodies, scientific community, stakeholders Tasks: Review of strategy and new needs as well as scientific achievements

For all these actions, adequate milestones will have to be developed by the players involved for the following decade.