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Report on existing (2010) institutional biodiversity research policies and strategies of BiodivERsA2 partners and identification of common priorities

Milestone 21 - Report

WP3: Joint funding activities in support of an ERA on Biodiversity
WP leader: Maurice Héral – Agence Nationale de la Recherche (ANR)

Task 3.1: Developing a mechanism to identify priorities for joint calls
Task leader: Rainer Sodtke – Deutsches Zentrum für Luft- und Raumfahrt (PT-DLR)

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BiodivERsA2
Report on existing (2010) institutional biodiversity research policies and strategies of BiodivERsA2 partners and identification of common priorities

Foreword

This report builds upon a compilation prepared by BiodivERsA partners within WP2 Task 2.3 (May 2011), additional verbal information received at a phone meeting of BiodivERsA partners on 10th May 2011, and BiodivERsA partners' research strategy documents available on partners' websites. This report was updated with latest information in August 2012.

Methodology

Aim of this Milestone 21 report (part of BiodivERsA task 3.1) is to gather and analyze BiodivERsA partners' institutional biodiversity research policies, strategies and priority areas as well as to outline shared priorities, concerns and/or needs if possible. For this, in May 2011 – in a joint activity with BiodivERsA task 2.3 – BiodivERsA partner agencies were surveyed if their agency provides of an own strategy or programme[1] on biodiversity research and/or research in general. Partners were also asked to provide documents of their national research strategy or national biodiversity research strategy (or programme, respectively), if existing.

Partners were asked to provide these strategies in an English version if available. If no English version of an agencies' strategy could be obtained English summaries of the strategies were used instead. All documents used for this report are published documents and could be obtained via the partner's websites.

Available strategies/programmes were analysed with regard to indicated priorities in biodiversity research in order to identify joint priorities for future joint research funding. For this, single priorities were compiled and merged into joint priorities if deemed similar with another priority. Table 1 shows two examples of a set of identified single research priorities and resulting joint priorities to illustrate how this was accomplished. The approach used is also demonstrated in the appendix using the examples of the joint priorities "Ecosystem services: role of biodiversity & sustainable use" and "Biodiversity monitoring: observatories, long-term data sets & indicators" and all corresponding partners' single research priorities (cf. appendix on pp. 27-28).

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[1] A strategy is defined as a document outlining an agency's (or national) strategic key research activities planned for several years. A programme usually specifies this strategy for short-term activities and may also form an agency's research programme announced by a call for proposals.

Table 1: Examples of identified single research priorities of BiodivERsA partner agencies and two joint priorities the single priorities were merged into.

Identified single priority	Joint (merged) priority
Promote research on ecosystem services (and the values) of biodiversity	Ecosystem services: role of biodiversity & sustainable use
Sustainable use of ecosystem services	
Advance theory (and modelling) to enhance understanding of the role of biodiversity in ecosystem services	
Marine biotic communities with extremely high biodiversity	Marine & polar ecosystems: biodiversity hot spots, structure, functions, impacts, management
Generate new basic knowledge of the structure, functions, driving forces, sub-processes, species diversity and types of nature found in marine ecosystems	
Impacts on biodiversity and ecosystems, particularly in poorly explored ecosystems, such as in marine, polar (and freshwater) environments	
Provide advice on marine biodiversity to enable sustainable management of the offshore environment	

Results

1. BiodivERsA partners' research strategies and common priorities
– a synthesis –

Thirteen (out of 21) BiodivERsA's partner agencies provide of an institutional research strategy or research programme. Partners without such a strategy in some cases make use of a national research strategy which exists in Bulgaria, Estonia, France, Germany, Spain, Sweden (Swedish Research Policy Bill) and Turkey. However, only four partner agencies (FRB, DEFRA, JNCC, MFAL) provide of a specific institutional strategy for biodiversity research. Furthermore, almost all countries do not provide of a national biodiversity research strategy, either. However, in France, FRB developed such a strategy endorsed as a national biodiversity research strategy by the French Ministry of Research part of its national strategy for research and innovation (SNRI). In the UK, DEFRA and the JNCC provide of Evidence or Business Plans specifically dedicated to biodiversity research priorities.

Most of the countries provide of a national biodiversity strategy developed in the context of the UN Convention on Biological Diversity (CBD). The mode for implementing these national strategies is sometimes defined by additional national biodiversity action plans or programmes which may comprise research activities, too. However, these strategies were not analysed for this report as this will be accomplished in BiodivERsA task 2.3.

Table 2 gives an overview on BiodivERsA partner agencies' strategies and programmes on general research and biodiversity research. It also compiles general research as well as biodiversity research strategies on a national level in BiodivERsA partner countries.

Table 2: Overview on BiodivERsA partner agencies' (general) research/ biodiversity research strategies (S) or programmes (P) as well as on national strategies on research or biodiversity research in BiodivERsA partner countries.

BiodivERsA partner agency	Agency's strategy/ programme		Country	National strategy	
	Research	Biodiversity research		Research	Biodiversity research
FWF	-	-	AT	-	-
Belspo	P	-	BE	-	-
BNSF	-	-	BG	S	-
ETF	-	-	EE	S	-
MEDDE	-	-	FR	S	S
ANR	P	-			
FRB	-	S+P			
PT-DLR/BMBF	S	-	DE	S	-
DFG	-	-			
MRD	-	-	HU	-	-
RCL	-	P	LT	-	-
NWO	S	-	NL	-	-
RCN	P	-	NO	-	-
FCT	-	-	PT	-	-
MINECO	S	-	ES	S	-
SEPA	-	-	SE	S[1]	-
FORMAS	S	-			
MFAL	S	S	TK	S[2]	S[2]
DEFRA	S	S			
JNCC	S	S	UK	-	-
NERC	S	-			

[1] Swedish Research Policy Bill

[2] Research priorities set in the Turkish National Biodiversity Strategy and Action Plan (NBSAP)

Though thirteen agencies provide of an own research strategy or programme, detailed research priorities for biodiversity research are only given by eleven agencies' strategies/programmes (Belspo, BMBF, DEFRA, FORMAS, FRB, JNCC, MFAL, NERC, NWO, RCL, RCN). In order to derive joint priorities of two or more BiodivERsA partners, single priorities were compiled and merged if deemed similar with another priority. Table 3 lists the compilation of joint biodiversity research priorities for the eleven above mentioned BiodivERsA agencies. Table 4 lists the compilation of single research priorities stated by only one of these partner agencies.

In total, 19 joint priorities and 39 additional single priorities for biodiversity research could be identified. Among joint research priorities the following fourteen issues were stated by 3 or more of the eleven agencies' strategies:

1) Biodiversity & ecosystem services (9 agencies)
2) Impacts of climate change on ecosystems and biodiversity (7)
3) Marine and polar ecosystems (5)
4) Biodiversity monitoring (5)
5) Modelling and scenario building of biodiversity dynamics (5)
6) Economic and social values of biodiversity (5)
7) Biodiversity conservation (5)
8) Tools for data analysis, management & access to knowledge and information (4)
9) Invasive species (4)
10) Organise scientific community for expert advice & support for IPBES (3)
11) Biodiversity in policy & decision making (3)
12) Discover novel biodiversity (3)
13) Global change & biodiversity (3)
14) Biodiversity & sustainable management of landscapes (3)

Not surprisingly, four of the first six joint priorities (priorities no. 1, 2, 5, 6 in the list above) were chosen by the BiodivERsA partners as topics (or as essential parts of the topics, respectively) for the first three BiodivERsA joint calls (2008, 2010/11, 2011/12 calls).

Single research priorities listed in Table 4 could not be harmonized. These priorities do not coincide much with each other: They are either too narrow (e.g. "importance of rapid adaptive processes & global change") or too broad (e.g. "Function, distribution & abundance of biodiversity") to appear as joint priorities.

Although the analysis given here might show deficits and the classification of research priorities might sometimes be viewed with caution, the results show that the methodology used for this analysis may give support for identifying research topics for joint calls within the ERA-Net's consortium. The identified research priorities will be used in future to enrich proposals for joint call topics in the already established BiodivERsA2 "common mechanism for the identification of priorities/topics for joint calls" (Deliverable D3.1).

The common mechanism was established by the BiodivERsA General Assembly in May 2011 in order to plan joint research topics and to get an outlook on possible future topics as well. The mechanism comprises to outline a first common research agenda which was prepared in August 2011 (Deliverable D3.2) and will be updated regularly in form of a rolling agenda: Once a year, BiodivERsA partners may propose potential research topics, prioritize them and decide by negotiation (within the General Assembly) which topic(s) to select for the next joint call. Remaining prioritized topics constitute the basis for an indicative list of future joint call topics which may be complemented by additional topic proposals in the following year(s).

The mechanism can benefit from the joint research priorities identified in this study. Partners may choose one (or several) of the listed topics and propose it/them to be included in the rolling agenda. Drafting scientific rationales – which is foreseen in the mechanism in order to justify the proposed topics – may be alleviated by making use of (the reasoning of) partners' strategies. Furthermore, prioritizing of topics will be simplified because this study allows for facile comparison with the own agency's priorities and other BiodivERsA agencies' (or national strategies') priorities as well. Beyond that, the identified joint research priorities (e.g. stated by 3 or more agencies) could be incorporated directly into the rolling agenda and form a permanent basis of potential research topics.

Table 3: Identified joint research priorities for biodiversity research compiled from analysed research strategies of eleven BiodivERsA partner agencies. X marks a clear, (X) an unclear priority statement by the respective agency.

Research priority	BiodivERsA partner agency										
	Belspo	BMBF	DEFRA	FORMAS	FRB	JNCC	MFAL	NERC	NWO	RCL	RCN
Ecosystem services: role of biodiversity & sustainable use	X	X	X	(X)	X	X		X	X	(X)	
Impacts of climate change on ecosystems and biodiversity		X	X	X	X				X	X	X
Marine & polar ecosystems: biodiversity hot spots, structure, functions, impacts, management		X	X			X		X			X
Biodiversity monitoring: observatories, long-term datasets & indicators	X		X		X	X		X			
Modelling & scenario-building of biodiversity dynamics					X			X	(X)	(X)	X
Economic & social values of biodiversity & link with ecosystem services	X		X		X			X		(X)	
Biodiversity conservation	X		X	X		X				(X)	
Tools for data analysis, management & access to knowledge/information	X		X			X		X			
Surveillance, risk assessment & control measures for invasive non-native species			X		(X)					X	X
Organise scientific community for expert advice & support for IPBES			X		X	X					
Biodiversity in (sectoral) policy & decision making & impacts on biodiversity	X	X	X								
Discover novel biodiversity (incl. novel genes, microbes)					X			X			(X)
Interrelation between global change & biodiversity		X			X					(X)	
Biodiversity & sustainable management of landscapes		X								(X)	X
Links between changes in biodiversity and human health & well-being	X							X			
Human impacts on biodiversity in freshwater ecosystems								X			X
Biodiversity overseas in areas of high strategic importance			X			X					
Use of biodiversity/natural substances for sustainable applications				X	X						
Urban biodiversity & spatial planning				X					X		

Table 4: Identified single research priorities for biodiversity research compiled from analysed research strategies of ten BiodivERsA partner agencies.

Research priority	BiodivERsA partner agency									
	Belspo	BMBF	DEFRA	FORMAS	FRB	JNCC	MFAL	NERC	NWO	RCN
Taxonomy and ecology, including inventories	X									
Protocols for rapid biodiversity assessment	X									
Inventory of agricultural biodiversity	X									
Inventory of medical plants biodiversity	X									
Public awareness & perceptions of biodiversity and consumer attitudes & behaviour	X									
Links between changes in biodiversity and animal diseases	X									
Effects of biodiversity use on ecological-economic system resilience	X									
Support CBD implementation in developing countries	X									
Effects of GMO on biodiversity & socio-economical aspects	X									
Explore species with a particular national responsibility		X								
Explore biodiversity hot-spots		X								
Actions with representative significance for the national biodiversity strategy		X								
Options for improving site & ecological connectivity			X							
Strategy for global biodiversity research			X							
Access & benefit sharing for genetic resources			X							
Interaction of climate change with the marine environment			X							
Sustaining and increasing marine ecosystem benefits			X							
Enable society to achieve sustainable use of natural resources & ecosystems				X						
Replace non-renewable resources with renewable ones				X						
Genetic modification of animals, plants & microorganisms				X						
Environmental properties & chemical substances occurrence				X						

Table 4: (to be continued).

Research priority	BiodivERsA partner agency									
	Belspo	**BMBF**	**DEFRA**	**FORMAS**	**FRB**	**JNCC**	**MFAL**	**NERC**	**NWO**	**RCN**
Interaction between humans, animals & microorganisms				X						
Importance of rapid adaptive processes & global change					X					
Develop the interdisciplinary character of biodiversity research					X					
Cross-over between temperate, tropical & Mediterranean, between terrestrial & marine, & between wild & domestic issues					X					
Education & training for biodiversity issues					X					
Provide advice to governments to meet their EU & international obligations for biodiversity & sustainable development						X				
Enable administrations to complete network of marine protected areas						X				
Plant Genetic Resources							X			
Animal Genetic Resources							X			
Fishery Genetic Resources							X			
Biosafety and Biotechnology							X			
Genetic Resources Database Development							X			
Microbial Genetic Resources and Microflora-Microfauna							X			
Function, distribution & abundance of biodiversity								X		
Thresholds of biodiversity for irreversible ecosystem change								X		
Ecosystem services & the role of water/water cycle									X	
Cumulative effects of pollution over time										X
Interactions between nature, society & culture at higher system levels										X

2. Institutional biodiversity research strategies and programmes of BiodivERsA partner agencies and countries

2.1 Austria – Fonds zur Förderung der Wissenschaftlichen Forschung (FWF)

The Austrian Science Fund (FWF) is Austria's central funding organization for basic research. The purpose of the FWF is to support the ongoing development of Austrian science and basic research at a high international level. In this way, the FWF makes a significant contribution to cultural development, to the advancement of our knowledge-based society, and thus to the creation of value and wealth in Austria.

The FWF does not provide of a specific research strategy. FWF's funding activities focus on research efforts devoted to generating new knowledge. Therefore, the activities follow the principles: excellence and competition, independence, international orientation, equal treatment of all disciplines, transparency and fairness, gender mainstreaming, equal opportunities, as well as ethical standards.

2.2 Belgium – Belgian Federal Public Planning Service (Belspo)

Belspo does not provide of a research strategy. Until 2009, however, its activities followed the research programme "Science for a Sustainable Development" (2005 – 2009; http://www.belspo.be/belspo/ssd/science/program_fr.stm). The programme deals with the complex, global, interrelated problems which lie at the basis of a sustainable development policy. It therefore responded to the strategic needs, on different levels of authority, for policy-supporting research and to the challenge to maintain and develop scientific expertise in complex and strategically important areas. The programme was composed of eight priority research domains, including biodiversity, but research priorities were not given. The SSD programme has been completed, but biodiversity will be part of a new programme whose strategic agenda will be worked out during autumn 2012.

Belspo's activities are also guided by Belgium's National Biodiversity Strategy 2006-2016 (http://www.cbd.int/doc/world/tr/tr-nbsap-v2-en.pdf) which is currently under revision. This strategy defines 15 national strategic objectives in order to contribute nationally and internationally to halt the loss of biodiversity. Objective 7 "Improve and communicate scientific knowledge on biodiversity" specifies eight research objectives as given below:

(1) Compile and synthesise existing data and information, and disseminate this knowledge to a wider audience

(2) Promote and encourage research that contributes to the knowledge and understanding of Belgium's biodiversity. Research priorities are specified as follows:
- taxonomy and ecology, including inventory projects
- protocols for rapid biodiversity assessment
- programmes for long-term monitoring
- detailed ad hoc conservation initiatives (e.g. in nature reserves, protected areas)
- thematic inventories (agricultural biodiversity, medicinal plants biodiversity)
- precise cartography of plants related to potentially imminent GMO cultures

(3) Develop adequate monitoring methodologies and biodiversity indicators

(4) Evaluate the level of integration of biodiversity into sectoral policies and their impact on biodiversity. This includes research in following priority areas:

- effects of agrotechnology on both agricultural biodiversity and wild flora and fauna (e.g. pollinators)
- effects of emerging technologies (e.g. GMOs, nanotechnologies) on biodiversity

(5) Improve our knowledge of the socio-economic benefits of biodiversity, including research on

- public awareness and perceptions, consumers' attitudes and preferences with regard to biodiversity, and their relations to behaviour and public policy
- values of biodiversity (including methods for biodiversity valuation)
- relationships between human health and biodiversity
- links between changes in biodiversity and incidence of human/animal diseases
- use of biodiversity and effects on biodiversity, ecosystem goods and services, and ecological-economic system resilience

(6) Improve the links and communication between research and policy, and promote actors participation

(7) Make best use of Belgian expertise to support implementation of the Convention on Biological Diversity in developing countries by

- supporting capacity-building for identification and monitoring of biodiversity
- facilitating access to biodiversity data stored in Belgian collections, archives and databases
- promoting scientific and technical cooperation
- transferring relevant technologies to address biodiversity matters
- developing educational and public awareness programmes

(8) Effects of GMOs on biodiversity and on socio-economical related aspects.

2.3   Bulgaria – National Science Fund of Bulgaria (BNSF)

The Bulgarian National Science Fund (BNSF, established 2003, functioning since 2008) is a supportive body of the Ministry of Education, Youth and Science and provides funding for fundamental and applied research in any field of science for public and private institutions. BNSF annually announces calls for proposals addressing the national research priorities determined in the "National Research Strategy of the Republic of Bulgaria 2020" (http://www.strategy.bg/StrategicDocuments/View.aspx?lang=en-GB&Id=684) set up for a period of ten years. National research priorities are:

(1) Energy, energy efficiency and transport. Development of green and eco technologies;
(2) Health and quality of life; biotechnologies and ecological foods;
(3) New materials and technologies;
(4) Cultural and historical heritage;
(5) Information and communication technologies.

Research funds should be allocated in order to meet "grand challenges" and link research and innovation results to achieve economic needs. However, the strategy does not specify research priorities related to biodiversity.

2.4   Estonia – Estonian Science Foundation (ETF)

The Estonian Science Foundation (ETF) does not provide of an own research strategy. The National Research strategy "Knowledge-based Estonia" (http://www.hm.ee/index.php?popup=download&id=6175), covering the period 2007–2013, focuses on sustainable development of the society by means of research and development, and innovation. The strategy sets out three main objectives:

(1) Competitive quality and increased intensity of research and development;

(2) Innovative enterprises creating new value in the global economy;

(3) Innovation friendly society aimed at a long-term development.

Resources are preferably directed into those fields of RD&I which have the potential to achieve results in frontier research at global level, are important for sustainable economic development and support important socio-economic objectives as well as the preservation of a nation and its culture. Biodiversity research is not explicitly mentioned in the national research strategy.

2.5   France – Ministère de l'Écologie, du Développement Durable et de l'Energie (MEDDE)

The French Ministry of Ecology, Sustainable Development and Energy (MEDDE) is the responsible department of the French government for implementing the French National Biodiversity Strategy (stratégie nationale pour la biodiversité 2011-2020, FNBS). The FNBS has got six strategic goals. The strategic goal F ("develop, share and promote knowledge") integrates two research-related targets; research priorities are not specified, however:

(1) Develop research, organise and perpetuate the production, analysis, sharing and dissemination of knowledge

(2) Improve expertise in order to build capacity to anticipate and act, mobilising all sources of knowledge.

The MEDDE policy pursues to stop biodiversity loss in four spheres of activity: protection of the environment, protection of species, diffusion of the biodiversity threat into French economy, culture and society, international engagement. MEDDE funds research related to biodiversity upon specific calls for proposals.

2.6   France – Agence National de la Recherche (ANR)

The French National Research Agency (ANR) is a research funding organisation established by the French government in 2005 to fund research projects, based on competitive schemes giving researchers the best opportunities to realize their projects and paving the way for ground-breaking new knowledge. The role of the Agency is to bring more flexibility to the French research system, foster new dynamics and devise cutting edge-strategies for acquiring new knowledge. By identifying priority areas and fostering private-public collaborations, it also aims at enhancing the general level of competitiveness of both the French research system and the French economy.

In order to enrich its portfolio of thematic programmes with the most strategic considerations, the ANR implements a continuous foresight and programme planning process in which it

consults the widest possible range of national and international stakeholders. Consulting the scientific community each year on the future needs in both fundamental and applied research is one of the agency's priorities. The ANR's goal is to identify themes which can respond not only to societal, environmental and economic needs, but also to technological and scientific challenges, through a broad consultation process. The annual programme planning process is the result of multiple inputs, including feedback from the previous or ongoing programme follow-up and assessment process.

ANR programme planning follows the priorities of the National Research and Innovation Strategy (SNRI). ANR's biodiversity research is covered in the programme planning area "Environment and Biological Ressources". ANR does not provide of an own biodiversity research strategy, but can use the one developed by FRB part of the SNRI.

2.7   France – Fondation pour la Recherche sur la Biodiversité (FRB)

In 2009, in response to a request from the French Ministry of Research, FRB produced a biodiversity research strategy that was endorsed as the biodiversity part of the French National Research and Innovation Strategy (SNRI). The report was produced by the scientific council of FRB with inputs from a range of stakeholders and outlines priorities for French biodiversity research. The document covers research priorities for the period 2009-2013 and identifies themes and field of actions for the coming years. The document was in French but a 4-pages summary in English was produced (http://www.fondationbiodiversite.fr/images/stories/telechargement/Prospective-scientifique-en.pdf). Following 10 priorities for French biodiversity research are indicated:

(1) Reinforce research on modelling and scenario-building of biodiversity dynamics

(2) Promote research on ecosystem services and the values of biodiversity

(3) Develop scientific bases for innovation in the field of biodiversity valuation as a source of new biotechnologies and in the use of biodiversity as a basis for sustainable activities

(4) Reinforce knowledge about the least-known compartments of biodiversity

(5) Support and coordinate biodiversity long-term observatories at the national level to produce and use long data series

(6) Analysing the importance of rapid adaptive processes operating over short time spans for biological diversity and its response to global change

(7) Develop the interdisciplinary character of biodiversity research bringing together life science, social sciences, engineering, physics, mathematics as well as earth sciences

(8) Favour the cross-over between temperate, tropical and Mediterranean, between terrestrial and marine, and between wild and domestic issues

(9) Rethink education and training to better prepare students and young scientists for biodiversity issues

(10) Help the scientific community to organise itself in response to society's growing need for expert advice on biodiversity and associated ecosystem services.

2.8   Germany – Projektträger im Deutschen Zentrum für Luft- und Raumfahrt e. V. (PT-DLR) on behalf of Bundesministerium für Bildung und Forschung (BMBF)

The Project Management Agency of the German Aerospace Centre (PT-DLR) does not provide of an own research strategy. PT-DLR acts as a project management agency on behalf of the German Federal Ministry of Education and Research (BMBF). BMBF, in turn, does not provide of a specific biodiversity research strategy. Biodiversity research is funded within the broader BMBF Framework Programme "Research for Sustainable Development" (FONA, http://www.fona.de/en/10011, http://www.bmbf.de/pub/research_for_sustainability.pdf). The programme addresses biodiversity in the Themes "Sustainable management and resources" and "Earth system and geotechnologies" and states briefly the following focus areas for biodiversity research.

Sustainable management and resources:

(1) The sustainable use of ecosystem services,

(2) The relationship between global change and biodiversity,

(3) Interactions between biodiversity policy goals and other (environmental) policy goals such as climate protection and water resource management.

Earth system and geotechnologies:

(4) Marine biotic communities with extremely high biodiversity.

Due to the strong interaction with several land use options, research funding activities (1)-(3) are integrated in the cross-sectional research programme "Sustainable land management".

The national German research strategy "High-Tech Strategy 2020 for Germany" (http://www.hightech-strategie.de/en/350.php, http://www.bmbf.de/pub/hts_2020_en.pdf) defines the FONA Framework Programme as one of their lines for action.

The National Strategy on Biological Diversity (Nationale Biodiversitätsstrategie, NBS, http://www.bmu.de/english/nature/downloads/doc/41253.php) was adopted by the German Federal Government in November 2007. The strategy defines 330 objectives and a scheme of 430 actions to be taken in several points of time until 2020 in order to stop biodiversity loss. The scheme is monitored via a set of indicators specifically defined by the NBS. The NBS is implemented by the German Biodiversity Programme (Bundesprogramm Biologische Vielfalt) which allocates funds for projects in 4 priority areas:

(1) Species with a particular German responsibility,

(2) Biodiversity hot-spots in Germany,

(3) Preserving ecosystem services,

(4) Additional actions with representative significance for the strategy.

Upon a national call for proposals (announced in spring 2012) BMBF/PT-DLR jointly with the German Federal Ministry of the Environment (BMU) will fund research and development projects in the above mentioned priority areas.

2.9 Germany – Deutsche Forschungsgemeinschaft (DFG)

The DFG does not provide of a specific research strategy. The DFG (German Research Foundation) is the self-governing organisation for science and research funding in Germany. It addresses the need to provide sustainable support for young researchers, the interdisciplinary development of the sciences and humanities, and support for networking in the field of research. DFG funds knowledge-oriented research without stipulation of topics and utilises competition to select the best projects in terms of scientific quality. DFG funds the best scientists and academics and pays particular attention to the promotion of young researchers and equal opportunities in the German research system. It promotes cooperation in science – especially interdisciplinary and international cooperation – as well as the interaction of science with industry and society. Finally DFG gives policy advice to parliaments, governments and public institutions as well as the general public on scientific issues.

2.10 Hungary – Ministry of Rural Development (Videkfejleszetesi Minisztérium)

The Hungarian Ministry of Rural Development (MRD) provides central governance for agriculture, forestry, food and related sectors as well as for rural development, associated research and development efforts. For this MRD develops the overall rural development strategy, the "New Hungary Rural Development Programme" (http://www.fvm.hu/main.php?folderID=2170), as the main MRD strategy. Though the strategy refers to research frequently it does not specify research priorities on biodiversity.

2.11 Lithuania – The Research Council of Lithuania

The Research Council of Lithuania (RCL, http://www.lmt.lt/en/about.html), established in 1991, acts as a counsellor of the Lithuanian Parliament and the Government on research and researchers training issues. It advises on the formulation and implementation of science, education and R&D policy. The Council also takes active part in program based competitive R&D funding, as well as promotes the development of Lithuanian researcher resources, fosters research activities of science and higher education institutions, and raises the prestige of science. RCL does not provide of a specific research strategy.

Biodiversity research, however, is part of the national research programme "Ecosystems in Lithuania: climate change and human impact (Biological invasions and species range change)" launched in 2010. The Programme aims to:

(1) obtain new scientific knowledge about the impact of recent and ancient biological invasions on the structure of biologic systems, their functioning and evolution in order to reveal the fundamental patterns of adaptation of ecosystems and their compounds under conditions of global change;

(2) to provide an integrated assessment of the state of ecosystems, biological diversity and biological resource alterations under the conditions of global biological invasions and species range change, and to provide for ways and measures of adaptation and impact mitigation.

2.12 The Netherlands – Nederlandse organisatie voor Wetenschappelijk Onderzoek (NWO)

NWO provides of an own research strategy: "Growing through Knowledge"(covering the period 2011-2014, http://www.nwo.nl/nwohome.nsf/pages/NWOA_7UUC9K_Eng). The strategy defines 6 overall themes for research:

- o Healthy living,
- o Water and climate,
- o Cultural and societal dynamics,
- o Sustainable energy,
- o Connecting sustainable cities,
- o Materials: solutions for scarcity.

Biodiversity is addressed in the themes "Water and climate" and "Connecting sustainable cities". The strategy mentions following research priorities related to biodiversity:

(1) Effect of climate variability on the distribution and behaviour of ecosystems, biodiversity and global food supplies,

(2) Extent of ecosystem services and the crucial role of water and the water cycle,

(3) Biodiversity and spatial planning policy in urban areas.

Accordingly, the research strategy of NWO's Earth and Life Sciences division (ALW, http://www.nwo.nl/nwohome.nsf/pages/NWOA_4X6JWF_Eng) mentions biodiversity as one of its relevant funding topics. More specific priorities for biodiversity research, however, are not given here. The national Research Programme "Biodiversity works" (www.nwo.nl/biodiversiteit) is the most concrete realization of NWO's biodiversity activities. The programme aims to generate new knowledge on three research priorities (covering more ore less the same priorities of NWO's strategy as given above):

(1) Achieving a greater focus on the dynamism of nature,

(2) Devising and implementing ecosystem services,

(3) Dealing with the limited physical space available for nature in the Netherlands.

2.13 Norway – The Research Council of Norway (RCN)

The Research council of Norway (RCN) does not provide of a specific strategy on biodiversity research. A national Norwegian biodiversity research strategy does not exist, either. Biodiversity, however, is duly mentioned in the programme plans of the three most relevant current RCN research programmes:

- o MILJO2015
- o NORKLIMA
- o HAVKYST

The MILJO2015 programme (http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1224697848161&p=12246978 48161&pagename=miljo2015%2FHovedsidemal) is designed to generate new, research-based knowledge to promote the sustainable use and management of the natural and cultural environments. Research activities will provide greater knowledge about the impact of various

factors on the environment, as well as facilitate a more accurate understanding of critical limits regarding the use of environmental resources, how to balance respect for these limits with other considerations, and how to designate and implement policy and instruments that will provide lasting solutions to environmental problems.

Biodiversity research is part of the thematic areas "Landscapes, terrestrial ecosystems, biodiversity, and the cultural environment", "Ecology of freshwater, wild salmon and limnic biodiversity", and "Pollution and biogeochemical cycles". Within these areas following research priorities are given:

(1) Enhance the knowledge base for long-term, cohesive use of the landscape and its natural and cultural assets and values. Generate basic knowledge about the processes, effects and instruments relating to landscapes, biodiversity, cultural heritage and outdoor recreational activities at all levels in a unified perspective.

(2) Enhance knowledge about ecosystem processes in limnic ecosystems and the effect of pressures on these. Facilitate knowledge-based management of limnic ecosystems and sustainable multi-species management.

(3) Generate greater knowledge about the cumulative effects of pollution over time. Strengthen the scientific basis for risk analysis and for management regimes that safeguard a clean natural environment in Norway and the Norwegian Arctic.

(4) Generate basic knowledge about the interactions between nature, society and culture. Provide a deeper understanding of processes at higher system levels - ecosystems, watersheds and landscapes - in order to integrate knowledge about physical, chemical and biological processes with social and cultural aspects.

The primary objective of the NORKLIMA (http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226993599851&p=12269935 99851&pagename=norklima%2FHovedsidemal) programme is to generate vital new knowledge about the climate system, about climate trends in the past, present and future, and about the direct and indirect impacts of climate change on the natural environment and society, as a basis for adaptive responses by society.

Research priorities related to biodiversity include:

(5) Effects of the climate system on biotic systems: Identifying and quantifying the effects of climate change on marine, limnic and terrestrial ecosystems.

The principal objective of the HAVKYST research programme (http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226994156364&p=12269941 56364&pagename=havkyst%2FHovedsidemal) is to encourage creative marine environmental research of high international quality. A broad understanding of our marine environment forms a basis for long-term management of the marine ecosystems and their resources. The Programme will bring about basic competence development in order to strengthen the integrated understanding of the structure, function and species diversity of the ecosystem.

Research priorities related to biodiversity include:

(6) Generate new basic knowledge of the structure, functions, driving forces, sub-processes, species diversity and types of nature found in marine ecosystems.

(7) Generate new knowledge of human impacts on marine ecosystems via the addition and effects of pollution, and to contribute knowledge capable of acting as a basis for

measures to clear up pollution from land-fills and sediments. Focus on the effects of introduced species on the flora and fauna of the coastal zone.

(8) Increase knowledge on the long-term effects of petroleum industry emissions to the sea.

(9) Acquire knowledge and tools capable of contributing to integrated ecosystem-based management of the ocean and the coast, and to conflict resolution between various societal interests and between nations.

(10) Obtain knowledge that will contribute to the foundations of great wealth creation from marine resources.

(11) Sharpen focus and methods, models and technology for generating new ecosystem knowledge and to develop a methodology for the adoption of knowledge based on experience.

(12) Simulate international research cooperation and exchanges of knowledge.

2.14 Portugal – Fundação para a Ciência e Tecnologia (FCT)

The mission of Fundação para a Ciência e a Tecnologia (FCT), established 1997, consists of continuously promoting the advancement of scientific and technological knowledge in Portugal. FCT therefore explores opportunities that become available in any scientific or technological domain to attain the highest international standards in the creation of knowledge, and to stimulate their diffusion and contribution to improve education, health, environment, and the quality of life and well being of the general public. This mission is mainly accomplished through the funding of excellent proposals presented by institutions, research teams or individuals in public open calls, as well as through cooperation agreements and other forms of support in partnership with universities and other public or private institutions, in Portugal and abroad. FCT, however, does not provide of a specific research strategy.

2.15 Spain – Ministerio de Economía y Competitividad (MINECO)

The Ministerio de Economía y Competitividad (MINECO) does not provide of a specific research strategy on biodiversity. MINECO's research plan "Plan Nacional de Investigación Científica, Desarrollo e Innovación Tecnológica 2008-2011" (http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/Politicas_I+D+i_PlanNacional/PLAN_NACIONAL_2008-2011_ingles.pdf) forms the national research strategy and addresses biodiversity research only as one priority among others in fundamental research. Furthermore, biodiversity research is generally included in the plan's 'Environment' section. Any specific priorities on biodiversity research are not given.

The Spanish National Biodiversity Strategy (Plan Estratégico del Patrimonio Natural y la Biodiversidad 2011-2017; http://www.magrama.gob.es/es/biodiversidad/publicaciones/Libro_Plan_Estrategico_PNB_tcm7-202703.pdf, only in Spanish) defines 39 national objectives to protect biodiversity, also including objectives for research. Detailed research priorities, however, are not given.

2.16   Sweden – Swedish Environmental Protection Agency (SEPA)

The Swedish Environmental Protection Agency (SEPA) acts on behalf of the Swedish Government to overview conditions in the environment as well as progress in environmental policy. A main task is to coordinate, monitor and evaluate efforts, involving many agencies and stakeholders, to meet Sweden's environmental objectives. This comprises:

(1) compiling knowledge and documentation to develop own and others' environmental efforts,

(2) helping to develop environmental policy by providing the Government with a sound basis for decisions and by giving an impetus to EU and international efforts,

(3) joining in environmental policy implementation by acting in such a way as to ensure compliance with the Swedish Environmental Code and achievement of the national environmental objectives.

<u>SEPA, however, does not provide of a research strategy.</u>

2.17   Sweden – Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)

The mission of FORMAS is to promote and support basic research and need-driven research in the areas Environment, Agricultural Sciences and Spatial Planning. Funded research should be of the highest scientific quality and relevance to the areas of responsibility of the Council. FORMAS also funds development projects to a limited extent.

FORMAS pursues a research strategy for 2009-2012 (http://www.formas.se/formas_templates/Page.aspx?id=4617) which defines five central research themes for sustainable development within FORMAS' area of responsibility. Biodiversity is explicitly mentioned in theme "natural resources and environment", but seems also to be tangent more or less to the other four themes. Priorities in biodiversity research, however, are not explicated. <u>Following research priorities taken out of the mentioned priorities are related to biodiversity</u>:

Climate and energy:

(1) Exchange of greenhouse gases between the biosphere/society and the atmosphere,

(2) Effects (of climate change) on man, nature and society,

(3) Need for adaptation in the various sectors of society, and suitable policy instruments,

Natural resources and environment:

(4) Enable society to achieve sustainable use of natural resources and ecosystems,

(5) Replace non-renewable resources with renewable ones,

(6) Stop environmental degradation and preserve biodiversity,

Environmental technology and new materials:

(7) Find substances in nature for environmental-friendly applications,

(8) Research on the genetic modification of animals, plants and microorganisms,

Urban and rural development:

(9) Show how cities can contribute to a better environment, be attractive and interact in a positive way with the surrounding countryside,

Quality of life for people and animals:

(10) Impact of the environment's physical properties and the occurrence of chemical substances,

(11) Interaction between humans, animals and microorganisms.

2.18   Turkey – Ministry of Food, Agriculture and Livestock (MFAL)

The Turkish Ministry of Food, Agriculture and Livestock (MFAL) funds research related to its domains in the food, agriculture and livestock policy sector. MFAL's 2010-2015 research master plan (http://www.tagem.gov.tr, only in Turkish) defines strategies for several Research Opportunity Areas (ROA). The ROA 'Biodiversity and Genetic Resources' consists of seven programmes related to the identified strategies and program research priorities. MFAL's biodiversity research activities are conducted in cooperation with research agencies from other sectors.

Within MFAL the General Directorate of Agricultural Research (TAGEM) sets up priorities for Turkey's agricultural research and allocates funds to programmes and projects according to the following priorities:

(1) Plant Genetic Resources

(2) Animal Genetic Resources

(3) Fishery Genetic Resources

(4) Biosafety and Biotechnology

(5) Genetic Resources Database Development

(6) Microbial Genetic Resources and Microflora-Microfauna

The National Biodiversity Strategies and Action Plan (NBSAP, (http://www.cbd.int/doc/world/tr/tr-nbsap-v2-en.pdf) defines Turkey's national goals and actions for conservation, management and sustainable use of biological diversity. As this affects many economic sectors the plan also terms national biodiversity research priorities.

2.19   United Kingdom – The Department for Environment, Food and Rural Affairs (DEFRA)

In its Evidence Investment Strategy 2010-2013 (http://www.defra.gov.uk/corporate/evidence/science/strategy-evidence-plans/) DEFRA mentions protecting biodiversity as one of its top priorities. DEFRA's activities are driven by international policies like the Convention on Biological Diversity's Strategic Plan 2020, the Convention on International Trade in Endangered Species (CITES), the Convention on Migratory Species, the EU Biodiversity Strategy, the EU Habitats and Birds Directives as well as national biodiversity policies. Annex 2 of DEFRA`s Evidence Investment Strategy lists following priorities for biodiversity evidence activities:

(1) Critical gaps in monitoring of species and habitats;

(2) Economic and social values of biodiversity and link with ecosystem services;

(3) Impacts of climate change and ecosystem-based adaptation and mitigation;

(4) Options for improving site and ecological connectivity;

(5) Crime prevention and mitigation measures for protected species;

(6) Mobilising biodiversity data to support local decision making and policy-relevant research;

(7) Robust, policy relevant biodiversity indicators, with reliable data supply;

(8) A UK strategy for global biodiversity research;

(9) Biodiversity overseas in areas of high UK strategic importance or responsibility, including UK Overseas Territories;

(10) Evidence needs relating to access and benefit sharing for genetic resources;

(11) Support for an Intergovernmental Platform for Biodiversity and Ecosystem Services

(12) Surveillance, risk assessment and control measures for invasive non-native species; and,

(13) Human control methods for wildlife pests.

Evidence priorities regarding marine biodiversity are specified in DEFRA's Marine Programme Evidence Plan (http://www.defra.gov.uk/publications/2011/05/09/pb13503-ep-marine/). Following priorities are mentioned:

(14) Understanding how the marine ecosystem functions (biodiversity, disturbance, assessment of Good Environmental Status, effects of human activities).

(15) Responding to climate change and its interaction with the marine environment.

(16) Sustaining and increasing ecosystem benefits.

This list of research priorities is particularized by DEFRA's Biodiversity Evidence Plan 2011/12 (http://www.defra.gov.uk/publications/2011/05/09/pb13491-ep-biodiversity/) as follows:

1) Protecting the best sites:
   - Review and address evidence gaps identified by the 'Lawton Review' Making Space for Nature.
   - Test the effectiveness of options for improving site and landscape connectivity, including development of appropriate metrics and influencing local decision-makers.

2) Conserving priority species and habitats / species protection:
   - Address critical gaps in monitoring of species and habitats identified in the current UK review of requirements of the Habitats Directive, through research that assesses risk or develops novel monitoring methods.
   - Develop and test cost-effective solutions to deliver more cost-effective conservation and mitigation measures for protected species.

3) Mitigating and adapting to climate change:
   - Develop tools and metrics to understand and quantify adaptive capacity and ecosystem resilience in the landscape.
   - Demonstrate the practical application of adaptation principles and identify barriers to their effective implementation, including aspects of individual and institutional behaviour.
   - Understand and quantify the biodiversity impacts of climate change adaptation and mitigation measures undertaken in other sectors (e.g. from increased forest cover, biofuels, agricultural and land-use changes and flood risk management) and develop options for conserving or enhancing biodiversity within these.

- Understanding the temporal and spatial scale effects of climate change on biodiversity.
- Understanding the role of biodiversity in the provision of ecosystem services relating to the mitigation of climate change (e.g. carbon sequestration in priority habitats).

4) Embedding biodiversity in policy and decision making:
- Develop evidence and case-studies to demonstrate the economic and social value of biodiversity and the social and economic benefits of natural and semi-natural habitats/ecosystems.
- Review the scale of current and ongoing impacts on biodiversity in other sectors e.g. planning, business, transport and energy, assess the effectiveness of existing actions and identify priorities for future action.
- Develop and test benefits, risks of options and evaluation measures for a conservation credits policy.

5) Intercepting / managing invasive species:
- Develop and test the effectiveness of the 'rapid response framework' for data collection, mobilisation, risk assessment and response.
- Maintain a pro-active programme of risk assessments for invasive or potentially invasive species.
- Improve surveillance and detection capacity to support cost-effective early intervention.
- Evaluate the success of current biological control trials.
- Develop cost-effective methods and expertise for controlling invasive species.
- Quantify the risks associated with different introduction pathways and climate change for non-native species e.g. various aspects of trade.

6) Wildlife management:
- Establish proof of concept and demonstrate practical application of fertility control as a non-lethal alternative for resolving conflicts of interest between human interests and wildlife.
- Develop more humane forms of lethal control, for example for rodents, ensuring close liaison with industry partners.
- Identify and test options for the resolution of conflicts of interest between human interests and urban badgers.
- Determine the actual, and through spatial modelling, potential impact of pest populations and scope new technologies for their control.

7) International biodiversity:
- Develop evidence and case-studies to demonstrate the economic and social value of biodiversity and ecosystem services, and develop and test policy support tools, in an international context.
- Quantification of the impacts on biodiversity overseas of UK economic activity (global footprints).
- Improve access to and uses of biodiversity data to support international policy development.
- Establishment of an Intergovernmental Platform on Biodiversity and Ecosystem Services.
- Develop with LWEC and other partners a UK strategy for global biodiversity research.
- Initiate targeted research to support biodiversity conservation overseas in areas of high UK strategic importance or responsibility (in conjunction with the Sustainable Development Dialogue and Overseas Territories research and training initiatives).

8) Cross cutting priorities:
- Maintain a small set of robust, policy relevant indicators, with reliable data supply for national assessments, including of public attitudes and engagement.
- Mobilise data to support local decision making and policy-relevant research.
- Review Countryside Survey and identify future options for efficient and effective assessment of change in the UK countryside, taking account of relevant evidence gaps identified in the Natural Ecosystem Assessment.
- Identify information needs to support informed local decision making on biodiversity conservation, including guidance to help with conflict resolution and the promote the role of lay knowledge within natural environment decision making and to help account for the public's perceptions and concerns for future changes in landscapes and ecosystems.
- Identify emerging threats to biodiversity – such as wildlife diseases, energy infrastructure development and artificial light.
- Review public understanding of and attitudes to biodiversity loss, ecosystem service provision and the control of invasive or other problem species.

2.20 United Kingdom – Joint Nature Conservation Committee (JNCC)

The Joint Nature Conservation Committee (JNCC) supports the other UK bodies in the implementation of the national biodiversity strategy. JNCC's business plan (http://jncc.defra.gov.uk/page-5970) sets out in detail JNCC's priorities for 2011/12. The work contributes to maintain and enriching biological diversity, conserving geological features and sustaining natural systems and thus to provide core services upon which humans depend, including fresh water, clean air and food.

JNCC's work over the period 2011-15 is focused on 6 objectives which are sub-divided into 21 priorities:

Objective 1: Maintain and develop biodiversity surveillance programmes, sufficient to achieve policy and statutory obligations cost-effectively

(1) Maintain and develop terrestrial species surveillance programmes (e.g. updated trends for bird, butterfly and mammal species)

(2) Facilitate application of Earth observation data and provide advice on how to use it to produce evidence necessary to meet Habitats Directive requirements and other priority needs for habitat information

(3) Undertake research and development work necessary to advise on options for a co-ordinated and integrated system of marine biodiversity monitoring covering all UK waters (e.g. develop sampling strata and indicators for habitat monitoring, assess change in cetacean and inshore waterbird populations, future vessel sharing arrangements)

Objective 2: Provide access to, and reporting of, information, evidence and knowledge on UK and international biodiversity

(4) Develop and agree the process for Habitats Directive reporting, including the evidence requirements and implications for monitoring of priority species and habitats

(5) Support Defra to achieve a pragmatic evidence-based approach to the new Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES), building on existing initiatives, and facilitate efficient engagement by the UK biodiversity science and policy communities

(6) Increase the use of the National Biodiversity Network (NBN) by providing advice to facilitate its application, undertaking technical development of the NBN gateway and developing interpretation tools for the analysis of biological recording data

(7) Provide evidence, analysis and advice to support the application of the Ecosystem Approach and the consideration of ecosystem services within nature conservation, including analysis of the suitability of using existing monitoring and surveillance to produce effective and efficient indicators of ecosystem services

(8) Contribute to the implementation of country environment strategies within the UK, in particular by facilitating links to international and European commitments, including those of the Convention on Biological Diversity and its framework of 2020 goals and targets agreed in Nagoya

(9) Provide evidence, analysis and advice on the UK's impact on biodiversity overseas, including publication of an annual update on the impacts of UK biomass consumption on biodiversity overseas, supported by a database

(10) Create habitat maps and associated confidence layers, including maps produced from surveyed and modelled outputs and habitat vulnerability maps

(11) Initiate a project to enhance the UK's ability to respond to major oil spill incidents by updating oil spill sensitivity maps for seabirds and developing JNCC's capacity to provide surveyors in the event of a spill, as agreed as part of JNCC's role in the Oil Spill National Contingency Plan

Objective 3: Provide advice to enable UK and devolved governments to meet their EU and international obligations for biodiversity and sustainable development.

(12) Provide advice to support government engagement at EU level, particularly to support implementation of the forthcoming EU Biodiversity Strategy, and to provide coordinated input of UK expertise to the advisory groups of the Coordination Group for Biodiversity and Nature dealing with reporting on directives, indicators, green infrastructure and other priority issues

(13) Support UK participation in, and implementation of, priority Multilateral Environmental Agreements (e.g. Convention on International Trade in Endangered Species, CITES)

(14) Support implementation of the UK Overseas Territories Biodiversity Strategy and the established regional focal points (Caribbean and South Atlantic) through capacity building, the identification and promotion of research priorities, implementation of the multilateral Agreement on the Conservation of Albatrosses and Petrels, and provision of the secretariat to the UK Overseas Territories Biodiversity Group

(15) Support implementation of the Marine Strategy Framework Directive in UK waters by working through the UK Marine Monitoring and Assessment Strategy and OSPAR to facilitate development of biodiversity-related targets and indicators at a regional seas scale

Objective 4: Enable UK administrations to substantially complete the UK network of well managed marine protected areas, sufficient to meet national, EU and international requirements

(16) To contribute to the objectives of the Habitats Directive (e.g. allocations of Areas of Conservation)

(17) To contribute to the objectives of the Birds Directive, identify a suite of inshore waterbird Special Protection Areas around the UK on behalf of the country nature conservation bodies

(18) To contribute to an ecologically coherent network of Marine Protected Areas (MPAs) in UK waters:

Objective 5: Provide advice on marine biodiversity to enable sustainable management of the offshore environment

(19) Ensure that 95% of requests for statutory advice on offshore industries (including oil and gas, renewables and aggregates) are responded to fully within the relevant consultation period

Objective 6: Manage and develop the organisation to identify and meet changing demands and opportunities, maximise its effectiveness in achieving our strategic goals and improve operational efficiency

(20) Deliver a programme of organisational changes in response to the Spending Review settlement, including staff complement, management structures, working practices and process streamlining to deliver efficiencies

(21) Develop and implement science quality assurance policies and procedures to ensure JNCC produces robust, high-quality evidence, in compliance with Government Chief Scientific Adviser Guidelines

2.21   United Kingdom – Natural Environment Research Council (NERC)

"Next Generation Science for Planet Earth"
(http://www.nerc.ac.uk/publications/strategicplan/documents/strategy07.pdf) sets NERC's strategic and scientific priorities for 2007-2012 and targets at sustainability of life on Earth. The science strategy was developed with the UK's environmental research community, funders and stakeholders, and sets out the challenges for science and management funding activities. NERC identified seven themes at the heart of its strategy. Research programmes explicitly address science challenges and priorities within these seven themes: climate system; biodiversity; sustainable use of natural resources; Earth system science; natural hazards; environment, pollution & human health; and technologies. Research programmes provide strategically directed environmental research, training and related knowledge exchange, and encourage national and international collaboration.

With regard to biodiversity the strategy specifies following major research priorities:

(1) Explore ecosystems to discover novel biodiversity and increase knowledge of the function, distribution and abundance of biodiversity.

(2) Describe novel genes, biochemicals and microbes to help explain how ecosystems function.

(3) Develop tools for analysing and managing data which can handle the massive amounts of information coming from high-throughput technologies that rapidly sequence large amounts of DNA.

(4) Produce, maintain and analyse long-term datasets, linking changes in biodiversity to physical, chemical and biological processes.

(5) Advance theory and modelling to enhance understanding of the role of biodiversity in ecosystem services.

(6) Develop integrated physical and biological models that predict the impacts of individual and multiple pressures on biodiversity and ecosystems, particularly in poorly explored ecosystems, such as in marine, polar and freshwater environments.

(7) Provide evidence for the impact that biodiversity loss has on people's well-being and health. Develop improved indicators of trend and patterns in biodiversity loss and develop new methods for assessing the direct and indirect value of biodiversity to society.

(8) Investigate the thresholds beyond which a change in biodiversity will lead to extinctions and irreversible ecosystem change.

Appendix

Appendix 1: Demonstration of the approach used to identify joint research priorities from priorities specified in BiodivErsA partner agencies' research strategies/programmes using the example of the identified joint research priority "Ecosystem services: role of biodiversity & sustainable use". In a first step different aspects within the specified priorities – if existing – were assigned to different priorities. In a second step aspects relating to the same priority were combined to a joint (merged) priority.

Agency	Specified research priority	Identified aspects	Joint (merged) priority
Belspo	Use of biodiversity and effects on biodiversity, **ecosystem goods and services**, and ecological-economic system resilience	Ecosystem (goods and) services: use of biodiversity	
FRB	Promote research on **ecosystem services** and the values of biodiversity	Ecosystem services; Values of biodiversity[1]	
BMBF	Research on the sustainable use of **ecosystem services**	Ecosystem services: sustainable use	
NWO	Extent of **ecosystem services** and the crucial role of water and the water cycle	Ecosystem services: role of water/water cycle[2]	
NWO	Devising and implementing **ecosystem services**	Ecosystem services	
DEFRA	Economic and social values of biodiversity and link with **ecosystem services**	Ecosystem services; Values of biodiversity[1]	Ecosystem services: role of biodiversity & sustainable use
DEFRA	Sustaining and increasing (marine) **ecosystem benefits**	Ecosystem services: marine ecosystems[3]	
DEFRA	Understanding the role of biodiversity in the provision of **ecosystem services** relating to the mitigation of climate change (e.g. carbon sequestration in priority habitats)	Ecosystem services: role of biodiversity; biodiversity & climate change[4]	
DEFRA	Develop evidence and case-studies to demonstrate the economic and social value of biodiversity and the **social and economic benefits** of natural and semi-natural habitats/ecosystems	Ecosystem services; Values of biodiversity[1]	
JNCC	Provide evidence, analysis and advice to support the application of the Ecosystem Approach and the consideration of **ecosystem services** within nature conservation, including analysis of the suitability of using existing monitoring and surveillance to produce effective and efficient indicators of ecosystem services	Ecosystem services: indicators; Biodiversity monitoring[5]	
NERC	Advance theory and modelling to enhance understanding of the role of biodiversity in **ecosystem services**	Ecosystem services: role of biodiversity; Modelling biodiversity[6]	

[1] Aspect of the joint research priority "Economic & social values of biodiversity & link with ecosystem services"

[2] Aspect of the single research priority "Ecosystem services & role of water/water cycle"

[3] Partly also an aspect of the joint research priority "Marine & polar ecosystems"

[4] Partly also an aspect of the joint research priority "Impacts of climate change on ecosystems and biodiversity"

[5] Aspect of the joint research priority "Biodiversity monitoring: observatories, long-term data sets & indicators"

[6] Partly also an aspect of the joint research priority "Modelling & scenario-building of biodiversity dynamics"

Appendix 2: Demonstration of the approach used to identify joint research priorities from priorities specified in BiodivErsA partner agencies' research strategies/programmes using the example of the identified joint research priority "Biodiversity monitoring: observatories, long-term datasets & indicators". In a first step different aspects within the specified priorities – if existing – were assigned to different priorities. In a second step aspects relating to the same priority were combined to a joint (merged) priority.

Agency	Specified research priority	Identified aspects	Joint (merged) priority
Belspo	Programmes for **long-term monitoring**	Biodiversity monitoring: long-term monitoring	
Belspo	Develop adequate **monitoring methodologies** and biodiversity indicators	Biodiversity monitoring: methods, indicators	
DEFRA	Critical gaps in **monitoring of species and habitats**	Biodiversity monitoring: critical gaps	
DEFRA	Address critical gaps in **monitoring of species and habitats** identified in the current UK review of requirements of the Habitats Directive, through research that assesses risk or develops novel monitoring methods	Biodiversity monitoring: critical gaps, risk assessment, methods	
FRB	Support and coordinate biodiversity **long-term observatories** at the national level to produce and use long data series	Biodiversity monitoring: observatories, long-term data sets	
JNCC	Undertake research and development work necessary to advise on options for a co-ordinated and integrated system of **marine biodiversity monitoring** covering all UK waters (e.g. develop sampling strata and **indicators for habitat monitoring**, assess change in cetacean and inshore waterbird populations, future vessel sharing arrangements)	Biodiversity monitoring: marine biodiversity monitoring[1], indicators	Biodiversity monitoring: observatories, long-term datasets & indicators
JNCC	Develop and agree the process for Habitats Directive reporting, including the evidence requirements and implications for **monitoring of priority species and habitats**	Biodiversity monitoring: priority species & habitats	
JNCC	Provide evidence, analysis and advice to support the application of the Ecosystem Approach and the consideration of ecosystem services within nature conservation, including analysis of the suitability of using existing **monitoring and surveillance** to produce effective and efficient indicators of ecosystem services	Biodiversity monitoring: indicators; Ecosystem services[2]	
JNCC	Support implementation of the Marine Strategy Framework Directive in UK waters by working through the **UK Marine Monitoring and Assessment Strategy** and OSPAR to facilitate development of biodiversity-related targets and indicators at a regional seas scale	Biodiversity monitoring: marine biodiversity monitoring[1], indicators	
NERC	Produce, maintain and analyse **long-term datasets**, linking changes in biodiversity to physical, chemical and biological processes	Biodiversity monitoring: long-term data sets; Biodiversity dynamics[3]	

[1] Partly also an aspect of the joint research priority "Marine & polar ecosystems"

[2] Aspect of the joint research priority "Ecosystem services: role of biodiversity & sustainable use"

[3] Partly also an aspect of the joint research priority "Modelling & scenario-building on biodiversity dynamics"

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