

SRU



German Advisory Council
on the Environment

Land Use, Nature Conservation and Agricultural Policies in Germany

**Selected chapters of the
Environmental Report 2008
Volume 2**

This publication is a partial translation of the 2008 Environmental Report
 "Climate Protection in the Shadow of Climate Change".
 For this reason, the numbering of sections and paragraphs follows the original German
 version and hence is not fully sequential.

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Preface

In June 2008, the German Advisory Council on the Environment has published its "Environmental Report 2008: Environmental Protection in the Shadow of Climate Change". The report provides a comprehensive evaluation of national and European environmental policies in the reporting period (2004 to 2008). This period is characterized by two contrasting trends: On the one hand, environmental policy has in many areas come under pressure while, on the other hand, the alarming risks of climate change have received a high level of attention. The title of the report should be interpreted as a call for a more integrated approach which should more strongly recognize the interdependence between climate change and biodiversity. Under conditions of climate change, several other areas of environmental policy are in fact becoming more critical, either because of their potential contribution to mitigating climate change and its consequences, or because of the threat to environmental resources stemming from global warming. Special attention should be given to the importance of forests, moors and grassland, as well as to the key role played by soils as a store and sink for greenhouse gases. An inappropriate use of these resources will have negative effects for the climate.

Having perceived a considerable interest in the international community to learn more about German national environmental policy approaches, the Council has decided to translate key parts of the Environmental Report 2008, especially those which concern national policies with an international relevance. The translation is organised in three volumes, targeting different expert communities:

Volume 1: Sustainable Development, Innovation and Climate Protection:
A German Perspective

Volume 2: Land Use, Nature Conservation and Agricultural Policies in Germany

Volume 3: Toxic Substances and REACH

Volume 2 assesses recent developments in German land-use related policy-making in the areas of nature conservation, soil protection and agri-environmental policies. Although Germany's international reputation initially was damaged by its slow implementation of the Habitats Directive, Germany has developed a strong legal framework for addressing biodiversity outside protected areas. The key instruments of environment-related land-use policies are the requirements for "good agricultural practice", landscape planning, and the provisions governing interventions in nature and landscape. These provisions establish a hierarchy of duties, starting with the principle of prohibiting interventions and ending with rules for financial compensation for unavoidable interventions. The effectiveness of this system of instruments for nationwide environmentally oriented land-use policies has come under considerable pressure due to efforts to increase flexibility as well as due to a lack of financial resources and staff for implementation. The SRU cautions against the possibility

that these trends could endanger a nature protection approach which offers interesting solutions to the new challenges posed by climate change and biodiversity loss.

The Environmental Council is characterised by its expertise and neutrality and as well as its interdisciplinary approach. It comprises seven university professors from a range of different environment-related disciplines. The members of the Council are appointed by the German government for a four-year period of tenure. The Council's mandate provides it with the freedom to select the issues addressed in its reports and statements. The council operates autonomously and is bound neither by instruction nor order. It does not represent any economic interests and enjoys authority as the non-partisan voice of scientific expertise and provider of principles-based analyses and recommendations.

The Council's key responsibility is the periodic evaluation of the environmental situation and of environmental conditions in Germany. It fulfils several functions:

- It acts as an 'early warning' system and highlights negative trends.
- It provides new ideas for German and European environmental policy.
- It has a broad advisory mandate which includes the German government, the sixteen German *Länder*, stakeholder organisations, and the general public.
- It actively monitors the 'Europeanisation' of environmental policy.

Responsible Council members for the Environment Report 2008 were:

- Hans-Joachim Koch (Chair), Universität Hamburg,
- Christina von Haaren (Vice Chair), Leibniz Universität Hannover,
- Martin Faulstich, Technische Universität München,
- Heidi Foth, Martin Luther Universität Halle/Wittenberg,
- Martin Jänicke, Freie Universität Berlin,
- Peter Michaelis, Universität Augsburg
- Konrad Ott, Ernst-Moritz-Universität Greifswald.

Since 1 July 2008 the composition of the Council has changed (see cover page).

Martin Faulstich
(Chair)

Christian Hey
(Secretary General)

5 Nature conservation

Messages

Nature conservation and landscape management are essential contributions to both the maintenance and the restoration of the effective services and functions of ecosystems in both inhabited and uninhabited areas. Nature conservation is characterised by an integrated perspective, which includes for example the functions of soil, surface waters, flora and fauna in its overall objectives. With sufficient political will and allocation of resources there is no reason why nature conservation needs to remain on the defensive; on the contrary it will be possible to achieve noteworthy goals, such as the recent successes in the establishment of the European conservation network Natura 2000 and in the area of safeguarding the national natural heritage for posterity. When measured against the urgent need for action in respect of the high levels of demand on the natural environment, however, these promising approaches are in no way adequate to the task of permanently and sustainably securing all of its functions. Issues of particular cause for concern remain the excessive input of nutrients into sensitive ecosystems; sharp increases in the ploughing of grassland with its serious implications for greenhouse gas emissions, water resources, flora and fauna; increasing demands on forest ecosystems; land take; and encroachment on natural habitats in tandem with inadequate provision for nature protection areas and poor links between existing biotopes. In consequence many of the functions of ecosystems – in particular biodiversity on all levels (genetic, species and ecosystem) – are under serious threat. Not only this, but new challenges will be posed by future developments such as climate change and changes in agricultural practices, the effects of which, at least in part, are hard to calculate. These challenges will imply increased demands on the administration of nature conservation in respect of future strategic direction, the ability to make forecasts and the capacity to act. The Federal Government has set trendsetting targets in the form of sustainability and biodiversity strategies which show the way and give some preliminary answers to the abovementioned challenges. It is now a matter of finding ways to implement these objectives. At this point it is necessary to point out some of the pitfalls inherent in the concept of biodiversity: it will be a significant challenge to successfully communicate the complexity of the issues covered by the notion of biodiversity and to prevent the reduction of nature conservation in public consciousness to the mere protection of animal and plant species. The implementation of the nature conservation objectives presents a considerable challenge to nature conservation, especially due to

- The inadequate financing and administrative capacity of nature conservation bodies,
- The fragmentation of legislative approaches across Germany and the low priority accorded to nature conservation in some of the Länder,

- The difficulty in getting the objectives of the Federal Government across to those municipalities and users of the land which actually have the decisive role to play in their implementation,
- The conflicting interests of different political sectors (transport, construction, agriculture),
- The lack of recourse on the part of interested citizens to active participation and complaints procedures and,
- In spite of the initially encouraging moves toward the implementation of Habitats Directive monitoring, the prevalence of largely fragmented and highly unsatisfactory environmental monitoring and information procedures.

Nature conservation is being hindered by the above in its attempts to find solutions to the problems previously outlined, and the successes achieved so far with such difficulty are in danger of being partially or completely reversed (e.g. through the qualitative erosion in particular of many important – in some cases even officially protected – areas which are not yet part of the Natura 2000 network).

The publication of the new Environmental Code by the Federal Government is intended to create fundamental preconditions for a more successful approach to nature conservation. To this end it will be necessary to define in concrete and uniform terms for the whole of Germany the aims, fundamental principles and instruments of nature conservation, not just in the future Environmental Code but also in any regulations of a non-legislative character. Counterproductive deadlocks in the objectively necessary legislative process must not be allowed to arise, still less a self-interested retreat behind existing legal frameworks. The fundamental principles of effective nature conservation must rather be afforded the full protection of the law. This must include the following:

- Extending the scope of Habitats Directive observation to a comprehensive monitoring of nature and natural landscapes by creating a robust database on the condition and functionality of ecosystems and biodiversity,
- Regulating encroachment on the natural environment by retaining the principle of the precedence of material compensation,
- Landscape planning by retaining the planning obligation at all levels of political decision-making,
- Improving the interface between laws governing nature conservation and soil and water protection by introducing an obligation on the part of those concerned to develop multifunctional measures and generally coordinated approaches to the deployment of instruments as provided for within the individual bodies of legislation, and
- A comprehensive law on class actions.

The instruments of nature conservation law can additionally make an effective contribution to measures aimed at minimising or adapting to the effects of climate change and should accordingly be clearly laid out in the new Environmental Code.

Also essential are improvements to the financial basis of nature conservation by ensuring increases in and more efficient expenditure of funds for environmental protection in agriculture and improvements in the fiscal position of donations and endowments. The capacities of nature conservation authorities need to be boosted to meet the demands of the comprehensive remit which will be their future lot. Opportunities for participation must be made available to interested citizens by creating channels for comprehensive information, participation and complaint, as well as education in environmental awareness with a direct link to hands-on nature conservation work.

5.1 Introduction

330. Overall it can be said that the way the twin needs of use and protection of natural resources are currently managed falls some way short of the requirements of sustainable development (see SRU 2002a, Item 51 ff.). The natural capital available to us is continuing to dwindle in spite of progress in particular fields of action. This can most clearly be seen in long-term decline in biodiversity, but also in respect of the functional deficit of the natural environment in terms of recreation, water retention and compensation for climatic changes. For this situation to improve there would be a need for thoroughgoing implementation of a multifunctional and universal nature conservation policy of the sort provided for in the objectives of the Federal Nature Conservation Act and the sustainability and biodiversity strategies. Significant obstacles to this are presented above all by problems in the implementation of nature conservation measures which arise from lack of integration with other political sectors, inadequate financial and staffing capacities and the lack of a sound and clear legal basis at the federal level.

Now as never before the natural environment is faced with future challenges which will clearly demand new strategies and measures within the framework of an integrated nature conservation and land use policy. Both changes in agricultural policy and climate change will confront nature conservation with a range of new tasks. In response to climate change it will be a question of activating nature conservation potential to reduce emissions of greenhouse gases and of helping ecosystems to adapt to the new conditions. This latter will more than ever before require a nationwide and European perspective, including if need be a dynamic approach to the setting of spatial and structural protective and developmental objectives. These challenges mean that it is especially important to consider not just past changes to the natural environment and landscape and the causes thereof, but to attempt to take developmental tendencies and future perspectives into account – notwithstanding all the uncertainties that arise in respect of a complex field of endeavour such as nature

conservation. Nature conservation policy will have to develop mechanisms on a scale as yet unknown to cope with future dangers and difficulties in making clear and accurate forecasts.

It is therefore the aim of the following to present a summary of the current condition of ecosystems in respect of their functionality and services and then to describe possible future trends in the negative impacts they are being subjected to, along with potential reactions that they might exhibit. Notwithstanding the high level of uncertainty associated with such an endeavour – further exacerbated by the inadequate data available in the field of nature conservation – the German Advisory Council on the Environment sees a need to illustrate future developmental tendencies in order to stimulate timely preventative responses and targeted future research.

Following on from the above we will consider the question of those characteristics of nature conservation, both in political-institutional terms and in respect of the history of ideas, that distinguish it from other instances of sectoral policy. The following section will evaluate the strategic aims of the Federal Government in the light of their adequacy as a response to the problems previously described and to the task of fulfilling their international obligations on the preservation of biodiversity. The current state of development of the Natura2000 network will be reviewed as an example of the extent to which these objectives have been fulfilled. What becomes clear is that – even in the case of a mandatory European obligation 15 years on from the initial implementation phase, in which significant progress has admittedly been recorded in certain areas – in many of the *Länder* progress has been hampered by significant failures to see the implementation through. Similar or worse implementation problems will also be faced by the ongoing attempts to establish habitat networks, which are intended to link areas of habitat of national and local significance but which have now come under fire. The following chapters will describe possible solutions with particular emphasis on defining nature conservation law for the whole country in the Environmental Code, in alignment with best practice in the individual *Länder*. Further recommendations are directed at improvements in the implementation framework by means of capacity building in nature conservation and the encouragement of active participation by interested citizens.

5.2 State and perspectives of nature and landscape

5.2.1 State of ecosystem functionality and its services

331. When it comes to determining the condition of nature and landscapes, ecosystem services and functions are key indicators. They are provided not only by individual environmental media but by their interplay. Natural ecosystems and processes can support many functions especially well (cf. e.g. EICHNER and TSCHIRHART 2007). However, disruption to natural systems frequently entails unpredicted risks. What is not, however, of sole decisive importance for the service and functional capacity of the landscape is whether

or not its ecosystems are untouched by human hand. Even within the realm of biodiversity many services depend upon human intervention. Changes to ecosystems and landscapes brought about by man are therefore not necessarily to be viewed in a negative light, as long as the functional capacity of the natural environment is not adversely affected – it may even be restored or improved by such interventions (cf. SRU 2002a, Item 46). Biodiversity is nowadays defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” (Art. 2 of the Convention on Biological Diversity).

332. Even after the application of this benchmark which relates to the long-term well-being of the human race it must still be said that recent developments in the field of nature conservation have not been especially positive ones. The dwindling resources available to nature conservation activities have in large part been concentrated on the construction of the Natura 2000 network, in which endeavour partial successes have been recorded. Unfortunately, however, these successes must be contrasted with the pressure across the board to which the natural environment continues to be subjected.

What must be counted as a success is the fact that 2007 saw the culmination of the registration of Sites of Community Importance (Habitats Directive) for the European Natura 2000 network (see Item 405). Safeguarding these regions means that around 14 % of the total area of Germany will be included in Natura 2000. These protected areas are mainly constituted by woodlands, which in all their forms of use and development make up 51 % of the total area. From a German perspective, however, the protection of inland rivers and lakes and grassland biotopes should take priority, being as they are particularly under threat. It is therefore a matter of urgency to set up further protected areas within Germany after the Natura 2000 areas have been successfully secured, either in 2010 or 2014. Further initial steps have also been taken in respect of the preservation of the national natural heritage. Those significant landscapes and biotopes which, as a result of German reunification, find themselves in the hands of the state are currently being safeguarded for the purpose of nature conservation, although it must be said that the question of where the new funding necessary for this will come from has not yet been definitively settled. The progress made in immission control has ensured an overall reduction in pollution of the ecosystems. Reductions in NO_x emissions led to a decrease in the deposition of airborne nitrogen of some 27 % between 1990 and 2005 (KLEIN et al. 2007). The remaining sources of pollution are, however, still too high for natural ecosystems to support. The targets set out in the Water Framework Directive (WFD) have given new impetus to efforts to renature inland waters and protect groundwater. Even though environmental agricultural measures have not been as effective as initially supposed (see Section 11.4.3), measures introduced under the contract-based nature protection scheme in particular and applied to small tracts of land

have led to not inconsiderable success. The living conditions of some species, for example otters, beavers, sea eagles and white storks, have even been improved thanks to special supporting measures (SUDFELDT et al. 2007; REUTHER 2002).

333. The successful efforts to protect individual species and small areas must not however disguise the fact that losses in biodiversity continue apace. The proportions of endangered ferns and flowering plants, animal species and habitats indigenous to Germany, at 26.8 %, 36 % and 72.5 % respectively, are amongst the highest in Europe (BMU 2007b, p. 17; RIECKEN et al. 2006; BfN 2007). It is also the case that the indicator of species diversity from the German government's sustainability strategy has only reached 74 % of the target value set for 2015 (BMU 2007b, p. 124), meaning that it will be almost impossible for this target to be fulfilled without additional efforts. Threats to biodiversity in Germany are not restricted to terrestrial areas: aquatic ecosystems are also in danger. As far as marine ecosystems are concerned it is the overexploitation of resources by the fishing industry which constitutes the most significant reason for ongoing losses in species diversity. Overfishing has reached such proportions that it is now questionable as to whether certain species, for example cod, will be able to regenerate even if an absolute fishing ban is imposed (ICES 2007).

5.2.1.1 Change of impacts

334. The deterioration of nature and natural landscapes mainly arises from a combination of various causes. In the following the most significant trends in the development of negative impacts will be described.

Pollution through nutrients and harmful substances

335. Whereas it is true that input by volume of individual nutrients and harmful substances has been reduced, these substances continue to cause critical loads on sensitive aquatic, marine and terrestrial ecosystems (NAGEL et al. 2004; Millennium Ecosystem Assessment 2005; BECK et al. 2006). In respect of the acidification and eutrophication of non-agricultural land it is the airborne nitrates which are of primary significance (KLEIN et al. 2007). Nitrogen is toxic to sensitive ecosystems, and its effects range from the displacement of species to direct damage to plants. The largely closed natural nitrogen cycle has been overlaid since the beginning of industrialisation by additional inputs of NO_x from combustion processes and NH_3 from nitric fertilisers. So much additional nitrogen in the forms mentioned above has been introduced into the environment that the soil bacteria can no longer denitrify these nitrogen compounds, resulting in acidification, eutrophication, global warming, nitrate pollution in the groundwater, ozone formation and negative impacts on health through NO_2 etc. (cf. 494, 497, 545).

The tolerance threshold of ecosystems for inputs of airborne harmful substances is defined according to location in terms of so-called critical loads (NAGEL et al. 2004; see box “Critical Loads for Acidification and Eutrophication”). In sensitive locations the tolerance threshold for nitrogen (N) can be as little as 5 kg per hectare per year. In respect of nitrogen 28 % of the total land area of Germany is home to particularly sensitive vegetation or soils (NAGEL et al. 2004). 71 % of the total land area of Europe is at risk of eutrophication (HETTELINGH et al. 2007) and in Germany the year 2004 saw the critical loads for eutrophication exceeded over some 98 % of the land area investigated (NAGEL et al. 2008). This percentage has barely decreased since 1990, though it needs to be said that the proportion of land area which gave rise to the highest exceedance levels has been significantly reduced (UBA 2005, p. 261).

Critical loads for acidification and eutrophication

“Critical loads for eutrophication are one defining criterion for determining the harmful effect of nitrogen inputs on sensitive ecosystems such as woodland, heather and bogs. In the mass balance for the calculation of critical loads for eutrophying nitrogen inputs in woodland soils the nitrogen inputs are contrasted with those processes which either fix or remove the nitrogen from the woodland ecosystem without further harm being done. Factors which are taken into account include timber harvest, long-term fixation of nitrogen in the humic layer, denitrification and any safe discharge via seepage.

Following on from the critical loads approach, the negative impacts on ecosystems brought about by airborne harmful substances are represented spatially in a sophisticated way with the aid of geographical information systems. [...] The tolerable level of concentration or deposition in each case is defined solely in line with the characteristics of the ecosystem under investigation. In the case of long-term total depositions below the critical loads, the current state of knowledge indicates that there is no harmful effect on the structure and function of ecosystems. It can however take decades for ecosystems to react to the exceedance of critical loads and several centuries for them to recover to pre-industrial states even if the critical loads are subsequently not exceeded” (UBA 2005).

Analogously, critical loads for acidification indicate the risk potential for the harmful effect of acidifying sulphur and nitrogen inputs on sensitive ecosystems.

336. The negative impacts are derived from a multiplicity of different causal agents. These include combustion plants, industry, traffic, and, above all, agriculture (cf. Items 966, 1003 f.). As a result of soil erosion, harmful substances such as cadmium, copper etc. (see Section 6.2.2.2, Item 915), in addition to nutrients such as nitrates and phosphates in particular, can migrate from farmland into sensitive ecosystems. Fertiliser application which exceeds the nutrient uptake of plants will additionally result in pollution of the groundwater.

The ploughing up of grassland

337. The intensification of use of grassland up to and including processes with frequent turning of the soil for maintenance has a twofold consequence. On the one hand it transforms the soil from a carbon sink into a source of carbon dioxide emissions that is significant enough to contribute to climate change (WEGENER et al. 2006; SRU 2007a, Item 21). On the other the ploughing up of grassland leads to the loss of many further functions such as erosion and groundwater protection, significant habitats and qualities necessary for recreational purposes.

The years 2005 and 2006 alone saw the loss of 47,000 ha of grassland in Germany (Deutscher Bundestag 2007a). The grassland balance has not yet exceeded the tolerances laid down in the cross compliance framework, meaning that it is not yet incumbent on any of the *Länder* to act (see Table 5-1). The ecological effects, however, are nonetheless significant. The significant increase in plant cultivation for biomass production means that further loss of grassland can be assumed in the future.

Table 5-1

Changes in proportions of grassland in the federal states 2003 to 2007

Federal state	2003	Changes 2003 to 2007
Mecklenburg/Western Pomerania	20.32 %	- 4.8 %
Schleswig-Holstein/Hamburg	34.95 %	- 4.6 %
North-Rhine/Westphalia	29.90 %	- 4.2 %
Lower Saxony/Bremen	29.02 %	- 3.5 %
Saxony-Anhalt	14.81 %	- 3.2 %
Rhineland-Palatinate	37.57 %	- 3.2 %
Brandenburg/Berlin	21.99 %	- 2.6 %
Baden-Württemberg	39.69 %	- 1.2 %
Saxony	20.91 %	- 1.1 %
Saarland	51.12 %	- 1.1 %*
Thuringia	22.39 %	- 0.8 %
Bavaria	35.67 %	- 0.7 %
Hesse	36.92 %	+ 1.7 %
*provisional figure		
SRU/UG2008/Table 5-1; Data source: Deutsche Bundestag 2007a; Press release C. Behm of 15 January 2008		

The areas of grassland ploughed up are often areas of land of particular significance for nature conservation. This is especially the case when the ploughing takes place on areas of land within Natura2000 designated areas (cf. NABU 2007b; NEHLS 2007). At a regional level the loss of grassland can be as high as 10 %. Cumulative interconnected cause-and-effect

relations can intensify the negative effect. Thus for example: in the *de facto* bird sanctuary at Eiderstedt in Schleswig-Holstein, not only did the proportion of grassland decline by 9 % (from 69 % in 2000 to 62.8 % in 2007), but also the drainage measures undertaken to improve the cultivability of the land were simultaneously intensified. The total number of breeding pairs of black terns therefore reached a historic low in 2007 (NEHLS 2007).

The suspension of the mandatory set-aside scheme

338. The suspension of the mandatory set-aside scheme in 2008 will only serve to further intensify the competition between the needs of agriculture and nature conservation. Out of a total of around 1 million ha fallow land in Germany, 400,000 ha are already being used for the cultivation of renewable raw materials; in 2008 as much as a further 200,000 ha will probably be brought into use for the production of food. Setting aside defined amounts of land area for the purposes of nature conservation is increasingly being rejected in the face of increasing world market prices and the biomass boom (press release from the German Farmers' Union (*Deutscher Bauernverband*) of 27 September 2007 and 8 November 2008). This will have the unfortunate consequence that nitrogen and pesticide outputs from agricultural land will not decrease, and the chances of survival for species living in the fields around settlement areas, such as the field hare, partridge or field hamster, whose dwindling numbers are currently protected (cf. NABU 2007c) by the set-aside scheme, will decrease.

Landscape fragmentation and land take

339. Land take by the construction and transport sectors means that all functions of ecosystems and, in particular, those of biodiversity and soil are affected (cf. SRU 2004b, Chapt. 3.5). The latter are permanently compromised or even totally lost, mainly because of the sealing of land (EEA 2006; SRU 2004b, Item 204). Both the construction of transport routes and human settlement account for the fragmentation of the landscape (COMPAS 2007; SRU 2002a, Item 400).

The data from the Federal Statistical Office and the Federal Agency for Construction and Regional Policy do not currently show any clear trend towards a reduction in land take. The transformation of open spaces into living, transport, leisure and industrial infrastructure shows no real sign of abating, even though economic developments in recent years have led to a slight reduction: The daily change of transformation of open spaces dropped from 115 ha per year during the years 2002 to 2004, over 114 ha per year during the years 2002 to 2005, towards 113 ha per year during the years 2003 to 2006 (written release from BBR, 13 February 2008).

The allocation of land use to individual use categories is handled differently in different *Länder*. Since 2001 there have therefore been several incidences of misinterpretation and deviation from the land area statistics, which has amongst other things led to an

underestimation of the rate of increase of land take for settlement and transport purposes, ranging from 6 ha (2001/2002) to as much as 14 ha (2003) per day. These statistical errors have been corrected, but a further assessment carried out by the Federal Environment Agency on the basis of data collected by the individual *Länder* showed that, due to the classification of former military training areas and opencast mining sites as recreational areas, the statistical land use figures are currently higher than the actual ones (currently around 95 ha per day) (written release from UBA, 21 November 2007; cf. also BBR 2007). These deviations demonstrate that the current monitoring of land use at individual *Länder* level, with its lack of standardised recording criteria, is inadequate and inappropriate when considered in the light of the general significance of the issue.

The causes of the current decline in new land use do not lie in the actions of the Federal Government, states or municipalities, but in the depopulation of the new *Länder* and the lack of demand in the construction sector (Federal Statistical Office 2006; 2005). One indicator for the continuing urgency of the need for action is to be found in the uninterrupted growth of land area given over to transport infrastructure, which can in turn be explained by the corresponding constant growth of investment from the public sector (written release from UBA, 21 November 2007).

340. A qualitative examination of new land use distinguishes between various types of use, as loss of functionality of an ecosystem can vary according to changes in use. At least it is the case that the capacity for tidal protection or bioclimatic compensation, certain types of recreational activity and, to a limited extent, supporting particular types of plants or animals can with appropriate planning be retained on land used for recreational purposes, e.g. in inner cities. It must however be said that urban green spaces, even when laid out in accordance with nature conservation principles, cannot in terms of their functions for nature and landscape be compared with natural open spaces. Noise and other types of disturbance are unavoidable in urban environments, nutrient loads are generally high and it is generally difficult to create corridors to other habitats. Case studies accordingly show that mobile city residents tend to prefer to spend their leisure time in the country rather than in urban green spaces (BRENKEN et al. 2003) or that areas, which appear to be more natural, are preferred (KAPLAN 2007). The majority of endangered species depends on larger areas of woodland, field and water, and it is very difficult to implement high-quality groundwater protection in built-up areas.

341. Meeting the target of 30 ha by the year 2020 will require an annual average reduction of 6.5 ha per day in land take, beginning immediately. Whether or not this objective can be met is first and foremost in the hands of local authorities, though it must be said that this national sustainability objective has not so far been echoed by significant activity on the ground. So far the 30 ha target has not become established as a criterion in the planning procedures of individual local authorities: for example, with reference to landscape planning

or environmental auditing of town planning measures. Positive developments can however be seen in the abolition or amendment within the period of this report of misguided incentives such as the home buyer allowance and the commuter tax allowance. The renewed discussion on the latter, triggered by a ruling by the Federal Fiscal Court of 23 August 2007 (VI B 42/07) calling the constitutionality of the new regulation of the commuter tax allowance into question, is a clear indicator that environmentally relevant matters have not yet been sufficiently well integrated into other sectors of policy. The many arguments for the complete abolition of this allowance have not been taken into consideration. In particular the commuter tax allowance serves indirectly to subsidise land-intensive construction on land far from the workplace or public transport access points, with the effects of increasing land take and, furthermore, private traffic volume with all its well-documented consequences. The objective of adapting the mobility of the population to its needs is thus not being achieved (cf. SRU 2005b, Section 10.2.1). The Federal Constitutional Court is expected to reach a verdict on the commuter tax allowance in 2008.

342. Negative impacts brought about by the fragmentation of landscapes also remain at critical levels (cf. SRU 2005b). In Germany there are still 562 non-fragmented low-traffic areas (NFLT: fewer than 1,000 private cars per 24 hours) which are not carved up by busy arterial routes. The closure of individual railway lines notwithstanding, the number of non-fragmented low-traffic areas has not increased in recent years. The current investigation for the year in question, 2005, is proving difficult because not all the *Länder* have provided the comprehensive data on the number of district roads which is necessary for any categorisation of NFLTs (cf. BMU 2007b, p. 129; note from the Federal Agency for Nature Conservation, 21 December 2007). Many larger, migratory mammal species such as the lynx, wolf, wildcat, red deer and European otter fall victim to traffic. If the populations of such migratory animals are to be preserved and further habitat fragmentation is to be avoided, the prevention of landscape fragmentation should be a key objective of sustainable transport policy. The construction of wildlife crossing points may represent a meaningful measure for the reconstruction of migration corridors for various animal species (NABU 2007a; BMU 2007b). Insufficient data are available on the migratory habits of other species groups (e.g. invertebrates), the state of development of measures reconnecting habitat fragments, and intended landscape-fragmenting construction projects (cf. Deutscher Bundestag 2007b).

5.2.1.2 Implications for the functioning of the ecosystem and its services

343. Various different types of German ecosystem are showing the signs of significant function deficits (see also overall evaluation for Germany in the Millennium Ecosystem Assessment in BECK et al. 2006, p. 88 ff.). Biodiversity is particularly affected by changes in the ecosystems, as animals and plants are frequently at the end of effect chains and are thus

affected by practically all negative impacts on the environment. The following will attempt to describe the performance losses in selected ecosystems which can generally be ascribed to a combination of the negative environmental impacts previously outlined. The consideration of ecosystems services highlights the cumulative effects of negative impacts in the overall system. What must in any case be borne in mind is that the extent of the threat to ecosystems in Germany is still quite possibly being underestimated because environmental monitoring of the changes in function of ecosystems are not being conducted either systematically or harmonized. The data available are insufficient and highly heterogeneous (Item 396; cf. SRU 2004b, Item 124, 171 ff.). The situation here is significantly less satisfactory than, for example, in the field of pollutant measurement. This section will deal with the already clearly manifest consequences of climate change in respect of the marine and Alpine ecosystems only, as the effects are especially marked in these particular systems.

Agricultural landscape/open countryside

344. Most agricultural landscapes in Germany are characterised by conflicts between the demands made by the intensive exploitation of agricultural resources and the imperative to preserve the many and various functions of the open countryside. Progress has certainly been made in large-scale protected areas (e.g. the *Eifel National Park*), in extensively used areas rich in grassland (after OHEIMB et al. 2004) and in areas where contract-based nature protection schemes have taken effect. Positive developments have also been recorded with the use of agricultural practices that protect rivers and lakes (ORÉADE-BRÈCHE 2005) and with increases in organic farming (HÖTKER et al. 2004). Land set-aside motivated by agri-political imperatives, although never originally conceived as an ecological instrument, has served to create havens for hares, deer and partridges (cf. Items 974, 999). However, it remains the case that the majority of the land area outside protected areas and even some of it within them shows clear signs of significant function loss.

The biodiversity typical of open land is especially under threat. It is already the case that more than 10 % of all plant species in Germany are directly threatened by agriculture, especially through the loss of types of grassland (SCHUMACHER 2005). The major influence of intensive agriculture has in the last quarter-century led to a reduction of some 44 % in the number of individuals of field- and grassland-dwelling bird species, whereas, at the same time, the reduction in the numbers of woodland bird species was only 9 % and in widely distributed common bird species only 14 % (EBCC 2007).

The currently observed intensification of agricultural activity is leading to further pressure on the living conditions of the majority of species. Only a few ubiquitous organisms (those which live without particular ties to an individual place or living environment) are in a position to profit from this. The wild bee species group, which has a vital pollinating function, has in the

recent past lost up to 80 % of its species diversity. Causes of this are above all reductions in plant diversity from intensive land use and the disappearance of complex landscapes previously divided into small cells (KLEIN et al. 2007; BIESMEIJER et al. 2006).

Due to the fact that there is only a limited amount of available land area in Germany, there is a basic problem within the agricultural sector of increasing competition between the intensive cultivation of crops for fuel and the need for food production, added to which are the aims of nature conservation (SRU 2007a, Item 8 ff.). The threat to grasslands – important both as habitat and, in the case of boggy soils, for the climate as carbon sink – is a case in point. For example, once the given innovation potential and available amount of land in Germany are taken into account, around 10 % of the primary energy needs of the country can be met by means of domestically produced bio-fuels. The targets which have been set at national or European level can only be met by means of imports; prioritising renewable energy needs at the expense of ecosystem functions is unacceptable (SRU 2007a, Item 16; cf. Items 338, 360, 1023).

Forestry

345. One third of the surface area of Germany is currently covered by woodland. Natural woodland areas represent an especially effective means of water pollution control, greenhouse gas capture, recreation and biodiversity. Damage to woodland trees from airborne pollutants has in general, as in 2006, decreased slightly in comparison to previous years. However, 68 % of all trees have been damaged to some extent by environmental pollution (BMELV 2006). 28 % of forest areas show clear signs of crown transparency (damage levels 2 to 4), which is 1 % less than the preceding year. Of these trees, in general spruce and pines – which are of less significance for nature conservation – are less seriously affected. In the case of spruce trees, 27 % of the forested area shows clear signs of crown transparency. The lowest proportion of affected trees by area, at 18 %, is amongst pines. In contrast, of all the principal species of tree the beech shows the highest level of crown transparency in terms of area (48 %), with the oak (44 %) in second place. The main cause of damage to forests is held to be airborne pollution (ozone, nitrogen compounds, remnants of sulphur compounds) and also climate change.

It is the general aim of forestry policy to increase the proportion of deciduous trees, mixed forest and near-natural forest management in order to avoid risks (such as deterioration of the soil, susceptibility to pests) and to improve the stability of these woodlands. In recent years the proportion of state-controlled woodland area managed according to “near-natural” or “ecological silviculture” principles has increased, though the actual make-up of silviculture concepts varies between the *Länder* (BAUMGARTEN and von TEUFFEL 2005). Further silviculture concepts practised in privately-owned woodlands, which make up about 44 % of the total forestry area in Germany, add to the overall picture. Central objectives of “near-

natural” or ecological silviculture are the replacement of tree types not suited to the area in which they are being grown with trees native to those areas, and sustainable, environmentally sensitive forestry management aimed at improving the numerous functions of woodland (BAUMGARTEN and von TEUFFEL 2005). Ecological silviculture entails the avoidance of clear felling, an increase in the proportion of deciduous trees to anything between 40 % and 65 % depending on the federal state, a proportion of dead wood to be left in place in woodlands, increasing turnover times and the development of multilevel woodlands with natural renewal. With the exception of the increase in the proportion of deciduous trees the other elements are not subject to quantitative targets. Therefore there are no uniform nationwide minimum standards for dead wood areas or turnover times.

In comparison with previous decades an increase in the proportion of deciduous trees has been achieved. However, from the point of view of nature conservation it is still not enough. More than one-fifth of the total forested area is still home to coniferous monocultures (WINKEL et al. 2005; FRITZ 2006, p. 264 ff.). In most of the tree populations the turnover times are still too short, in terms both of species and biotope preservation and climate protection. Most of the woodland areas are carved up by roads, leading to the impairment of their biotope and recreational functions (WINKEL et al. 2005, p. 52; FRITZ 2006; MÜLLER et al. 2007).

Oceans and coasts

346. Both the North Sea and the Baltic must still be considered to be severely impaired in terms of their function. In respect of substance pollution the high concentration of nutrients, especially nitrogen compounds, still to be found in these two seas is problematic, leading as it does especially to the eutrophication of coastal waters – and in the case of the Baltic, the whole body of water. The particular topographic and hydrographic conditions that obtain in the Baltic mean that eutrophication is leading to significant oxygen loss at deeper levels; zones have now formed in which there is little or no oxygen (HELCOM 2006). Over a large area (about one-sixth of the total) of the Baltic Sea the concentration of oxygen in the deeper water layers has declined to such an extent that the layers nearest the sea bed can barely support life at all. Furthermore, a constant increase in water turbidity and an increase in particularly intense algal blooms can be observed. The excessive nutrient concentrations are a major danger to biodiversity in the Baltic (HELCOM 2003).

Concerning the input of harmful substances, a reduction in the amount of heavy metals has been observable for some time. At certain locations, however, the sediments are still heavily polluted. Under certain conditions remobilisation of the harmful substances is conceivable. Organisms at the end of the food chain continue to be contaminated with persistent, bioaccumulative and toxic compounds such as DDT and PCB, which are associated with long-term effects on viability (in terms of developmental, reproductive and survival capacity).

It is increasingly the case that “new” persistent harmful organic substances are being found in the different matrices (LOEWE et al. 2006; HAARICH et al. 2005; SRU 2004a). Finds of oil-covered seabirds are an indicator of oil pollution, although the indications are that this form of pollution has decreased in recent years (CAMPHUYSEN et al. 2005). Historical pollution sources also continue to pose a threat to the oceans. Particular threats are posed by ammunition sunk during the Second World War in the Skagerrak and the Baltic, which contains toxic substances such as compounds of arsenic. It is feared that continued weathering of such ammunition could lead to the release of ecologically relevant amounts of harmful substances (Deutscher Bundestag 2006a).

The reduction in biomass amongst usable fish stocks has continued apace, to the extent that half the most economically important North Sea fish stocks are outside the biological limits necessary for stocks to be secure. In addition to this a clear reduction in the numbers of especially sensitive non-usable fish species has been observed in areas of intensive industrial fishing, affecting such species as sharks and rays (ICES 2007; FRID et al. 2003; SRU 2004a).

Further environmental problems which are also showing no major signs of let-up have to do with the dumping of wastes, noise exposure, pollution caused by oil and gas extraction and damage to benthic biocenoses caused by ocean dumping of sedimentary deposition as well as gravel and sand extraction (BSH 2006). Furthermore, the intended construction of offshore wind farms is likely to lead to further encroachments into marine habitats.

The rise in average annual temperature of the surface water layers in the North and Baltic Seas, which has been partially documented since the end of the 19th century, is being associated with anthropogenic climate change and is leading amongst other effects to increased immigration of thermophilic species; at the same time the distribution limits of species adapted to lower temperatures are shifting northwards. This development has been documented for a very diverse range of organisms including fish populations (see also FRANKE and GUTOW 2004; PERRY et al. 2005; WILTSHIRE and MANLY 2004). The comparison between terrestrial and marine mammals in Europe clearly shows that the latter are in percentage terms considerably more under threat than their land-based counterparts (22 % of 27 species in contrast to 14 % of 204 species) (TEMPLE and TERRY 2007).

The Alps

347. In terms of surface area the Alps represent the smallest of Germany's large natural regions. They are however characterized by a high diversity of habitats and a corresponding diversity of species (SCHMIDT et al. 2003). Current developments are being driven above all by the retreat of agriculture from alpine areas, changes in forest management and climate change. The introduction of a more commercially oriented style of forest management would have especially grave consequences for the multiplicity of preservation functions performed

by Alpine forest. In addition to the negative impact of nitrogen inputs and changes in land use, global warming is already making itself felt in the Alps. Between 1850 and 1980 the Alpine glaciers lost between 30 and 40 % of their entire surface area and half of their mass. Since 1980 a further 10 to 20 % of the total ice has been lost. The hot summer of 2003 alone accounted for a further loss of 10 % of total glacier mass (AGRAWALA 2007). The Natura 2000 report on the condition of ecosystems thus considered glacial habitats to be in a bad state (BMU 2007a).

General decline in species biodiversity in Germany

348. The negative impacts to which ecosystems are exposed by the various factors outlined are leading as a collective consequence to a decline in local or ecosystem-specific species diversity in Germany. The retreat of near-natural or extensively used areas affects ferns and flowering plants, for example, of which 31 % depend upon areas that are used or managed extensively (KORSCH and WESTHUS 2004 on the example of Thuringia). Many species which were previously widely distributed are showing clear signs of population decrease. Species loss and declining species distribution are accompanied by a significant reduction of genetic diversity (European Commission 2006). Lower life forms are also demonstrating as yet unknown but potentially significant changes. The fact that species loss in Germany significantly exceeds that across Europe as a whole should send alarm signals. Germany is also helping to ensure that the declared European aim of bringing species extinctions to a halt by 2010 (see Gothenburg Summit 2001) is unlikely to be achieved (cf. also the aim of the Convention on Biological Diversity (CBD) 2002, Resolution VI/26: significant reduction of the current rate of loss of biological diversity at global, regional and national levels by 2010).

5.2.2. Summary and recommendations

349. Notwithstanding some individual successes in reducing negative environmental impacts, the current level of stress to which ecosystems are exposed still poses a threat. In particular, efforts to halt the ongoing decline in biodiversity have not yet borne effective fruit. Significant reasons for the current negative environmental situation are

- nutrient and harmful substance pollution, especially by nitrogen inputs which have led in many places to critical loads being exceeded,
- the accelerating loss of grasslands being caused, amongst other things, by rising prices for market crops and intensive expansion of renewable energies and
- continuing high levels of new land use and the fragmentation of habitats.

Generally speaking the combination of these various factors is bringing about impairments in the functions of ecosystems which are in many cases extremely serious in nature. Due to the

insufficient and heterogeneous nature of environmental monitoring in Germany, the degeneration of ecosystems is still being underestimated. It is to be expected that the current impairment of ecosystems will be magnified by the effects of climate change, the beginnings of which can already be felt. At the same time the decrease in near-natural crops will have a negative impact on the greenhouse gas balance. Performance losses are to be expected in the following ecosystems:

- Agriculture and open countryside: the biodiversity which is typical of these ecosystems is especially at risk; there have been dramatic reductions of population in many species groups.
- Woodlands: in spite of a slight reduction in the levels of damage from air pollution the proportion of damaged trees is still high, with beech and oaks trees particularly affected. Ecological forestry management is being squeezed out by the increasing pressure from economic interests which has come about due to increases in prices for natural resources.
- Oceans and coasts: harmful substance loads are as high as ever and the stocks of many fish species are continuing to decline drastically.
- Mountains: through the effects of climate change the Alpine glaciers have lost between 40 and 60 % of their ice since 1850, and this trend has accelerated in recent years.

350. Along with the other causes of pollution outlined in Chapter 11.2 and their reduction, the following measures will be necessary if any improvement in the condition of the natural environment is to be achieved:

Reduction of nitrogen surpluses

351. As a means of reducing the excessive amounts of nitrogen used on farmland, the introduction of fertiliser tax to penalise excessive use of nitrates previously mooted by the German Advisory Council on the Environment would appear to be the most effective instrument (cf. Item 561). The less effective tax or charge on nitrogen per se may come into consideration as a second-best solution. This measure has already led to reductions in nitrogen fertiliser use in other European countries.

Tackle land take at its roots

352. No effective solution has yet been found for the problem of land take, as the causes, which are to be found in the lack of overlap between the interests of the goal-setters (the Federal Government) and the implementers (local authorities), have, with the exception of the phasing out or abolition of some incentives, not been addressed. The cornerstones of the German Advisory Council on the Environment's proposals are, as before:

- Tradable planning permits for land-use control, in conjunction with local area planning (SRU 2004b, Item 214 ff., 782; from HAAREN and MICHAELIS 2005) and

- The introduction of financial equalisation on ecological lines in conjunction with concerted management through land-use planning.

In addition, further development of landscape planning could be used to guarantee, in terms of both instruments and methods, the implementation of specific aims, such as the reduction of land depletion and the preservation or expansion of the current proportion of non-fragmented low-traffic areas (from the current level of around 20.6 % of the land area of Germany to 25 %), (cf. BRUNS et al. 2005; PENN-BRESSEL 2005). The Strategic Environmental Assessment (SEA) could also provide a framework not only for opening discussions on the subject of land take but also for giving existing arrangements real clout by transferring the 30 ha objective from national to local authority level. The Federal Building Code's emphasis on the significance of thinking in terms of space-saving certainly represented progress, but if it is to be fully effective this will need to be complemented by measures aimed at implementation and completion. As it is above all the housing construction and transport sectors which are responsible for ongoing land take and the fragmentation of habitats, it is a matter of urgency to improve the use of waste land and remediation land and to ensure closer integration of nature conservation imperatives (such as wildlife corridors or areas set aside for biotope networks, cf. Section 5.6.2) into transport planning. Incentives or concrete quality standards should be put in place to permanently reduce land use. Measures within cities and districts might include encouraging the revitalisation of old industrial sites or an obligation to conduct further housing developments in such a way as to reduce land use. Cooperation between municipalities or increased conversion of waste land might also come into play. These measures will be particularly essential if the introduction of the market instrument of tradable planning permits for land-use control does not succeed.

As a longer term perspective, changes in population growth should also be investigated from the point of view of land area use and scenarios developed concerning where and how reductions in population might be used positively to reduce land take. Monitoring of such scenarios must be subject to uniform criteria throughout the *Länder* in order to improve its quality.

Bring about differentiated land use

353. Outside protected areas it would be in keeping with the concept of differentiated land use (HABER 1998) to concretise the largely non-location specific demands of good practice in agriculture, forestry and fisheries and to support their implementation more adequately through consultation and monitoring. In addition, sufficient funds should be made available to environmental agricultural measures and contract nature conservation schemes to encourage land use to be voluntarily adapted to location-specific sensitivities and species and biotope significance.

Forest ecosystems should also be treated in a differentiated fashion and with respect to ecological significance and sensitivity. The reduction of air pollution, especially by ozone and NO_x, must therefore be more strongly integrated into immission control policy. Apart from the need to combat external pollution threats, it is also necessary to practise ecological forest reconstruction and near-natural forest management if forest functions are to be preserved (FRITZ 2006; WINKEL et al. 2005). In particular, depending on the initial situation and habitat tradition, the aim should be pursued of establishing differentiated dead wood proportions within woodlands (MÜLLER et al. 2007). In addition further quantitative goals, such as the proportion of completely reserved areas (e.g. 5 %, BFANL 1989), should be defined. In Germany, in addition to the general concept of ecological forest reconstruction, woodland areas are currently certified according to different standards, e.g. according to PEFC, FSC and Naturland. If the aims of ecological forest reconstruction are to be supported, the German Advisory Council on the Environment proposes the development of a uniform EU ecological forest reconstruction standard along the lines of the “Bio” label in organic farming (EU directives 2092/91, 1804/99 and 834/2007). This label should be indicative of a uniform standard that is as high as possible; ideally the criteria of the FSC would be adopted.

5.3 Future developments

354. Scenarios are an instrument of strategic planning aimed at generating clarity in respect of possible future developments. Due to the multiplicity of indirect and direct forces affecting the functions of ecosystems, it is important also to develop future scenarios for nature conservation in order to be able to confront any possible negative changes in good time. With climate change in mind there is a basic need in the nature conservation field to be able to make long-term forecasts, which will in any case be hampered by significant forecasting problems due to insufficient data availability and the potentially highly complex nature of future events. Nature conservation will be particularly hard hit by the indirect effects of climate change, e.g. measures taken to minimise it (such as cultivation of plants for fuel) or adaptation measures taken in other areas of agricultural practice (such as irrigation). As a result, the uncertainties involved in forecasting are increasing. Decision makers are therefore confronted with a dilemma: many changes can only be predicted with a considerable degree of uncertainty but, due to the nature of the risk associated with them, are potentially so serious that action is becoming necessary now. Also, successful preventative strategies may prevent the feared changes from occurring in the first place, which means the successes are not immediately apparent (the Cassandra phenomenon). One of the most important challenges facing future environmental policy is therefore how to make the public case for the necessity of changes.

The results of various scenario studies (on the meta-level for example the Millennium Ecosystem Assessment or IPCC Report, IPCC – Intergovernmental Panel on Climate

Change) must lead to the conclusion that, if further measures are not adopted by 2050, the planet will be confronted with serious losses of ecosystem functionality. These will primarily

- affect the carbon storage and buffer capacity of ecosystems and
- lead to a drastic increase in the rate of species extinctions.

The principal causes are climate change, overuse of natural resources, inputs of harmful substances and nutrients into the environment, and mismanagement in sector policy (e.g. agricultural policy) (Millennium Ecosystem Assessment 2005). At European level scenarios developed by the European Environment Agency (EEA) point to growing environmental problems, above all in the areas of eutrophication and land take and urbanisation respectively (EEA 2007a; 2007c). Depending on the way rural land use develops in the future – which is very hard to predict – it is equally possible that negative (e.g. loss or degradation of ecosystems) or indeed positive effects (e.g. increase in forested area) might arise. The PRELUDE project of the EEA has identified the forces behind these future developments and concluded that most of them can be directly influenced by policy decisions (cf. EEA 2007d).

355. The following is intended to describe those driving factors and trends within Germany which entail especially high levels of risk for nature and natural landscapes, so that a preliminary sketch of the potential need for corrective action may be made. At the same time the development of trends that would have unfortunate consequences for nature conservation if left unchecked will be described as it would unfold without additional political intervention.

The driving forces which will have a negative impact on nature conservation in Germany in the medium and long term include:

- Climate change and associated changes in the water balance, temperature-dependent processes in ecosystems and species mix,
- The continuation and intensification of an EU agricultural policy that entails a reduction in the financial resources available for environmental agricultural measures in combination with a worldwide trend towards rising market prices, partly brought about by the conflicting demands of food and fuel crop production (cf. SRU 2007a),
- A forestry policy that neglects the aims of ecological forest reconstruction in favour of short-term boosts to timber yields,
- The increased incidence of invasive alien species assisted by growing international trade and global warming and
- The weakening of the institutional framework of nature conservation, especially in the sense of a decreasing capacity for action occasioned by cuts in financial and human resources (cf. SRU 2007b), combined with a decline in legal standards.

These driving forces are being reinforced by further factors such as demographic trends (HEILAND et al. 2004; HEILAND 2007; WOLF and APPEL-KUMMER 2007) which will lead to structural changes in human population, infrastructure and land use, more resource-intensive and travel-intensive lifestyles, and a continued high level of land take (cf. Items 339 f., 352). The most significant expected developments will be briefly described.

5.3.1 Climate change

356. Effects of climate change on ecosystems can already be observed. Climate change could mean, alongside increases in temperature, a reduction in summer precipitation in Germany. Such a reduction in precipitation will manifest itself mostly strongly in the north-east and south-west of the country (UBA 2007). High summer temperatures could also lead to pronounced increases in evaporation (UBA 2007). Without appropriate adaptive measures this development could become problematic in areas in which water shortages are already an issue, such as the north-east of Germany. More frequent instances of low water tables, above all in summer, present problems for biocenoses in river flood plains due to poor oxygenation. On the other side of the equation, if winter precipitation and intense rainfall events increase as projected by 2080, the number and intensity of winter and spring floods could increase (UBA 2006, p. 8; ZEBISCH et al. 2005). As the changes in summer and winter precipitation will make themselves felt very differently in different regions, there will be a need to develop regional adaptive nature conservation strategies. Increases in tree damage brought about by weather events, such as has already been witnessed in the case of pine, spruce and beech trees in 2003/4 (SEIDLING 2006), might, should climate change continue unabated, lead to the collapse of entire tree populations.

The more frequent occurrence of intense rainfall events could increase the risk of soil erosion by water. Long periods of drought can increase the susceptibility of soils to wind erosion (van KAMP et al. 2004, Vol. II). The predicted increase of some 1.4° C in average temperature for the state of Brandenburg, with extended periods of summer drought and lower precipitation, will lead to a general reduction in soil moisture, thus increasing the risk of wind erosion (LAHMER 2006).

357. The effects of climate change on many animal and plant species can already be seen (e.g. HENNIGES et al. 2005; SCHABER and BADECK 2005; STREITFERT et al. 2005; MENZEL et al. 2006; BAIRLEIN and WINKEL 2001; HÜPPOP and WINKEL 2006; LUBW 2007). Whereas, for example, the numbers of ducks stopping over in Central Europe during their migration from overwintering areas has increased, it is above all long-distance migratory birds that are suffering from the effects of climate change during migration and in the overwintering areas (SUDFELDT et al. 2007). If the warming trend continues unabated, further species displacements must be expected (LEUSCHNER 2005; THOMAS et al. 2004; ROOT et al. 2003; WALTHER et al. 2002). Forecasts indicate that habitats climatically

suitable for many animal and plant species in Germany will be displaced to the north and east, up to higher ground or into areas with more favourable humidity conditions (summarising KORN and EPPLE 2006; EEA 2004; BAKKENES et al. 2002; GITAY et al. 2002). The next few decades could see the extinction of between 5 and 30 % of all species native to Germany due to climate change (KORN and EPPLE 2006).

358. Global meta-analyses assume an average migration speed of species of 6.1 km towards the poles or 6.1 m upwards to higher ground per decade (PARMESAN and YOHE 2003). One precondition for such spatial displacements is the availability of landscapes that allow for easy passage and many local opportunities for resettlement. Such conditions do not yet obtain. Particularly affected by climate change will be the Alps and the oceans as well as wetlands in north-east and south-west Germany (BERRY et al. 2003; THUILLER 2004; CHAMAILLÉ-JAMMES et al. 2006). Coastal areas for example will see the disappearance of entire biotope types in areas outside protective dykes. This will have a damaging effect on tourism in these areas and, especially, on the islands (WBGU 2006).

As far as plant biodiversity is concerned, in most regions the availability of water will be a key factor (KREFT and JETZ 2007). If climate change causes regions to become markedly drier, and competition for groundwater use between water management, agricultural, and nature protection needs becomes more intense, the result could be the drying out of wetland areas and disappearance of those species adapted to high water table conditions. Not only would species diversity suffer but the thinning out of vegetation cover could have further negative impacts on the water balance. Moreover, the drying out of bogs in particular would lead to the release of significant quantities of CO₂ and nitrous oxide, thus in its turn contributing further to the intensification of climate change. However, due to the fact that precipitation distribution and water balance change on a regional scale, it would be inappropriate simply to assume that today's biocenoses would, as it were, be displaced northwards in their entirety. It must instead be assumed that changes in distribution of individual species in response to climate change would lead to the displacement of vegetation patterns and food chains, a development which would have effects right up to the level of biogeochemical circulatory systems.

The arrival of invasive species is being accelerated by global warming. Displacement effects could have negative consequences for biodiversity. The spread of the Pacific oyster in mudflats, for example, is leading to the expulsion of indigenous mussels, thus depriving migrating birds of their traditional food supply (SUDFELDT et al. 2007). There will also be problematic effects on agriculture if non-native pests are able to become permanently established. Thus, for example, the western corn rootworm (*Diabrotica virgifera virgifera*) was found for the first time in 2007 in south Germany, and its presence could bring about massive damage (at least 25 million Euro per year) and the need to use increased amounts of insecticides (BBA 2004).

359. Possible effects of climate change on an ecosystem are illustrated here using the example of woodland, on which subject numerous studies are available (cf. DOYLE and RISTOW 2006; DUDLEY 1998; HANSEN et al. 2001; NOSS 2001; LEEMANS and EICKHOUT 2004).

Woodlands and climate change

Climate change can have the following effects on woodland ecosystems:

- Increased incidence of disruption: climate change will increase the extent and frequency of disruptions due to extreme weather events such as storms, a probable increase in the incidence of wildfires, changes in pest infestation patterns, but also lesser changes (length of seasons, precipitation events and local temperatures). This will all serve further to reduce the already low proportion of ancient forest in the existing woodlands, thus reinforcing the trend towards juvenescence of tree populations. This has far-reaching consequences for biodiversity, as many endangered species rely on older tree populations for their survival. Climate change will thus come into play in addition to the already manifest forms of anthropogenic disruption such as fragmentation and changes to the structure of woodland ecosystems, with reciprocal effects that are as yet unknown.
- Uniformity: many types of tree and other forest plants with slow growth and late reproductive maturity can only spread slowly to more suitable areas. Instead it is the fast-growing species, short-lived generalists and invasive species that will profit first. The consequence will be an accelerated trend away from woodlands with high species diversity to those with low species diversity.
- Area displacement: increasing temperatures will lead to the displacement of tree species to higher altitudes, whereas drying out will simultaneously have the opposite effect; micro- and macroclimatic feedback effects may arise as a result of vegetation cover.
- Extinction: some of the most sensitive forest habitats, along with the relict species which occur in them for which such habitats represent vestigial areas of their so-called ecological niche, could be especially affected. In individual cases the disappearance of whole forest types dependent on cooler conditions and individual species can be assumed.
- The relevance of the individual points can vary. The effects outlined above will probably be replicated in many ways in other units of vegetation. However, for these the effects are more difficult to predict due to the poor availability of data.

5.3.2 Agriculture

360. Because of its dominant share of the total land area of Germany (about 53 %), agriculture will play a key role in the future development of nature conservation. The most

important criterion for a more environmentally oriented agricultural policy – sufficient reward for ecological services – has been weakened in the new EU budgetary period from 2007 in comparison to previous years. At present it is unclear if future European and national agricultural policy will focus more strongly on environmentally relevant aims and objectives. The likelihood of the pillar 1 being seriously whittled away or disappearing altogether has, however, never been so high. The hikes in prices of agricultural produce have led to the rapid de-legitimisation of pillar 1. The interim evaluation scheduled for 2009 could see the introduction of new priorities, but fundamental changes would only become possible from 2013 onward. Table 5-2 depicts the agri-political drivers which are relevant for nature conservation by contrasting two possible scenarios of the Common Agricultural Policy (CAP).

The basic difference between the two scenarios from the perspective of nature conservation lies in the fact that the liberalisation scenario could theoretically mean a higher EU budget for environmental agricultural measures being made available. Additional incentives and checks and balances aimed at guaranteeing good agricultural practice would in any case be abolished. Structural changes in agriculture would in addition probably continue and intensify (GAY et al. 2004). Rising world prices lead in both scenarios to an increased demand for land for cultivation. The liberalisation scenario, with its projected end to all – direct or indirect – subsidies for fuel crop cultivation, would lead to more modest price hikes and lower incentives for the cultivation of such crops. Both scenarios would lead to the endangering of two key nature conservation objectives – the preservation of grasslands and the maintenance of extensive different forms of use – unless readjustments are made by the use of sovereign protection or support programmes. In the case of cultivatable or recoverable land, locations which do not enjoy the protection of nature conservation status, increased conversion of grassland up to the effective national limit of 10 % of all current grassland area set by Cross Compliance is to be expected in the status quo scenario. Only once this limit has been exceeded are the recipients of direct payments required to carry out reseedling measures (see more detailed elaboration of the Cross Compliance regulations in Chap. 11.3). The liberalisation scenario also gives rise to a trend towards grassland conversion, albeit to a reduced extent due to the fact that the cultivation of biomass would not be subsidised. The expected grassland conversion must be countered with appropriate regulations in the area of good agricultural practice. The direct and indirect subsidisation of renewable raw material cultivation, along with increased returns for cereal and corn crops, means that there are significant financial incentives for converting grassland into arable land.

Table 5-2

**Characteristics and factors of two possible scenarios in
Common Agricultural Policy (CAP)**

	Status Quo Scenario	Liberalisation Scenario
Factors relevant for nature conservation	Development in line with the Luxembourg Resolutions (of June 2003) by 2013	Comprehensive liberalisation in line with the increasing globalisation of trade
Direct payments	Decoupling of payments under the Single Payment Scheme; broadly guaranteed until 2013, then progressively less due to eastward enlargement	Abolition of all direct payments
Observance of cross compliance requirements	Mandatory for those in receipt of direct payments	Abolition of cross compliance; minimum standards of good agricultural practice
Budgetary allowance for agri-environmental measures	For EU 15 progressively less due to eastward enlargement	Agri-environmental payments as Green Box (WTO) measures can continue: potential for budget increase due to savings in the first pillar.
Direct and indirect subsidisation of sustainable raw material cultivation	Continues as before	No subsidisation (weakening the trend to price increases)
Price developments in lamb and beef products	Increasing, yet with competition World market prices endanger this branch	Increasing, yet with competition World market prices endanger this branch
Source: Luxembourg Resolutions of June 2003; SRU 2004b; von HAAREN et al. 2007		

361. In addition the abolition of single payments for animals (particularly suckler cows and ewes) and the milk quota will enhance the trend towards conversion of grassland. Dairy farming will no longer be viable in disadvantageous locations or with unfavourable operating structures. Should the status quo scenario play out without adjustments being made to the regulations on protected areas, then grassland conversion could also continue within the protected areas, legislation on which does not cover the conservation of grasslands. The rules on cross compliance do not allow for a basic ban on grassland conversion of sufficient precision in respect of individual tracts of land that might serve to prevent this (cf. Lower Saxony Ministry for Food, Agriculture and Consumer Protection 2007a, p. 13 f.). In areas with poor conditions for agriculture the probability will increase that, without environmental

agricultural measures, existing grassland will only be maintained in compliance with the minimum standards demanded by cross compliance once the direct incentives for extensive livestock farming (single payments for suckler cows and ewes) have been removed. It is also probable that disadvantageous land which is not suitable for the cultivation of fuel crops will increasingly become fallowed to the extent that the grassland is not subject to the minimum requirements laid down by cross compliance regulations. In the liberalisation scenario this trend will be amplified. This may, depending on the location, lead to either positive or negative consequences for the functional capacity of the ecosystem. Overall, the development of areas of "wilderness" on suitable land such as flood plains, mountainous or woodland areas and as part of a biotope network is clearly to be desired (e.g. 3 to 5 % of the total land area of the Federal Republic; cf. SRU 2002a, Tab. 2-5: "*Wildnis 2010*"). Taking land out of agricultural use can also have positive consequences for the quality of inland water bodies and soil functions. A particularly good opportunity would be presented here if a raft of environmental agricultural measures such as those allowed within the Green Box framework could be used to manage the following processes in line with nature conservation principles. If no such agri-environmental measures are available, both scenarios provide a bleak outlook for bog and heath lands. The abolition of the single payment system for ewes and the absence of payment entitlements for areas which do not meet the German definition of permanent grassland will lead to critical economic conditions for the continuation of ewe farming (von HAAREN et al. 2007). It is also the case that in both scenarios, albeit at different speeds, a transformation of agricultural structures can be expected which will favour the increase in extent of agricultural areas until they reach an economically optimum size, probably leading in consequence to a significant reduction in such landscape elements as baulks, hedgerows and field groves.

362. The inability of the agri-environmental programmes to counteract the undesired effects outlined above is indicated by three points. Firstly it is questionable whether the proposed subsidy volumes for the agri-environmental programmes will suffice to safeguard the development of nature conservation oriented landscapes, especially in the light of a past deviation rate of up to 49 % (cf. REITER et al. 2005, p.23). Secondly the subsidy prioritisation of the Natura 2000 areas which currently holds sway covers only a fraction of the areas which are in need of action (e.g. Lower Saxony Ministry of Food, Agriculture and Consumer Protection 2006, p. 140; von HAAREN et al. 2007). Thirdly, readiness to participate in agri-environmental programmes is clearly on the wane (e.g. a reduction in contract-based nature protection areas of around 20 % in the *Wesermarsch* rural district; *Hannoversche Allgemeine Zeitung* of 30 August 2007). The fact that contract-based nature protection schemes should be becoming less attractive is, when seen against the backdrop of the drivers outlined previously, an inevitable consequence of not raising the payments for agri-environmental measures in line with the general increases in contribution margins (for

current premiums see e.g. Lower Saxony Ministry of Food, Agriculture and Consumer Protection 2007b; cf. KAPHENGST et al. 2005).

5.3.3 Forestry management

363. Identifying future trends in German forestry management is currently fraught with uncertainties. Whereas it was the case in the past that serious efforts were made in the area of ecological woodland reconstruction, the recent past seems to have brought about a slackening of efforts to turn to near-natural forestry practices. Amongst the drivers of this trend with all its dangers for ecological woodland functions are the privatisation of state-owned woodland in some *Länder*, high timber prices and increased demand for smallwood for energy production (SRU 2007a, Item 29). The integration of forestry, which, unlike agriculture, is not subsidised, into a global lumber market and rising demand for timber are bringing about dramatic rises in prices. As is the case in agriculture, the increased demand for renewable energy sources is leading to a marked improvement in the future commercial prospects of the lumber industry in comparison to the situation just a few years ago. Structural changes in the forestry industry are resulting in increasing outsourcing of forestry services and the emergence of new wood clusters serving to boost demand for timber. The recent past has seen significant expansion in Germany – including the new *Länder* – of sawmill capacity (30 % increase between 2005 and 2008; MILLER 2007), which the industry now naturally wants to make use of. The concept of “mobilisation of timber potential” is becoming widespread and has merited inclusion in the Federal Ministry for Food, Agriculture and Consumer Protection’s Forest Condition Reports (BMELV 2006). Studies which present scenarios for the overall development of the forestry industry are not yet available; there is, however, already a series of scenarios concerning partial developments (climate-induced damage to trees, availability of raw timber etc.). Comprehensive scenarios for the time horizons 2020, 2050 and 2100 are currently being worked out in a research project of the Federal Ministry of Research and Education (www.waldzukuenfte.de).

According to a study carried out by the Federal Research Centre for Forestry and Forest Products, in the twin scenarios of increased use but unchanging supply from private woodlands and unchanging use but increased supply from *Länder*-owned woodlands, the future volume of raw timber may increase up to an amount of 76 million scm. per year (DIETER et al. 2001). This amounts to an increase of some 11 million scm. This increase is desirable in respect of fossil fuel substitution. Increasing this any further, however, causes a conflict with other woodland functions. In addition, natural disasters or, for example, the susceptibility of spruce trees to climatic changes could lead to high levels of forced timber use, meaning that it would seem to make sense in respect of the stated aims to orient forestry policy to current regional potential for use (cf. WINKEL 2007).

5.3.4 Increased spread of alien species

364. Invasive alien species (as defined in Art. 8 h of the CBD) are animal and plant species whose presence threatens native ecosystems, habitats or species (cf. SRU 2004b, Items 125-129). One of the controlling instruments available to nature conservation is the permit requirement for the release and installation of alien species contained in Section 41 (2) of the Federal Nature Conservation Act. Some alien species can also cause economic damage (above all in the area of plant protection) or actual damage or risks to health (the much-discussed highly allergenic common ragweed *Ambrosia artemisifolia* is a current example).

Against the backdrop of climate change it is expected that the proportion of alien species that could establish themselves in Germany will increase, not least because increased disruption to the vegetation cover will create openings for them. It is probably the cities that will have a key indicative role to play in respect of possible climate-driven species occurrences in the future. Warmer city centres which are already home to more alien – mostly thermophilic – species than the surrounding countryside will probably represent future distribution centres for alien species (SUKOPP and WURZEL 1999). A further example of the way climate change and the spread of alien species could combine is to be found in the spread of the bullfrog (*Rana catesbeiana*) in some of Baden-Württemberg's rivers and lakes. This North American invader could have a significant influence on the ecosystems of water bodies due to the fact that fully-grown bullfrogs eat, amongst other things, other amphibians. In this way tadpoles of the indigenous amphibian species are almost completely absent from those spawning grounds which have been invaded by the bullfrogs. Increases in temperature will encourage the spread of bullfrogs, which need water temperatures of between 17 and 21° C and air temperatures of 28° C to reproduce. Their spawning period can also extend well into high summer, unlike that of the indigenous species (LAUFER and WAITZMANN 2001).

5.3.5 “Dismantling bureaucracy” – loss of capacity for action in nature conservation

365. General reforms of administration in many *Länder* have seen reductions above all in the capacity of official nature conservation bodies (cf. SRU 2007a). Reduction in staffing and financial capacities is leading to a implementation and acceptance deficit. Above all, reductions in areas of expertise and staffing brought about by the abolition of middle management tiers, the devolvement of environment tasks to local authorities and the merging of *Länder*-level authorities are leading to deterioration in the conditions for practical nature conservation and environmental monitoring (summary of SRU 2007b, Item 420 ff.). Confronted with the weakening of the legal basis or, alternatively, deviation from previously agreed standards (debate on the Environmental Code, parliamentary initiative on the amalgamation of the Habitats Directive and Birds Directive) nature conservation is

threatened with further structural undermining. This contrasts starkly with the truth of the real need for improved capacities for action in order to be able to respond to future challenges and to develop and implement long-term, strategically oriented concepts.

5.3.6 Summary and recommendations

366. Climate change, agriculture – especially the future direction of EU agricultural policy; land use and fragmentation; forestry and the progress towards ecological forest reconstruction; reductions in staffing and the inadequate financing of nature conservation administration: all these are of key importance for the future development of ecosystems. The most significant of all of these is climate change, which will in all probability lead to great regional and seasonal variations in temperature and precipitation patterns and amounts; not forgetting indirect effects of relevance to nature conservation such as measures introduced on the part of other uses to limit or to adapt to the changes. When combined with the other driving forces previously mentioned this could lead, at least in part, to dramatic changes in ecosystems and species diversity, the scope of which can hardly be predicted. Whereas a considerable proportion of indigenous species (between 5 and 30 %) will be threatened with extinction by climate change alone, the appearance of new, invasive species will bring about further drastic changes to the composition of species diversity.

It is therefore necessary on the basis of new insights to intensify the development of future ecosystem development scenarios and from them to derive suitable adaptation and limitation strategies for nature conservation. It is already clear that there is sufficient reason to prompt immediate action at political level.

367. A robust climate policy is essential for the targets of nature conservation. However, it will hardly be possible to prevent a further increase in temperature. If the consequences of climate change for indigenous animal and plant species are to be mitigated, then climate change must be taken into consideration in the planning of nature conservation measures. Adaptive responses to climate change in nature and landscapes must be supported and undesired changes as far as possible prevented, above all by means of measures to stabilise climate-sensitive ecosystem functions and a multifunctional biotope network (cf. Section 5.6.2, Item 421). This could include identifying and setting aside alternative habitats for certain adaptable endangered species of animals or plants in the event of habitat displacement. Such nature conservation measures as, for example, the rehydration of bogs and the maintenance and introduction of extensive grassland use forms also have a part to play in reducing emissions of greenhouse gases, inasmuch as they can strengthen the carbon sink and storage functions of ecosystems and reduce land-use related emissions by means of adapted usage forms. The instrumental value of possible synergies between nature conservation and climate protection should be given official recognition in the revised Environmental Code.

368. The effects of climate change should be taken into account more strongly in forestry management, as woodlands – depending on the nature of their management – have a quite special function as reservoirs or sinks for greenhouse gases but can also turn into significant sources when deforestation takes place. There is reason to fear further damage to forest ecosystems from climate change. Ecological forest reconstruction and intensive efforts to support natural renewal seem to be the most appropriate means of supporting the adaptation of woodlands to climate change (FRITZ 2006). These would include amongst other things the increased replacement of non-native coniferous trees by broadleaf trees (SPERBER and HATZFELDT 2007) and a near-natural age structure. Especially important for the preservation of species diversity in woodlands would be the maintenance of unfragmented and extensively used forested areas.

369. In order to reduce the risks posed by invasive alien species, the following measures should be taken in addition to the 3-step approach envisaged by the CBD (prevention, early warning, measures to minimise the effects):

- Monitoring of the incidence and spread of all non-native species, especially potentially invasive ones,
- The use of plants of local origin in open landscape planting measures, in combination with guarantees of origin by means of the development of proof of quality and origin.

370. Federal, *Länder* and local authority administrations have been under almost constant pressure to reform for decades. A new wave of cuts would put the successful work of the environmental bodies in jeopardy. The criterion for necessary reform efforts needs to be the requirement profile of a modern environmental administration which is equal to the challenges of protecting natural living environments in the face of Europeanisation and globalisation and of emerging environmental threats such as climate change. Integrative, inter-sectoral and sustainable concepts need to be developed to this end.

5.4 Intellectual history and political and institutional background of nature conservation policy

371. Reductions in biological diversity and ongoing functional losses of nature and natural landscapes are typical examples of environmental problems which cannot be solved in the wake of economic developments and for which the state carries a particular responsibility (according also to Art. 20a of the Basic Law) (see also SRU 2004b, Item 100; 2002a, Item 32 ff.). In order to be able to estimate the extent of this responsibility in a correct and proper way and to work out exactly where concrete measures are necessary, clarification is required about framework conditions pertaining to the history of ideas and political institutions. Max Weber's 1920 studies of the influence of the protestant work ethic on modern economic life (WEBER 1920) first highlighted the fact that actions performed in any

society are not motivated solely by direct and visible interests but also by factors which operate on the level of ideas. Many of the problems facing nature conservation can in this sense be understood as symptoms which have deeper structural causes. The following will attempt briefly to describe the most important cultural and political-institutional barriers to the development of a comprehensive nature conservation policy. In association with the normative criterion of permanent safeguarding of a society's natural capital ("strong" sustainability according to SRU 2002c, Chap. 1), this allows some conclusions to be drawn about a future nature conservation policy which could form part of a self-aware, or reflexive modern societal movement (GIDDENS 1995; BECK 1986). The various aspects will be listed here in a particular sequence, although the sequential form does not do full justice to the interplays and reciprocal effects involved.

5.4.1 Historical and intellectual obstacles to nature conservation

372. The negative impacts on nature and natural landscapes described in Chapter 5.2 are, first and foremost, results of economic exploitation of the natural environment, above all in the agricultural and silvicultural sectors, but also by construction and transport. These activities follow a purely economic logic which does not take the total cost to society into account and is thus frequently practised in a way which is not in the long-term interest of the environment. Such forms of use and the implicit assumption which lies behind them that economic interests take priority over those of nature conservation derive their legitimation to a great extent from a tradition of ideas which saw the mastery of nature as an important element of human endeavour. This view goes back as far as the so-called call to subjugation found in the Biblical story of the Creation ("let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth" [Genesis 1, Verse 26 ff.]) In terms of historical effects this call to subjugation forms a decisive background conviction to social practice (for correlations between this notion and the ecological crisis cf. WHITE 1967). Thus the large-scale technical projects of the 18 th and 19 th centuries such as the drainage of the Oder swamp, the straightening of the Rhine and the construction of ports in Friesland were legitimised not only by references to the economic advantages but also in respect of the duty of mankind to subjugate Nature (BLACKBOURNE 2006).

373. Early modern philosophy adopted the idea of Man as master and proprietor of nature from the Christian tradition. This was of decisive importance for René Descartes, Francis Bacon and the French Enlightenment. The effects of Bacon's philosophy on the protagonists of early industrialisation and the central role of the Royal Society, in the context of an ever more intimate association of science, technology and industry, have been subjects of much research (MUSSON 1977). It is not without reason that the project of the modern age has

been described as the Bacon Project (SCHÄFER 1993). This project sees nature as having no inherent value and as the mere object of scientific observation or as an object of work or “raw material”. This “demythification of the world” (WEBER 1920) represents a necessary precondition for the perfection of Man’s mastery of nature (in place of many MERCHANT 1987).

374. The project of the modern age seems to exclude a non-objective attitude to the natural world as being inimical to reason (HABERMAS 1984, p. 508 ff.). Traditions which articulate a “careful”, “understanding” and “reverent” approach to the natural world (as for example in the cases of Francis of Assisi, Hildegard von Bingen, Nicholas of Kues) are thus banished to the periphery or relegated to the status of pre-modern world views. Nature conservation is therefore always suspected of harbouring a value-conservative, romantic attitude and aspiring to remythify nature. It is precisely in order to confound this suspicion that nature conservation since the 1950s has been keen to provide an “objective” scientific or, as the case may be, “ecological” rationale for its existence. Such a latent scientism/naturalism militates against an understanding of the aspects of nature conservation which are not directly related to the “basics of life” but refer instead to idea of a good life. The approach to nature conservation that sees it as “applied ecology” (according to ERZ 1998; 1990) can make it more difficult to understand that nature conservation is also a cultural task of modern society.

375. Since around 1800 the basic pattern of social order has moved away from hierarchical stratification towards systemic differentiation (LUHMANN 1984). This transformation was basically completed in the second half of the 20th century. Individual social systems specialise in particular functions; society as a whole loses any sense of a centre. Social systems can, according to systems theory, only process information that is, or can be, presented in the code that is specific to that particular system. Anything that is not appropriately coded is perceived as “white noise” from an overly complex environment. The external natural world can not be represented within the system as nature per se but only in the code of the system, in this case as a mere production factor (economy), as votes (politics), true assertions (science), infringement of rights (law) etc. With this in mind LUHMANN has very forcefully asked the question of whether systemically differentiated societies can find an appropriate attitude to ecological problems (LUHMANN 1986).

376. Taken in the context of time many processes of destruction of the natural world reveal themselves as slowly evolving problems, which are by their very slowness hidden from direct perception. The general tendency in modern societies towards acceleration (to summarise ROSA 2005) favours objectives that come at the end of ever more abbreviated time scales. The necessarily long-term character of nature conservation measures means that their successes can hardly be directly perceived, thus making it more difficult for them to gain political legitimacy over and above the more obvious results of economic processes that

consume natural resources. The wake-up call given by the idea of long-term responsibility implied in the concept of sustainability remains weak in its effects when confronted by the real accelerative tendencies of modern societies.

377. These general ideas about the relationship between Man and nature are also reflected in traditions of economic thought. Whereas economic practice in the 18th century defined the value of land exclusively in terms of soil as a production factor, the 19th century saw the gradual establishment of the view that “land” could be seen in economic terms as a form of capital, thus meaning that ground rent could be regarded as a form of capital return (CLARK 1888). “In order to reduce all units to homogeneity, Clark would fund all the factors of production. Land and capital are reduced to an abstract mobile capital fund” (HANEY 1949, p. 892). In this way land in the form of ground finds its place in the homogeneous capital stock of a society. The triad of soil, work and capital is replaced in the neoclassic model by a bipolar structure of work and capital. The theory behind the obliviousness to nature qua nature in neoclassical economics was only corrected very slowly (in world economics) or reversed (in ecological economics) (on the history of theory see DÖRING et al. 2007).

378. W.W. ROSTOW declared the flow chart of economic prosperity that he developed on the example of Great Britain to be exemplary for the whole world (ROSTOW 1960) At the heart of this scheme lies the permanently high growth rate of gross domestic product (GDP). High growth rates are still regarded as the central indicator of societal well-being and successful economic policy. Despite the criticism of GDP as key indicator that has come from all sides since the 1970s – a criticism that has been renewed at EU level (e.g. during the *Beyond GDP* conference, 19-20 November 2007, in Brussels), this very indicator was adopted as the heart of the Lisbon strategy and has taken its place in German sustainability as an indicator of sustainable development (cf. Table 1-5). Within this growth paradigm those policy options which might imply loss of growth are under pressure to justify themselves. Nature conservation is particularly affected by this because, in contrast to industrial environmental protection, it does not aim to establish any new areas of economic activity and is still too little recognised as a precondition e.g. for tourism.

379. Current ideas of prosperity are based primarily on standard of living – in other words, the options for consumption created by income. Quality of life – satisfaction with one’s own living situation that is not solely derived from monetary criteria – is neglected relative to easily measurable standard of living. The multiplicity of values of Nature as a public good in relation to quality of life (eudaimonistic values) (SRU 2002a, Item 15 ff.) is, if at all, not taken into consideration sufficiently in decision making and is neglected in relation to the potential uses of nature that can be expressed in monetary terms.

380. It is not to be expected that this intellectual history background will change fundamentally in the near future. Nature conservation policy should, however, also not

overlook the fact that this basis of assumptions and practices has for a long time no longer held complete sway in the relevant scientific disciplines, and that the whole structure has started to move. Works on environmental and ecological economy (HAMPICKE 1991; 1992), environmental ethics (KREBS 1997; OTT and GORKE 2000), creation theology (exegetical NEUMANN-GORSOLKE 2004; systematic EBACH 1986; SCHLITT 1992) and sustainability theory (OTT and DÖRING 2004; 2007) all offer significant corrective and modifying proposals. The background of ideas described above can thus no longer be said to correspond to the best insights of a self-aware modern individual.

With the gradual signs of movement that can be discerned in this respect it doubtless follows that there are possible ways of conducting successful nature conservation policies. Despite all its deficiencies, the sustainability strategy represents a promising approach. Its reinforcement by means of the biodiversity strategy, as already been called for by the German Advisory Council on the Environment (SRU 2002a; 2004b), is a necessary future emphasis for nature conservation policy.

5.4.2 Political-institutional barriers to nature conservation

381. The abovementioned cultural and ideas-related structures that stand in the way of the development of a consistent nature conservation policy are joined by others in the political and institutional arena. They relate to the fact that nature conservation themes do not get the attention they need in political circles, that they do not enjoy a successful record of penetration of political decision-making processes, and that the German federal structure leads to particular problems when it comes to full implementation.

Lack of attention in political circles to nature conservation themes

382. Many areas of environmental protection have borne witness in recent decades to the fact that, whilst high levels of economic performance go hand in hand with far-reaching environmental problems, improvements in economic performance tend to lead to improvements in the capacity to act on environmental issues and to solve the associated problems (JÄNICKE 1996b; RAYMOND 2004). In the area of nature conservation the options for technical compensation of environmental damage are highly limited. The fact that politically attractive win-win solutions are not in sight to the same extent as they are in technical environmental protection leads to a situation in which, although nature conservation issues do feature in public debate, these tend to go to the back of the queue when it comes to selecting questions for political decision making. In the absence of effective political regulation, high levels of economic performance have an overwhelmingly negative impact on the environment due to continuous demands on land and the ongoing – if often somewhat slower – accumulation of harmful substances in soils, water bodies and the food chain (VOLKERY 2007).

Unsuccessful record of penetration of political decision-making processes

383. The structural causes of damage to nature lie mainly outside the traditional sphere of influence of environmental and nature conservation policy. Agricultural, transport and construction ministries see their task first and foremost as being to safeguard the production conditions of their client sectors, thereby improving the conditions for growth and employment in those sectors as a whole. From this perspective nature conservation is a form of land use that is associated with opportunity costs (HAMPICKE 1991). Nature conservation has a “cost” due to the fact that no alternative use is possible. It therefore seems “normal” in the process of political deliberation between alternative uses to burden nature conservation with a particular need for self-justification which this latter, depending on the case under scrutiny, has difficulty in providing (OTT 1996).

What complicates the matter further is the fact that environmental damage frequently results from the “normal” functions of economic or social sectors. In the case of sectors in which intensive use of the resources of the environment forms the basis of production, the solution of environmental problems demands a basic change to their functional logic, which has thus far not been targeted by the sectoral departments (on the subject of agricultural policy cf. Chap. 11.7) Thus in agricultural as in construction policy, for example, it has not been primarily environmentally motivated factors that have brought about political changes so much as a growing budgetary deficit and the attendant necessity of reducing environmentally damaging subsidies. In place of such external, random changes in individual factors and instruments a political approach should be followed that does not accept functional logic as a precondition but attempts to change it.

384. A second structural weakness in the enforceability of nature conservation issues relates to the way public and private interests are weighed up in the case of plans that promise to consume large amounts of land. In the course of such deliberations the efficacy of planned uses that will have deleterious effects on nature or landscapes is stated in very concrete form in terms of money and jobs. Not only this, but it is very often the case that larger scale plans tend to conceal private economic interests of significant economic weight and correspondingly high levels of organisational and implementational clout. Public interest in nature and landscape protection is often contrastingly diffuse and unspecific. In the face of complex cause-and-effect relationships it is difficult to determine what concrete contribution an individual project makes to the continuing existence of a particular species. Planning decisions tend to favour interests which are concrete and specific over those which are diffuse and unspecific (SRU 2002a, Item 127).

385. The lack of clout of nature conservation issues is also further enhanced by the “logic” of collective action described by OLSON (OLSON 1968). According to this theory, aggregated (economic) interests are more influential politically and easier to assert than the diffuse and dispersed interests in the preservation of collective public commodities.

Therefore, in relation to biodiversity no one interest group can be clearly defined which would suffer direct (economic) losses from a loss of biological diversity, as the effects are gradual in time and spatially dispersed and are often not easy to predict. As far as the preservation of biodiversity as a public good is concerned, the “state” bears a responsibility which is distributed across a number of different departments and levels and is therefore fragmented (cf. Items 400-403). In systems of representative democracy, when the influence of lobby groups on the legislature becomes a matter of normal procedure, the consequence will in all probability be that the population will be undersupplied with collective commodities. In spite of the methodological difficulties in this field, analyses of readiness to pay exist which clearly show that the demand for nature conservation measures is greater than the supply (HAMPICKE 1991; 2005). Thus it can be seen that existing nature conservation policy is inadequate from the economic perspective as well.

Decision making structures in German federalism

386. In addition to the structural barriers described thus far which apply to environmental problems as a whole, the assertion of nature conservation interests also suffers as a result of the specific decision-making structures of the German federal system (VOLKERY 2007). Although it is admittedly the case that comparative studies have delivered no clear evidence that federated states are disadvantaged in terms of environmental policy performance when compared to centralised, unitary states (JÄNICKE and WEIDNER 1997; WEIDNER and JÄNICKE 2002), the freedom to act of nationwide bodies in federated systems is frequently subject to limitations. In many areas of environmental policy this restriction is compensated for by means of strong neo-corporate negotiation systems (JÄNICKE 1996a). In problem areas such as nature conservation which are characterised by a large number of causal agents and the absence of simple standard technical solutions, the limited freedom of action of state environmental protection bodies cannot be adequately compensated for in this way. On the other hand, the causal agents do not have a single consistent negotiation partner. It can basically be assumed that nature conservation suffers more strongly from the fragmentation of responsibilities and competences characteristic of federalism than do other fields of environmental protection (see also SRU 2007b).

5.4.3 Strategic options for nature conservation

387. In the face of this basic constellation of opposing forces, nature conservation since its beginnings in the 19th century (for a history of nature conservation cf. FROHN and SCHMOLL 2006; OTT et al. 1999) has had to act from a defensive position. In the course of time it has registered considerable successes (DRL 2003). The most important of these was the development of a system of nature protection areas, which has recently been reinforced by measures introduced under the Natura 2000 scheme (cf. SRU 2004b; 2002c; 2002a). These successes were very often achieved in the face of strong resistance and conflicts (on

the acceptance problems of nature conservation cf. SRU 2002a, Item 77-114). Looking back it is hard to imagine being without the results of these successful nature conservation measures e.g. the 14 national parks. The limitations of this system of protected areas, however, lie mainly in the fact that it is too static and too insular to face up to new challenges such as climate change; a fact that will undermine its ability to safeguard 'society's natural capital as demanded by the concept of sustainability being promulgated by the German Advisory Council on the Environment (SRU 2002c, Chap. 1). It is for this reason that the policy of enshrining nationwide nature conservation in German nature conservation law must be pursued with determination. As part of the concept it is important to recall the system of differentiated land use (originally HABER 1971; cf. SRU 2002a; OTT and DÖRING 2004). Against the backdrop of growing pressure of intensive land use and ongoing high levels of land depletion in the decisive land use systems, the SRU sees this as a key task of nature conservation policy in the coming years.

In conceptual terms both the protected areas approach and the system of differentiated land use are embedded in the comprehensive protection of biological diversity (for more on this see the contributions in POTTHAST 2007). It is therefore to be welcomed that the Federal Government has given pride of place in the national sustainability strategy to a biodiversity strategy, as has been repeatedly called for by the SRU (cf. SRU 2002c; 2004b). When it comes to implementing this strategy the barriers and resistances described above all will re-emerge in the form of nature conservation conflicts. Hereby there is a danger that biodiversity strategy, if devoid of further implementation and concretisation measures, will remain a token element of environmental policy (on this general danger see the contributions in HANSJÜRGENS and LÜBBE-WOLF 2000). There is therefore a need for a kind of concerted action: the development of a capacity strategy in regard to a clear revaluation of the whole spectrum of nature conservation activities, in order to be able to rise in particular to the challenge of overcoming the expected resistance in the context of growing and new functional demands. Such an approach should be pursued in a way that is confident and decisive and does shirk conflicts. It cannot be down to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety to achieve this alone. What is needed is a cross-sectoral strategy. This strategy should be based on new insights from environmental and ecological economy, environmental ethics, creation theology and sustainability theory (Item 380), thus giving the nature conservation issue a new discursive framework. Such a framework would allow the use of an emotionally charged form of environmental communication appropriate for promulgation in the mass media, which would of necessity be of a symbolic and exemplary nature ("the return of the wolves", "salmon in the Rhine", "a breath of wilderness"). The aim would be to break down the paradigm of nature subjugation and the inevitability of conflict between nature conservation and economic interests, and to replace it with an understanding of the dependency of modern societies on ecosystem services.

While the biodiversity strategy is an important element of such a strategy, it is of course not a cure-all. Further necessary elements of such a capacity strategy include the implementation of Natura 2000 and the biotope network, as well as the laying down of general principles of nature conservation in the Environmental Code. These could be complemented in a meaningful way through the reinforcement of participation and voluntary work by means of nature and environmental education and through the availability of new sources of finance for nature conservation.

It is with this in mind that the SRU will in the following chapters present the biodiversity strategy itself, the implementation of Natura 2000 and the biotope network, the laying down of general principles of nature conservation in the Environmental Code, and other accompanying approaches to finding solutions.

5.4.4 Summary

388. Societal activities, to which many problems in nature and landscape conservation can be ascribed, are motivated not just by directly visible interests but also by the power of ideas. This background of ideas is made up a wide variety of concepts: for example the concept, derived from the Biblical call to subjugation and carried via Bacon into modern thinking, of nature as an inherently valueless object that can be freely instrumentalised; the accusation levelled at nature conservation of having a conservative, romantic and irrational attitude; the loss of the social “centre” brought about by the differentiation into individual social subsystems; and certain contemporary patterns of general and economic thought. The background of ideas described above can thus no longer be said to correspond to the best insights of a self-aware modern individual, and recent times have seen the beginnings of movement. It is here that nature conservation policy should come in and attempt to encourage such movement to go in a particular direction, making use of the result. The overdue shift of emphasis to nature conservation policy in sustainability strategy presented by the biodiversity strategy represents a promising approach in this regard.

Consistent nature conservation policy is hampered in the political and institutional field by the fact that nature conservation themes do not get the attention they need in political circles, that they do not enjoy a successful record of assertion in political decision-making processes, and that the German federal structure leads to particular problems when it comes to full implementation. Due to the tendency to ineffectuality of state nature conservation authorities and social nature conservation interests – a tendency that was reinforced further with the first stage of federalism reform in 2006 – nature conservation is basically reliant upon support from other economic sectors. Here too, the biodiversity strategy may open new avenues.

389. The following chapters will describe the instrumental and strategic options of a future nature conservation policy. They will pay particular attention to the opportunities and restrictions in the national biodiversity strategy, the instrumental options available to nature

conservation, the amendment of the Federal Nature Conservation Act in the context of the Environmental Code process, the improvement of the financial and human resources available for nature conservation, and the improvement of social acceptance of measures for the protection of nature.

5.5 Strategic targets of the Federal Government

390. The Federal Government responded as long ago as 2002 to the problems of nature conservation described above – which for the most part had long been visible, but were still unsolved – with a National Sustainability Strategy (Bundesregierung 2003; 2004). This contains objectives which relate to ecosystems in general and biodiversity in particular (SRU 2002b; 2002a; 2004b, Section. 3.1.3.3). In 2007 the National Biodiversity Strategy was finally agreed between all ministries and approved by the Federal Cabinet (BMU 2007b). It is intended to implement the Convention on Biological Diversity and the European Biodiversity Strategy (see Items 393-395). Both national strategies pursue an integrative approach and are thus close in spirit to the integrative approach of the more recent European concepts. The biodiversity strategy relates to the whole natural environment. It therefore makes an essential contribution to complementing the sustainability strategy. This perspective, which has long been enshrined in the Federal Nature Conservation Act, creates the foundation for an efficient cross-sectoral nature conservation programme.

The biodiversity concept was developed by biologists as a means of raising political awareness of the loss of biological diversity (TAKACS 1996). With the Convention on Biological Diversity (CBD) and, on a national level, the biodiversity strategy it developed further into a specialist political term which incorporated most of those issues previously covered by nature conservation, with the addition of the fair offsetting of advantages in the use of genetic resources. It has significant amounts in common with the central concept of natural capital that occurs in sustainability thinking (on this subject see SRU 2004b, Ch. 3.1.3; see OTT and DÖRING 2004, Ch. 4). Whether the term “biodiversity” is adequate to the task of conveying the issues and aims that it includes as well as the spatial approach to nature conservation that spans all the environmental media has yet to be seen (HABER 2008; HOFFMANN et al. 2005).

The new National Biodiversity Strategy will be assessed in the following in respect of its capacity to implement global and European objectives and to solve national nature conservation problems, as well as in respect of its contribution to the task of counteracting the structural causes of the consumption of natural resources and of the wholesale destruction of the natural environment (cf. Chaps. 5.2 and 5.3). The aims and indicators of the sustainability strategy have already been considered in detail (SRU 2002c, Chap. 1.1; 2004b, Section 3.1.3.3). By virtue of their newness the aims of the strategy for biological diversity cannot yet be considered to have been embedded in the current array of

instruments. They should, however, be taken into account in the revision of the Environmental Code.

5.5.1 The Convention on Biological Diversity and the European Biodiversity Strategy: Basis for the coordination of national strategy

The Convention on Biological Diversity

391. With the establishment of the CBD in 2002, the aim of significantly reducing current losses in biological diversity at global, regional and national levels by 2010 was made into official policy (CBD 2002b; 2004). Biodiversity as a “living foundation for sustainable development” (CBD 2002b) is thus to be protected from long-term or permanent qualitative (related to area-typical species and size of population) or quantitative reductions of their components and their potential as commodities and providers of services. The development of biodiversity is to be recorded at global, regional and national levels (CBD 2004).

392. 2002 saw the enactment of a measure for the protection of plants under the auspices of the CBD in the form of the Global Strategy for Plant Conservation – GSPC (CBD 2002a; SCBD 2007). This measure is thus legally binding for Germany. The strategy is intended to provide a framework for action at global, regional and national levels. One of the main objectives is to safeguard 50 % of all regions of the Earth which are significant for plant species diversity by 2010 (overview of the objectives in Table 5-3). The aims formulated from a global perspective can be transferred and concretised at EU and national levels (cf. Item 399). They have the advantage of being able to be monitored in respect of fulfilment by means of concrete data in percentage terms. The Global Strategy for Plant Conservation, appropriately adapted, also serves as a model for concrete and quantifiable target setting for the thematic working programmes of the CBD.

Table 5-3

**Targets of the Global Strategy for Plant Conservation (GSPC)
for the year 2010**

<p><i>A. Understanding and documenting plant diversity</i></p> <p>1. A widely accessible working list of known plant species, as a step towards a complete world flora</p> <p>2. A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels</p> <p>3. Development of models with protocols for plant conservation and sustainable use, based on research and practical experience</p>
<p><i>B. Conserving plant diversity</i></p> <p>4. At least 10 % of each of the world's ecological regions effectively conserved</p> <p>5. Protection of 50 % of the most important areas for plant diversity assured</p> <p>6. At least 30 % of production lands managed consistent with the conservation of plant diversity</p> <p>7. 60 % of the world's threatened species conserved in situ</p> <p>8. 60 % of threatened plant species in accessible ex situ collections, preferably in the country of origin, and 10 % of them included in recovery and restoration programmes</p> <p>9. 70% of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained</p> <p>10. Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems</p>
<p><i>C. Using plant diversity sustainably</i></p> <p>11. No species of wild flora endangered by international trade</p> <p>12. 30 % of plant-based products derived from sources that are sustainably managed</p> <p>13. The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted</p>
<p><i>D. Promoting education and awareness about plant diversity</i></p> <p>14. The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes</p>
<p><i>E. Building capacity for the conservation of plant diversity</i></p> <p>15. The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy</p> <p>16. Networks for plant conservation activities established or strengthened at national, regional and international levels</p>
Source: SCBD 2007

European biodiversity strategy

393. The European Community and all EU member states have ratified the CBD, thus committing themselves to the implementation of the strategies listed above. The year 1998

saw the development of a strategy of the European Community on the conservation of species diversity, which in 2001 was made concrete in the form of action plans on the conservation of biological diversity in the agricultural, fisheries, environmental and development policies of the EU. The basic objective is to halt the loss of biodiversity by the year 2010 (Gothenburg Summit 2001). In May 2006 the European Commission produced a reworked version of the biodiversity strategy of the European Community bearing the title “Halting the loss of biodiversity by 2010 – and beyond” (European Commission 2006). Two threats to biological diversity are singled out for special attention: land use and spatial planning along with the increasing effects of climate change. The Commission has defined four central areas of policy in which measures are to be implemented and ten paramount objectives associated with them (cf. Table 5-4)

The Commission has identified four central support measures to facilitate the implementation of these objectives:

- Ensuring adequate financing,
- Strengthening EU decision-making,
- Building partnerships,
- Building public education, awareness and participation.

394. The strategy is underpinned by an “EU Action plan until 2010 and beyond” and EU a set of headline biodiversity indicators. The action plan specifies the abovementioned ten principal aims for the Community and at the level of individual member states. In contrast to earlier versions the new strategy thus also incorporates the allocation of responsibilities. Overall the focus is very much on demands to implement measures which have already received political blessing.

Table 5-4

**Central policy areas and objectives of the
biodiversity strategy of the European Commission 2006**

POLICY AREA	Objectives
Biodiversity in the EU	1. To safeguard the EU's most important habitats and species. 2. To conserve and restore biodiversity and ecosystem services in the wider EU countryside. 3. To conserve and restore biodiversity and ecosystem services in the wider EU marine environment. 4. To reinforce compatibility of regional and territorial development with biodiversity in the EU. 5. To substantially reduce the impact on EU biodiversity of invasive alien species and alien genotypes.
The EU and global biodiversity	6. To substantially strengthen effectiveness of international governance for biodiversity and ecosystem services. 7. To substantially strengthen support for biodiversity and ecosystem services in EU external assistance. 8. To substantially reduce the impact of international trade on global biodiversity and ecosystem services.
Biodiversity and climate change	9. To support biodiversity adaptation to climate change
The knowledge base	10. To substantially strengthen the knowledge base for conservation and sustainable use of biodiversity, in the EU and globally.
Source: European Commission 2006	

The basic evaluation and monitoring instruments are expected to be annual reports; this will come into effect for the first time in the first quarter of 2008 (European Commission 2008). In addition to this the year 2007 saw the creation of a biodiversity index as a structural and sustainability indicator, which is to be filled out by the Commission in cooperation with the member states and will thus fulfil the function of monitoring mechanism for the implementation of the objectives. Information about the current state of implementation of the CBD worldwide, or at least in Europe, is hardly available at present. This is because gathering the information would require the use of appropriate indicators and a monitoring procedure which would entail a very long drawn-out process of international cooperation. The existing EU headline indicators were concretised in the context of the SEBI 2010 (Streamlining European 2010 Biodiversity Indicators) programme in the form of 26 separate specific indicators developed to the point of readiness for implementation (EEA 2007b; European Commission 2006, Annex 2). The indicator set thus proposed is suitable for estimating the effects of various sectoral policies on biodiversity. However the financing for this needs to be secured, especially in view of the costs entailed by the fundamental need for

monitoring to be carried out at all levels. So far it has only been possible to carry out implementation with the help of environmental associations (EEA 2007b).

395. In a statement on EU efforts in the field of biodiversity the European Economic and Social Committee (EESC) bemoaned the fact that the public authorities have not so far made the kind of contribution to the conservation of biodiversity that might have been expected of them. The statement goes on to say that public institutions should lead by example instead of acting in a way that actually contributed to the further endangerment of biodiversity through planning decisions and subsidisation programmes. The picture is further complicated by the fact that the budget period 2007 to 2013 foresees savings measures in precisely those areas that are particularly significant for the conservation of biodiversity (EWSA 2006). Large-scale European subsidisation programmes such as the Common Agricultural Policy (cf. Chapter 11.4), the structural, regional and cohesion funds, and the infrastructure policy of the Trans European Networks (TEN) (cf. SRU 2005b) at best hardly support the aims of the European biodiversity strategy and at worst even run contrary to them (cf. SPANGENBERG 2007). The European Biodiversity Strategy is adequate to the task of implementing the CBD and outlines the legal framework that is already in place. However, in its practical implementation it neglects the necessary integration of the various different environmental policies within a perspective based on the needs of ecosystems.

5.5.2 National biodiversity strategy: Touchstone for implementation

396. The national strategy on biological diversity approved in November 2007 by the Federal Government represents a step in the right direction to improving the normative current basis of nature conservation policy. The Federal Government has thereby made concrete its commitment to the aims of the Convention on Biodiversity and to an integrative approach to nature conservation (BMU 2007b). Nature conservation policy can now for the first time be measured in terms of concrete aims and objectives, and a very concrete discussion of these with representatives from other policy areas can now ensue at the Federal level. The strategy is firmly anchored in the national sustainability strategy (BMU 2007b, p. 8) as well as being interlinked with other EU strategies. It describes the current basis, gives justifications for the conservation of biodiversity and names the thematic areas that need implementation in the chapter "Concrete Visions" (Table 5-5), which contains quantified and thus verifiable environmental quality and action targets as well as time lines from the present day until 2050. Also considered are the players and fields of action associated with the conservation of biodiversity as well as their links with economic and social issues (innovation, employment, combating poverty and equality). Conclusions are drawn from the demands of the Millennium Assessment in Germany (cf. BECK et al. 2006), and flagship projects are highlighted and a monitoring concept outlined. The national

biodiversity strategy means that the aims of conservation and sustainable exploitation of biodiversity have for the first time become verifiable, and a clear demarcation of areas of responsibility means that whole project has become traceable in its entirety. The implementation phase that is to follow will concentrate primarily on publicising the strategy in the *Länder* and bringing in the players relevant to implementation. The 430 measures listed in the various fields of action should as a next step be given legal status in other areas of law as well and the necessary human and financial resources should be definitively set. It is inconceivable that the field of nature conservation, which suffers from a shortage of money and staff in comparison to other areas of environmental policy (see SRU 2007b), will with its current capacity be able to cope with implementing the strategy.

The national strategy reflects the demands of global and European strategies with regard to objectives. It makes these concrete in a way that allows them to be used as guidelines for nature conservation at a federal level as well as arguments supporting the claims of nature conservation at local levels. The final version, however, contains no concrete statements about soil protection (e.g. in relation to humus content in particular areas) or about residential construction and transport, especially in respect of new land use, or about agriculture (e.g. reduction of pesticide use, guarantee of at least three-fold crop rotation). At the same time, the final version in its presentation of the action fields (Chapter C of the National Strategy on Biological Diversity) makes no reference to the demand previously to be found in the preliminary version that the reorientation of agricultural policy on ecological lines should be reinforced by a significant reduction in direct payments and a massive regrouping into the second pillar. Proposals for further regulations in the context of cross compliance were edited out.

397. The driving forces behind losses in biological diversity cited in Chapters 5.2 and 5.3 (climate change, agriculture and forestry, new land use/urban development) are addressed in concrete terms. However, the goals relating to these are formulated in a very cautious way, and at times the sustainability strategy is taken as the sole point of reference (organic farming, new land use). The SRU welcomes the planned development of a strategy for increasing agricultural biodiversity by 2010 and the establishment thereof by 2015 (BMU 2007b, p. 48) as well as the development of a concept with the title “City of short distances” by 2010 and the implementation thereof by 2020 (ibid. p. 51). What is however problematic is the fact that the declining human resources and financial capacity for nature conservation action in respect of biotope and conservation area networks is only briefly touched upon (ibid, pp. 63-64) and the demand for a financing instrument exclusive to Natura 2000 is completely absent. The strategy of the Federal Ministry for Food, Agriculture and Consumer Protection entitled “Conservation of Agricultural Biodiversity, Development and Sustainable Use of its Potentials in Agriculture, Forestry and Fisheries” (BMELV 2007a) is basically to be welcomed, addressing as it does a proportion of those land users whose activities are of

especial relevance for the conservation of biodiversity. However, the strategy lacks an explicit link to the Federal Government's national strategy on biological diversity, along with a critical examination of the biodiversity loss being brought about by agricultural and forestry practices and any concrete objectives and measures for future land management that might be derived from such an examination.

Table 5-5

**Thematic fields of the concrete vision
of the National Biodiversity Strategy**

Conserving biological diversity	
Biodiversity	Biodiversity as a whole, species diversity, diversity of habitats, genetic diversity of wild and domesticated species
Habitats	Forests, coastlines and oceans, lakes, ponds, pools and lagoons, rivers and water meadows, peatlands, mountains, groundwater ecosystems
Landscapes	Areas of wilderness, cultivated landscapes, urban landscapes
The sustainable use of biological diversity <ul style="list-style-type: none"> – Nature compatible management – The government as role model – Effects of German activities on biological diversity worldwide – Agriculture – Soil use – Mining of raw materials and energy extraction – Land use for human settlement and transport – Mobility – Nature-based recreation and tourism 	
Environmental influences on biological diversity <ul style="list-style-type: none"> – Area-wide diffuse substance discharges – Climate change 	
Genetic resources <ul style="list-style-type: none"> – Access to genetic resources and equitable sharing of benefits – Conservation and sustainable use of genetic resources (in situ, ex situ, on farm) 	
Social awareness	
Source: BMU 2007b	

398. The Federal Government plans in future to present a report once in each legislative period on the achievement of the objectives and implementation of the measures in the action fields. One set of indicators according to the DPSIR (DPSIR – Driving forces, Pressure, State, Impact, Response) approach consisting of 19 indicators (BMU 2007b, Chapter H) is being regularly updated and forms part of the accountability report. However,

indicators are still missing above all in respect of statements on the condition and quality of biodiversity (state indicators). The sole available indicator is that of species diversity sustainability (populations of 59 bird species in six principal habitat types) (assessment of and proposals for the extension of this indicator in SRU 2004b, Section 3.1.3.5). Statements on the condition of conservation of the Habitats Directive habitats and species are planned for 2008. The majority of the indicators represented are pressure and response indicators. The indicators contained in the CBD and the EU biodiversity strategy have not been fully taken into account in this process. For this reason additional state indicators in particular should in future complement the set of indicators agreed amongst the various departments.

399. As part of the implementation of the Global Strategy for Plant Conservation (GSPC) the European Plant Conservation Strategy – EPCS was developed (Planta Europa 2002). This strategy works with the methodical concept of Important Plant Areas (IPA). This does not amount to a new protection category but rather serves the purpose of setting priorities and minimum requirements or assessing those conservation area concepts which are already on the table (BERG et al. 2008; ANDERSON 2002). The implementation of the global and European strategies is one of the demands of the national biodiversity strategy. In contrast to the national biodiversity strategy, however, the European Plant Conservation Strategy contains in part more concrete targets (e.g. subordinate objective 6 cf. Table 5-3). In the context of a research and development project being carried out by the Federal Agency for Nature Conservation, an examination is now being conducted to ascertain whether the aims of plant conservation in Germany are being fulfilled (von den DRIESCH and LÖHNE 2007; von den DRIESCH et al. 2008). Germany is already fulfilling some of the strategy's aims, having created lists of species and volumes on flora and having processed the Red Lists of plant species. However, there is an urgent need to check whether existing conservation measures are effective (objectives 5 and 7) and to create additional capacities for action in nature conservation (objective 15). A further priority goal, alongside the examination of the effectiveness of the species conservation programmes, needs to be their coordination in Germany. For example, there is no agreed and coordinated overall strategy at national level for the conservation of beech trees, for which Germany bears an international responsibility (SCHERFOSE et al. 2007). The basic prerequisite for this is a better network of communication and cooperation between the players from all the *Länder*. This must in any case be expedited by all the *Länder* in the context of implementing the biodiversity strategy. Whether or not the requirements mentioned above can be fulfilled will determine whether Germany can meet its obligations for the international conservation of flora (KNAPP et al. 2007; LUDWIG and SCHNITTLER 2007). Overall it can be said that the German biodiversity strategy in terms of its concepts is very well suited to implementation of the European requirements and those contained within the CBD, with some reservations in respect of the European Plant Conservation Strategy. It meets the requirements of a cross-sectional approach by referring also to other areas of policy. It also generally meets the

requirements of an approach that integrates all natural commodities and functions into an ecosystem-based nature conservation strategy (SRU 2002a). However, it will be important to take measures to counter tendencies that would reduce nature conservation to the conservation of biological diversity alone, and also to emphasise the breadth of function covered by the overall natural environment and the beauty of landscapes. The greatest challenge for the biodiversity strategy will be in its implementation. This is intended to be effected simultaneously at federal level, by means of agreed sectoral strategies and inclusion of the aims in legislative and financial action falling within federal competence (national natural heritage, areas of collective national significance, reorganisation of the GAK (Joint task “Improving the structure of agriculture and coastal protection”) in line with federal reforms), and at *Länder* level in the context of concrete implementation (for more on the conditions of implementation see KÜCHLER-KRISCHUN and BRENDLE 2008).

Strategic implementation by the *Länder*

400. In the wake of federal reform, the situation now is that legislative authority for nature conservation and laws pertaining to water and waterways, as well as forestry and hunting laws, remains within the mandate of the Federal Government, but responsibility for their actual implementation has been fully devolved to the *Länder*. The Federal Environment Ministry is preparing the implementation process, with seven regional forums planned for 2008 to present the national biodiversity strategy in the different regions of Germany and to motivate the regional players responsible for its implementation. So far, only a handful of *Länder* have provided the necessary area-specific and timeline-specific hierarchical target concepts (SRU 2002a; cf. RECK et al. 1996) which are intended to mesh with the national biodiversity strategy (e.g. for Baden-Württemberg cf. RECK et al. 1996; for North-Rhine/Westphalia LÖBF NRW 2004; for Lower Bavaria and Upper Franconia RAAB and ZAHLHEIMER 2005). Nature conservation measures at *Länder* level currently focus on the implementation of the Natura 2000 areas and the biotope network (Chapter 5.6).

5.5.3 Summary and recommendations

401. The national biodiversity strategy fully implements the international and European strategies and thus represents a decisive step towards effective conservation of Germany's biodiversity. The strategy meshes extensively with other strategies and is groundbreaking especially in respect of the requirements for concrete quality and action targets. Although these put the urgent problems on the table, in some instances they respond to them with targets that are too soft. Points of contact are missing for concrete implementation in respect of integration into the sectoral policies of agriculture, construction and transport, and of the *Länder*. The cross-sectional character of a biodiversity strategy demands close and continuous cooperation between the departments as well as between the Federal Government, the *Länder* and local authorities. In the same way there is a need to consider

the congruence of targets and instruments for achieving them with the sectoral policies of those who cause negative environmental impacts. Only then will it become clear whether a policy integration in the sense of a nature conservation strategy that spans the environmental media is actually being aspired to or is capable of success. The effect of the biodiversity strategy will thus basically depend on the extent to which its aims are reflected in sectoral strategies in other policy areas, federal legislation and the efforts made by the *Länder* to implement it. It will be important to ensure continuous monitoring of the extent to which the aims are being fulfilled by means of an environmental observation procedure which is in line with nationwide criteria and compatible with international monitoring. Furthermore, overall concepts that go beyond the borders of individual *Länder*, especially in respect of species and biotope protection, floodplain development, integrated river basin management (cf. Chapter 7.4) and the development of soil functions for climate protection are desirable.

402. Federal reform has left the vast majority of the authority and responsibility for the implementation of nature conservation goals in the hands of the *Länder*. At the same time, however, many *Länder* have reduced the human resources and financial capacities available to nature conservation to an alarming extent. It has to be assumed that the gulf between the expectations voiced at EU level and the urgent national need to act on the one hand and the actual implementation by the *Länder* on the other will continue to grow.

403. For the implementation of the national biodiversity strategy and the associated aim of permanently environmentally compatible land use to be successful, the SRU recommends the following steps to the *Länder* and the Federal Government:

- The national biodiversity strategy should be reinforced at *Länder* level with corresponding, spatially concrete strategies (in the landscape programmes).
- The *Länder* should institute an implementation and information service, in which nature conservation and landscape management administrations, along with water, forestry and agricultural administrations are all represented to cover the following issues:
 - Detailed planning
 - Management and coordination,
 - Performance review,
 - Reporting,
 - Information and consultation by authorities, associations and private citizens.
- The Global Strategy for Plant Conservation (GSPC) as a concrete implementation strategy of the CBD makes it possible to monitor the biodiversity strategy in the fields of plant protection and conservation and should thus be used as a touchstone in Germany. This process also requires effective coordination by means of an information network between the different players in botanic species conservation.

- Objective 6 of the GSPC (at least 30 % of production lands managed consistent with the conservation of plant diversity) is of central importance for the conservation of biodiversity.
- Furthermore, Germany must fulfil objective 5 (protection of 50 % of the most important areas for plant diversity assured) and objective 7 (60 % of the world's threatened species conserved in situ) of the GSPC in order to meet its responsibility for particularly endangered species.
- In respect of monitoring Germany should take into account the need for alignment with the indicator system of the CBD and the EU biodiversity strategy. Indicators which could be used to prepare statements about the condition and quality of biodiversity are missing and need to be provided.
- The strategy should be supported in future by a strong public awareness campaign and with concrete funding proposals.

Strategic building blocks for marine protection and in respect of invasive alien species are missing and need to be provided.

5.6 Activities of the *Länder*: Natura 2000 and the biotope network

404. Tackling the unsolved problems of nature conservation requires a differentiated approach that aspires to a nationwide minimum protection standard, the prioritisation of nature conservation in priority areas – some of which are extensive – and the establishment of a biotope network on a range of scales (cf. POIANI et al. 2000). At variance with this is the observation that, in matters of practical nature conservation, the *Länder* are concentrating their financial and human resources, which are totally inadequate in relation to the scale of the task, on the registration and securing of the Natura 2000 areas. There is hardly any spare capacity left for important strategic and conceptual work, such as informing citizens and decision makers and implementing nationwide minimum objectives (SRU 2006). In addition to this, efforts are continuing on the part of the *Länder* to dilute European nature conservation law by making more concessions to economic interests (cf. resolution of the Bundesrat (Upper House of the German Parliament) “Evaluating European nature conservation law and making it fit for the future”).

5.6.1 Implementation of the Natura 2000 network of protected areas

405. The most important EU instrument for the conservation of biological diversity is the European coherent network of protected areas Natura 2000 in accordance with the Habitats Directive of 1992 and the EU Birds Directive that has been in effect since 1979. The long-

term positive effects of the Birds Directive on the conservation or positive population development of many bird species has most recently been confirmed by extensive studies (DONALD et al. 2007).

As of June 2007 there were 21,474 Sites of Community Importance (Habitats Directive) (= 626,870 km²) registered in the 27 EU member states. This corresponds to some 12.8 % of the total land area. It includes 1,265 marine areas (= 79,759 km²). The 4,380 registered special protection areas (European Bird Sanctuaries; Birds Directive) (= 486,571 km²) corresponded to 10 % of the land area of the EU 27, including 491 marine areas (= 56,956 km²) (European Commission 2007). Officially the Natura 2000 network covers some 20 % of the entire area of the EU 27.

406. The German network of Sites of Community Importance (Habitats Directive) has been recognised as complete by the European Commission. Germany has thus far registered 33,130 km² (9.3 %) of its land area and 20,164 km² of its marine area as Sites of Community Importance, as well as 33,617 km² (9.4 %) of its land area and 16,487 km² of its marine area as European Bird Sanctuaries (Tables 5-7, 5-8) (BfN 2008). Therefore a total of some 14 % of land area and 41 % of marine area have been registered under the Natura2000 network scheme (BfN 2008). As these figures show, there is a good deal of overlap between the Sites of Community Importance and European Bird Sanctuaries (see Table 5-6)

Table 5-6

**Ratio of Sites of Community Importance and European Bird Sanctuaries
to large-scale protected and nature conservation areas**

	No. of areas	Total area	Share of Sites of Community Importance	Share of European Bird Sanctuaries	Share of German land area
Sites of community importance (Habitats Directive)	4,596	5,312,334 ha	100.0 %	60.7 %	9.3 %
Special protection areas (Birds Directive)	539	4,662,587 ha	52.9 %	100.0 %	8.4 %
Nature conservation areas	7,278	1,160,199 ha	17.7 %	14.4 %	ca. 2.9 %
National parks	15	968,068 ha	16.6 %	19.3 %	ca. 0.6 %
Biosphere reserves	14	1,572,185 ha	15.4 %	21.0 %	ca. 3.0 %
Nature parks	87	8,044,051 ha	18.0 %	10.8 %	ca. 22.5 %
Source: RATHS et al. 2006					

Table 5-7

**Overview of the Sites of Community Importance according to
Article 4(1) of the Habitats Directive (as of 25 January 2007)**

Federal state	Sites of Community Importance			
	No. of areas	Land area (ha)	Marine area (ha) ²	Land share registered (%) ¹
Baden-Württemberg	260	414,009	12,201 ³	11.6
Bavaria	674	645,420		9.2
Berlin	15	5,470		6.1
Brandenburg	620	333,106		11.3
Bremen	15	3,365	860	8.3
Hamburg	16	5,669	13,742 ³	7.5
Hesse	585	209,020		9.9
Mecklenburg/ Western Pomerania	230	287,306	181,546 ³	12.4
Lower Saxony	385	326,323	284,070 ⁴	6.9
North- Rhine/Westphalia	518	184,606		5.4
Rhineland-Palatinate	120	249,226		12.6
Saarland	118	26,325		10.3
Saxony	270	168,661		9.2
Saxony-Anhalt	265	179,525		8.8
Schleswig-Holstein	271	113,608	580,006 ⁴	7.2
Thuringia	247	161,427		10.0
German EEZ (exclusive economic zone)	8		943,986	28.6
Germany	4,617	3,313,066	2,016,411	9.3
<p>The figures in the table are based on the official digital data transferred by the <i>Länder</i> with the exception of the data for Bremen, Hamburg and Schleswig-Holstein, which are taken from the written communications received from these states</p> <p>1 Related to the area of the federal state in question according to the Statistical Yearbook (2003) or the area of the exclusive economic zone (EEZ)</p> <p>2 Including Lake Constance</p> <p>3 Lake Constance, tidal flats, Wadden Sea and ocean area according to data supplied by each federal state</p> <p>4 Tidal flats, inland water and ocean area according to calculations by the Federal Agency for Nature Conservation (BfN)</p>				
Source: BfN 2008				

Table 5-8

**Overview of Special Protection Areas (SPA) according to Article 4
of the Birds Directive (as of 3 May 2007)**

Federal state	Special Protection Areas			
	No. of areas	Land area (ha)	Marine area (ha) ²	Land share registered (%) ¹
Baden-Württemberg	73	174,495	5,624 ³	4.9
Bavaria	83	545,179		7.7
Berlin	5	4,979		5.6
Brandenburg	27	648,431		22.0
Bremen	8	7,120		17.6
Hamburg	7	2,265	12,015 ³	3.0
Hesse	60	311,097		14.7
Mecklenburg/ Western Pomerania	16	290,602	157,386 ³	12.5
Lower Saxony	61	288,776	246,796 ⁴	6.1
North- Rhine/Westphalia	25	153,191		4.5
Rhineland-Palatinate	51	165,660		8.4
Saarland	41	23,680		9.2
Saxony	77	248,965		13.5
Saxony-Anhalt	32	170,612		8.4
Schleswig-Holstein	46	95,831	748,419 ⁴	6.1
Thuringia	44	230,824		14.3
German exclusive economic zone	2		514,499	15.6
Germany	658	3,361,707	1,684,739	9.4
<p>The figures in the table are based on the official digital data transferred by the <i>Länder</i></p> <p>1 Proportion registered related to the area of the federal state in question according to the Statistical Yearbook (2003) or the area of the exclusive economic zone (EEZ)</p> <p>2 Including Lake Constance</p> <p>3 Lake Constance, tidal flats, Wadden Sea and ocean area according to data supplied by each federal state</p> <p>4 Tidal flats, inland water and ocean area according to calculations by the Federal Agency for Nature Conservation (BfN)</p>				
Source: BfN 2008				

407. In comparison to other European states Germany does have the largest number of Sites of Community Importance (Habitats Directive), but the average size of the areas tends to be small; around two-thirds of all the areas measure less than 500 ha (RATHS et al. 2006), and some 40 % less than 100 ha. Only the Czech Republic and Malta have a smaller average size of Sites of Community Importance (written communication of the Federal

Agency for Nature Conservation (BfN), 19 March 2008). However, the smaller the area available to a population, the greater is the probability of (local) extinction processes brought about by extreme events such as, for example, local consequences of climate change. On the other hand, the larger the area, the larger the number of species it houses and the greater the probability that any given species will survive (basic premise of MacARTHUR and WILSON 1967; PIMM 2002). For this reason the protection of larger areas is an important criterion for the conservation of biodiversity. "Large area" protection must thus be called for, both for the protected areas and for the integration of nature conservation into economic areas, as well as for the network connecting relevant nature conservation areas with one another. One principal area of focus for those *Länder* responsible for nature conservation should therefore be conservation and extension in the sense of expanding Natura 2000 and other protected areas; another should be the reinforcement of their coherence. This demand for species-specific and habitat-specific protected areas of sufficient size has been carried over into the national strategy for biological diversity (BMU 2007b, pp. 27, 41).

408. As far as the proportion of registered land area also forming part of Sites of Community Importance is concerned, Germany ranks 21st of 27 member states, ahead only of the Czech Republic, the Netherlands, France, Denmark, the United Kingdom and Poland, in that order. The largest land share has been registered by Slovenia, Spain, Estonia, Portugal and Greece. To look on the positive side, Germany is foremost in respect of the size of the areas registered by those 22 member states with responsibility for marine areas, followed by the United Kingdom, Denmark and Greece. Germany's high ranking is due to the large proportion of registered areas belonging to the Exclusive Economic Zone (EEZ) administered directly by the Federal Government. Germany's largest Sites of Community Importance and European Bird Sanctuaries are located in marine areas (Table 5-9).

A look at the land share of the registered European Bird Sanctuaries reveals a similar picture. As far as the proportion of registered land shares also forming part of European Bird Sanctuaries is concerned, Germany ranks 15th of 27 member states, with the United Kingdom, Malta, Luxembourg and Ireland bringing up the rear in that order. The largest land shares have been registered by Slovakia, Slovenia, Spain and Hungary. Germany heads the list when it comes to the size of the areas registered by the 22 member states with responsibility for marine areas, followed by Denmark, Poland and Estonia.

Table 5-9

**Germany's largest Sites of Community Importance
and European Bird Sanctuaries (over 100,000 ha)**

	Name of the area	Total area (ha)	Federal state or EEZ
Atlantic Region			
Sites of Community Importance (Habitats Directive)	<i>Sylter Außenriff</i>	531,428	EEZ
	Schleswig-Holstein Wadden Sea National Park and adjacent coastal areas	452,455	Schleswig- Holstein
	Lower Saxony Wadden Sea National Park	276,956	Lower Saxony
	Dogger Bank	169,895	EEZ
Special Protection Areas (Birds Directive)	Ramsar area Schleswig-Holstein Wadden Sea National Park and adjacent coastal areas	463,905	Schleswig- Holstein
	Eastern German Bight	313,513	EEZ
	Lower Saxony Wadden Sea	259,892	Lower Saxony
	Seabird protection area Helgoland	161,333	Schleswig- Holstein
Continental region			
Sites of Community Importance (Habitats Directive)	Pomeranian Bight with Oder Bank	110,173	EEZ
Special Protection Areas (Birds Directive)	Pomeranian Bight	200,986	EEZ
SRU/UG2008/Table 5-9; Data source: RATHS et al. 2006			

5.6.1.1 Distribution of Sites of Community Importance and European Bird Sanctuaries in the *Länder*

409. About 80 % by area of the existing nature conservation areas lie within the registered Sites of Community Importance. However, in 2003 only 18 % of the Sites of Community Importance were identified as nature conservation areas (RATHS et al. 2006; cf. Table 5-9). At the same time as much as 58 % of the European Bird Sanctuaries had already been safeguarded as nature conservation areas (RATHS et al. 2006).

The main proportion of terrestrial Natura 2000 areas consists of woodland (51.3 % or 1,638,631 ha), broad leaf and mixed woodland (33.1 %), coniferous forest (18.2 %), followed by arable (21.4 %) and grassland (17.8 %) (Table 5-10, as of 2005; RATHS et al. 2006). Germany bears a particular responsibility within Europe for the conservation of deciduous woodlands, especially beech woods, because 26 % of the total land area of red beech woodlands lies within its borders, and the country is geographically located in the centre of their distribution (BOHN and GOLLUP 2007). Near-natural beech woods are however only to be found on 5 % of the land by area, even though at least 67 % of it would provide a suitable habitat for them. The total area of beech woods in the Natura2000 areas only amounts to 1.6 % of the total surface area of the country (= 583,036 ha) (SCHERFOSE et al. 2007). All of the larger registered beech woods lie in the low mountainous regions of Germany, in southern Germany or in the Alpine foothills, whereas there are large gaps in the low mountain ranges of south-western or south Germany (e.g. Palatinate Forest, Black Forest, Spessart, Steigerwald).

Across the whole of Germany 99 of the roughly 900 species to be found in Annex II to the Habitats Directive have been registered, of which the most frequently occurring (in decreasing order) are: Crested newt, greater mouse-eared bat, otter, bullhead catfish, Dusky Large Blue butterfly, Bechstein's bat, brook lamprey, yellow-bellied toad, beaver and stag beetle (RATHS et al. 2006).

5.6.1.2 Safeguarding the Natura 2000 network of protected areas

410. The Habitats Directive basically provides for three tools to permanently safeguard the European Natura 2000 network of protected areas: The designation of protected areas, the ban on deterioration, and impact assessment.

A brief glance at the practice of protected area designation in the *Länder* reveals a thoroughly inconsistent procedure. Its compliance with EC law is dubious and it is detrimental to the effectiveness of area protection, all of which provides justification for the formulation of nationwide standards. For example, in the recent past a majority of the *Länder* have gone over to a system of designating Natura 2000 areas not by means of declarations of protection for individual areas, but, in the interests of a speedy process of designation, all together in the context of one or more legal acts. The Bavarian regulation on the designation of European Bird Sanctuaries and their borders and conservation objectives, based on Article 13b (1) 1 of the Federal Nature Conservation Act, which designated 83 protected areas with a short description of their borders and conservation goals, is a case in point. In some cases the protection regime is even to be implemented successively: for example, Saxony-Anhalt's directive on the creation of the Natura 2000 ecological network, which is based on Article 44a (2) of the state's Nature Conservation Act, names only the Sites of Community Importance and European Bird Sanctuaries to be designated along with the

habitat types and animal and plant species that are to be protected within them. Concrete area boundaries, specific protection objectives and/or land management measures are to be laid down in future directives. The goal of extending protection to the Natura 2000 areas without delay is to be welcomed in view of the considerable delays in its implementation that have already occurred. But this must not be permitted to detract from the efficiency of the designation concept or its longer-term legal security. As can be seen in the justifications of the abovementioned delegated powers to issue statutory instruments, the selected procedure has as its particular aim for the European Bird Sanctuaries the transition from a Birds Directive regime to a Habitats Directive regime (Bavarian Parliament 2005, p. 24 f. to No. 23; Parliament of Saxony-Anhalt 2005, p. 273 f.). According to the transitional provisions in Article 7 of the Habitats Directive, this latter is also to be applied to those areas which have already been designated Protected Areas under the provisions of the earlier Birds Directive. The particular effect of this change in legal regime is that the strict ban on changes found in the Birds Directive (Art. 4 (4)) is replaced by the more moderate deterioration ban found in the Habitats Directive (Art. 6 (3,4)). The law attaches various preconditions to the existence of any protection measures capable of bringing about this change in regime. The European Court of Justice (ECJ) requires that the declaration of protected areas be effected by means of a formal act which is recognisable by external observers (ECJ Case C-374/98, verdict of 7 December 2000, ECJ reports 2000, I-10799, marginal note 53). This must be of a definitive nature (ECJ, Case C-240/00, Court of Justice reports 2003, I-2202, marginal note 18 ff.) and must automatically apply regulations which guarantee protected status in line with European standards (ECJ Case C-415/01, verdict of 27 February 2003, Court of Justice reports 2003, I-2089, marginal note 26). The Federal Administrative Court requires in its ruling on the upper Moselle crossing a definitive, legally binding declaration of an area as a bird protection area that is also effective for third parties (verdict of 1 April 2004, Ref. 4 C 2.03, BVerwGE 120, 276 ff.). The Court finds the Rhineland-Palatinate declaration of the area in question as a protection area by means of a public resolution of the Council of Ministers to be legally insufficient, there being in this case no pre-existing criteria in state law for placing the said area under protection. The concrete criteria for the quality and grade of regulation of a protected area declaration were not defined in detail by the Court in its ruling. The Court did, however, in line with the requirement for an adequate provision of protection laid down by the ECJ, refer to the standards for the declaration of protected areas according to Article 22 (2) 1 and Article 33 (3) Federal Nature Conservation Act.

Table 5-10

**Overview of current land use in the Natura 2000 areas
(evaluation Corine Land Cover 2000)**

Land use	Sites of Community Importance	Bird Sanctuaries	Natura 2000 areas
Housing development	0.7 %	0.7 %	0.8 %
Arable and other agricultural uses	13.4 %	24.4 %	21.4 %
Grassland	17.5 %	19.1 %	17.8 %
Salt marsh and inland saline areas	0.4 %	0.5 %	0.3 %
Marsh, heath and bogs	3.6 %	3.4 %	2.8 %
Inland water bodies	5.0 %	4.4 %	4.1 %
Sand and dunes in coastal and inland areas	0.3 %	0.3 %	0.3 %
Low-vegetation areas, cliffs, glaciers	1.2 %	1.3 %	0.9 %
Deciduous and mixed-leaf forest	40.5 %	25.6 %	33.1 %
Coniferous forest	16.7 %	19.9 %	18.2 %
Mudflat and estuarine areas	0.6 %	0.5 %	0.4 %
Source: RATHS et al. 2006			

In view of such judgements, the successive designation of protected areas that has been observed in the *Länder* in recent times cannot be regarded as placing an area under protection if there has been no legally binding determination of concrete area boundaries or of the conservation goals relevant to the conduct of impact studies (Art. 6 (3, 4) of the Habitats Directive). A state government declaration of areas as Natura 2000 sites is on its own not a sufficient basis for effective area protection (as argued by KLOOTH and LOUIS 2005, p. 441 f.; correctly refuted by THUM 2006b, p. 692 f.). Even if the designation steps envisaged under state law are fully and completely carried out, doubt must remain as to whether an adequate protection status that accords with EC law can be guaranteed. For example, the regulations cited initially are not to contain any requirements or prohibitions in respect of the protected areas. However, it is precisely such requirements and prohibitions which give real and specific shape to the general aims of protection in the form of binding duties of conduct towards the public and which, on the basis of the given conditions in any particular area, determine the framework for assessing the compatibility of encroachments (GELLERMANN 2005, p. 582).

411. If the ban on deterioration is to be upheld in a sustainable way, contract-based nature protection schemes alone are not sufficient to safeguard it. This is because contracts are time-limited, do not apply legally to third parties and therefore cannot guarantee permanent protection (Item 456). The problems of a policy that takes contract-based nature protection

as its sole basis, even in the case of priority areas for nature conservation, can be seen in the current situation where funds for agri-environmental measures are dwindling and marginal returns for agricultural land use are increasing (cf. Item 1001). In individual cases, however, for example bat habitats, contract-based safeguarding is a suitable approach. Legal safeguarding of the Natura 2000 sites at *Länder* level is currently coming into effect successively and in a very heterogeneous fashion. The regulations have however in the main not yet been adapted to the Habitats Directive and Birds Directive and generally do not contain any reference to the EU conservation targets (written communication from LANA, 10th October 2007). “Those representatives of the *Länder* who are present are of the opinion that an implementation of the legal requirements contained within the Habitats Directive necessitates informing the managers of the land that their land contains Habitats Directive habitat types which may not be destroyed, complemented if applicable by making known to them the possibilities that exist for the subsidisation of appropriate land management methods.”

Furthermore, the *Länder* should work towards ensuring that Natura 2000 sites are not damaged as a result of spatial planning activities (European Commission 2006, p. 8). The survey “Specialist information system and specialist conventions to determine significance in the context of Habitats Directive impact assessment” (*Fachinformationssystem und Fachkonventionen zur Bestimmung der Erheblichkeit im Rahmen der FFH-Verträglichkeitsprüfung*), LAMBRECHT and TRAUTNER 2007), carried out in consultation with LANA, represents an important first step in this regard towards filling the knowledge gaps in the specialist nature conservation criteria for assessing the significance of encroachments.

5.6.1.3 Management plans

412. Article 6 of the Habitats Directive provides above all for the drafting of management plans for long-term conservation of the Habitats Directive areas. This obligation currently meets with very varied responses on the part of the *Länder*. Whilst, for example, many of the *Länder* (including Bavaria, Baden-Württemberg, Saxony, Saxony-Anhalt, Mecklenburg/Western Pomerania) are creating state-wide requirements for the drafting of management plans in the interests of a coherent network of protected areas, other *Länder* (e.g. Rhineland-Palatinate, Saarland) have thus far not created any such requirements (Table 5-11). Even where an appropriate regulatory framework exists it is partially being undermined due to the fact that it does not place the responsible authorities under any kind of obligation. Contract-based nature conservation has been taken as the principal instrument of implementation. Implementation in this way, however, depends heavily upon cooperation by the potential user of natural resources, and the need to offer incentives means that it is a costly affair. Contract-

based nature conservation alone cannot be used to safeguard long-term nature conservation management (cf. Item 411).

Within the EEZ there are particular difficulties regarding the development of management plans for the Natura 2000 sites: The current failure of the Federal Nature Conservation Act fully to include the EEZ, the devolution to the EU of the responsibilities hitherto borne by the individual member states for the regulation of fisheries and by international bodies such as the International Maritime Organization (IMO) for the regulation of shipping make it impossible to set up and, above all, to implement complete management plans.

Table 5-11

**Comparison of management planning for the Natura 2000 sites
in the *Länder***

Federal state	State-wide requirements	Legally binding nature of plans/ binding on authorities	Instruments of implementation
Baden-Württemberg	Manuals (decree), recommendations for action	Binding on authorities	Contract-based nature conservation
Bavaria	Decree, organisational template, working instructions for woodland areas	Efforts to make binding on authorities	Contract-based nature conservation, agri-environmental programmes; LIFE
Berlin	Organisational template for PEP (care and development plan - MDP) being prepared for management plan	Binding on authorities	No data
Brandenburg	Draft organisational template and ArcView-based planning mask for MDP, organisational template for land management decree	MDP: binding on authorities where agreed; land management decree binding on authorities	Contract-based nature conservation, agri-environmental programmes, subsidisation guidelines for forestry, EAFRD programmes
Bremen	None	None	Contract-based nature conservation, compensation measures
Hamburg	Organisational template (based on MDP)	None	Contract-based nature conservation
Hesse	Guidelines and manual	None	Contract-based nature conservation, compensation measures, sponsoring
Mecklenburg/ Western Pomerania	Two decrees, manual	Decree (binding on nature conservation authorities)	Contract-based nature conservation

Federal state	State-wide requirements	Legally binding nature of plans/ binding on authorities	Instruments of implementation
Lower Saxony	State forest: Directions on creation, contents and implementation of the MP (in progress), organisational template (2002)	State forest: Binding on forestry authority in the context of forest constitution	State forest: Own funding within forest administration, partial funding from third parties; further woodland areas and open land: contract-based nature protection
North-Rhine/ Westphalia	Woodland: decree and working instructions; Open land: Working instructions (modular MDP) in preparation	None	Contract-based nature conservation, possibly: compensation measures, sponsoring
Rhineland-Palatinate	None	Binding on authorities	Contract-based nature conservation
Saarland	None	None	Contract-based nature conservation
Saxony	Decree	Binding on authorities (by decree)	Contract-based nature conservation, compensation measures
Saxony-Anhalt	Decree	None	Contract-based nature conservation, compensation for restrictions
Schleswig-Holstein	Organisational template	None	not specified
Thuringia	Framework concept for woodlands, brief guidelines for open land	Legal binding: No; Binding on authorities: Yes	Contract-based nature Conservation
MDP = Maintenance and Development Plans, MP = Management plans			
Source: BROSCHE et al. 2006, amended			

The financial cost of creating management plans is considerable. For example, in Baden-Württemberg it is projected to run to €36 million over the next ten years (State Parliament of Baden-Württemberg 2007). For Germany, estimated costs for the implementation of Natura 2000 run to some €619 million (investment costs, management planning and administration, running administrative measures and monitoring) (European Commission 2004, Annex 8).

413. In the context of management, current discussions concern possible ways of dealing with dynamics in Habitats Directive areas. There are fewer uncertainties in respect of succession (e.g. from heathland to acidic oak wood). Here the ECJ has clearly and unambiguously stated that such changes are only acceptable within narrowly defined limits (ECJ judgement C-6/04 of 20 October 2005 against the United Kingdom on the subject of “natural deterioration”, see GÖDDE 2006). The protection of habitat types is generally accorded greater value than allowing natural developments to take place, as in, for example,

the case of vegetation encroachment (ibid.). In the future, however, climate change may in some cases make “adaptive management” of Natura 2000 sites necessary (KETTUNEN et al. 2007). It would make sense to conduct further research and for the Habitats Committee to issue a guideline paper in order to facilitate development of the concepts necessary for such an undertaking whilst at the same time forestalling any dangers to biodiversity that might arise from too high a degree of flexibility.

5.6.1.4 Monitoring

414. The state of conservation of the protected species and habitats in the Habitats Directive should be regularly monitored, and reports on conservation measures, the evaluation of their effects and the most significant results arising from the monitoring be presented (Art. 11, Art. 17 Habitats Directive; SRU 2004b, Item 168). The national report from the year 2007 compiled pursuant to Article 17 covers the reporting period 2001 to 2006. The monitoring report already available can be said to take an initial step towards the more comprehensive monitoring of nature and landscapes that is so necessary (for more on environmental monitoring see SRU 2004b, Chapter 3.3). First of all it will be necessary for the *Länder* to collect additional data, which must include updated versions of the biotope maps that are, in many cases, out of date. As the Natura 2000 sites are only home to some of the habitat types and populations in question, any evaluation of their state of conservation should be carried out throughout the entire bio-geographical region (SPERLE 2007). A research and development project is currently being conducted by the Federal Agency for Nature Conservation (BfN) to establish a national sampling procedure which is intended to achieve an error probability of $p < 0.05$. For each habitat type and each species per bio-geographical region 63 samples are to be collected. These samples can only be used to make statements at the bio-geographical level. Further samples will in some cases need to be added to permit statements to be made at *Länder* level. The R&D project is intended to create an overview of the data quantities and costs involved. A decision is expected in 2008, with the start of the project to follow in the second half of the year.

5.6.1.5 Report pursuant to Article 17

415. The national Habitats Directive report of the Federal Government for the 2001-2006 reporting period (www.bfn.de/0316_bericht2007.html) provides rather basic information about the state of conservation of habitat types and species on a three-tier “traffic light” scale, as intended by the European Commission. Each individual state sends the data for each habitat type and for all species to the Federal Agency for Nature Conservation (BfN) according to a simplified evaluation procedure instigated by LANA. The BfN assigns a specific weight to the data according to the proportion of habitats or species to be found in the individual *Länder* and then creates an evaluation proposal as already agreed with the

Länder (cf. BALZER et al. 2008). The report to the EU only concerns bio-geographical regions; *Länder*-level data are no longer recognisable. As a result, the report does not contain comprehensive monitoring with transparent and easily accessible environmental information. Nonetheless, the crude results already published do in places conceal more differentiated data. Some of the *Länder* have already published more differentiated reports themselves.

The Federal Government's report to the European Commission gives a positive rating to the condition of only a quarter of the species and habitat types on which data has been collected in line with the Habitats Directive; the vast majority are in a negative state of conservation (BMU 2007a). The assessment evaluates the period since the Directive came into force in 1994. The most favourable state of conservation is accorded to the species and habitats of the Alpine region (53 % or 60 % are "green" whereas only 7 % are in a poor state of conservation ("red")), whereas the Atlantic regions (parts of Lower Saxony, North-Rhine/Westphalia, Schleswig-Holstein and Saxony-Anhalt and all of Hamburg and Bremen, corresponding to 20 % of the entire land area of Germany) are given the lowest rating, especially in respect of habitat types (43 % poor state of conservation). These evaluations concur with the results recorded by RIECKEN et al. (2006; cf. Item 333).

5.6.1.6 Integration with the Water Framework Directive and the Directive on the assessment and management of flood risks (Floods Directive)

416. Meaningful and necessary harmonisation of the aims of nature conservation, especially the implementation of Natura 2000, with the implementation of the Water Framework Directive (WENDLER 2007) is not being carried out in the *Länder* to any adequate degree (see also Items 566, 583-586). A resolution has been adopted by the Joint Working Group on Water Issues (*Bund/Länder-Arbeitsgemeinschaft Wasser – LAWA*) and the Joint Working Group for Nature Conservation, Landscape Management and Recreation (*Bund/Länder-Arbeitsgemeinschaft Naturschutz, Landschaftspflege und Erholung – LANA*) to coordinate monitoring procedures. For example, in the state of Brandenburg it was possible to supplement the monitoring list of the WFD. The costs of nature conservation monitoring are met from the nature conservation budget, whereas monitoring of the WFD is financed through water rates. As far as the harmonisation of measures and bundling of means of implementation in the context of integrated management planning are concerned there have not yet been any targeted implementation efforts, even though appropriate proposals for such integration have already been made and are freely available (cf. Items 583 to 586). A proposal for integrating the environmental objectives according to the WFD and the conservation and development aims according to the Habitats Directive was worked out by JESSEL (2006) and recommended for use to the *Länder* after a resolution adopted by LANA

and LAWA. Individual conflicts resulting from differences in the concepts of the directives, which could lead to problems in identifying objectives in the process of developing measures, appear to be capable of resolution. Generally speaking such conflicts arise from divergences between the WFD's aim of preserving as far as possible the good, natural condition of inland water bodies and those ecosystems and wetland areas directly dependent upon them in respect of their water balance (Art. 1a WFD), and the approach of the Habitats and Birds Directives which also includes culture-dependent species and culture biotopes. As far as the development of inland water bodies is concerned there is hardly any divergence, as nature conservation also generally aspires to the conservation of such water bodies in as natural a condition as possible. Exceptions in respect of species with special needs – such as, for example, the freshwater pearl mussel – in the event of a lowering of the groundwater table with the attendant disadvantages for important floodplain biotopes, or for secondary habitats of specific significance for nature conservation, should be decided after a period of deliberation with priority to be placed on the over-arching conservation needs. Regarding this process of deliberation (cf. also Art. 4 (2) WFD), according to which, in cases where several objectives are affected, the “highest aim” takes priority, JESSEL (2006) states that, in cases where specific management objectives come into conflict, it is to be assumed that Habitats Directive objectives, as being contained within the more specific directive, are pre-eminent. In view of the management planning concepts already worked out (cf. Section 5.6.1.3) and the conservation and development aims that have thus far been inadequately specified, this underlines the necessity of working out such aims, especially in respect of the Natura 2000 sites characterised by water, as a matter of priority and in good time for the programme of measures to be presented under the WFD (to be completed by 2009).

If in future the EU directive on assessment and management of flood risks (Floods Directive) also requires measures relevant to water bodies and floodplains to be carried out, efforts must be made to ensure that the political focus on flood protection as a means of protecting private property does not lead to an effective deprioritisation of the requirements of Natura 2000. When it comes to transposition of the above directive into national law (see Section 7.4.4), care must be taken to reconcile the directive's aims, which are restricted to limiting the dangers posed by flooding, with those of nature conservation.

LAWA and LANA have adopted a resolution to coordinate German ocean monitoring procedure between the Federal Government and the *Länder* in the context of their joint measuring programme (*Bund-Länder-Messprogramm – BLMP*). German marine environmental monitoring is currently being further developed in view of the EU requirements found within the WFD and the Habitats Directive.

5.6.1.7 Under-financing of measures due to cuts in the second pillar

417. The European Commission sees as one of the main problems in the implementation of Natura 2000 the fact that only limited means are available for effective area management and supportive measures (European Commission 2006, p. 8).

Whereas it was originally thought that the Natura 2000 sites would have their own financing instrument, the EU contribution to the financing of Natura 2000 was subsequently implemented through integration into the EU's existing subsidy schemes, in line with the Commission's integration strategy. Natura 2000 is now largely to be financed using the resources made available by the Common Agricultural Policy. Simultaneously, Art. 17 of the Directive on the European Agricultural Fund for Rural Development (EAFRD) determined that at least 25 % of the funding from the second pillar should go into Axis 2 (improving the environment and agriculture). These funds could also potentially be used for Natura 2000. In the context of the EU's financial forecast the member states themselves have in any case cut the relevant budget item for the old EU member states by almost one quarter compared to the Commission's proposals (see Item 976), which must cast doubt on the credibility of any efforts to halt biodiversity loss by 2010.

Nature conservation measures in the German Natura 2000 sites can be co-financed by the EU by means of the European Agricultural Fund for Rural Development (EAFRD; cf. Item 980) or by structural funds, or indeed fully financed by the exclusive means of state funds. In the case of an application for EU funding the subsidies must be determined in national and regional programmes to be developed by the member states. The European Commission has commissioned a manual so that options for subsidisation that are not recognisable at first sight can also be exploited (MILLER and KETTUNEN 2006). Under the law there is only one ministry in each member state with the authority to administer the funds; this, in line with the integrated approach followed by the EU, is usually the agriculture ministry. The funds for the system of protected areas therefore come from the same source as, for example, the compensation payments or the subsidisation of young farmers, leading to competition for resources. Overall the funds available in the *Länder* are insufficient or, as is the case in some *Länder*, use up the whole available budget for area-focused nature conservation. What also acts as a brake is the fact that the smaller the areas in question become, the greater are the administrative costs involved in allocating the funds, making them appear disproportionately high in respect of very small areas of land. The German Natura 2000 sites, which are mostly small in extent, thus bring about high administrative costs for the authorities and also have negative impacts on the readiness of land users to enter into voluntary agreements.

What is needed as a source of funding exclusive to Natura 2000 which could cover 100 % of the costs. In addition the joint task programme of the Federal Government and the *Länder* for the improvement of agricultural structures and coastal protection (GAK) should be opened to

nature conservation, having up to now excluded it. Federal reform has made this opening theoretically possible. An initial step in this direction is represented by the subsidisation of conservation and genetic resources in agriculture. This includes for example the cultivation of endangered indigenous agricultural crops which are adapted to regional conditions and are thus threatened with extinction (BMELV 2007b).

Particularly welcome would be a voluntary system of stewardship of the Natura 2000 sites in addition to the official one. The work should consist in informing the public and visitors, and also include the initiation of applications for subsidies. Land users should be informed about the populations living on their land and given advice to help them to adopt suitable land management procedures. Natura 2000 can be efficiently implemented given intensive participation by local authorities, tourism bodies and regional players in nature conservation (DVL 2007).

France, for example, already operates a system of full-time stewards for protected areas. In Germany, however, depending on the federal state, systematic stewardship of protected areas is the exception rather than the rule. Bavaria currently has six full-time nature stewards from a job creation programme, Brandenburg has so far only deployed nature stewards in the large-scale protected areas, and in North Rhine-Westphalia the corresponding tasks are carried out by the nature conservation stations.

5.6.2 Network of Interlinked Biotopes

418. In addition to the Habitats Directive, the function of which is to create a European network, the Federal Nature Conservation Act and the Federal Government's biodiversity strategy envisage a network of biotopes – not least because of the threat of climate change – which will by means of emigration or dispersal corridors allow for species displacement as well as safeguarding suitable core habitat areas (Art. 3 Federal Nature Conservation Act; Art. 3, Habitats Directive; Art. 3, Birds Directive; Water Framework Directive). This biotope network focuses on those biotopes which are considered to be especially important within Germany but which do not completely correspond to those deemed from the European angle to be worthy of protection. From a European perspective, for example, Germany's beech woods are deemed particularly worthy of protection, whereas national criteria accord standing water bodies and certain types of grassland the status of being particularly endangered and therefore worthy of protection. Central to this is the aspiration to preserve species and biotopes not just in those parts of Europe where they happen to occur in greater density but to preserve species throughout their entire distribution areas, thus safeguarding high levels of biodiversity in keeping with the natural make-up of particular areas. The biotope network as envisaged in the Federal Nature Conservation Act thus includes the Natura 2000 network and additionally comprises those key areas at regional and *Länder* level not covered by the network as well as habitat corridors and other connecting elements.

The biotope network should be complemented by management corridors with sustainable land use practices on the part of agriculture, forestry and water management which do more than meet the criteria of good agricultural practice (KNOP and HERZOG 2007; HANSEN et al. 2003; BENNETT 1999; SLUIS et al. 2004).

Ecological coherence is defined by SSYMANK et al. (2006) as “sufficient representation (patch quality, total patch area, patch configuration, landscape permeability) of habitats/species to ensure favourable conservation status of habitats and species across their natural range”. A biotope network should take into account both the structural aspects (spatial continuity) and the functional aspects (e.g. organism needs ways of obtaining food, nesting, fertilisation) of the network system (KETTUNEN et al. 2007).

419. An initial grid of actual areas to be considered for the inter-state biotope network was evaluated in respect of size, biotope quality, degree of fragmentation and occurrences of target species (FUCHS et al. 2007 in line with the recommendations in BURKHARDT et al. 2004). The result was the identification of core areas for the biotope network taken from woodlands, open land and inland waterways, selected on the basis of their significance above and beyond the individual state in which they are located. In addition, further areas which might be used as connecting corridors to link wetlands, arid areas and woodlands were delineated. The areas thus mapped account for 5.8 % of the area under investigation in the case of woodlands and a bare 1.7 % for open land habitats. For inland waterways the proportion was 18.7 % of the total waterways network. These areas now need to be permanently secured. Gaps in the data collected in respect of open land habitats made nationwide investigation impossible; all that could be identified was a minimal set. Furthermore, significant supra-regional points of fragmentation and, in some cases, conflict with transport infrastructure were identified.

The list of nationwide areas of significance for nature conservation names areas for which Germany bears a particular responsibility. It thus provides a supportive framework for the inter-state biotope network, a framework that should be further underpinned, modified and extended (SCHERFOSE 2007). The proportion of land area thus represented amounts to 4.3 % of the total area of Germany, with values in the *Länder* that range from 2 % in Baden-Württemberg to 10 % in Saxony. These major regional differences in distribution of the areas identified are of significance for the further planning and detailed definition of the biotope network and its implementation by the *Länder*. It can be seen that the specific criteria applied mean that some *Länder* are obliged to take more responsibility than others and that the minimum proportion of area to be earmarked in these *Länder* for the purposes of the national biotope network (FUCHS et al. 2007) regularly exceeds the level of 10 % of total land area envisaged under federal law. Funding from central government or ecological financial compensation between the *Länder* would help to prevent a minority of them from being subjected to overly high financial demands (SRU 2002a Section 5.1.1.2.3; 2000, Item 540).

420. Three years after the framework provisions of the Federal Nature Conservation Act came into effect the *Länder* should have passed corresponding laws at state level and started to implement them. As of September 2006, nine of the 13 states included in the area network programme had already developed state-wide plans for the biotope network. These plans were not in place in Baden-Württemberg, Hesse, Lower Saxony and Thuringia; in Baden-Württemberg, however, a specialist map with roughly demarcated areas had been drawn up (HÄNEL 2006; 2007). Whereas in four of the *Länder* the primary responsible body is landscape planning, the other five have already instituted a planning procedure particular to the biotope network. Differences in methodology and presentation that are in some cases significant have been established between the individual biotope network planning procedures in respect of planning scale, target species and choice of area. Overall the categories are only comparable in a few of the *Länder*, especially when it comes to cartographic representation (HÄNEL 2006).

The requirement in Article 3(1) of the Federal Nature Conservation Act to set aside 10 % of land area for the biotope network is subject to very broad interpretation (Conference: Biotope network planning – from planning to implementation, 6-7th September 2006 in Halle, Environmental Protection Office of the state of Saxony-Anhalt) The figure of 10 % is often reached with the core areas alone, meaning that more than 10 % would be necessary in such cases (see also SRU 2002c). ZELTNER (2006) for example defines a requirement of 40 % nature conservation land area (15 % each for nature and culture biotopes plus network) for Schleswig-Holstein. In Berlin 15 % of the land area of the state is already protected (6 % consists of Habitats Directive sites) (MEIßNER 2006). In Saxony-Anhalt the planned protected area system (nature conservation areas, landscape protection areas, national parks) and the biotope network account for 30 % of the state's total area.

The proposed implementation instruments also differ from state to state. Some of the *Länder* are planning a biotope network exclusively on the basis of Natura 2000 site registrations and other designated protected areas; in other *Länder* stipulations according to planning law, contract-based nature conservation, EAFRD, eco-account/ compensation areas, job creation schemes, local authority measures or special help programmes for individual species are being used as instruments.

The biotope network has featured in provisions governing 'intervention in nature and landscape' and environmental impact studies – for example in the case of plans to build motorways which affect more than one state – only with reference to species under maximum protection (Article 19(2) Federal Nature Conservation Act). Little attention has so far been paid to the network which is planned and is to exist on a permanent basis (BÖTTCHER 2006; LEIBENATH et al. 2007). Guidelines for the regulation of provisions governing 'intervention in nature and landscape' come from the *Länder*. They also need to take account of the needs of the biotope network. Measures to reverse rural fragmentation

by means of crossing points or road closures have not yet been systematically undertaken in Germany, in contrast to other European states. Taking RECK et al. (2005) as its basis, the Nature Conservation Association of Germany (NABU) has therefore presented a “Federal Wildlife Corridor Plan” which names 125 locations that are in urgent need of crossing points, green bridges etc. for the selected principal animal species of wildcat, lynx, wolf, red deer and otter. In general the planning of the biotope network should be agreed at all levels and between the *Länder*, clearly defined and laid down, and implemented (Item 421).

5.6.3 Summary and recommendations

421. The vast majority of the authority and responsibility for the implementation of nature conservation aims is in the hands of the *Länder*. The conservation of large areas of land is an important criterion for the conservation of biodiversity. The aim is to be achieved by means of larger-scale area protection and by integrating nature conservation into economic areas and connecting relevant nature conservation areas with one another. If a contribution is to be made to achieving the aims of the biodiversity strategy (cf. Section 5.5.2) the *Länder* should adopt a nature conservation objective that is

- large-scale in terms of land area
- integrated in respect of the targeted areas
- supported by the biotope network.

Increasing the size of the areas involved also brings advantages for the efficient use of subsidies in respect of the administrative costs.

In respect of financing, the SRU sees a need to create a source of funding at EU level exclusive to Natura 2000 which should cover 100 % of the subsidisation of those aims and measures with Europe-wide implications. This would ensure credible involvement of the European Commission in the aims of the European Biodiversity Strategy (cf. Items 393-395). At *Länder* level the joint task program of the Federal Government and the *Länder* for the improvement of agricultural structures and coastal protection (GAK) should provide further openings for nature conservation in its next subsidisation period from 2011.

In respect of the implementation of Natura 2000 the *Länder* should complete the securing of Sites of Community Importance and European Bird Sanctuaries as quickly as possible and institute management plans for them. A trans-regional monitoring system for Natura 2000 should be established. The existing backlog in some of the *Länder* in respect of the aims to be pursued within the protected areas and the management plans should be cleared.

In the interests of optimum stewardship and public relations work, the SRU recommends a stewardship system for the Natura 2000 sites as well as better information and consultation services for land users, both inside and outside the protected areas.

The trans-regional biotope network for the Natura 2000 network of protected areas should be further optimised in a methodical fashion, supported by efforts at *Länder* level and implemented. As the concepts that have been developed entail a high level of divergence in terms of the areas involved in the individual *Länder*, which could represent a financial burden for some, these nationally significant nature conservation services should be rewarded by extending the financial compensation available along ecological lines.

5.7 Nature conservation as part of the future Environmental Code

422. On the basis of the new federal competencies that resulted from the reform of the federal system carried out in 2006, the federal legislature intends to enact the first parts of an Environmental Code (*Umweltgesetzbuch – UGB*) in the present legislative period. The programme of regulation includes amendments to nature conservation law. The aim of this revision is to replace the existing legal framework with directly executable federal regulations. These must meet the requirements of the current and future challenges in the nature conservation sector (Chapter 5.2). In addition to the problem of increasing loss of biodiversity, attention must be paid to the growing significance of nature conservation as an instrument of climate protection and adaptation to the possible effects of climate change. In respect of the requirements of marine ecosystems conservation the reader is referred to earlier publications (SRU 2004a).

5.7.1 Legal basis of the revision of the Federal Nature Conservation Act in respect of competencies

423. The reorganisation of legislative competencies brought about by the reform of the federal system reshaped the initial conditions for the amendment of the Federal Nature Conservation Act in three ways (for more on the consequences of the reform of the federal system, with partly differing assessments: KOCH and KROHN 2006; SCHULZE-FIELITZ 2007): Firstly, the federal state was given the possibility of enacting laws covering the entire subject matter of conservation of nature and landscapes. The previously limited competence “nature conservation and landscape management” was transferred to the competing legislative competence of the federal state and simultaneously exempted from the strict requirements of the necessity clause (Art. 74 Section 1(29) in conjunction with Art. 72 Section 2 of the Basic Constitutional Law). Secondly, this expansion of the federal state’s competence portfolio has been compensated by according rights to the *Länder* to deviate from the federal nature conservation law, a development that must be viewed critically. With the exception of the “general principles of nature conservation” and the laws on species and marine conservation, these rights cover the entire spectrum of German nature conservation law (Art. 72 Section 3(2) of the Basic Constitutional Law). It is not only the danger of

competition to deregulate at the expense of effective nature conservation and supra-regional interests that lurks behind the rights of deviation. They also run counter to the declared aim of the reform of the federal system, which is to disentangle jurisdictions in the sense of providing the public with clear and recognisable allocations of responsibility. There is a danger that informal bargaining processes between the federal government and the *Länder* could deprive federal legislation of real stringency right from the outset in order to avoid later relativisation of federal law through deviation at *Länder* level or disputes over the construction of the non-negotiable core elements (SRU 2006, Para. 48; SCHULZE-FIELITZ 2007, p. 255). Thirdly, constitutional requirements mean that the process of amending the Federal Nature Conservation Act has to take place on a tight schedule, a fact which further favours the complex structure of interwoven decision-making. After 31 December 2009, in accordance with the transitional provisions of Article 125b), Section 1 of the Basic Constitutional Law, existing nature conservation law will also be open to deviations on the part of the *Länder*. Until this time such deviations are excluded in order to allow the amendment of the Federal Nature Conservation Act to proceed as smoothly as possible.

5.7.2 Implementable provisions as an essential legal component of the amendment

424. Notwithstanding the previously discussed weaknesses of the new distribution of competencies, the drafting of the third book of the Environmental Code (nature conservation and landscape management) presents an opportunity to create uniform regulations across the whole of Germany for citizens, administrations and project developers. The amendment of the Federal Nature Conservation Act will be judged in the light of its success to create normative nature conservation standards throughout Germany by means of executable legislation of the entire subject matter that is adequate to the task. Stringent standards can be seen to be urgently necessary in order to do justice to the leading function of Federal law in the light of the challenges facing nature conservation. The effective recognition of nature conservation interests requires nationwide quality targets and supra-regional instruments that can mesh with one another (KOCH 2004, p. 19 ff.). These are indispensable in the light of climate protection and the need to adapt to the effects of inevitable climate change.

425. Furthermore, nature conservation law requires a high normative density in order to enhance its perceived significance, especially in terms of its implementation. The above-average level of cuts in staffing and other tangible resources in the administrative bodies involved in nature conservation must raise questions about their ability to represent the interests of nature conservation and landscape management in an appropriate way, especially in cases of conflict (SRU 2007b; BENZ et al. 2007; BAUER et al. 2007). Concrete and normative parameters can free authorities from the burdensome need to argue their case and can provide a counterweight to pressures inhibiting the implementation of nature

conservation law. This latter tendency is especially apparent at the level of local authorities which are in direct competition with one another in respect of where businesses are to be set up (PIELOW 1990; BURMEISTER 1988). Current trends towards the devolution of nature conservation work to local authorities desperately require regulatory accompaniment by concrete standards in order to counteract losses of quality in the implementation of measures (critical about the endeavour of the *Länder* to reduce the normative density of legislation: SRU 2007b, Item 234).

In the final analysis, regulations enacted at the federal level also help to standardise the law. Precise parameters can set a reliable framework for planning and other activities in the interests of administrations, project developers and private citizens, and counteract the tendency to legal disputes. The legislative fragmentation that has existed up to now contributed considerably to the fact that nature conservation law is insufficiently effective (SRU 2002a, Item 322; 2004b, Item 191 f.).

426. Overall it can be said that a revision of the Federal Nature Conservation Act “in the shadow of deviation rights” can only make a positive contribution to the cause of nature conservation and to more effective disentanglement of competencies if the federal state can withstand the temptation to dispense from the outset with concretisation and further developments of existing legislation that may lead to conflict but are essential from a nature conservation point of view. A clearer allocation of competencies requires the *Länder* to expose themselves to a critical public and to discussions within the context of appropriate legislative scenarios. Adopting federal legal parameters does not necessarily signify a retreat from the existing legislative models in the *Länder*. On the contrary, positive experience with particular pieces of legislation enacted by the *Länder* should provide yardsticks for the further development of federal law.

5.7.3 The general principles of nature conservation

427. In respect of consistent legislation of the entire subject matter and the leading function of federal law there is a clear case for the federal state, to determine comprehensive norms regarding the “general principles of nature conservation”. These, along with the legislation on species and marine conservation, are, according to Article 72, Section 3 No 2 of the Basic Constitutional Law, not amenable to deviation on the part of the *Länder*. The concept of general principles has not been more precisely defined by the constitutional legislator and requires, in the case of disputes, adjudication by the Federal Constitutional Court (on the lack of precision of the concept see: KOCH and KROHN 2006). The natural meaning of the word “principles” indicates that this concept must include legislation that is capable – and, for that matter, in need – of further elaboration (KLOEPFER 2006, p. 262). In respect of the highlighted significance of the principles as core legislative elements that

permit no deviation, any parameters must also possess essential significance for effective, long-term nature conservation (SCHULZE-FIELITZ 2007, p. 257).

428. If nature and natural landscapes are to be conserved, nature conservation law must from a specialist point of view revolve around the following principles at the very least. They are therefore themselves to be considered to be “general principles of nature conservation”:

- The principle of nationwide minimum protection: This counteracts a tendency towards the fragmentation of habitats along with an attendant loss of biodiversity and increased susceptibility of ecosystems to climate change, and helps preserve different options of land use for the future.
- The principle of appropriate protection of non-fragmented natural spaces: This permits climate-related species displacement in the interests of the long-term safeguarding of biological diversity.
- The principle of avoidance of harmful impacts on natural commodities and their functions: This principle of protection does not exclude every type of harmful impact but does require the justification of any measure that may have deleterious effects. The greater the risk to species and habitats is perceived to be, the greater the necessity of strict measures to protect them. Negative impacts are only to be permitted in the interests of higher priority subjects of protection and also require credible justification.
- The principle of integration of the interests of nature and natural landscapes into environmentally relevant decisions.
- The principle of precaution from unacceptable risks to the natural regime, so that, in cases where there is insufficient scientific knowledge, damage can be prevented and usage options can be kept open for the future.
- The principle of restitution of negatively affected subjects of protection and compensation, according to which harmful impacts on nature and natural landscapes are to be compensated for in the interest of their long-term conservation. Real compensation is to take priority over monetary compensation, being aimed at a kind of equalisation that is close in time and appropriate in nature to the original event.
- The principle of liability of the originator for risks to the subjects of protection and any harm that may befall them (polluter pays principle).
- The principle of participation in and monitoring of decisions relevant to nature conservation by nature conservation associations in order to safeguard the implementation of nature conservation law as objective law that does not in principle establish any individual right to sue (SRU 2005a).

5.7.4 Necessary provisions for selected instruments of nature conservation law

429. The following will outline the need for amendment in respect of those central instruments of nature conservation law which are up for discussion in the Environmental Code as a result of the interest in deviation already expressed by some of the *Länder*. These include in particular the legislation on impairments of nature and natural landscapes (Item 430 ff) and landscape planning (Item 441 ff). A significant role in the future-oriented amendment of the Federal Nature Conservation Act will also be played by the legislation on good agricultural practice (Item 454 f), area protection (Item 456) and monitoring (Item 457).

5.7.4.1 Provisions governing interventions in nature and landscape

Non-negotiable cores of the provision

430. The provision governing interventions in nature and landscape is based on various general principles of nature conservation. Noteworthy amongst them are the imperative of nationwide minimum protection, the integration idea, the imperative to avoid causing harm and to pay compensation in the event of so doing, along with causer liability. At least to this extent the provision is part of the non-negotiable general principles of nature conservation law (Item 428) (KOCH 2007, marginal note 92; FISCHER-HÜFTLE 2007, p. 81; in a rudimentary form also: LOUIS 2006b, p. 342; also the Federal Government in its answer to the question asked by the FDP in the Lower House of the German Parliament, Deutscher Bundestag 2006b, p. 5). Inadequate legal provisions and an unsatisfactory level of administrative enforcement have in practice led to a situation in which the provision governing interventions in nature and landscape has not fulfilled the expectations associated with it (SRU 2002a, Item 322 with further references). In order to make better use of its potential for overcoming the nature conservation problems mentioned in Chapters 5.2 and 5.3, the provision should be further developed by means of the following federal legislative parameters on the basis of more than 30 years of experience of practical implementation.

Concretisation and further development of the provisions governing intervention in nature and landscape

431. The provisions governing intervention in nature and landscape are only applied when a “significant intervention” in nature and natural landscapes as subjects of protection is found to take place. The ongoing controversy amongst specialists about this particular situation is detracting from efforts to implement the provision. To improve the chances of implementation the *Länder*, with the exception of Bavaria and Lower Saxony, have adopted a procedure of using positive and negative lists in respect of clusters of cases to help clarify the hazy legal term of significant intervention. Nationwide, appropriately detailed and uniform lists could

support implementation and free the process from what are in some cases difficult investigations into the applicability of the provision. It will not be possible at the federal level to list all conceivable interventions. What would make sense would be the drafting of a basic catalogue of interventions at the federal level which could be supplemented by provisions enacted in the *Länder*. The future Federal Nature Conservation Act should accordingly empower the federal state primarily and the *Länder* secondarily to draft positive and negative lists. As the Federal Administrative Court has clearly demonstrated, the positive and negative lists provide nothing more than a basis for rebuttable presumption of the existence or non-existence of a significant intervention (FAC ruling of 27 September 1990, Ref. 4 C 44.87, FAC 85, 348 (355), ruling of 31 August 2000, Ref. 4 CN 6.99, FAC 112, 41 (45)). Some *Länder* are nevertheless trying, in misguided application of the law, to use the lists to get certain negative impacts definitively excluded from the intervention concept (on individual state provisions: de WITT and DREIER 2006, marginal note 714; KOCH 2007, Section 4 marginal note 21). It should be the aim of the federal legislature to counteract this tendency by means of even clearer normative establishment of the mere presumption of conformity represented by the lists.

In respect of the subjects of protection, it should be clarified that – in accordance with existing case law – inland bodies of water fall into the category of subjects of protection in circumstances other than the explicitly mentioned changes in groundwater level (for example ruling of the Munich Higher Administrative Court of 21 April 1998, Ref. 9 B 92.3454, NuR 1999, 153 f.).

Furthermore, the release of greenhouse gases through changes in land use should be taken into account in the context of implementation of the provisions governing intervention in nature and landscape to the extent that other instruments are not already serving to compensate for it (cf. on demands for a ban on ploughing permanent grassland, Item 454). The provisions governing intervention in nature and landscape in their current form already allow for such greenhouse gas emissions to be included in its scope. However, the methodological basis for the inclusion of emissions needs further development. A further precondition for the successful management of the ploughing of grasslands, for example, with all its greenhouse gas emission implications, and drainage measures within the provision would be the introduction of a duty of disclosure for such interventions.

Avoidance requirement and real compensation

432. The system of legal consequences in the provisions governing intervention in nature and landscape with (1) avoidance, (2) compensation and replacement measures, (3) careful consideration and (4) financial compensation has in general proved itself. At the same time, however, there is need for improvement in the organisation of the individual steps within this system. In respect of the avoidance requirement it must first be recognised that this

instrument is in the main bound to bring about nothing more than the specialist technical optimisation of projects in the areas for which they are planned. This is due to the nature of the provisions governing intervention in nature and landscape with their primary emphasis on compensation (KÖCK 2005, p. 9 with further references). In partial contradiction to state laws which read differently (state nature conservation laws of Brandenburg, Schleswig-Holstein and Hesse in the version created on 16th April 1996) the prevailing opinion is that it does not require project developers either to search for or to select another more ecologically suitable location. Still less is there any provision enabling the prevention of projects altogether. The avoidance requirement thus presents itself as a stringent dictate to minimise the effects of interventions rather than as a means of regulating the choice between location and project alternatives (KOCH 2007, No. 31). In the case of deliberative decisions in the area of planning law, an examination of alternative locations is a necessary part of the doctrine of fair commensuration. The form of examination of planning alternatives is primarily determined by elements of the provisions governing intervention in nature and landscape under nature conservation law (Federal Administrative Court ruling of 7th January 2007, Ref. 9 C 1/06; more on this in: KOCH 2007, Section 4 No. 47 ff.). In the case of bound decisions on applications for planning permission it seems to be advisable as well to provide for inclusion of the examination of alternative locations or evidence of the lack of ecologically favourable alternatives in the preconditions for granting planning permission (cf. HANSMANN 1998, p. 15 f.). In order to advance the avoidance requirement in the sense of technical optimisation, the authorities involved should also be given explicit powers to order the ecological supervision of construction projects (KRATSCH 2006, p. 5 with further references).

433. In respect of the compensation of an intervention by means of (primary) compensation and (secondary) substitute remediation, there has been a continuing tendency in the majority of *Länder* to relax the tightly regulated relationship, in terms of both space and time, between the intervention event and the compensation for it in the context of the provisions governing intervention in nature and landscape under nature conservation law. Especially land and measure pools as a means of providing a ready supply of compensation land or concrete measures to be taken are provided for to allow a flexible organisation of compensation (for an overview of the legislation at *Länder* level see KOCH 2007, Annex). This system of pools has given rise to the expectation that all compensation measures will be better co-ordinated and harmonised (for information on the mandate of those responsible for land pools cf. BÖHME et al. 2005, p. 36 ff.) and that, in individual cases, the provisions governing intervention in nature and landscape will be applied more swiftly. The increased flexibility promised by pool solutions also brings the risk that the clear demarcation and order of priority that puts compensation first and substitute remediation second will be watered down. Although it is true that both compensation and substitute remediation presuppose a functional and spatial relationship to the intervention, this is more precisely defined in the

case of compensation (one of many examples: LOUIS 2004, p. 715 f.). The compensation measures, for which the chief applicable criterion is that of “like-for-like” compensation, are to be preferred to the substitute remediation which merely take “equal value” as their criterion, especially in the case of those particularly valuable – and threatened – functions of nature and natural landscapes. Substitute remediation is also susceptible to compensation solutions that are oriented to the principle of the cheapest possible “restoration” and thus lead more readily to standardised measures and a concomitant homogenisation of the countryside.

A comprehensive empirical survey of more than 300 land pools in Germany came to the conclusion that the legally required distinction between compensation and substitute remediation plays a subordinate role in the pool context (BÖHME et al. 2005, p. 171 ff.; along the same lines the analysis conducted by THUM 2006a, p. 293). The choice of land area is basically decided using the criterion of land availability in the pool (BÖHME et al. 2005, p. 176 ff.). The danger of over-focusing on the land currently available in the pool at the expense of technical criteria appears particularly acute in those cases where compensation land pools are primarily understood to be an instrument for speeding up the process of granting permission (THUM 2006a, p. 291). In many cases the process of selecting compensation measures has been less rigorous than the aims of landscape planning would require (BÖHME et al. 2005, p. 184 ff.).

It has also been observed that in some cases land pools are used to finance nature conservation tasks that were originally the responsibility of the state (THUM 2006a, p. 294). In view of the discussions taking place in various *Länder* this seems likely to develop into a tendency to employ compensation measures laid down in the provisions governing intervention in nature and landscape primarily in the development of the Natura 2000 protected area scheme required by European law. The Compensation Ordinance of the Hessian parliament already envisages that the implementation of compensation and substitute remediation will primarily take place within the Natura 2000 areas (Art. 2 Section 1 no 2 of the Ordinance on the Execution of Compensation Measures, Eco-accounts, their Negotiability and the Setting of Compensation Charges). To the extent that these compensation measures are intended to finance the obligations of the member states under European nature conservation law, these activities represent a retreat on the part of nature conservation that can simply not be justified and are in contravention of the basic principle behind the provisions governing intervention in nature and landscape of nationwide minimum standards of protection.

434. The aforesaid in mind, the Federal Government’s future Environmental Code should, in respect of compensation and substitute remediation measures, determine the following:

- The basic requirement of upgradability of the compensation land both within and outside pool solutions in respect of location, size and location-specific requirements,

- A procedure to set technical distinctions between compensation and substitute measures in order to maintain the technical standards of the provisions governing intervention in nature and landscape (on the general requirement for a technical assessment procedure see Item 438), in which the functional relationship between intervention and compensation demanded by the compensation concept is to be safeguarded in order to compensate for the effects of the intervention in the best possible way. The spatial relationship between intervention and compensation does not necessarily require restoration or new development at the exact location of the intervention; what is of decisive importance is whether or not the functional relationship can be more reliably safeguarded at some other appropriate location that must at least be within the same natural context,
- Coherence of land pool planning with other instruments of nature conservation, especially landscape planning, including the planning of the biotope network, and
- A ban on the use of compensation resources for nature conservation tasks where the state bears legal responsibility for financing, such as measures for the conservation and management of the Natura 2000 areas.

State nature conservation legislation generally ties land and measure pools in with so-called eco-accounts. Project developers can have their eco-account credited with any preventative compensation measures they have carried out. These will then be used later to offset any liabilities that arise out of the provisions governing intervention in nature and landscape. Eco-accounts thus contribute to ensuring that the delay – undesirable from the point of view of nature conservation – between the actual intervention and the time the compensation measure takes effect is at least reduced. They are to be explicitly authorised in federal law and underpinned with technical criteria for the assessment of interventions and compensation (Item 438).

Long-term safeguarding of compensation measures

435. More precise federal standards for long-term safeguarding of compensation measures are urgently necessary. To this end there is a need for legal clarification that compensation and replacement measures must both remain operative for the entire duration of the intervention (Higher Administrative Court Lüneburg, judgement of 14 September 2000, Ref. 1K 5414/ 98, NuR 2001, p. 294 ff.). This requires initial securing of the land in question itself. This calls for the definition of a standard basic duty to provide security by a charge on property, which should be universally binding. The security to be offered in any given case is however to be selected on the basis of the circumstances of the individual case (on conceivable security options see: BUNZEL 2004, p. 47 ff.; BERCHTER 2007, p. 225 ff.). In addition, there is to be explicit legal clarification that the burden of implementation and financing of any measures for restoration, development and maintenance falls exclusively on the project developer. The need for a clarification of this kind is clear in view of the lack of

readiness of project developers to assume their responsibilities in practice. In spite of the difficult public-sector budgetary situation, in some cases little effort is actually being made to ensure that the costs generated by the intervention are borne by its originator (BÖHME et al. 2005, p. 196 ff.; THUM 2006a, p. 295). As evidenced by the oft-quoted analysis conducted by BÖHME et al., only around a third of the compensation land pool administrators are passing on the costs of permanently safeguarding the land to the project developers. The prototype bylaws of the Central Association of Local Government on the levying of the reimbursement charge pursuant to the old Article 8a of the Federal Nature Conservation Act as well as to Articles Sections 135a to 135c of the Federal Building Code also run counter to an appropriate attribution of costs. They limit the liability of the project developer for the costs of ensuring completion and development to a maximum period of five years. This period is demonstrably too short for the compensation to take effect successfully and for its long-term security to be assured.

Deliberation and replacement payment

436. As a result of its subsidiarity relative to replacement measures as well, the careful consideration regulation contained in the provisions governing intervention in nature and landscape have hardly any effect in practice on restricting the granting of planning permission (THUM 2006a, p. 294). Efforts should however be made to improve coherence between the planning doctrine of fair commensuration and the relationship between the steps in the strictly defined cascade of legal consequences under the provisions governing intervention in nature and landscape. In planning law too the steps in the examination procedure consisting of avoidance, compensation and replacement should precede the actual deliberative procedure (KOCH 2007, marginal note 48).

437. Nearly all the *Länder* have taken advantage of the possibility of providing for monetary substitute remediation for interventions that cannot be compensated but are nevertheless permissible. However, the individual regulations differ in respect of the grounds for the payment obligation, the method of calculation and the use of the monies collected. In view of the twin points of the function of monetary substitute remediation as an instrument of cost attribution to the originator on the one hand and budgetary restrictions on the other, there is no obvious reason why the determination of grounds for the payment obligation should be left to the judgement of the responsible authorities (as is laid down, for example, in Bavarian nature conservation law). The monetary substitute remediation should, as is already frequently the case in practice, be calculated on the basis of the costs for hypothetical compensation measures. In addition to this the calculation can also take into account the value and advantage that the project developer will derive from the intervention in question. The calculation methodology needs to be prescribed in a uniform way nationwide, not least in the interest of creating comparable investment conditions. Flat rates

should in any case be applied when there is insufficient possibility of calculation in individual cases (as is the case in the Monetary Substitute Remediation Ordinance of Saxony-Anhalt).

In view of the use of the revenue, a duty to invest the monetary substitute remediation in nature conservation measures to be implemented in the natural context affected by the intervention should be laid down as standard in accordance with the aim of establishing a nationwide approach to nature conservation. State law as currently formulated only contains very limited spatial restrictions on the use of the revenue (BERCHTER 2007, p. 117 f; KOCH 2007, Section 2007 No. 67). In order to avoid creating any incentives to make further cuts in the budget for nature conservation, the monies are only to be used to finance measures for which there is no existing legal provision. The strictly subsidiary function of the monetary substitute remediation, which comes into play only if it is actually or legally impossible to implement compensation or substitute remediation, is to be maintained.

Technical evaluation procedures in nature conservation

438. If the provisions governing intervention in nature and landscape are to be implemented appropriately there is a need for a technical evaluation procedure which is capable of evaluating the current state of nature and natural landscapes, the intensity of the effect of the planned intervention, and its scope and quality with an eye to any future compensation measures. Such evaluations are of decisive importance for the whole system of legal consequences – over and above the investigation into the statutory admissibility of an intervention – from the question of avoidability of the intervention to the possible outcome of the decision-making process and the level of compensation in the form of a monetary substitute remediation levy. The Federal Administrative Court requires “trackable and quantifiable evaluations” of instances of intervention and compensation for reasons of transparency and comparability of official decision-making (FAC ruling of 9 June 2004, Ref. 9 A 11.03, FAC 121, 72 (83)). A large number of guidelines already exist in the *Länder* to meet the requirements of this ruling (BENZ et al. 2007; KOCH 2007, Annex 4 with a list of the guidelines). They are however based on a wide variety of methodological approaches (BRUNS 2007; BERCHTER 2007, p. 142; BÖHME et al. 2005, p. 187 ff.). In spite of scientific recommendations made at a very early stage (KIEMSTEDT et al. 1996), it has not yet been possible to standardise these different evaluation procedures. The revision of the Federal Nature Conservation Act should henceforth aim at creating uniform parameters for a qualified collection of data on the environmental state of affairs and an evaluation of the subjects of protection affected, as well as possible compensation measures. This should take the form of technical instructions on interventions and should be carried out on the basis of existing recommendations. Future evaluation procedures should also include consideration of the climate relevance of interventions in the sense of the greenhouse gas emissions that occur in the course of the intervention. Appropriate compensation measures should be prepared.

Official monitoring instruments

439. In respect of the overall implementation of the provisions governing intervention in nature and landscape it has to be stated that the responsible authorities do not have an adequate array of monitoring instruments at their disposal. The nature conservation laws at Federal and *Länder* level hardly contain any regulations concerning this point. At the same time, despite certain improvements, empirical analyses bear witness to significant implementation deficits, above all in the field of compensation and substitute remediation (rate of implementation according to investigations carried out by DIERßEN and RECK 1998: 48 %; BAURIEGEL et al. 2000: 60 %; JESSEL et al. 2003: 61 %; TISCHEW et al. 2004: 62 to 90 %; RAADTS 2006: 67 %). These deficits are principally to be found in town planning procedures; rather less in transport planning. It is entirely possible that they are inherent in the way the provisions governing intervention in nature and landscape are being implemented: In a kind of “piggyback procedure”, checking it is the responsibility of the authorities that are competent under the relevant law governing project licensing (cf. Article 20 Section 2 Federal Nature Conservation Act). It is they and not the nature conservation authorities that have jurisdiction over both the determination and the monitoring of compliance with the requirements of nature conservation law (THUM 2005, p. 29 ff.). However, many specialist authorities lack staff that is trained in nature conservation, above all in the field of town planning. This has a significant impact on their ability to fulfil this responsibility. In particular, the monitoring of longer-term compensation measures is frequently lost sight of by approval and licensing authorities (STEFFEN 2007, p. 42). As it is unlikely that an independent nature conservation licensing procedure will be established in the near future, the significance of the provisions governing intervention in nature and landscape for the work of licensing authorities should be underlined by the following provisions in the Federal Nature Conservation Act:

- The duty of the project developer to provide documentary evidence of the environmental inventory, information about the type, location, scope and duration of the intended intervention as well as measures to avoid, compensate for, or offset the intervention.
 - The determination of certain bottom-line criteria for licensing authorities in order to define the areas of responsibility of the project developer in a legally binding and controllable way.
 - The requirement for project developers to provide evidence certified by an independent expert of the successful execution of compensation measures.
 - The explicit authority to issue retrospective orders on the implementation of nature conservation law and, as a last resort, to revoke the license.
 - The explicit approval of collateral securities to cover the costs of implementation measures carried out by authorities in the course of execution of replacement measures.
- In many cases the relevant sectoral law limits directives on collateral security to such an

extent that they cannot be used to meet legal nature conservation obligations (for more see: PROELß 2006).

440. It can be seen as a positive development that many *Länder* have drawn up cadastral maps, which make it possible in practice to prevent the multiple classification of compensation measures that has in some cases been ascertained (BÖHME 2005, p. 44 f.). The obligation to draw up cadastres that comprehensively cover their area of application with minimum requirements to be more precisely defined should be enacted in federal law. The cadastres should be administered by the nature conservation authorities.

5.7.4.2 Landscape planning

Responsibilities of landscape planning and rights of deviation

441. The principles of nationwide minimum protection, integration and precaution must be concretised in landscape planning for implementation, over and above individual projects and for the entire area of the country. Most of the quality targets of nature conservation cannot be defined at federal or European level for implementation in particular areas and cases. This is, for example, the case in emission tolerances. The goals of nature conservation are generally specific to situations and need to be given concrete form that takes account of the local or spatial values and sensitivities of the subjects of protection, as well as their relations to one another in time and space. This applies not least to the implementation of the biotope network, including the Natura 2000 network, which is unthinkable without spatially concrete target setting. Also in view of the challenges of climate change, there is a need to develop environmentally oriented strategic goals and measures which can make a nature conservation contribution to planning decisions on land use conflicts and necessary adaptation measures in particular (in England there has been a planning application procedure in relation to this at the local authority level for some years [WILSON 2006]). In the “tool box” of current nature conservation law, concretisation of this particular target is within the remit of landscape planning (SRU 1998, Item 1025; 2002c, Item 706; 2002a, Item 268). It is thus to be seen as a further development of the “general principles” listed at the start of this section and should in this respect be standardised as a largely non-negotiable core item of the new Federal Nature Conservation Act.

Implementation deficits in landscape planning
and demands on the revised Act

442. The use and implementation of landscape planning is currently made more difficult by obstacles which need to be cleared out of the way in the revision of the Federal Nature Conservation Act and by improving the conditions for implementation. Thus, with some exceptions, there is as yet no interface in the *Länder* between landscape planning and

landscape oriented funding instruments, specifically the agri-environmental programmes. The obsolescence of many plans and the lack of coordination of terms between the Federal Nature Conservation Act and other areas of environmental law, especially in respect of the Environmental Impact Assessment Act (EIA Act), are hindering the application of landscape planning elements in the Strategic Environmental Assessment (SEA) and the environmental impact assessment. The potential for integration of these elements in other use-oriented or environmentally-oriented technical planning procedures, for example in water management plans, is not being adequately exploited. One principal cause of this is the heterogeneous and non-standardised presentation of individual landscape plans.

It must be the aim of the revised Federal Nature Conservation Act to shape landscape planning in such a way as to guarantee use of the instruments of nature conservation and landscape maintenance that is as efficient as possible and also in harmony with its multifunctional array of objectives. In addition, nature conservation law should render possible an interplay that is as smooth as possible between landscape planning and other instruments of environmental protection that are not specifically nature conservation-related, as well as spatial or technical planning. This urgently requires a nationwide landscape planning procedure at all planning levels.

Elements and presentation of landscape planning

443. In view of the significance of landscape planning the SRU considers it necessary to extend the content of the plans to the parameters laid down in the existing Federal Nature Conservation Act in the following subject matters:

- Statements relating to climate protection: As land use in Germany contributes to the emission of greenhouse gases, landscape planning should register the scope and intensity of land-use forms that are relevant to the climate and take them into account in a concept for integrated minimisation and adaptation measures.
- Spatial concretisation of good agricultural practice in agriculture, forestry and fisheries.
- Statements on the land-specific and location-specific use of subsidies, especially for agri-environmental measures: Bringing resource allocation into landscape planning allows for an optimised relationship between subsidisation and nature conservation policy (SRU 2002a, Item 266 with further references). Efficient deployment of subsidies in areas where there is a particularly pressing need to act is becoming increasingly important in the light of mounting challenges in the fields of nature conservation and landscape maintenance on the one hand (Chapters 5.2 and 5.3) and the limited resources of public budgets on the other (SRU 2007b, Item 90 ff.).
- Highlighting the spatial limitations of certain forms of biomass use and other forms of renewable energy.

- Demarcation of areas from which genetically modified organisms (GMO) are to be excluded (buffer zones in areas of special significance which are threatened by incursions of GMOs, Section 12.1.3, Item 1087).

A more strongly use-oriented approach to landscape planning can be supported by making it obligatory to name instruments of implementation in landscape plans (e.g. for the land pools in the context of the provisions governing intervention in nature and landscape: BÖHME et al. 2005, p. 209). The plans are to be formatted in such a way as to ensure easy application of their stipulations to other instruments of environmental protection. "Translation maps" are a suitable means of selecting the contents of landscape planning and transferring them into the decisive "language" of the instrument which is to be used. Such formats are already being made available in many cases for spatial and urban planning. The digital form of current plans makes it significantly easier to create presentations for specific addressees (for details of the possibilities of interactive landscape planning: OPPERMANN et al. 2007). On the level of standardisation, the obligation in Article 14 Section 2 sentence 3 Federal Nature Conservation Act, which requires the usability of the presentation format of landscape plans to be taken into consideration in spatial and urban planning, should be extended to further programme-related and project-related instruments of environmental protection such as the SEA or the programme of measures envisaged by the WFD. Nationwide guidelines could serve the purpose of further concretising the demands made of presentation formats. In order to guarantee the applicability of landscape planning beyond local community, regional and state borders (e.g. for the development of the biotope network, or for use in environmental impact assessments or in plans drawn up in line with the WFD), there is a need for a non-legislative catalogue of services, which prescribes nationwide minimum required contents and planning drawings capable of digital processing for inventory and evaluation purposes.

444. Particularly at local and regional levels, a qualified and periodically adjusted landscape planning procedure can also make significant contributions to environmental information and monitoring. What is necessary for efficient use of the data that transcends the narrow framework of local interests is nationwide uniformity of contents and presentation forms of landscape planning (von HAAREN 2007).

Species protection in landscape planning

445. There is a need for further research into whether and how landscape planning can make the most effective contribution possible to the implementation of the requirements laid down in the laws on species protection. The present standard of compilation of information on animal and plant species in landscape plans is generally not sufficient to fulfil the requirements in European law on species protection (MÜLLER-PFANNENSTIEL and WULFERT 2007, p. 39). This is due to its limited degree of detail and to the fact that the

records cannot always be assumed to be kept up to date. Under the current Federal Nature Conservation Act, prohibitions in Article 5 of the Birds Directive and Article 12 Section 1 of the Habitats Directive are to be broadly construed in the sense of conservation related to individuals and can only be overruled in the exception rulings provided for in European law (Federal Administrative Court ruling of 16 March 2006, Ref. 4A 1001.04, NVwZ 2006, 1055 ff., No. 570 – for more on disputes concerning the relation to individuals laid down in the prohibition provisions see: GELLERMANN 2007; WOLF 2006). Whether individuals from a protected population are to be found in a particular area cannot currently be reliably determined by examining landscape plans. Whereas these plans do admittedly frequently contain targeted species-related special investigations (for indications on landscape planning see amongst others BRINKMANN 1999), these are seen as special services (in line with the Fee Structure for Architects and Engineers, HOAI) and are not included in the standard documentation programme. Nonetheless, all information currently available on protected and endangered species should be contained in landscape planning. Its statements on habitats permit qualified estimates to be made of the possible spectrum of species to be found at the location and – depending on the scope of the population survey – in part, of the state of conservation of the local populations. Landscape planning thus facilitates at least a targeted orientation of the investigation programme of tests of environmental consequences, even in the least promising of cases. It would seem advisable to create a stronger connection between landscape planning and in situ modelling of species population that builds on the existing indicative character of landscape planning.

446. As far as the implementation of European and national species protection law is concerned, it is essential to secure positive conservation of protected species and their populations (Articles 2 and 3 of the Birds Directive, Article 2 Section 2 and 2 Section 16 of the Habitats Directive, or national implementation especially by means of Article 42 Federal Nature Conservation Act). In this context the preventive species protection function of landscape planning could become highly significant. Landscape planning particularly opens up possible avenues of coordination of biotope network and species conservation measures. It could also provide further impetus for measures on population stabilisation and increase as well as function conservation. In the run-up to planning or projects there is an opportunity to favour compensation measures, to present options for the resettlement of affected populations and to tie in special species protection with compensation measures for other subjects of protection. This would need a nationwide system of basic information.

Principle of nationwide coverage

447. “Blank spaces” in population surveys and target setting in landscape planning reduce the effectiveness of the various plans, not only in respect of the area that is not included in landscape planning. They also raise the spectre of erroneous weighting in respect of the plan as a whole. For example, without a nationwide basis of information it is not possible to

evaluate programmes, plans and projects according to the criteria of the SEA, ecological audits or the provisions governing intervention in nature and landscape in the overall context of nature and landscapes. There is no way of guaranteeing an appropriate aggregate evaluation that takes into consideration simultaneous and previous negative impacts. For example, it is hardly possible to evaluate the significance of a biotope accurately without knowing how many other biotopes of the same kind exist and where they are. It would seem conceivable to permit a reduction in the intensity of development or further development of plans in a narrowly defined planning context, depending on the type and scope of the affected natural commodities and their degree of endangerment. For example, it might be possible to dispense with further planning in the case of a protected area that has already been the subject of intensive planning. Such a procedure must however be subject to authorisation by the higher nature conservation authorities if misuse of the concept resulting in a departure from the necessary planning depth is to be prevented.

Planning levels

448. The planning system as currently constituted rightly allows for a contribution from the side of nature conservation to be made at any level of spatial planning – state planning, regional planning, and urban planning. This must also be upheld in the future. Local authorities are also under a particular obligation to pursue the aim of sustainable urban development that guarantees conservation of the service provision and functionality of the ecosystem (Article 1 Section 5, Article 1 Section 6 No. 7a, Article 1a Section 3 Federal Building Code). Local authorities are dependent on contributions from landscape planning in order to guarantee an appropriate deliberative process of urban planning.

In any move to dispense with planning stages in the landscape planning context it is essential to ensure that functions related to detail and concretisation can be carried out at a higher level or that lower-level objectives can be appropriately formulated (SRU 2007b, Item 235). For example, dispensing with a local landscape plan would burden the framework landscape plan with a very high workload in the sense of having to provide information in the context of municipal physical development planning. There would also be much less readiness to accept the supportive involvement of local population and land users.

449. It would be possible to reduce the burden of presentation at the various planning levels by ensuring clearer classification and more consistent hierarchical differentiation of planning contents in the context of the multi-tiered system of landscape planning. The manageability and transparency of planning systems would be increased if landscape planning statements could be oriented less around benchmark concepts and much more towards the facts actually presented (be it on local, regional or supra-regional level) and the decision-making competencies at the planning level in question. For example, a nationwide biotope network or the designation of biosphere reserves should be planned at a supra-

regional level, whereas the development of hedgerows and field groves for the purpose of erosion protection can be safely left to decision makers at the local planning level. Such a multi-tiered system of allocation of responsibility should not, however, permit adverse effects on the functions of landscape planning. It must also be borne in mind that the allocation of decision-making competencies to particular levels is subject to change, especially in view of the intensive modernisation of administrative functions taking place in the *Länder* (SRU 2007b, Item 171 f.). A sufficiently long-term planning system would require such reallocations of competence or planning contents to be kept within bounds.

Federal landscape programme

450. Challenges such as the expected displacement of species populations as a result of climate change, the establishment and appropriate management of the Natura 2000 network, the designation of nationwide protected areas of special significance, the supra-regional interlinking of biotopes – for example, along river courses and in large areas of woodland – or the distribution of subsidies can only be planned and managed really effectively at the supra-regional level. It would thus seem urgently necessary to introduce nationwide landscape planning. A federal landscape planning programme could also incorporate the aims of biodiversity strategy (Item 396 ff.) and tie them in with suitable instruments.

Public participation and updating

451. From a procedural point of view the future Federal Nature Conservation Act should contain legal requirements:

- in respect of public participation in the creation of plans and the publication of their contents,
- in respect of the conduct of development monitoring in the planning field in question and
- in respect of the regular updating of landscape plans.

The duties of public participation and monitoring already exist as a result of the Strategic Environmental Assessment obligation incumbent on landscape planning, which has been enacted in German law through the implementation of the SEA Directive. Such an obligation, however, appears not to possess definitive legally binding force (LOUIS 2006a, p. 285) and could in future be subject to renegotiation. The corollary effects of use of the instrument, which from a nature conservation perspective are to be viewed in a positive light, should therefore be secured in accordance with the objectives of the Aarhus Convention independently of the SEA obligation. Publishing landscape plans in the Internet would tally particularly with the information-focused requirements in the Aarhus Convention and with the Environmental Information Directive.

Regardless of the various procedural requirements laid down by the *Länder* on integrating the landscape planning content in overall planning, it would also be advantageous to safeguard the environmental information function of landscape planning in those *Länder* whose legislation provides for the primary integration or independent binding force of landscape planning. This could be done by providing for a non-binding specialist contribution to be made public before the actual planning is carried out, irrespective of the integration model used.

452. If landscape planning is to be capable of wider implementation, it must be regularly brought up to date. This can be done in several stages by ensuring that

- changes of use are continuously recorded in computerised plans,
- planning is periodically assessed and its objectives reviewed in line with changes in overall spatial planning or the requirements of environmental monitoring, as well as
- specific updates are undertaken in respect of sub-areas where significant changes occur or are planned.

Landscape planning in the light of integrated environmental protection

453. Whereas the integrative approach in the context of project licensing is enjoying increased attention as a result of the work on the Environmental Code, no perceptible efforts are being made at the planning level to harmonise and consolidate relevant instruments. On the contrary, the decline in the relative importance of landscape planning is resulting in marginalisation of the planning instrument that currently corresponds most closely to cross-media environmental planning. In view of the importance of integrated environmental protection this hardly seems appropriate. If the aim, at least in the medium term, is to maintain a media-specific planning approach, it will be necessary to counteract coordination deficits by improving and strengthening the interfaces, not by making cuts in landscape planning. It is hard to comprehend why, in view of the fact that the position of landscape planning has been strengthened by the ratification of the European Landscape Convention by 29 European states (as of January 2008), it is being undermined in, of all places, Germany, the pioneer of landscape planning. Of the 27 EU member states only Germany, Austria and Estonia have not signed the convention. Article 5b and Article 6 Sections C to E of the convention require measures for recording and evaluating the characteristics of landscapes and changes to them, formulating quality targets and creating instruments for the implementation of landscape-related policies. It is doubtful whether German landscape planning is in a position to fulfil these aims by itself. In view of the good initial situation in Germany, ratification of the convention would not entail any additional reporting obligations or related extra costs. The involvement of the public that is stipulated by the convention means that significant impetus for a democratic nature conservation policy based on public participation can be expected.

5.7.4.3 Good agricultural practice

454. Good agricultural practice can be seen as an elaboration of the basic principle of nationwide minimum protection in those areas used for agricultural, forestry or fisheries purposes. At the same time the codified criteria for good practice are not commensurate with the current demands of nature and climate protection. They need to be further developed into a coordinated catalogue of environmental standards. This demands the adoption of

- a ban on ploughing of grassland to reduce substance inputs into bodies of water and greenhouse gas emissions; such a ban is also justified in view of the multiple functions of grassland for biodiversity (Items 973 f., 999),
- an obligation to preserve at least a triple-crop rotation to reduce the biodiversity-related effects of increased biomass production (SRU 2007a, Item 67),
- a ban on the elimination of important, above all older, structural and marginal elements.

In cases where woodlands are used for forestry the turnover times and choice of tree types should be geared to the functions of the woodlands as a store of and temporary sink for greenhouse gas emissions. Silvicultural measures are to use techniques that cause no damage to soils and species populations.

455. In addition, the rules of good agricultural practice are to be reinforced by requirements in respect of their official enforcement (SRU 2002a, Item 354 ff.). A closer look at the nature conservation laws at federal and *Länder* level reveals that, almost without exception, there are no standards imposing pressure to observe good agricultural practice.

5.7.4.4 Protected areas

456. Appropriate protection of non-fragmented land areas (Items 342, 352, 479) requires a quantitatively and qualitatively adequate, secured and, above all, interlinked system of protected areas (Chapter 5.6). To this end the protected area legislation contained within the Federal Nature Conservation Act should be further developed.

As far as the types of protected area are concerned this demands that the profiles be more exactly specified as regards content of the existing categories. In addition, a nationwide nature conservation concept concerning species and habitats worthy of protection should be devised (SRU 2002a, Item 310 ff).

In respect of protected area declarations it is necessary to define more precisely the catalogue of minimum contents and above all to ensure conformity of the requirements of Article 33 Section 3 Federal Nature Conservation Act for Natura 2000 protected areas with the general requirements of Article 22 Section 2 Federal Nature Conservation Act (on the practice of protected area designation, see Item 410f.). In contrast to this latter regulation

applying to protected areas in general, it is unclear in the case of the former whether the declaration of a protected area must itself include both imperatives and prohibitions.

Particularly in the case of Natura 2000 areas there is, in view of the instrument of protection to be used, a need to impose a requirement for basic regulatory protection of the areas. The existing law in Article 33 Section 3 Federal Nature Conservation Act assumes that, where equivalent protection is provided by means of contractual agreement, it is possible to dispense with a protective order based on regulatory instruments. In view of the non-binding nature of the contracts on third parties it appears to be doubtful in law whether contracts can in fact guarantee such equivalent protection in the first place (APFELBACHER et al. 1999, p. 67; SCHUMACHER and FISCHER-HÜFTLE 2003, Article 33 margin number 36; for the introduction of a regulation on the general declaration of the binding force of contracts: BMU 1998). For the admissibility in principle of contractual agreements, especially in relation to the protection of Habitats Directive areas, it would be possible to cite Article 1 No. 1 of the Habitats Directive, according to which special protection areas in line with the Habitats Directive regime could also be based upon a contractual agreement. In the context of the transitional provision of Article 7 of the Habitats Directive, the European Court of Justice has ruled that the demarcation of the special protection areas must also be pointed out to third parties (ECJ ruling of 27 February 2003, Ref. C-415/01, Slg. 2003, I-02081, marginal number 16 ff). Concerning the protection aim of the Birds Directive it must demonstrate “unquestionable binding force”. This judgement should place significant restrictions on the areas of applicability of contractual agreements (on current *Länder* practice see also LANA 2005). A basic level of protection based on regulatory instruments also appears to be essential in respect of the frequently limited duration of contractual agreements and their complete dependence on financial consideration (APFELBACHER et al. 1999, loc. cit.).

In order to secure the long-term success of the protection measure the Federal Nature Conservation Act must include an explicit requirement for regular evaluation of the state of the protected area. To reinforce this there is a further need for provisional securing of areas until their final designation.

5.7.4.5 Environmental monitoring and surveillance

457. A coordinated nation-wide environmental monitoring procedure is indispensable for appropriate decisions based on an adequate degree of knowledge. Despite the existence of relevant supra-regional and international obligations (Birds Directive, Habitats Directive, WFD, Directive 2001/18/EC, Convention on Biological Diversity) there is no uniform coordinated nationwide monitoring procedure in Germany that provides information about the condition of nature and landscapes and any changes occurring in them. In the context of the revision of the Federal Nature Conservation Act and in view of Germany’s obligations under European and international law, it is essential to define nationwide minimum requirements for

environmental monitoring. These must be more comprehensive than the general regulation contained in Article 12 Federal Nature Conservation Act. Minimum demands must be formulated for appropriate data collection in the fields of nature conservation and landscape management in particular (for more see: SRU 2002a, Item 364 ff.). A glance at nature conservation laws in the *Länder* will show that *Länder* regulations have thus far come hardly any closer to fulfilling the requirements of federal law. In the vast majority of cases the relevant regulations are reduced to the definition of the purpose of monitoring and / or the apportioning of areas of responsibility. In some cases the monitoring is merely subsumed under the general aims of nature conservation, and non-specific demands are made on it to support and promote the latter Article 1 Section 3 of the Hessian Nature Conservation Act). The nature conservation laws at *Länder* level contain no statements on data collection criteria or methods.

5.7.5 Summary and recommendations

458. The creation of an Environmental Code has also placed the revision of the Federal Nature Conservation Act on the agenda. Notwithstanding significant challenges in respect of judicial competences, efforts to do justice to the leading function of federal law by enacting fully implementable and complete bodies of legislation must not be allowed to fail. These must give suitable answers to the urgent questions of biodiversity loss and climate change. The technically necessary legislative process must not be allowed to come to a counterproductive standstill as a result of the long-drawn-out process of creating an Environmental Code. In respect of the central instruments of nature conservation law the following further developments are necessary:

With reference to the provisions governing intervention in nature and landscape:

- An extension of the intervention concept (explicit recognition of water as a subject of protection) and regulations on its precise definition using positive and negative lists (Item 431) as well as taking account of greenhouse gas emissions due to changes in land use in the execution of the provisions governing intervention in nature and landscape.
- On the legal consequences side – while maintaining the priority of real compensation – the formulation of technical evaluation criteria for appropriate differentiation between compensation and substitute remediation; in addition there is a need to ensure the upgradability of compensation land both within and outside the pool solutions, coherence between compensation and other instruments of nature conservation, and permanent safeguarding of the compensation measures. Compensation funds must not be allowed to be used for nature conservation tasks where the state bears the legal responsibility for financing and execution (Item 433 ff.).

- Nationwide uniform criteria for the calculation of the subsidiary monetary substitute remediation and an obligation to use the funds in the natural context in which the intervention takes place (Item 437).
- A uniform nationwide nature conservation procedure for evaluating interventions and compensation measures (Item 438).
- The strengthening of the array of controlling instruments available to authorities to implement the provisions governing intervention in nature and landscape (Item 439 f.).

With reference to landscape planning:

- An extension of the content of landscape planning by the addition of climate-relevant statements on land use and integrated emissions reduction and adaptation measures, on the spatially-oriented concretisation of good agricultural practice, on the use of subsidies specific to particular areas of land and particular locations, on the spatial restriction of biomass production, and on the exclusion of GMOs (Item 443).
- Whilst maintaining nationwide landscape planning (Item 447) and, in principle, the current structure of planning stages (Item 448 f.), the introduction of a federal landscape programme (Item 450) with a consistent hierarchical differentiation of planning content (Item 449).
- An obligation to regularly update landscape plans with public participation. Such plans should be made available to interested members of the public in digital form (Item 451 f.).

With reference to good agricultural practice:

- The adoption of a general ban on the ploughing of ancient grasslands, an obligation to maintain a system of triple crop rotation, the orientation of silvicultural measures to climate-relevant considerations having regard to techniques that protect soil and species populations; the rules of good agricultural practice are to be underpinned by means of an array of official controlling instruments (Item 454 f.).

With reference to area protection:

- A precise definition of the profiles of protection area categories and a more exact definition of the minimum content required for protected area declarations, as well as a requirement to protect Natura 2000 areas using regulatory instruments (Item 456).

With reference to monitoring:

- Uniform nationwide minimum content requirements for environmental monitoring (Item 457).

The regulatory density of nature conservation law must be stepped up to strengthen its enforcement position, and to free the nature conservation authorities, which are suffering

acutely from capacity deficits, from the burden of argumentation. This will make a contribution to improving the effectiveness of nature conservation legislation.

5.9 Summary and recommendations

5.9.1 Summary

477. Developments in nature conservation since 2004 can be characterised on the one hand by individual successes; on the other, and more significantly, by inadequate progress or even reverses. Improvements were effected, for example, by completing the process of registration of protected areas for the European network Natura 2000, by more comprehensively securing the national areas of natural heritage, and by means of individual developments in sectoral policy such as air quality and water conservation. In respect of the strategic integrated and multifunctional approach to nature conservation, however, and in the case of targets such as reducing nutrient input into sensitive ecosystems, conserving multifunctional biotope types such as grassland, reducing land take and – consequently – conserving biodiversity, the situation is unfavourable.

In addition, the task of preserving and restoring the multiplicity of services and functions of nature and landscapes is being further complicated by the challenges presented by the onset of unpredictable climate change. It is for this reason that increasing demands are being made of the strategic orientation, forecasting abilities and capacity for action of nature conservation. In view of the known difficulties in the implementation and enforcement of nature conservation objectives, combined with its dwindling human and financial resources, it must be said that nature conservation in its current state is not equal to either present or future challenges. There is reason to fear serious reductions in the performance and function of ecosystems and, above all, continuing and – in all probability – increasing loss of biodiversity, with associated consequences for society (e.g. higher consequential costs).

With its sustainability strategy and, more recently, the biodiversity strategy, the Federal Government has responded to the need for an orientation which will be able to meet future challenges. The implementation of these strategic objectives, however, is being put in jeopardy by the primary structural causes of the problems. These have their origin in the lack of funding of nature conservation, the fragmentation of legislative authority in the federal system, the relative inaccessibility of local authorities and land users who in many cases have a crucial role to play in implementation, insufficient public opportunities for participation and for making complaints about interventions, and a fragmented and inadequate system of environmental monitoring and information for the public.

The new Environmental Code is intended to create the conditions for closing the gap between objectives and their implementation that exists in nature conservation. For this reason it is necessary for the aims, basic principles and instruments of nature conservation

to be defined in concrete terms both in the Environmental Code and in non-statutory regulations. The aims of climate protection should be integrated into the Environmental Code – above all through taking account of greenhouse gas emissions as a consequence of land use change – but also through the further development of good agricultural and technical practice (e.g. a ban on the ploughing of permanent grassland), as well as the strengthening of the biotope network as a multifunctional adaptation measure. Overall the standing of nature conservation law as the only cross-sectional law that specifically refers to the natural world and associated human well-being in a way that connects all environmental media should be enhanced. It is only in this way that meaningful synergies can be used and target priorities set, and multifunctional measures and landscapes can be developed with the limited resources available.

If the ability of nature conservation to continue to shape events in the future is to be maintained, then it is essential to improve its financial basis. Alongside the “classic” direct support of nature conservation projects, care must also be taken to ensure that efforts made by land users to provide ecological services or, alternatively, their readiness to accept limitations on use are honoured in an appropriate competitive framework. As a parallel development the existing fiscal preconditions for tapping further financial resources from private initiatives should be improved and at the same time made available for use to voluntary nature conservation bodies.

In accordance with the demands of the Aarhus Convention, efforts should be made to provide comprehensive access to relevant environmental information, especially in the field of nature conservation, combined with better opportunities for public participation and complaint (SRU 2007b, Items 283 ff., 323). To this end, and most importantly of all, the currently inadequate and fragmented system of environmental monitoring in Germany needs to be improved if changes in natural assets and functions are to be recognised in good time. This should be accompanied by closer integration of environmental and nature-conservation relevant issues in the educational sector as a whole – including adult education and teacher training – in order to cement the significance of the issues involved in society as a whole.

5.9.2 Recommendations in detail

478. The following measures are suitable for improving the situation in nature conservation. They refer particularly to the problem areas of

- climate change and the associated changes in species composition, water balance and economic forms,
- biodiversity loss,
- current and expected substance inputs into ecosystems, above all as a consequence of agriculture and

- land take and increases in traffic density, or the fragmentation and reduction in size of plant and animal habitats.

479. The SRU proposes the following as measures for the conservation and enhancement of the functions and performance of ecosystems:

- Ensuring synergies between nature and climate protection, among other things by embedding the instruments in the revision of the Environmental Code,
- Reducing nitrogen surpluses in agriculture by introducing a fertiliser tax to penalise excessive use of nitrates, or, as a second-best solution, a nitrogen tax or charge,
- Combating land take by introducing tradable planning permits for land-use control and an ecological financial compensation scheme,
- Countering landscape fragmentation by expanding the share of non-fragmented, low traffic density areas to cover 25 % of German territory and by providing migration corridors between the most significant biotope network axes (e.g. green bridges and crossing points),
- Preserving species diversity by implementing the national biodiversity strategy at federal, *Länder* and local authority levels and integrating biodiversity protection into all sectors of policy (biodiversity mainstreaming). An implementation concept for the strategy at federal and *Länder* level would be created, monitoring concepts developed and programmes implemented, and a system of indicators created which would be compatible with international systems,
- Further developing, consistently implementing and more closely monitoring good agricultural practice in land usage,
- Promoting or completing the sovereign protection of all particularly valuable areas as seen from a European or national perspective, above all the Natura 2000 sites, taking account of both the interlinking of the protected areas as a whole and the minimum size of the individual protected areas that is acceptable according to nature conservation criteria,
- Safeguarding on the one hand the conservation and redevelopment of grassland, using directives from good agricultural practice, and on the other the designation of protected areas or, alternatively, the adaptation of protected area ordinances,
- Consistently and swiftly implementing management plans for the Natura 2000 sites as well as a trans-regional monitoring system,
- Introducing an ecological financial compensation scheme based on the fact that some *Länder* have a larger proportion of their land area within the biotope network than others,
- Establishing a stewardship system for the Natura 2000 sites to improve their acceptance rates and to provide consultation services to land users,

- Pushing for the creation of an independent fund at EU level which would assume 100 % of the costs of financing the Natura 2000 network,
- Integrating the interests of the biotope network in the guidelines governing ‘intervention in nature and landscape’ and
- Creating a uniform nationwide monitoring system for nature and landscapes, which can provide the basic data for an appropriate and up-to-date description of their state, as well as facilitating the reporting of condition indicators for biological diversity at national and international levels. The effects of climate change on biodiversity should thereby be appropriately integrated into the monitoring programmes.

480. The proposed measures require effective enshrinement of nature conservation in the new Environmental Code. The SRU is arguing for determined efforts to enforce the unbundling of nature conservation law, which should however be done without trying to avoid from the outset any concretisations and further developments in the law that might lead to conflict. In detail the following should be done:

- The the provisions governing ‘intervention in nature and landscape’ should be extended to include the protection categories of water bodies and groundwater. Furthermore, greenhouse gas emissions as a result of changes in land use are to be taken into account in the provision to the extent to which other instruments cannot be used to mitigate them. The priority of real compensation, against the background of the distinction between compensation and replacement, is to be upheld. In the planning of compensation land pools, coherence with other instruments of nature conservation is to be safeguarded, as is the permanent securing of the land in question. Uniform nationwide criteria are to be formulated for the implementation of the provisions governing ‘intervention in nature and landscape’ and the calculation of the subsidiary replacement payment.
- A blanket ban on the ploughing of permanent grassland, the maintenance of at least triple crop rotation, and a ban on the elimination of old structural and marginal elements should be included in good agricultural practice.
- The multi-tiered nature of landscape planning, especially at local level, should be preserved, with the assistance of clear quality targets (biotope network, landscape elements, environmentally sensitive areas). Planning contents are to be extended by the addition of climate change fields (emission reduction and adaptation measures), the concretisation of good agricultural practice, the use of subsidies specific to particular locations, the spatial restriction of biomass production and the exclusion of GMOs.
- In respect of area protection, the profiles of the protected area categories are to be precisely defined along with the minimum contents of protected area declarations.

In addition the Federal Government should ratify the European Landscape Convention, which brings no disadvantages and significant advantages for the establishment of landscape planning in Germany and Europe.

481. The financial basis of nature conservation can be improved above all by diverting subsidies for agriculture into agri-environmental measures. Furthermore, state expenditure should be supported by the expansion of alternative financing models (foundations, investment funds and trusts) under appropriately constituted fiscal framework conditions, above all in order to safeguard the national natural heritage.

Voluntary work is an indispensable part of nature conservation. Here too it is a question of improving the financial basis, but it is also important to safeguard public involvement in voluntary work by strengthening civil rights and wasting no time in implementing the Aarhus Convention. This can be promoted by improving the integration of the aims of nature conservation and the national strategies on sustainability and biodiversity into the education sector. This affects all fields of education; the focus should, however, lie on teacher training and school education.

6 Soil Protection

Messages

Soils are the indispensable precondition for a wide variety of eco-system functions and economic uses. The complexity of processes, the long-term nature of changes, the competition among the various functions, as well as the difficulty in defining both general and comprehensive quality objectives for soil, present obstacles to the development of a transparent soil-related body of regulations. Owing to its multi-functional nature, soil is the subject of various departmental policies and administrations and is addressed not only in the German Federal Soil Protection Act (*Bundes-Bodenschutzgesetz*), but also directly or indirectly in other laws. Such fragmentation of the body of laws has often resulted in inadequate soil protection in the course of policy planning and administrative procedures. To address this deficit by establishing a specialised administration for soil protection and additional specific soil protection instruments would currently be neither realistic nor reasonable. A sectoral approach would run counter to an approach of integrative environmental protection, acting across all environmental media and creating synergies among the environmental functions.

The strategic direction set out by soil protection concepts should therefore aim to

- Raise awareness on the part of users and the general public of the multifunctionality of soils.
- Expand the function and location-specific ceilings and guiding values for soil loads as well as the verifiable quality objectives, and integrate these into existing legal provisions German Federal Soil Protection Act (*Bundesbodenschutzgesetz* – BBodSchG, Federal Water Act (*Wasserhaushaltsgesetz* – WHG), Federal Nature Conservation Act (*Bundesnaturschutzgesetz* – BNatSchG).
- Take greater account of soil protection when identifying values for emissions and immissions (Federal Immission Control Act – BImSchG), and extend existing concepts for the identification of limits (such as the "critical load", which takes account of the relations between nutrient content and pollutant content) to include additional parameters.
- Compare soil protection regulations with the targets set for other environmental media, and thus build a consistent system of regulations.
- Standardise implementation and execution of regulations relevant to soil protection, and check these for effectiveness.

The main soil problems in Germany are land sealing and extensive inputs of pollutants and nutrients as a result of agricultural use. Measures to contain these stresses are:

- A legally binding definition of subgoals to reduce land use, plus rigorous implementation at the municipal planning level, as well as the introduction of tradable allowances for designation of land areas.
- An amendment to the Fertilizer Utilization Regulation (*Düngemittelverordnung* – DüMV); harmonisation of the ambitious limit values for heavy metals and organic pollutants in all fertiliser products in addition to introduction of a levy on surplus nitrogen, a clearer definition and monitoring of compliance with good agricultural practice, further development of agri-environmental measures (see chapter on Agriculture), and an increase of the share of organic farming in agriculture as a whole.

Soil protection is embodied in a number of laws, including the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance (*BBodSchV*), but also in laws governing physical planning, nature conservation, or protection of water bodies. Effective soil protection requires that in the execution of these sets of laws the choices for action take soil protection concerns into adequate consideration. It would thus be desirable to improve the status of soil protection within the scope of physical development planning, landscape planning and water law planning. Greater emphasis on soil protection aspects is also necessary in strategic and project-related environmental impact assessments to stem the steady increase in land use and the endangering of soil functions. This can be achieved by the appropriate objectives set in the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance, which are to be considered as binding in sectoral planning and not to be traded off against other conflicting interests.

Together with other Member States, Germany played a significant part in the initial failure of the legislative procedure to enact a Soil Framework Directive at the EU level. Had the directive been enacted it would have opened up a new sphere of activity in environmental politics for the EU as well as bringing a new dynamic into national law, in particular in the field of soil protection which has been unsatisfactorily regulated to date. The principle of subsidiarity mentioned in Art. 5 Section 2 of the Treaty Establishing the European Community, and by which Germany essentially justified its rejection, suggests that an EU regulation is needed on grounds that include the important function of soils in climate protection.

6.1 Introduction

482. Soil is located at the interface between the atmosphere, lithosphere, and biosphere, and often acts as a support medium and catalyst for processes which occur between these spheres. Soil is able to cushion the stress of impact from environmental media and thus soften the effects of sudden changes. However, soil itself changes, sometimes with change brought about by pollutant contamination or global warming, which can affect its compensatory functions. Quite often such changes are not noticed for long periods of time,

since the soil system reacts slowly and recognition of disruptions in function and use are delayed. Preventive care that reacts to even slight changes is especially necessary in the case of soil, as new soil formation processes are extremely slow, and soils, from a human time perspective, must be considered a finite resource. Moreover, the effects of soil damage can very often not be traced to individual factors pertaining to location or time, which in addition to a lack of public funds, accounts for a widespread failure to carry out necessary remediation work.

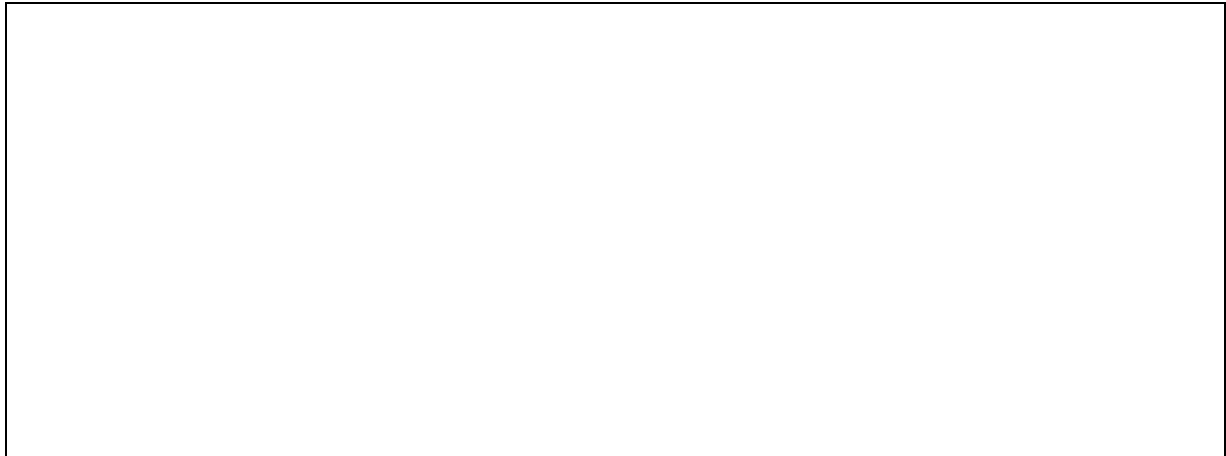
Unlike the media air and water whose quality has been monitored and regulated for decades, soil as a medium was long considered less significant or only sporadically treated as being in jeopardy.

Some of the reasons for the soil protection deficits in Germany are that:

- the cause-and-effect relationship is widely separated in terms of time and space, e.g. in the case of airborne inputs,
- soil processes are very complex; they concern hydrological, biological, chemical and physical properties, which means that limit values and guideline values for various soil components are difficult to derive,
- soil reacts very slowly to stress factors, and changes which occur are often not registered until other protected assets such as water, biodiversity or soil fertility are affected,
- pollutants accumulate, soil can hardly regenerate and is therefore in particular need of precautionary protection,
- the question of whether soil is worth protecting and the value of soils is justified indirectly on the basis of their manifold functions (e.g. protection of waters, conservation of species and biotopes, use in agriculture), which is also reflected in the gaps and lack of consistency in legislation.
- different authorities are in charge of certain aspects of soil protection, but do not address the issues extensively, due to lack of clear and consistent allocation of competencies.

483. Since the objectives of soil protection are assessed by the preservation of its functions (Fig. 6-1), there must be measurable indicators of changes in soil function. However, the multifunctionality of the medium and its great number of users have not resulted in the necessary vigilance regarding its condition.

Figure 6–1

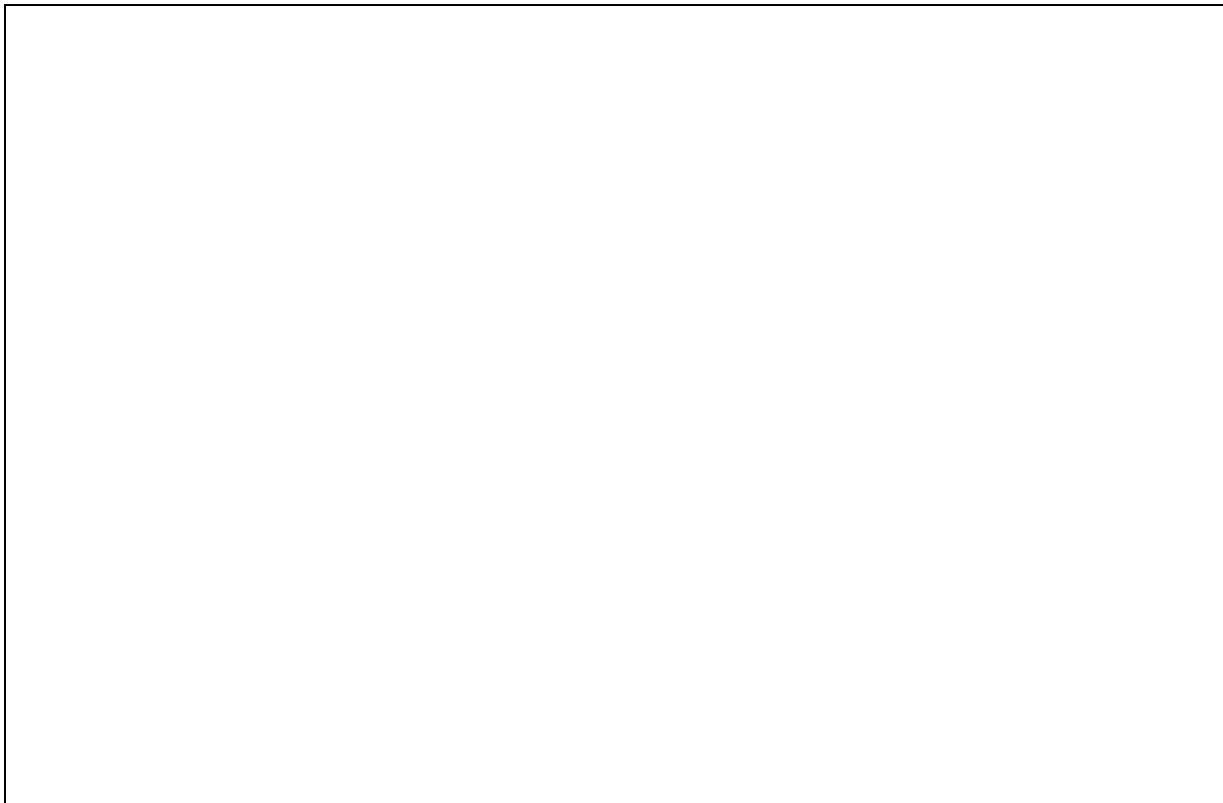
Soil functions

SRU/UG 2008/Fig. 6-1

Soil quality objectives can be derived on the basis of desired function and soil properties. The extent to which it fulfils its function is generally measured by external performance indicators (water quality, yields, biotopes) as well as in soil analyses, which however are of limited information value due the complexity of processes occurring in soils.

Due to the competition between the goals of achieving long-term preservation of functions and those of its use, as well as the competition between the functions themselves, quality targets based on function may conflict (e.g. carbon sequestration versus agricultural yield). This contradiction can only be resolved by making decisions based on spatially concrete environmental quality targets. The quality targets exist between the conflicting priorities of desired function, existing soil properties, and various soil impairments (Fig. 6-2).

Figure 6–2

Key conflicting priorities in setting quality targets for soil protection

SRU/UG 2008/Fig. 6-2

484. Due to its multifunctional nature, various sectoral policy bodies and administrations are entrusted with soil protection. Relevant statutory regulations that address soil protection either directly or indirectly are laid down in various specialist laws as well as in the Federal Soil Protection Act. Statutory regulation of soil protection in Germany occurs through regulation of the pollution sources on the one hand and by the Federal Soil Protection Act on the other, where the latter explicitly covers only those domains not already regulated by other law. The Federal Soil Protection and Contaminated Sites Ordinance (*BBodSchV*) sets precautionary, trigger, and action values for seven heavy metals and a number of organic substances. Regarding the overriding goal of the legislation to preserve soil function, reference is made to a large number of regulations related to the polluter (such as fertiliser law, waste law, building law, etc). In order to abate and possibly reduce impairments or pollution at source wherever possible, the significance of soil protection must be duly acknowledged by the mandated administrations and decision-makers. At the same time, verifiable criteria must be in place.

Consistent enforcement of existing regulations (Table 6-1) could result in either protection of or, at least, positive changes for soils.

Table 6–1

Types of soil impairment, cause, regulation

Measurable impairment	Cause	Key regulations (non-exhaustive)*
Sealing, compaction, soil erosion	Housing construction, traffic areas, commercial/industrial space, recreational areas	Regional Planning Act, Federal Building Code, Federal Land Utilisation Ordinance (<i>BauNVO</i>), Federal Nature Conservation Act, Federal Water Act, transport route laws
Diffuse airborne pollutant inputs	Transport, house fires, industry, waste management sector	Federal Immission Control Act and related legislative provisions, Road Traffic Licensing Regulation (StVZO) and annexes, Closed Substance Cycle and Waste Management Act (KrW-/AbfG)
Direct diffuse pollutant and nutrient inputs	Commerce, industry, agriculture, waste management sector	Federal Water Act, Federal Soil Protection Act, Federal Soil Protection and Contaminated Sites Ordinance, Fertilizer Utilization Regulation (DüV), Fertilisers Ordinance (DüMV), Ordinance on Waste and Sewage Sludge, Plant Protection Act (PflSchG), Ordinance on Biowastes (BioabfV), Ordinance on prohibitions of use of plant protection products (PflSchAnwV), Closed Substance Cycle and Waste Management Act, Federal Nature Conservation Act
Contaminated sites	Commerce, industry, mining, military, waste management sector	Federal Soil Protection Act, Federal Soil Protection and Contaminated Sites Ordinance, Federal Mining Act (<i>BBergG</i>)
Erosion	Agriculture	Direct payment obligation law, Federal Soil Protection Act, Federal Nature Conservation Act
Compaction	Agriculture	Direct Payment Obligations Act (<i>Direktzahl/VerpflG</i>), Federal Soil Protection Act, Federal Nature Conservation Act
Loss of organic matter	Agriculture	Direct payment obligation law, Federal Soil Protection Act, Federal Nature Conservation Act (in case of tillage, organic soils near groundwater)
* also see list of abbreviations		
SRU/UG 2008/Table 6-1		

However, only some of the regulations (notably the Federal Soil Protection Act together with the Federal Soil Protection and Contaminated Sites Ordinance) focus on verifiable limit values relating to soil. Other legislation such as the Federal Nature Conservation Act protects rare or endangered geotopes either directly or indirectly by instituting natural monuments, legally protected biotopes or protected landscape areas. Landscape conservation areas and

regulations contained in the ban on ploughing up grassland can prevent soil erosion or the loss of organic matter. Within the scope of nature conservation impact mitigation regulations, loss of soil-related functions is to be avoided as far as possible – or at least compensated if unavoidable. However, the Federal Nature Conservation Act does not lay down any measurable quality targets. Although protection of bodies of water is closely linked to soil protection, it represents only an indirect aim of the Federal Water Act, and is oriented exclusively to the targeted water quality objectives.

Splitting up the regulatory body of protective laws and mandating them to various administrations has resulted in soil protection being insufficiently taken into account in planning and administrative procedures. Administrations chiefly pursue their respective sectoral interests when implementing regulations. Soil protection is a matter of weighing interests in the field of urban land-use planning (MIEHLICH 2006). In the field of agricultural soil protection there is a conflict of goals between economic and ecological interests.

Addressing this deficit by instituting a separate specialised administration for soil protection and other specific soil protection instruments is neither promising nor sensible at present. Sectoral soil protection policy is difficult to justify to both the political and public spheres since soils are indirectly considered to be part of the functions of areas such as drinking water or flood protection or biodiversity. Exceptions to this are the functions of the soils which are the natural production basis for agriculture and forestry and archives of natural history. Transferring responsibility for soil protection to the agricultural authorities, as was often done in the past, would not be sensible however, as they would at the same time have to represent the interests of agricultural enterprises, i.e. the main cause of harmful soil impacts. A sectoral approach would conflict with the approach of integrative environmental protection that is meant to act for the benefit of all environmental media and create synergies among environmental functions.

Solutions should therefore aim at bolstering the status of soil protection in the various sectors. This requires

- generally applicable soil limit values and quality targets geared to the most sensitive function,
- alignment of the objectives in the various regulations and their integration into a consistent body of laws,
- a clearer definition of the means of implementation and monitoring of their efficiency.

The importance of soil protection was taken into account at the European level in a Thematic Strategy and in a proposal for a Framework Directive. In view of the fact that only nine Member States possess soil protection regulations, and only two them – Germany and Denmark – have far-reaching regulations, the Directive might have resulted in improvements

in soil protection throughout Europe. The failure of the draft in December 2007 is yet another hurdle on the path to enforcing the significance of soil protection at the European level.

Chapter 6.2 documents in detail the condition of soils in Germany based on their function and identifies deficits. Chapter 6.3 addresses current developments in soil protection legislation at the German and European levels.

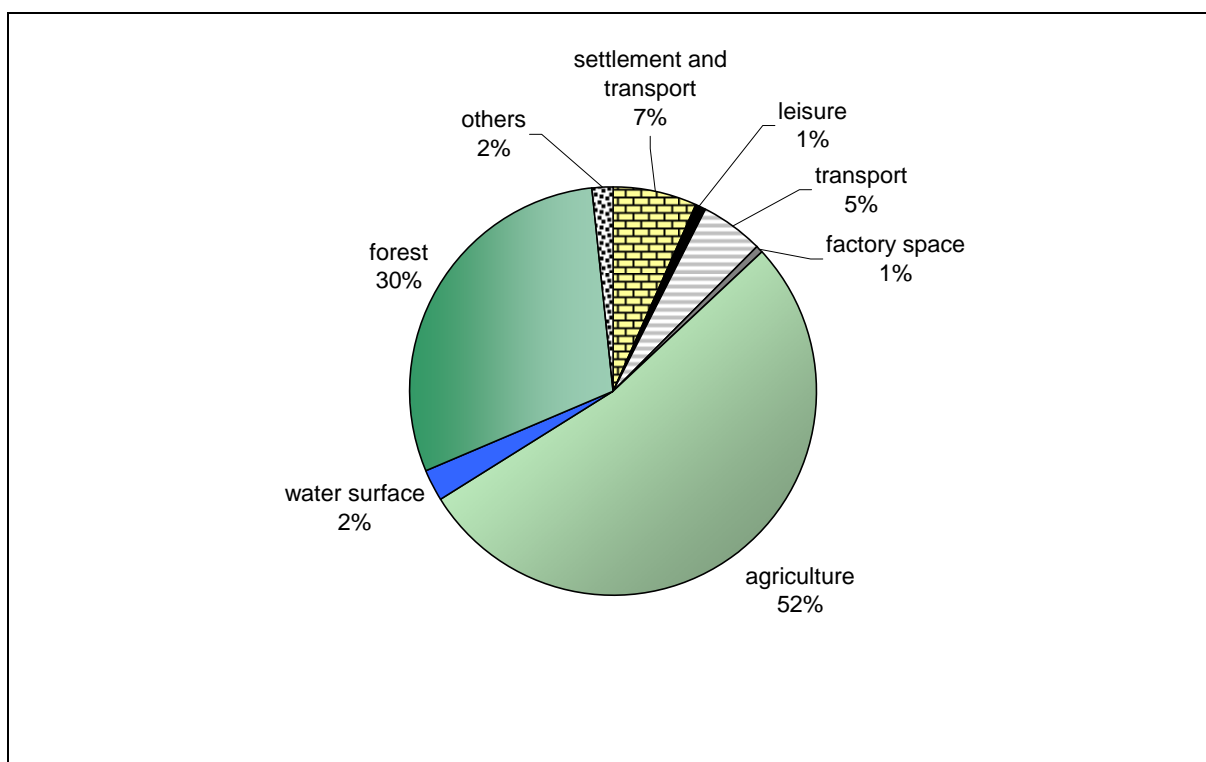
6.2 Soil functions, impairments and regulation deficits

485. More than 50 % of soils in Germany are used for agriculture (Fig. 6-3), which underscores the great importance and responsibility of farmers for their condition.

Figure 6-3

Land area according to types of use in Germany 2004

Total area: 357 050 km²



SRU/UG 2008/Fig. 6-3; Source: Federal Statistical Office 2005

Each type of use has a considerable impact on the condition of soils, although the changes have not been recorded in any systematic manner over time. Although quality targets have been identified for some individual aspects of soil impairment in the German government's Sustainable Development Strategy (Bundesregierung 2002) and currently in the National Biodiversity Strategy (BMU 2007a), they serve as policy guidelines only and do not constitute binding levels that must be achieved.

Soil functions

486. Soil is the means of livelihood for flora and fauna and is also the foundation of mankind's food supply. The breakdown of plant remains by soil organisms and the renewed availability of the nutrients they contain is a basic requisite for biotic processes to function. Abiotic material life cycles such as the deposition of dust-like precipitation, filtration of rainwater or groundwater recharging also occur at the same time. The buffering capacity of soil results in a continuous supply of nutrients for plants and can, to a limited extent, capture harmful substances such as acids and heavy metals. The precipitation retention capacity of soil is vital for flood protection and agriculture.

Besides the types of use associated with their functions, it is precisely in densely populated countries like Germany that soils fulfil additional important compensatory functions in relation to microclimate, biodiversity or groundwater. Article 2 Section 2 of the Federal Soil Protection Act classifies soil functions into “natural functions”, “functions useful to man”, and its function as an “an archive of natural and cultural history”.

Man's claims on use of soil range from provision of food and drinking water, land use for settlements and industry, to the extraction of raw materials. Its significance as an archive of natural and cultural history is especially important as concerns documentation and evaluation of outside influences.

Some claims to use are in competition with one another; for instance, a given area cannot be used for both farming and construction at the same time. In some cases their intended uses are even diametrically opposed: improper fertilisation (for maximum crop yield) or storage of waste can permanently impair the extraction of drinking water.

487. Soil's influence on the climate balance is hardly taken into account in the abovementioned functions. Art. 1 of the EU draft directive on soil protection (European Commission 2006a), however, explicitly identifies the soil's capacity to store carbon as a vital function. Storage of carbon as part of the carbon cycle depends on various conditions. The world's soils with their approx. 1,550 GtC store the greatest share of the organically fixed carbon in terrestrial ecosystems. For comparison: there is about 560 GtC in the biomass of land vegetation, and 750 GtC in the atmosphere (SCHLESINGER 1997). Depending on type of soil use and cultivation, soils can have far-reaching impacts on global climate, since carbon dioxide (CO₂) is either emitted from or stored in them in the process of both biomass accumulation and degradation. The emission of carbon in the form of CO₂ is a speedy process, whereas its capture is a very slow one. The content of organic matter is of great significance as a measurable indicator.

488. A large number of evaluation methods of varying scales for different aspects in planning and authorisation procedures have been developed in recent years to take account of the soil's performance of its natural functions and archive function. Table 6-2 illustrates the

soil's many purposes according to its functions, partial functions, and evaluation criteria. They are based on methods to evaluate natural soil functions and the archive function of the soil (BALLA 2007).

Table 6-2

Soil functions, partial functions and evaluation criteria

Soil functions	Soil partial functions	Criteria
Habitat function	Habitat for mankind	Exceedence of precautionary, trigger, and action values in Federal Soil Protection and Contaminated Sites Ordinance
	Habitat for plants	Site potential for natural plants, natural soil fertility
	Habitat for animals and soil organisms	Appropriateness of location for animal and soil organism communities
		Naturalness
Function as part of ecosystem	Soil function in the hydrologic balance	Regulation of runoff Role of soil in groundwater recharge (infiltration rate) General water hydrologic budget conditions
	Soil's function in nutrient mass balance	Nutrient potential and nutrient availability
Medium of decomposition, equalisation, and generation	Filter and buffer for inorganic sorbable pollutants	Capacity of soil to capture heavy metals
	Filter, buffer and substance transformer for organic pollutants	Binding and degradation of organic pollutants
	Buffering ability of soil for acidic inputs	Capacity to neutralise acidity
	Filter for non-sorbable substances	Retention of groundwater
		Seepage water retention time
Archive of natural and cultural history	Archive of natural history	Pedogenesis significant to natural heritage
	Archive of cultural history	Pedogenesis significant to cultural heritage
Source: BALLA 2007		

The principle of soil protection is an evaluation of individual soil functions and the relevant harmful impact if impaired. Various methods of prioritisation of the individual soil functions (maximum value principle, mean value principle/summation) are available depending on the

problem in question (FELDWISCH et al. 2006). In the medium term, national standardisation of approach would be desirable, perhaps adjusted to the requirements of the future Soil Framework Directive (Item 526).

Impairment of soil functions

489. Soil may be impaired by both chemical and physical changes. Damage owing to pollutant input can occur either locally (i.e. chemical spills) or across wider areas (deposition of air pollutants). Excessive input of nutrients and physical changes made to soil, such as compaction due to cultivation by heavy vehicles or erosion, always affect large areas.

The thematic strategy for soil protection identifies the following factors as conducive to soil degradation: sealing, contamination, salinisation, erosion, compaction, loss of organic matter, and landslides, all of which are of varying significance to the individual Member States. The first five are of particularly great relevance in Germany.

6.2.1 Soil sealing

490. The transformation of undeveloped land into residential settlements, transport, recreational and commercial space continues unabated (UBA 2007c). The consequences for soil are compaction, sealing, and total soil removal. Sealing of surface areas deprives it of use as a biologically active space as well as its function as a medium of rainwater retention. Removal of buildings or road networks in favour of natural undeveloped spaces is exceptional at best. There has been no increase in conversion of brownfields to date. The UBA (2007c) pointed out brownfield areas amounting to 139,000 ha within urban and municipal areas that are directly available for re-use. Approximate restoration of soil function after sealing is only possible at considerable cost since the natural soil structure is permanently changed through use. The SRU addressed the subject of land take in detail in its Environmental Report 2004 (SRU 2004, Item 202 ff., 781). Current developments do not point to a turnaround as compared to 2004 (Items 339-342). There has been no approximation to the sustainability strategy's stated goal (Bundesregierung 2002) of reducing new land consumption to only 30 ha/day. It is doubtful whether the inclusion of Article 13a in the Federal Building Code, under which municipalities may introduce certain simplified procedures in regard to drawing up so-called legally binding land-use plans, will promote the use of existing municipal brownfields (Item 518).

491. The definition of a quality target in the sustainable development strategy has triggered various activities aimed at reducing land use, although these can not yet be measured statistically.

Table 6-3 provides an overview of the key information on land consumption.

Table 6-3

Basic information on soil sealing

Indicator	Sealed land [ha/d]
Cause	Society's growing demand for spatial use
Quality objectives	Sustainability strategy: 30 ha/d by 2020; Ratio of inner-outer development: 3 : 1 National Biodiversity Strategy (Draft 2005): 60 ha/d by 2010, 30 ha/d by 2020 and 0 ha/d by 2050 National Biodiversity Strategy 2007: 30 ha/d by 2020
Measures	Building infill, brownfield redevelopment, unsealing
Key statutory regulations	Regional Planning Act; Federal Building Code; Federal Nature Conservation Act (landscape planning, intervention/equalisation regulation); Federal Soil Protection Act; waste water charge legislation; EIA Act (<i>UVPG</i>)
Deficits	No systematic evaluation of protection of soil functions occurs; soil protection has lower priority than other interests (e.g. sale of building land).
SRU/UG 2008/Table 6-3	

In addition to indirect steering instruments, there is still an urgent need for tradable allowances for the designation of building land combined with qualitative control of spatial planning and physical development planning, as an important means of reducing land take (SRU 2004, Item 214 ff., 782; von HAAREN and MICHAELIS 2005; Item 352).

6.2.2 Diffuse pollutant and nutrient inputs in soil

492. Relevant diffuse input pathways of pollutants and nutrients into soils are the deposition of air pollutants, inputs from fertilisers (commercial fertiliser, compost, digestates, sewage sludge, mineral fertiliser), soil adjuvants (substances without significant nutrient content whose express purpose is to improve the physical, biotic or chemical condition of soil), and inputs of materials and wastes.

6.2.2.1 Airborne inputs

493. Soil quality depends on the gaseous substances sulphur dioxide (SO₂), ammonia (NH₃) and nitrogen oxide (NO_x), which cause changes in pH (acidification) or nutrient supply (eutrophication). It also depends on dust as a carrier of heavy metals (e.g. lead, cadmium, and nickel). The pollutants enter soils and bodies of water from the atmosphere by wet deposition (rain, snow) and dry deposition (particles). A discussion of emission trends and the impact of major air pollutants will follow, for eutrophication see Item 335.

Particulate matter (PM₁₀) air pollution remains so high, especially in Germany's metropolitan areas, that the limit value established for the protection of human health and in effect since

2005 is regularly exceeded. In 2007, particulate matter concentrations were over the daily limit value of $50 \mu\text{g}/\text{m}^3$ on more than the allowed 35 days at 34 of the 415 measuring sites in Germany. On the other hand the annual limit value of $40 \mu\text{g}/\text{m}^3$ was only exceeded at one measuring station. The exceedences occurred primarily at measuring sites in the vicinity of urban traffic areas. In a comparison of the 2000 – 2007 time period taking meteorological conditions into account, the Federal Environment Agency (UBA) concludes there is no clear trend in the development of pollution in this area.

It is forecast that the annual NO_2 limit value of $40 \mu\text{g}/\text{m}^3$ set to take effect in 2010 for the protection of human health can not be complied with in many urban areas. In 2007 this value was exceeded at more than half of the urban measuring sites near traffic areas in Germany (UBA 2008). There has been only a slight decline in NO_2 pollution at many measuring sites near traffic areas, with some sites even recording an increase. This development does not correlate to the considerable success achieved in recent years in reducing NO_x emissions, that is, the sum of nitrogen monoxide (NO) and nitrogen dioxide (NO_2). The source of anthropogenically released nitrogen oxides is largely combustion processes, with nitrogen monoxide accounting for the majority of emissions. The latter can be oxidised in the air to nitrogen dioxide by ozone or *peroxy-alkyl radicals* (reactive alkyl-oxygen compounds). More detailed analyses of immission data reveal that only the concentrations of NO are decreasing, whereas the concentrations of NO_2 which are more relevant to health are hardly changing (LAMBRECHT 2006; FISCHER et al. 2006). A study based on immission measurements taken in *Baden-Württemberg* showed a steep increase in the NO_2/NO_x ratio since 2000: from between 4 and 15 % in 1999, to 19 – 28 % in 2005 (KESSLER et al. 2007).

Reasons for this development may be accounted for by more frequent ozone episodes in urban areas, which results in more oxidation of NO to NO_2 . Furthermore, a series of tests show that the share of NO_2 in motor vehicle exhaust gases has risen. This is due to the larger number of diesel-powered vehicles on the road. Without any specific reduction measures, diesel-run vehicles emit eight to ten times more nitrogen oxide than petrol cars (SRU 2005a, Item 278). Moreover, diesel-powered vehicles fitted with an oxidation catalyst to reduce CO and HC emissions or with an oxidation catalyst and retrofit soot filter (CRT filter system), primarily city buses, can produce higher levels of functional NO_2 exhaust emissions (HÖPFNER et al. 2006). First projections in commercial vehicles without CRT systems show an NO_2 share of 8 % in NO_x gases, compared to vehicles fitted with a CRT filter system showing a share of 45 % (LAMBRECHT 2006).

The NO_2 hourly mean value of $200 \mu\text{g}/\text{m}^3$ is almost exclusively exceeded at measuring stations in the vicinity of traffic areas. In 2007 the limit value to take effect as of 2010 was exceeded at four such measuring sites more frequently than the permissible 18 times in a year (UBA 2008).

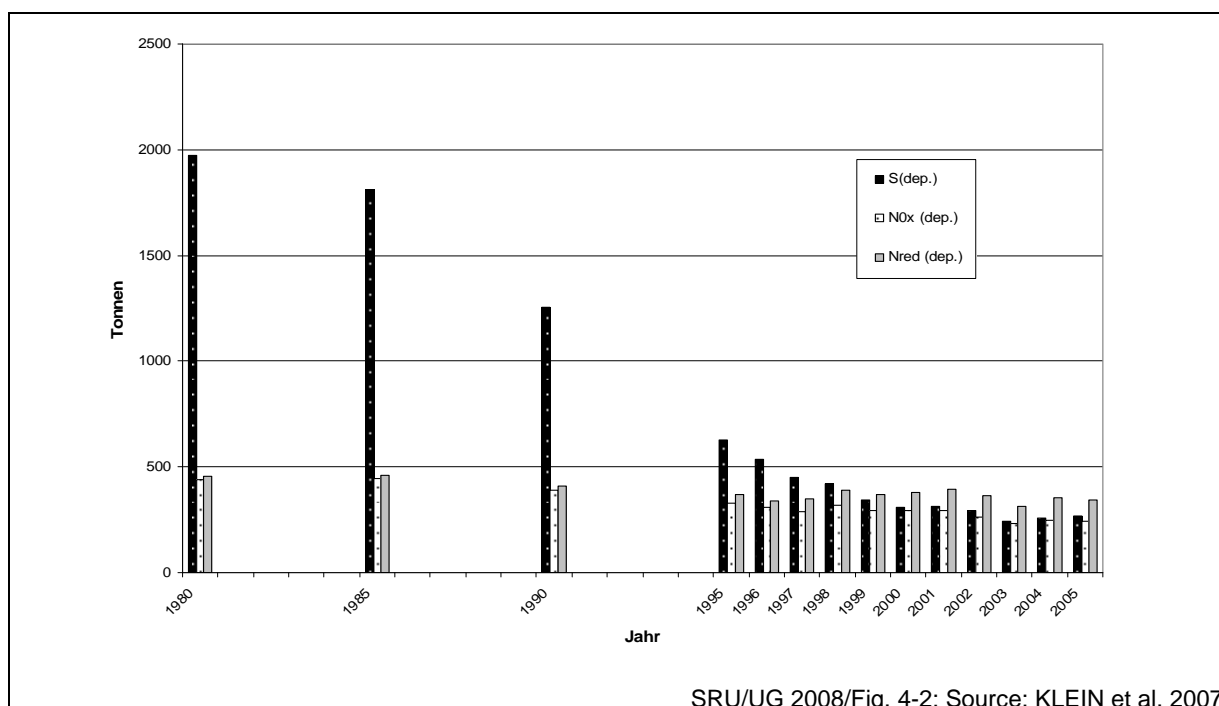
Deposition, which is the input of nitrogen compounds via the air, amounted to 589 kt in Germany for the year 2005. Airborne sulphur compound deposition amounted to 269 kt. Deposition of reduced nitrogen (N_{red} : NH_3 , NH_4^+), 95 % of which comes from agriculture, is approximately 50 % higher than deposition of oxidised nitrogen (NO_x) originating from combustion processes. In relation to land areas in Germany, the total volume of nitrogen deposits varies between 1 and 3 g/m². N deposition declined by about 27 % between 1990 and 2005, of which 38 % accounts for reductions of NO_x , and 16 % for N_{red} . Deposition of airborne sulphur actually dropped by 79 % (Fig. 4-2; KLEIN et al. 2007).

The deposition of airborne nitrogen compounds results in eutrophication of ecosystems, contamination of ground and surface waters, and soil acidification. SO_2 is also in the group of acidifying air pollutants. Thanks to the considerable reductions in SO_2 achieved in recent years, the current cause of ecosystem acidification in Germany at present owes much more to reduced nitrogen compounds.

Critical loads for eutrophying nitrogen were exceeded in Germany in 2004 in more than 98 % of sensitive ecosystems (see KLEIN et al. 2007). As concerns acidification, critical loads for acidifying air pollutants were exceeded in 1999 in about one half of all sensitive ecosystems (UBA 2005b).

Figure 4-2

Development of N and S deposition in Germany 1980 – 2005



Long-range inputs from neighbouring countries also account for N deposition in Germany, although the majority share of emissions of reduced and oxidised nitrogen is exported to

these countries (for NO_x : export 80 %, import 66 %; for N_{red} : export 55 %, import 32 %; all data from 2005 (KLEIN et al. 2007)). Airborne N deposition accounts for only 6 % of the nitrogen surpluses on cropland (Item 1003 f., Agriculture chapter). Yet these nitrogen inputs have an impact on non-agricultural land (forests, bogland, etc.) which are fertilised via the air only. The share of deposition on this land area that originates from agriculture is over 60 % (about two-thirds of the N deposition consists of reduced nitrogen, 95 % of which comes from the agricultural sector).

There have been varying degrees of reduction in emissions of SO_2 , NO_x , NH_3 and particulates in Germany and Europe. The reductions achieved so far, however, do not meet the EU standards as of 2010 which define national emission ceilings for NO_x and NH_3 for the sake of protecting ecosystems against acidification and eutrophication (BMU 2006).

The sources of SO_2 emissions are mainly installations in the energy sector and industrial processes. Airborne nitrogen oxides are largely traceable to emissions from industrial facilities, power plants and district heating plants, from building heating systems and traffic emissions, although the transport sector accounts for by far the greatest share. The agricultural sector is virtually the sole source of ammonia (UBA 2007b).

The member states of the European Union have adopted harmonised regulations to contain inputs via the air pathway, based on the Air Quality Framework Directive of 1996. These European resolutions have been transposed into German law in recent years. Limit values and alert thresholds for the specific pollutants were set through a series of daughter directives (see SRU 2004, Item 538 ff.).

All measures that address the main sources energy sector, transport, and agriculture are thus relevant to soil protection. The planned measures to comply with the guidelines of the directive on national emission ceilings for certain atmospheric pollutants (NEC Directive 2001/81/EC) will also have a positive effect on soils.

6.2.2.2 Inputs from solid matter

494. Preservation of natural soil functions requires that nutrients which are extracted, for example through agricultural use, be replaced. There are specially manufactured fertilisers to meet this need as well as residual materials such as manure, sewage sludge, and increasingly, digestates from biogas production. The agricultural sector has produced considerable fertiliser surpluses for many years which have caused eutrophication. The slight decrease in nitrogen surpluses can be attributed to better use of the volumes of nitrogen applied and a rise in land share devoted to organic farming. The desired uptake of nutrients is dependent on soil type, so that excessive amounts of fertiliser can lead to nutrient pollution having an adverse impact on the climate, groundwater, surface waters, and biodiversity

(Item 335 f.). Improper use of plant protection agents can also have a considerable detrimental effect on soil.

Fertilisers, in addition to the desired nutrients, often contain pollutants (e.g. pharmaceutical drugs, disinfectants, feed additives, heavy metals) which may accumulate in soil and plants and affect groundwater (see Item 911, Chapter 8.4 in Selected chapters of the Environmental Report 2008, Volume 3).

495. Sewage sludge mainly serves to extract undesirable substances from wastewater. These are concentrated in sludge. Manure may contain all the substances, or their metabolites, which are used in animal husbandry. The relatively new digestates from biogas production are also subject to the Fertilizer Utilization Regulation (*Düngeverordnung – DüV*) and the Ordinance on Principles of Good Agricultural Practice in the Use of Fertilisers (Fertilisers Ordinance) (*Düngemittelverordnung – DüMV*). The composition of the digestate depends on the respective input, which is made up of organic materials such as slurry or renewable primary products. Initial studies (DEDERER 2006) show that digestates contain a broad range of nutrients depending on input. Digestates require closer investigation and evaluation to ensure timely fertilisation appropriate to needs.

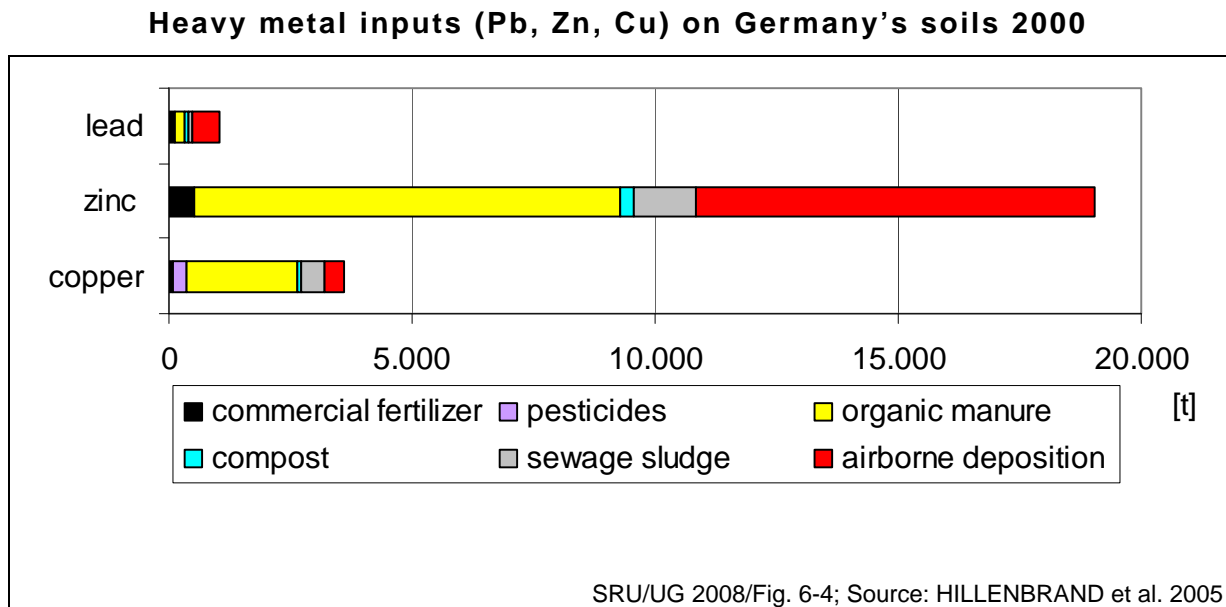
496. There have been national background levels for inorganic substances in topsoils and subsoils since 2003 that reflect geogenic contents as well as diffuse inputs of substances and might serve as a basis for assessment, e.g. in regional soil protection for the purpose of identifying areas where there are extensive harmful changes in the soil. With a view to the precautionary values set in the Federal Soil Protection and Contaminated Sites Ordinance, background levels representative of land areas were derived for lead (Pb), cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), mercury (Hg), and zinc (Zn) (LABO 2003).

An evaluation of select measurements taken in continuously monitored soils revealed that the heavy metal concentrations in topsoils were generally below the precautionary values set in the Federal Soil Protection and Contaminated Sites Ordinance, with the exception of mercury in sandy soils where the median corresponded to the precautionary value. Conspicuously high lead content was recorded in forest soils. Concentrations of Cd, Cu, Ni and Zn in grassland areas were nearly double the figures for soils used for other purposes (HUSCHEK and KRENGEL 2004).

In a large-scale comparative study of background levels of lead in Germany's topsoils and subsoils, extensive accumulations of this heavy metal owing to anthropogenic inputs into topsoils was evident (UBA 2005). To a large extent the figures even exceed the precautionary value set in the Federal Soil Protection and Contaminated Sites Ordinance.

Input pathways for copper, zinc, and lead are illustrated in Figure 6-4.

Figure 6-4



The major input pathway for lead is via particulate deposition. Air and commercial fertilisers are the medium for large volumes of zinc inputs, and organic manure accounts for copper inputs (HILLENBRAND et al. 2005).

Inputs via fertilisers

497. Fertilisers can result in nutrient surpluses (Item 1003 ff.) as well as heavy metal inputs. Table 6-4 illustrates the contamination of various fertilisers with heavy metals and arsenic. For the sake of evaluation the pollutant volumes applied per nutrition unit are significant, since a highly effective fertiliser – despite high pollutant content – can result in lower pollutant input than a fertiliser that has to be applied in considerably larger quantities due to its low nutrient content.

Table 6-4

Concentrations of elements in fertilisers

	Zn	Cu	As	Cd	Cr	Hg	Ni	Pb	Tl	U
	mg/kg									
Potassium chloride (55)	0.01	1.6	0.01	0.01	0.01	0.01	0.01	3.1	0.01	0.56
Urea	1.7	0.4	0.35	0.03	0.33	0.07	0.26	0.09	0.13	0.30
Calcium ammonium nitrate (CAN)	32	4.0	0.31	0.17	2.9	0.01	2.3	16.0	0.04	0.23
Calcium carbonate	31	9.0	4.8	0.23	16	0.02	14	9.6	0.05	0.60
Triple super-phosphate (45)	159	5.2	10	14	131	0.09	17	10	0.78	197
NPK fertilisers	283	172	2.0	4.5	18	0.02	5.5	6.1	0.19	23
Organic-mineral NPK-fertiliser (9-7-8)	110	77	1.55	2.44	112	0.61	5.8	1.8	0.04	19
Compost	323	76	-	1.0	28	0.3	21	61	1	-
Sewage sludge (Lower Saxony)	609	238	3.2	0.83	29	0.5	23	26	0.13	0.75
Cattle slurry	225	54	1.6	0.28	4.8	0.04	5.4	4.7	0.08	1.1
Pig manure	864	225	1.2	0.29	6.7	0.03	9.8	4.5	0.05	3.5
Source: SEVERIN 2007										

498. Current tests for organic and inorganic pollutants in fertilisers reveal isolated cases of exceedence of heavy metal limit values in the Fertilisers Ordinance for mineral fertilisers. Ecological organic manure has a lower concentration of copper (and zinc in some cases) than conventional organic manure. The assessment values for arsenic, cadmium, chromium, nickel and lead proposed by the Federal Environment Agency (UBA) for the “Good Quality and Secure Yields” concept are undercut on average in organic manure, although levels of zinc and copper sometimes exceeded these values (KÖRDEL et al. 2007).

Sewage sludges largely comply with current limit values for heavy metals and with the limit values for polychlorinated biphenyls (PCB) and polychlorinated dibenzo-p-dioxine/furans (PCDD/F) set in the Sewage Sludge Ordinance (*Klärschlammverordnung – AbfKlärV*). Whereas areas fertilised with sewage sludge revealed no significant accumulation of heavy metals, there was accumulation of benzo(a)pyrene and polycyclic aromatic hydrocarbons (PAH) as well as organotin compounds and musk compounds (KÖRDEL et al. 2007).

There is a wide variety of human drugs present in sewage sludges, and there is need for more research into their impact and behaviour in soils (HEMBROCK-HEGER and BERGMANN 2007). Precisely because the complexity of the processes and the variability of

soils has produced very few universally valid conclusions about the mobility and backflow of pollutants in water, air, and plants, it is imperative to act according to the precautionary principle.

499. The presence of veterinary drugs in organic manure is a cause for concern. The threshold value of 100 µg/kg per individual substance above which further ecotoxicological tests are required (EMEA 1996) was exceeded for ten veterinary drug substances present in organic manure (although the follow-up regulation by the European Agency for the Evaluation of Medicinal Products (EMA) 2000 no longer established any values for organic manure). As a result, soils treated with organic manure revealed volumes of tetracycline in excess of 100 µg/kg. According to HEMBROCK-HEGER and BERGMANN (2007), tetracycline and the antiparasitic agent Ivermectin pose a direct risk to soil. There is little data available on their ecotoxicological impact on soils (SRU 2007).

The increasing numbers of livestock also lead to a rise in the volume of organic manure and digestates. In addition to the nutrients, these may contain pollutants (e.g. from medicinal products, feed additives, hoof baths) that are used mainly in intensive animal husbandry.

Recycling of mineral residues

500. In terms of volume the largest waste stream is the 185 million t (2005) of mineral material from the construction and demolition industries, consisting of excavated material, demolition material, ashes and slags. All material streams may be contaminated with, e.g. pollutants from the utilisation phase, insulation materials or heavy metals. The high recycling rate of these wastes (2005: 87 %) can be accounted for firstly by the construction industry's voluntary agreement of 1996, and secondly by the high degree of recyclability of the majority of the substance flows. A large proportion of the material is used to fill pits and mined spaces. Some 50 million t of recovered construction materials were used in 2004. Quality standards in mineral-based materials were regulated for a long time by a data sheet issued by the Joint Working Group of the *Länder* on Waste (LAGA), which was also used for enforcement purposes. Since this meant that compliance with the precautionary values prescribed by the Federal Soil Protection and Contaminated Sites Ordinance was not guaranteed (Federal Administrative Court, decree of 14 April 2005, BVerwGE, Vol. 123, p. 247 ff.), the individual *Länder* instituted widely varying implementation practices. Authorisation to recycle sorted waste in excavation sites (European Waste Catalogue 191212) – intended for the mineral components from construction waste sorting facilities – has in the meantime been used repeatedly to dispose of sorted waste from mechanical-biological treatment. A short-term solution is likely to ease the situation here, by reviewing and amending the authorisation procedure for backfilling operations by the *Länder*. In the longer term, however, the draft federal ordinance on "Utilisation of Mineral Waste and

Secondary Products – Substitute Building Materials” (*Ersatzbaustoffverordnung*), should seek to create generally valid rules for the use of mineral waste materials.

6.2.2.3 Summary

501. The existing regulations for the protection of soil against pollutants introduced either via the air or via direct input into soils are only partially successful in achieving their aims.

Table 6-5 provides an overview of the key information on diffuse pollutant inputs.

Table 6-5

Basic information on diffuse pollutant inputs

Indicator	<p>Polluter-based: Emission values; N nutrient balance; P balance; pollutant loads (mg/ha); fertiliser turnover; pesticide turnover</p> <p>Cumulative contamination of soils: Heavy metal content; Nmin content (mg NO₃ + NH₄/100g soil), organic parameters</p>
Cause	<p>Air pathway: Industry / trade, transport, power plants, house fires</p> <p>Direct pathway: Agriculture, waste storage</p>
Quality targets	<p>NEC-RL: Halve ecosystem surface area affected by acidification; minimise eutrophication</p> <p>Water Framework Directive (WFD): Achieve “good” chemical condition in surface and ground water bodies of water by end of 2015</p> <p>Sustainability Strategy 2002: Achieve 20 % share in organic farming by 2010; contain nitrogen surplus at 80 kg/ha by 2010</p> <p>National Strategy on Biological Diversity 2007: Compliance with critical loads and levels for acidification, heavy metal and nutrient inputs by 2020; Reduction of management-related pollutant inputs in soils used for agriculture and forestry as of 2020</p>
Measures	Containment of emissions; reduction of use of mineral fertiliser, commercial fertiliser, sewage sludge, pesticides
Key legislation	Federal Immission Control Act, 33rd Immission Control Ordinance (<i>BImSchV</i>), Technical Instructions on Air Quality Control, Fertilisers Ordinance (<i>DüMV</i>), Fertilizer Utilization Regulation (good practice), Ordinance on waste and sewage sludge (<i>AbfKlärV</i>), Sewage Sludge Ordinance (<i>KlärschlammV</i>), Ordinance on Biowastes, Ordinance “Utilization of Mineral Waste and Secondary Products – Substitute Building Materials” (draft), Federal Water Act and <i>Länder</i> water laws, German Plant Protection Act, Ordinance on prohibitions of use of plant protection products (<i>Pflanzenschutz-AnwendungsV</i>)
Drawbacks	Unquantifiable targets, deficient implementation and supervision; lack of uniformity in definition of limit values for fertilisers
SRU/UG 2008/Table 6-5	

Inputs via the air pathway are declining gradually across Germany and Europe, and the further tightening of caps on e.g. NO_x emissions from power plants and waste incineration represents a step in the right direction.

Harmonisation of caps on the input of pollutants into soils is necessary to ensure consistent protection levels regardless of the product or waste introduced. The “Good Quality and Secure Yields” concept introduced in 2002 (BMU and BMVEL 2002) is thus as valid as ever but ought to be expanded to include mineral fertilisers and certain organic pollutants.

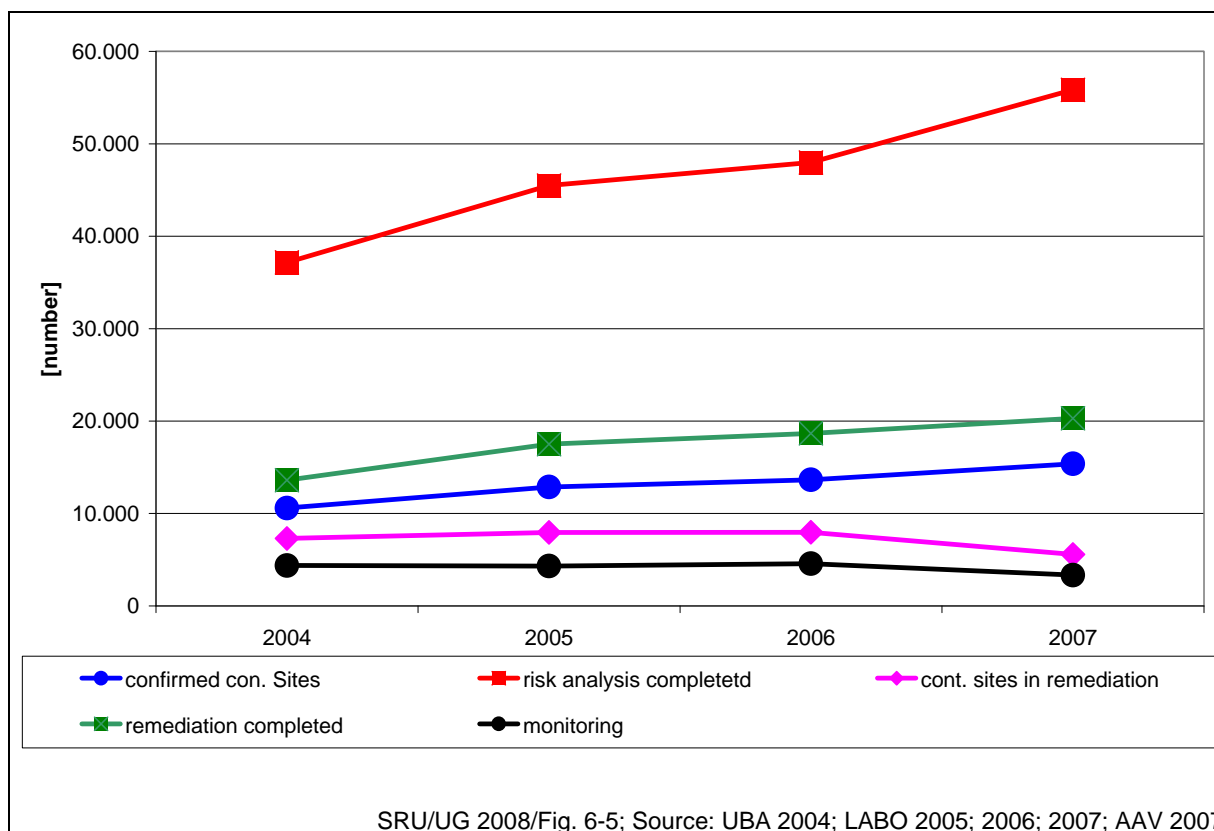
Assessment of human and veterinary drugs requires systematic eco-toxicological testing to derive stable limit values oriented towards what is necessary rather than what is possible. As a basic principle the precautionary principle must be taken into account in this area.

6.2.3 Contaminated sites

502. Contamination of soils due to industrial, commercial and military use jeopardises soil structure and groundwater alike. Unsorted storage of waste also has an impact on these media. Special attention must be paid to the long-term effects since leaching occurs over long periods of time and as a result of altered chemical conditions.

503. Recording methods in the Länder still result in divergent interpretations and gaps in data on individual features. Recording of other parameters such as area, remediation targets, and time planning as already called for in 2004 (SRU 2004, Item 835), is still not common in some *Länder*. The trend in recent years points to a steady increase in suspected contaminated sites (old landfill sites and abandoned industrial sites), from 230,500 in 2003/2004, 271,000 in 2005, 272,000 in 2006, to 289,508 in 2007 (UBA 2004; LABO 2005; 2006; 2007; AAV 2007). By 2007, risk analyses had been carried out for only about 56,000 suspected sites. Figure 6-5 illustrates the trend for confirmed contaminated sites, risk analyses completed, and measures implemented.

Figure 6-5

Progress in remediation of contaminated sites in Germany, 2004 – 2007

The main reason for the rather slow progress made in the remediation of contaminated sites appears to lie in difficulties related to financing (more in SRU 2004, Item 801 ff.).

The enforcement of existing outline provisions and general provisions, for example in the Directive on the Landfill of Waste or the Directive on Integrated Pollution Prevention and Control (application of best available techniques for authorisation of environmentally relevant industrial installations) ought to lead to a decline in soil impairments (EEA 2005). The planned designation of areas “at risk” in the Soil Framework Directive would have meant a step towards recording suspected contaminated sites across Europe (Item 526).

504. Remediation of contaminated sites in Germany is an ongoing effort, although its scope is determined less by necessity than by the financial resources available.

Table 6-6 provides an overview of the key information on contaminated sites.

Table 6-6

Basic information on contaminated sites

Indicator	Contamination with organic and inorganic substances; exceedence of action values in the Federal Soil Protection and Contaminated Sites Ordinance
Cause	Industry/commerce, transport, military, mining, waste management sector
Quality objectives	National Strategy on Biodiversity 2007; remediation of contaminated sites largely complete by 2050
Measures	Assessment based on precautionary/action values; remediation plan proposal
Key statutory regulations	Federal Soil Protection Act, Federal Soil Protection and Contaminated Sites Ordinance, Environmental Damage Act (for future contaminated sites)
Deficits	Case-specific establishment of remediation target
SRU/UG 2008/Table 6-6	

Recommendations made in 2004 are still valid (SRU 2004, Item 828 f.). Standardisation in the recording of data on contaminated sites continues to be necessary throughout the country so as to facilitate evaluation. It would be desirable, although involving greater cost, to include additional information such as surface area, remediation objectives, and time planning. Additional funding would be useful, particularly in view of the positive effects of urban land recycling by means of remediation or re-use of fallow land.

6.2.4 Soil erosion

505. Wind and water erosion result in irreversible loss of fertile topsoil if the rate of erosion outstrips regeneration. Factors responsible for water erosion (EISELE 2008) include:

- Precipitation (volume and intensity, infiltration),
- Soil structure (soil type, aggregate stability, water conductivity, surface),
- Topography (gradient, length, shape) and
- Soil management (cultivation, ground cover, direction of tillage).

What is more significant than the visible effects such as the formation of gullies is the large-scale loss of organic matter. At the same time erosion may have an adverse impact on bodies of water as the soil may be contaminated with pollutants and nutrients. Climatic changes such as decreased precipitation, higher temperatures and longer dry seasons result in lower soil moisture, less vegetation, and as a result, greater risk of erosion. The predicted increase in intense rainfall events will lead to greater water erosion (UBA 2006). An increase in the frequency of intense rainfall has already been statistically demonstrated in Bavaria and Baden-Württemberg (ALBRECHT 2006).

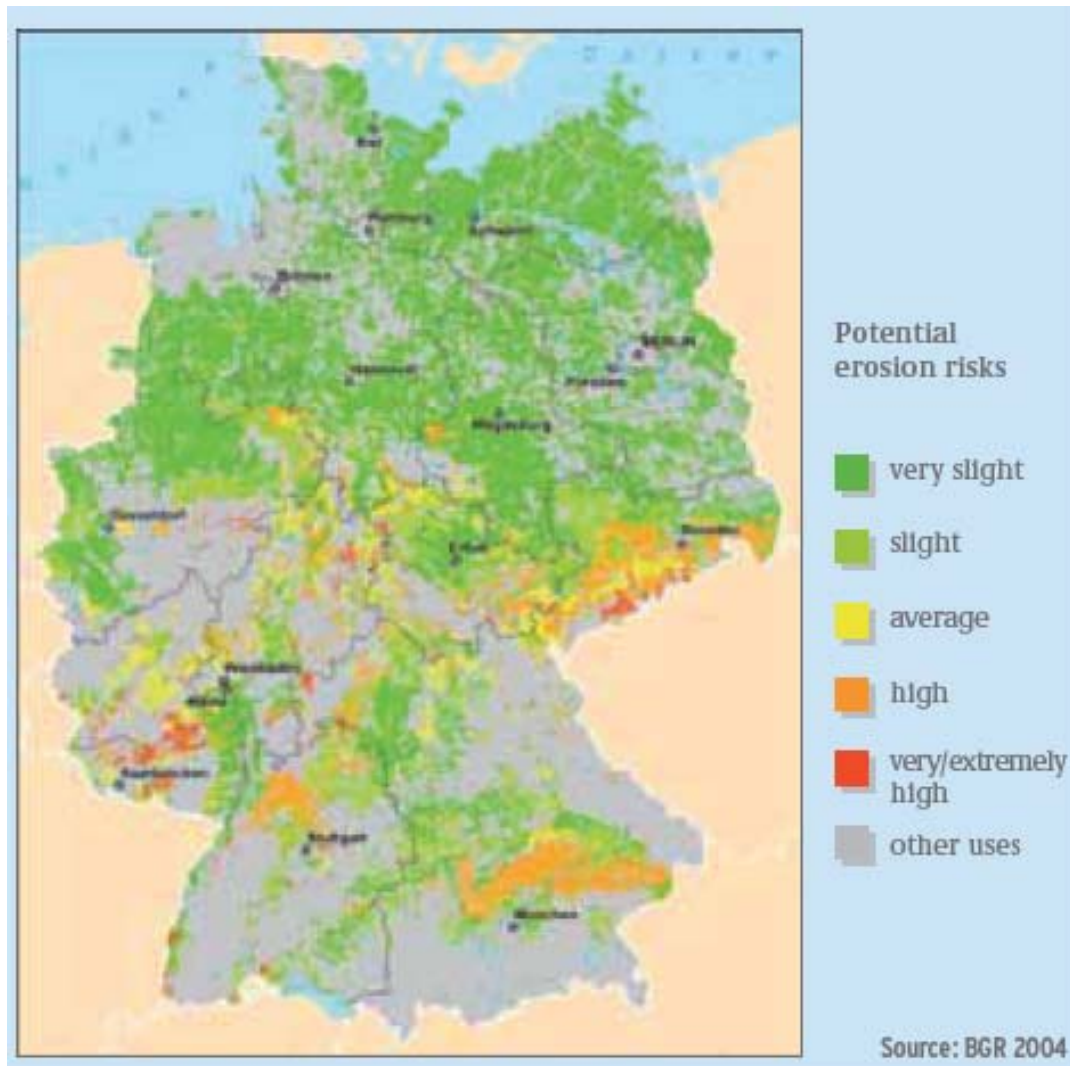
The main causes of erosion are the exposure of soil matter and the cultivation of vulnerable areas (agriculture). The enlargement and consolidation of farmland, whilst economically worthwhile, amounts to a loss of protective field border strips and an increase in the length of runoff paths. The choice of crop rotation and what is grown also affect the susceptibility of the soil to erosion. Even long after sowing, maize and sugar beet do not provide sufficient ground cover to protect soil against summer storms and heavy rains.

Erosion protection measures such as minimal cultivation, contour ploughing, mulch-till, intercropping, and cover crops can greatly decrease vulnerability to erosion (UBA 2005). Projects carried out at the European level (SOWAP – Soil and Water Protection) successfully reduced erosion by more than 50 %, and CO₂ emissions were cut by up to 70 %. However, these successes are only possible by careful selection of crop rotation. It is problematic that no-till farming entails increased use of plant protection agents to curb unwanted growth of wild plants (SOWAP 2006).

506. The potential risk of water erosion on Germany's farmland has been assessed nationwide on the basis of natural site factors (precipitation, soil properties, slope length and gradient) and land use (Fig. 6-6). Areas at particularly high risk are the Tertiary uplands in Bavaria, the Erzgebirge with foothills, the Kraichgau region, the scarped tableland of the Palatinate-Saarland region, and the Saar-Nahe hill country.

Figure 6-6

Potential risk of erosion in Germany



Source: UBA 2007a

Climate changes can also result in additional soil losses, as a combination of intense rainfall and a period of weak vegetative ground cover will lead to increased soil loss.

507. In addition to water erosion, wind erosion plays a significant role in the loss of topsoil. It occurs mainly when high wind speeds meet vulnerable dry surfaces or when surfaces are inadequately protected (FUNK 2008). This poses a particular problem in Germany's northern federal states. Investigations in Brandenburg demonstrated a loss of 220 t/h, equal to 15 mm topsoil over a period of four years (FUNK 2004). The intensity of wind erosion can vary greatly, as much lower losses were measured in subsequent years. Protective measures include windbreak-hedgerows and continuous ground cover of more than 40 % of total surface.

National data on actual erosion does not exist as it would have to be collected on a site-specific basis as a function of soil management and any erosion protection measures implemented.

508. There are changes planned in the conditions to be met for receiving direct payments as concerns agricultural use of soil, and they are meant to curb the steady erosion of agricultural land. In future the direct payment and obligations ordinance (*Direktzahlungen-Verpflichtungenverordnung – DirektZahlVerpflV*) will establish erosion hazard classes (wind and water erosion) and corresponding protective measures that take the risk of erosion into account. There are to be three hazard classes for water erosion (no risk, risk, high risk) and two classes for wind erosion (no risk, risk). Definition of the classes will be keyed to land features, soil and climate conditions, management systems, land use type, crop rotation, and operational structures. The direct payment and obligations ordinance is to stipulate erosion protection measures that target the individual hazard classes (CRAMER 2007).

509. Protection against wind and water erosion is not only important for soil fertility, but also a key to reducing nutrient inputs into waters. Table 6-7 provides an overview of the key information on erosion.

Table 6-7

Basic information on erosion

Indicator	Visible soil erosion, degree of risk (hillside situation, silt soils), degree of ground cover
Cause	Agriculture, global warming (intense rainfall events)
Quality targets	National Strategy on Biodiversity 2007: continuous reduction of erosion by 2020
Measures	Increase contour ploughing; type of tillage; limitation of soil management time periods
Key statutory regulations	Federal Soil Protection Act (good agricultural practice), Federal Soil Protection and Contaminated Sites Ordinance (for water erosion only), Direct payment and obligations ordinance (<i>DirektZahlVerpflV</i>)
Deficits	Federal Soil Protection and Contaminated Sites Ordinance in conjunction with Article 17 Federal Soil Protection Act merely requires registration of problem, consultation if necessary, but no actual measures
SRU/UG 2008/Table 6-7	

The “visible soil erosion” indicator should be seen in a critical light, as large-scale erosion that is hardly visible also leads to significant soil losses. The envisioned regulations of the direct payment and obligations ordinance should be shaped with a critical view to their actual implementation as well as their efficiency. As the efficiency of individual protective measures can vary widely in practice, comprehensive protection against water and wind erosion must be ensured by a combination of several measures (MOSIMANN 2008).

6.2.5 Harmful soil compaction

510. Harmful soil compaction denotes permanent damage done to soil structure through its use. Some of the negative effects on soil functions caused by large agricultural machinery are impaired infiltration capacity, reduced air capacity, and interference with its water and air conductivity. This has adverse effects on crop yield and on the living conditions of soil organisms and microorganisms. In addition, harmful soil compaction increases the risk of water erosion on surfaces otherwise only moderately at risk.

Soil compaction can be minimised by means of conservation tillage. Low levels of mechanical stress would allow soil organisms such as earthworms to regenerate on their own within one to two vegetation periods, in turn leading to improvement of soil structure.

511. No national data on the extent of soil compaction is available at present, particularly as the experts have not reached a consensus on the methods of unambiguous identification of harmful soil compaction as intended by the Federal Soil Protection Act (CRAMER et al. 2006). Criteria for detecting harmful soil compaction were developed for the *Land* of North-Rhine/Westphalia on the basis of tests conducted on 46 areas of varying soil types. Also taking into account criteria developed by LEBERT et al. (2004) to determine harmful soil compaction, such compaction was found at the topsoil base but not in the subsoil. However, air capacity levels in many loam and silt soils are already in the critical range. The authors conclude that only long-term soil monitoring can determine whether gradual degradation of the subsoil is occurring (CRAMER et al. 2006). Tests in Saxony, Bavaria, Schleswig-Holstein, Lower Saxony and Thuringia also revealed that although there is no extensive compaction of subsoil, it has occurred on soils subject to heavy traffic such as driving lines, headlands, and access areas (LORENZ 2008).

Table 6-8 provides an overview of the key information on compaction.

Table 6-8

Key information on compaction

Indicator	Air capacity, water conductivity, structure/texture (compactness, packing density, spade diagnosis)
Cause	Agriculture
Quality targets	National Biodiversity Strategy 2007: Maintenance of yield capacity and natural soil functions, avoid soil compaction as far as possible, achieve 20% share organic farming by 2010
Measures	Limitation of wheel load per unit space, optimisation of type and timing of tillage, crop rotation scheme
Key statutory regulations	Federal Soil Protection Act (good practice)
Deficits	Due to lack of authoritative indicators, no limit values/impact levels can be derived
SRU/UG 2008/Table 6-8	

The precautionary principle calls for consistent monitoring programmes, more knowledge about causes and synergies, and in particular, user-oriented transmission of this knowledge.

6.2.6 Loss of organic matter

512. Loss of organic matter can be caused mechanically by wind and water erosion (removal of humus-rich topsoil). More extensive loss, however, is caused by widespread reduction of carbon content as a result of intensive agricultural use.

A study conducted by the Federal Institute for Geosciences and Natural Resources (BGR) determined the content of organic carbon (C_{org}) in four different climatic regions throughout Germany with 15 different soil types, with a total of 9,000 samples of topsoil used as farmland, grassland, and forest. The organic carbon content can be categorised according to humus class on the basis of the German Soil Mapping Guide (Table 6-9) (BGR 2005).

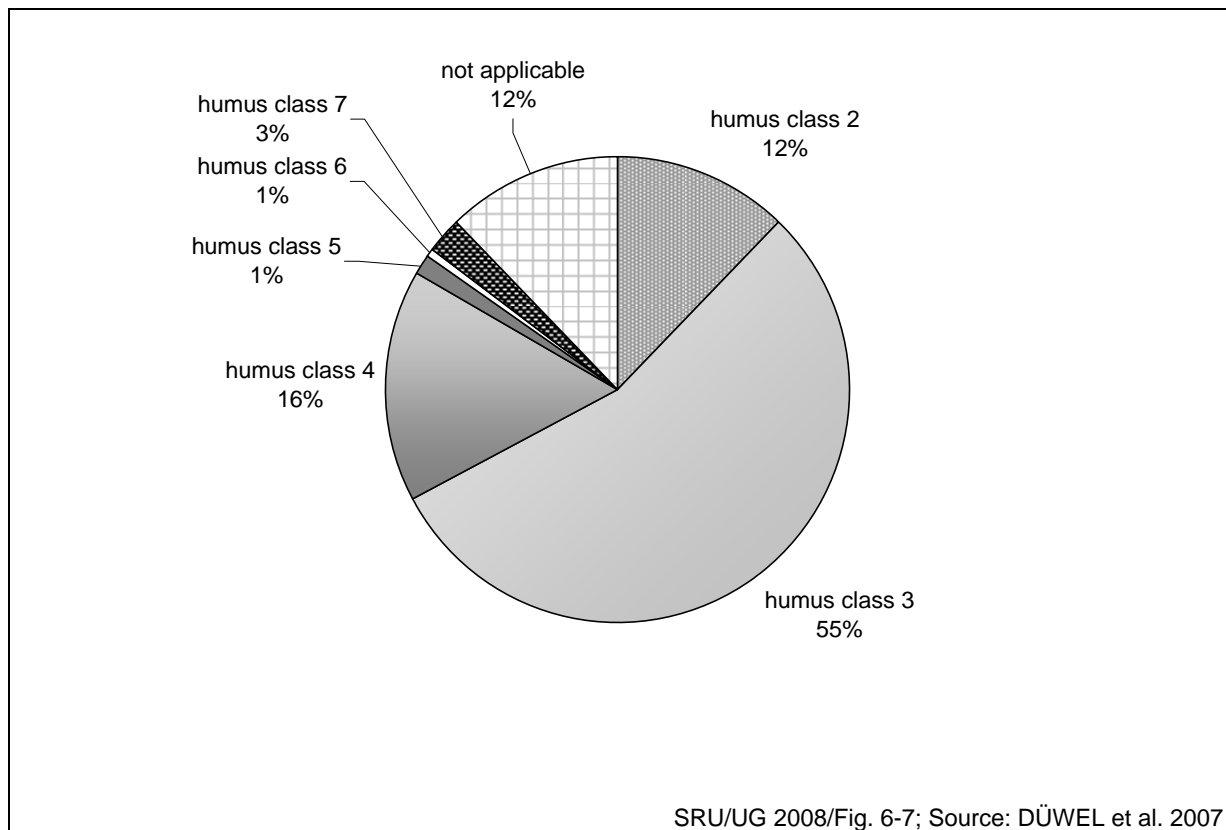
Table 6-9

Humus classes as per Soil Mapping Guide

Abbreviation	Humus content (wt.%) Farmland, grassland	Humus content (wt.%) Forest	Designation
H1	0	0	Humus-free
H1	< 1	< 1	Very low humus
H2	1 to < 2	1 to < 2	Low humus
H3	2 to < 4	2 to < 5	Middle humus
H4	4 to < 8	5 to < 10	High humus
H5	8 to < 15	10 to < 15	Very high humus
H6	15 to < 30	15 to < 30	Extremely high humus content, peaty soil
H7	> 30	> 30	Organic
Source: DÜWEL et al. 2007			

Figure 6-7 illustrates that more than half of Germany's land area is classified as humus class 3 (Middle humus).

Figure 6-7

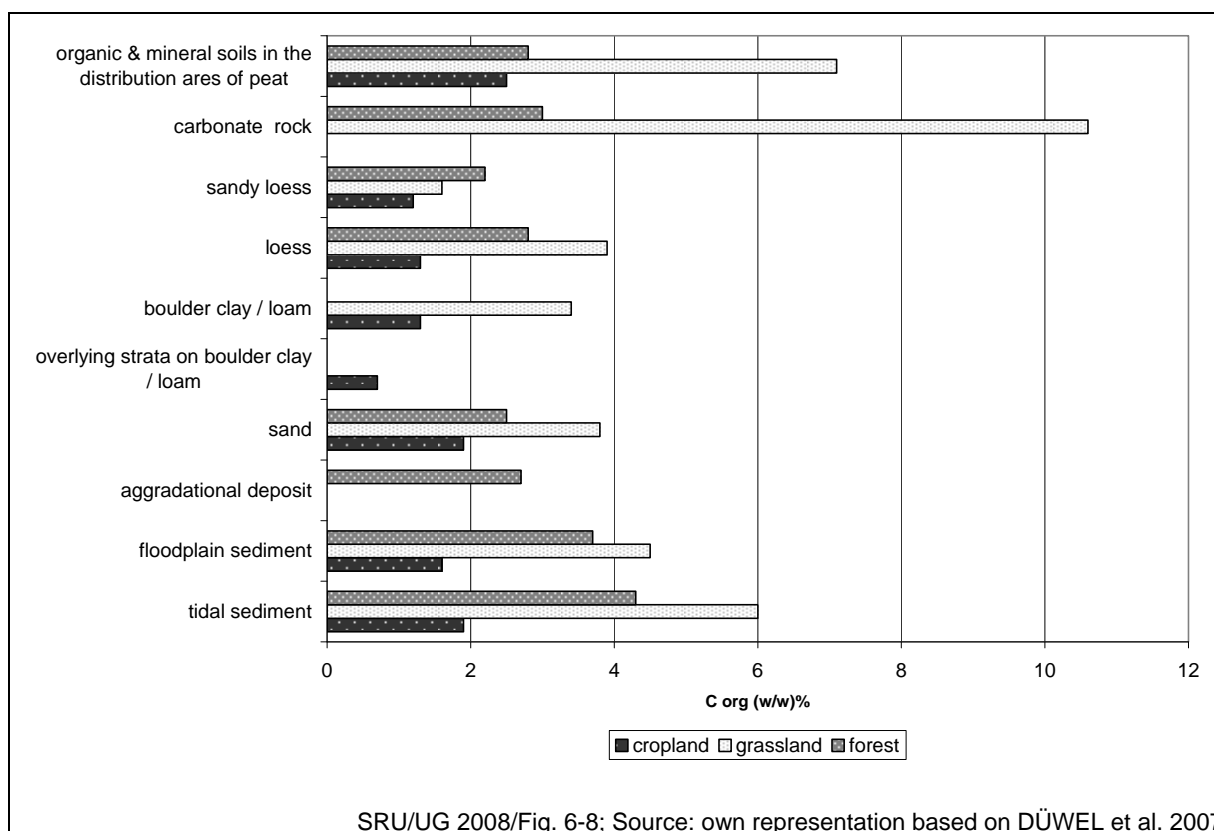
Surface area according to humus content (Germany)

It is striking that the lowest humus concentrations were found in soils used in agriculture regardless of soil type and climate region. As a rule an increase in humus content is observed in the order: farmland – forest – grassland. Humus contents in soils used for arable farming fall mainly in humus classes h2 and h3; in forestry use within the range h3 and h4; on grassland within the range h4 and h5 (DÜWEL et al. 2007).

513. Figure 6-8 shows the content of organic C in the topsoils of Climate Zone 33 for various use types. It describes the north-western climate region of Germany (medium to (partly) heavy precipitation, moderately cold winter, moderately warm summer, vegetation period ranging from 180 to more than 210 days). Regardless of soil type, use as farmland demonstrated the lowest levels of humus content; grassland the highest.

Figure 6-8

**Contents of organic C in Germany's various topsoils in Climate Zone 33
(Use: farmland, grassland, forest)**



No trend can be established as the data evaluated stems largely from 1984 – 2004, but the data can provide a basis for comparison for harmonised monitoring. Regular tests based on an optimised data collection scheme should be carried out so as to produce reliable proof of changes.

514. Analysis of data on the organic C content of topsoils in Germany reveals that more than 75 % of land areas possess a satisfactory humus content of more than 2 %. What is conspicuous, however, is that humus content depends heavily on type of land use – a move to use set-aside land for agriculture as recently decided (European Commission 2007) will have associated negative impacts on the C supplies stored in the soil.

Table 6-10 provides an overview of the key information on loss of organic matter.

Table 6-10

Basic information on loss of organic matter

Indicator	C content, humus content, fertility/lower yields
Cause	Agriculture
Quality objectives	Humus balance on agricultural land receiving direct payments: Humus balance must be between 75 and 125 kg C/ha per year; alternatively, minimum 1 % humus content on soils used for agriculture
Measures	Humus formation through use of organic fertilisers, mulches
Key statutory regulations	Direct payment and obligations ordinance (DirektZahlVerpflV); Federal Soil Protection Act (good practice)
Deficits	Inadequate implementation
SRU/UG 2008/Table 6-10	

Since humus formation is dependent on the breakdown of organic matter (by fertilisers or soil adjuvants), measures must be taken so that the desired components of organic fertilisers (liquid manure, manure, compost, digestates) are not introduced into soils together with pollutants (Item 497 ff.).

6.3 Soil protection law

515. German soil protection legislation is comprised primarily of specific soil protection instruments embodied in the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance. However, these laws only govern limited areas of what should be regarded as comprehensive cross-sectoral soil protection. A great number of other aspects are addressed by other environmental protection laws, which include in particular nature conservation law, laws governing approval of installations, sectoral planning and building law, as well as legislation governing hazardous and other substances (HERRMANN 2007, marginal note 18 f.). This complex regime is in essence suited to achieving an appropriate measure of protection of soils and their functions. However, although deficits in the regime have been known for quite some time, no corrective measures have been initiated. The following section first illustrates well-known deficits, before going on to analyse current developments in soil protection law. In respect of soil protection law *per se* no appreciable changes have occurred in the period under review. With regard to environmental law, for which soil protection is relevant but not a primary focus, the following points have increasingly been recognised:

- The necessity to make the legislative planning instruments of building law, nature conservation law, and water conservation law more effective by targeting a reduction of land use, and

- The need to take more account of soil protection in environmental impact assessments of plans and programmes and in the environmental impact assessments for specific projects.

After a long period during which the EU remained very reserved on the subject of regulating soil protection, the EU Commission took decisive steps in 2006 to initiate European Community legislation governing the protection of soils. The Commission put forward a draft Soil Framework Directive, which has however failed in the meantime.

6.3.1 Deficits of German soil protection law – a survey

516. In respect of German soil protection law in particular (SRU 2000, Item 447 ff.; SRU 2004, Item 786; for more far-reaching demands, see BVB 2006), the following issues remain grounds for criticism:

- the far too narrow scope of application of the Federal Soil Protection Act,
- lack of governance capacity in the identification of the purpose and principles, Article 1 Federal Soil Protection Act, which can be traced to omission of legal establishment of the priority of individual soil functions over other functions,
- the continued lack of an ordinance on unsealing,
- inadequate legally binding constraints on agricultural use of soil,
- the limited enforceability of compliance with Good Agricultural Practice as per Article 17 Federal Soil Protection Act due to prioritised implementation of the Sewage Sludge Ordinance, the Fertilisers Act (DüngeMG), and the Closed Substance Cycle and Waste Management Act (KrW-/AbfG), traceable to Article 3 Section 1 No 1 Federal Soil Protection Act, which in part contain regulations that prejudice soil protection,
- lack of regulations on recording accumulation of soil impairments from diffuse sources,
- lack of regulations on physical damage impact in the Federal Soil Protection and Contaminated Sites Ordinance, especially in respect of avoidance of soil compaction when applying substances in accordance with the Federal Soil Protection and Contaminated Sites Ordinance,
- the insufficient recording of relevant harmful substances in the lists of substances and values of the Federal Soil Protection and Contaminated Sites Ordinance,
- lack of orientation of the Federal Soil Protection and Contaminated Sites Ordinance towards the function of soil as a basis of life,
- lack of test values for the soil-human pathway in the Federal Soil Protection and Contaminated Sites Ordinance, which have in the meantime been developed,
- lack of consideration of soil acidification in the Federal Soil Protection and Contaminated Sites Ordinance,

- insufficient definition of protection against soil erosion through run-off in the Federal Soil Protection and Contaminated Sites Ordinance, and
- lack of definition of protection against wind erosion.

Altogether the deficits identified underscore the considerable incapacities of the laws specifically governing soil protection.

In respect of other legislation relevant to soil protection, the following shortcomings can be highlighted:

- a gradually increasing relaxation of the principle founded in Article 35 Federal Building Code under which building on outlying areas should largely be avoided,
- lack of obligations to work towards space-saving planning in the realm of transport infrastructure planning,
- despite the statutory requirement to treat soil and its functions as a good worthy of protection in its own right, soil protection is upstaged by the fact that the practical implementation of intervention rules under nature conservation law focuses on the protected assets animals and plants,
- failure to ensure that fertiliser legislation, which is very closely related to soil protection, is keyed to the interests of preventive soil protection by means of binding and standardised pollutant limits which are established on the basis of universal sets of criteria and are applicable to all fertilisers;

(For detailed critique and other deficits see: SRU 2000, Item 444 ff.; 2004, Item 778 ff.; SPARWASSER et al. 2003, Article 6 marginal note 17 ff., Article 9 marginal note 73 ff.; KÖCK and HOFMANN 2007, p. 46 f.). There is an urgent need to correct these imbalances in future amendments to pertinent legislation.

6.3.2 Further developments in soil protection law

6.3.2.1 Increasing the effectiveness of planning law

517. Planning law is quite significant in relation to preventive soil protection, as it is better suited to controlling land consumption before authorisation is granted to projects that impair soil, and it can sometimes help to protect soil against substance inputs. This will now be shown for physical development planning, landscape planning, and planning in the area of water protection laws.

Physical development planning

518. A number of the provisions in the Federal Building Code seek to combat land use in urban building projects and thus slow the unbridled consumption of land (Item 339). The so-

called soil protection clause in Article 1 Section 1 Federal Building Code states that land shall be used sparingly and with due consideration. In order to minimise land take for building purposes, there is a need to implement the development possibilities for municipalities such as rehabilitation of (derelict) land, building infill and other urban development measures. In an effort to advance the cause of preventive soil protection and reduce land take, regulations were added to the Federal Building Code as a result of the entry into force of the Act Facilitating Planning Projects for Inner Urban Development (*Gesetz zur Erleichterung von Planungsvorhaben für die Innenentwicklung der Städte* (Federal Gazette I, 27 December 2006, p. 3316) on 1 January 2007. The amended Article 13a Federal Building Code will be examined in greater detail.

The regulation is aimed at creating incentives to prioritise building in urban areas in that the statutory requirements have been simplified and the process of setting up so-called local development plans can be accelerated. According to Article 13a Section 1 Federal Building Code these land-use plans are aimed at making space re-usable, building infill and other urban development measures. The simplification will essentially be achieved by dispensing with the environmental assessment as per Article 2 Section 4 Federal Building Code (for more on the procedure and requirements see inter alia BATTIS et al. 2007; UECHTRITZ 2007; TOMERIUS 2008; GÖTZE and MÜLLER 2008; MITSCHANG 2007; KOCH and HENDLER 2008, Article 11 marginal note 31 f.). This provides grounds for concern that the specific risks associated with urban development cannot be managed adequately. The environmental assessment serves to take due account of the requirements of environmental protection mentioned in Article 1 Section 7 Federal Building Code. Should the steps necessary for the assessment procedure be waived, the required handling with due consideration of environmental protection requirements affected by the local development plan is hardly possible. As the obligation to include affected environmental protection requirements in the weighing-up process continues to exist, it seems doubtful whether the intended acceleration will actually occur (BUNZEL 2006, p. 37). Dispensing with the environmental assessment for local development plans is also at odds with the authorisation requirements for industrial installations in industrial regions. An environmental assessment of these is mandatory although the standards in the requirements for protecting the environment and human health in industrial areas are lower than those for urban development projects.

Furthermore, it is problematic that Article 13a Section 2 No 4 Federal Building Code makes it possible for local development plans affecting areas of less than 20,000 m² to dispense with compensatory measures for considerable interference with the landscape or the performance and functional capacity of the natural environment in the weighing-up process. In many cases this regulation may well have adverse effects on soil protection, since abolishing the obligation to compensate also eliminates the requirement to feature soil protection measures

such as unsealing in local development planning (TOMERIUS 2008, p. 5 with further references). Should a municipality resort to the accelerated procedure to set up a local development plan, it is imperative that the simplified procedure concerning application of the regulation on interventions as per Article 13a Section 2 No 4 Federal Building Code be limited to compensatory measures. There is no exemption from the obligation to avoid and minimise interventions (LOUIS 2007, p. 98 f.; MITSCHANG 2007, p. 446; TOMERIUS 2008, p. 5).

Overall it must be said that the simplified procedure introduced in Article 13a Federal Building Code raises the risk of considerably weakening the level of environmental protection for the area covered by the local development plan. In addition, it seems doubtful that urban planning will indeed be prioritised. In any event there is no legally binding establishment of a principle to prioritise building infill in urban areas before greenfield areas. Urban development measures continue to be voluntary and have to compete with building development in outlying areas, which from the short-term economic perspective are frequently a more attractive option (TOMERIUS 2008, p. 6).

Nature conservation law planning

519. In the area of nature conservation law, landscape management as per Article 13 et. seq. Federal Nature Conservation Act will play a key role. A revision of the Federal Nature Conservation Act in 2002 significantly boosted the priority of soil protection. Landscape management is oriented towards preventive and extensive nature conservation (MAAß and SCHÜTTE 2007, marginal note 52) and is supposed to exhibit and justify the requirements and measures taken in terms of nature conservation and landscape management for each individual planning area. According to Article 13 Section 1 sentence 2 of the Federal Nature Conservation Act, landscape management serves to implement the aims and principles of nature conservation and landscape management, of which soil protection is one. Article 2 Section 1 No 3 Federal Nature Conservation Act requires soil resources to be preserved in a way which allow them to fulfil their relevant tasks and functions in the ecosystem. No 11 of this provision stipulates that on account of their significance for the ecosystem and for recreation, non-built-up areas are to be preserved in terms of area and their properties and functions which enable them to fulfil their purpose in this context. Sealed surfaces which are no longer required shall be restored to a more natural state ('re-natured') or, where unsealing is not possible or excessively expensive, they shall be left to develop naturally. In addition, the specific provisions on landscape planning also require arrangements to be made regarding soil protection in landscape plans. Article 14 Section 1 No 4e of the Federal Nature Conservation Act stipulates that the requirements and measures needed to protect, improve the quality of and allow regeneration of soils must be included in plans. Landscape planning that involves soils used for agriculture may also have indirect soil protection effects if the objectives of nature conservation are pursued by placing limitations of the use on certain

areas (HOFMANN 2007, p. 1396 with further references). With this foundation, soil protection measures affecting both area and quality can be set out in landscape plans.

The significance of landscape planning for soil protection is evident from Article 14 Section 3 Federal Nature Conservation Act, which requires the contents of landscape planning to be taken into account as part of other plans and administrative procedures. In addition to the environmental and Habitats Directive impact monitoring assessments referred to in Sentence 2 of the provision, there is an obligation to take into consideration all planning and administrative procedures which may lead to decisions having an impact on nature and landscape in the planning area concerned, thereby establishing a comprehensive enforcement directive. Sentence 3 establishes a means to monitor this, as any decisions made within the scope of other plans that are not geared to the contents of landscape planning must be justified. (GASSNER in: GASSNER/BENDOMIR-KAHLO/SCHMIDT-RÄNTSCH 2003, Article 14 marginal note 16 ff.). However, there is no concrete legal formulation of how soil protection can be incorporated into the determination, assessment and establishment of measures required in landscape management. This is identified as the main reason why soil protection is in fact not taken into adequate consideration in landscape planning (KÖCK 2007, p. 173 ff.). The contribution currently made by landscape management to soil protection is also limited in that, in practice, it prioritises the protection of valuable animal and plant species and the protection of habitats (HOFMANN 2007, p. 1396 with further references).

Water protection law planning

520. Based on the obligation to draw up water management framework plans and measures set out in the WFD and featured in Articles 36 and 36b Federal Water Act, water law planning is also of increasing importance for soil protection. Since these plans and programmes must be applicable to the entire catchment area of a river, they will affect soil protection, especially in terms of quality, since achievement of good chemical water quality often requires a reduction in pesticide and fertiliser inputs. If a programme of measures places such a restriction on the use of certain substances, the enforcement authorities have no power to change it (KÖCK 2007, p. 175 f. with further references).

The flood protection regulations of Article 31a to 32 Federal Water Act have in the meantime also promoted the cause of soil protection. In particular, this can be traced to the regulations in Article 31b Federal Water Act relating to flood areas and the obligation to avoid possible erosion and pollutant inputs from agricultural land, limitations on building development (Article 31b Section 4 Federal Water Act), as well as the obligation to preserve the water retention function or actually restore retention areas. The extent to which flood planning is binding for other sectoral planning has not as yet been regulated by law (KÖCK 2007, p. 176 ff.). The Federal Environment Ministry's draft for the second book of the

Environmental Code – Water Management (BMU 2007b; UGB-E II) does not prescribe any binding force for the risk management plans for areas at risk of flooding pursuant to Article 57 UGB-E II.

6.3.2.2 Soil protection in the context of cross-sectoral impact assessments

521. Effective soil protection also depends to a large extent on consideration of aspects relevant to soil protection in cross-sectoral impact assessments of plans and programmes (Strategic Environmental Assessment – SEA) as well as specific projects (environmental impact assessment – EIA). Incorporation of SEA into national law in 2005 was justified on the basis of the requirements of Community law that certain plans and programmes be subjected to an assessment of their environmental impacts in the course of their deployment. According to the Environmental Impact Assessment Act (EIA Act, German: *UVPG*) an EIA must be carried out in the preliminary stages of a specific project. The implementation of nature conservation intervention rules within the meaning of Article 18 ff. Federal Nature Conservation Act also stipulates that relevant soil protection aspects must be considered. Their evident deficits have been discussed (Item 516 for references), and the following analysis will therefore be confined to SEA and EIA.

Impact assessments of plans and programmes

522. The strategic environmental assessment (SEA) provides a means whereby the plans analysed in Items 518 – 520 can be designed to take sufficient account of soil protection considerations. An SEA as per Article 14b Section 1 No 1 in conjunction with Annex 3 No. 1 EIA Act must be performed not only for the physical development plans, flood protection plans and programmes of measures pursuant to Article 31d or Article 36 Federal Water Act discussed here, but also for landscape planning within the meaning of Articles 15 and 16 Federal Nature Conservation Act, as well as other plans that may have considerable implications for soil protection issues. The same applies to Federal Government infrastructure planning, airport expansion plans, or regional policy planning.

An SEA must include aspects of soil protection in the environmental report required pursuant to Article 14g EIA Act. The environmental report must detail and evaluate the probable significant environmental impacts of implementation of the plan or programme and must propose feasible alternatives. The environmental impacts which must be taken into consideration pursuant to Article 14g Section 2 No 5 in conjunction with Article 2 Section 1 No 2 Federal Soil Protection Act include impacts on soil. Soil impact is to be interpreted broadly as the recording of impairments of any and all soil-related functions including land consumption. Promoting soil protection concerns within the scope of an SEA does however require a more precise definition of the legal mandate in such a way as to make it legally

obligatory to carry out an investigation and review of the plans and programmes with a view to favouring the most economic plan in terms of its land take (BOVET 2007).

Environmental Impact Assessment

523. In addition to other protected assets, an EIA within the meaning of Article 2 Section 1 Nos 2 and 4 EIA Act comprises identification, description and assessment of the direct and indirect impacts of a project on soil as well as the interactions between soil and the other protected assets mentioned in the provision. The EIA must focus in particular on the protection status and performance of the soil in respect of its various functions, its potential sensitivity and need for protection, as well as its stress resistance and any pre-existing pollution (GASSNER et al. 2005, p. 85). As concerns the assessment of the effects of a project subject to an EIA on the soil substance structure, guidance is provided in No. 1.3 of the Annex to the General Administrative Guidelines on the Execution of the Environmental Impact Assessment Act (GMBL 1995, p. 671). This stipulates that the focus must be on enabling soil to retain its natural functions, use functions and performance capacity (APPOLD in: HOPPE 2007, Section 2 marginal note 30). Under Sentence 2 of the provision, the assessment must check whether execution of the development project would cause a change in the physical, chemical or biological condition of the soil which could potentially impair natural soil functions. Furthermore, it is decisive whether the project, having regard to its intended use functions, is compatible with the character of the area and whether the planning decisions are in accordance with statutory environmental requirements. The factors relevant to all soils are sealing, pollutant input, soil deposition and erosion. For the factors soil compaction, water and wind erosion as well as nutrient inputs or changes in the groundwater balance, however, a differentiated assessment depending on the specific sensitivity of the affected soil must be undertaken (GASSNER et al. 2005, p. 97).

The General Administrative Guidelines on the Execution of the Environmental Impact Assessment Act (German: *UVPVwV*) apply statutory environmental standards when assessing the environmental effects of a project subject to a mandatory EIA (see No. 1.3.1 for installations subject to licensing in accordance with the Federal Immission Control Act or No. 5.3.1 for waste water treatment installations subject to licensing under Article 18c Federal Water Act). As a result, the procedure for especially relevant installations subject to licensing under the Federal Immission Control Act in respect of soil protection is as follows (GASSNER et al. 2005, p. 303):

- It must be determined whether soil as an asset is actually affected.
- If there are grounds to suspect a contaminated site, appropriate measures must be taken as prescribed by the Federal Soil Protection Act.
- It must subsequently be verified whether the project would lead to harmful soil changes within the meaning of Article 2 Section 3 Federal Soil Protection Act.

- Should the environmental impacts of the project fall within the scope of one of the laws listed in Article 3 Section 1 Sentences 1-11 Federal Soil Protection Act, the soil impacts are to be assessed according to these laws insofar as they are relevant.
- If the law is not pertinent, the Federal Soil Protection Act can be implemented on a subsidiary basis.
- Subsidiary implementation of the guidelines for assessment of the effects on the soil substance structure pursuant to No. 1.3 of Annex 1 UVPVwV is permissible.

6.3.2.3 Interim conclusions

524. The above considerations illustrate that significant domains of sectoral planning and environmental law whose scope does not specifically address soil protection are grounds for establishing an appropriate legal framework with which to promote soil protection. This is especially valid for the procedural provisions analysed which pertain to nature conservation and protection of waters as well as the cross-sectoral SEA and EIA environmental assessments. There is one exception, namely in Article 13a Federal Building Code, as it does not establish a basis which encourages efficient space-saving urban land use planning. Furthermore, several other clauses in the Federal Building Code call for taking account of relevant soil protection aspects, and as such the Federal Building Code also provides an adequate framework for soil protection. Thus the root cause of the unchanged poor condition of soils in Germany (Chapter 6.2) is not possible deficits in sectoral planning and environmental law, but rather the fact that insufficient use is made of the opportunities to take account of soil protection in the enforcement of the regulations discussed here. As an example, soil protection consistently takes lower priority in the course of development planning procedures. The stronger emphasis required in enforcement of the relevant legal framework can be achieved by setting tougher objectives in legislation pertinent to soil protection. It is thus crucial that the Federal Soil Protection Act and Federal Soil Protection and Contaminated Sites Ordinance be amended to include requirements that cannot be circumvented in the context of pertinent sectoral planning and environmental law.

6.3.3 On the way to Europeanisation of soil protection law

525. In 2006 the European Commission made an attempt to an Europeanisation of soil protection law by presenting a thematic strategy for soil protection, an impact assessment based on this strategy, and a proposal for a framework directive on soil protection (European Commission 2006b; 2006c; 2006d). However, owing to resistance by Germany, Great Britain, Austria and the Netherlands, no consensus was reached in the EU Council of Environment Ministers (EU Council 2007, p. 8; ENDS Europe Daily, 20 December 2007). As far as Germany was concerned, this was due largely to subsidiarity considerations and the perception that resolving possible transboundary effects of soil impairments was better done

by bilateral agreement, as well as objections to certain clauses in the draft directive (Bundesrat 2006). After initial failure of its legislative initiative the European Commission is now waiting for a future President of the Council to readdress the proposal. The following section outlines the legal content of the draft soil protection framework directive (German: *BRRL-E*), shows the need for adjustment of German law had the framework directive entered into force, and takes a closer look at the subsidiarity argument.

6.3.3.1 Provisions of draft Soil Framework Directive

526. The objective of the draft Soil Framework Directive was to create a framework in which to protect soil and preserve its capacity to fulfil its ecological, economic, cultural and social functions. According to Art. 1 Section 1 Lit. a) to g) of the draft directive these functions include biomass production, storing, filtering and transforming nutrients and water, hosting the biodiversity pool, acting as a platform for human physical and cultural activities, providing raw materials, acting as a carbon pool and storing the geological and archaeological heritage. In order to reach these goals the draft had foreseen planning instruments with which to prevent or minimise degradation of soil quality and also to protect soil from chemical pollution. The instruments are geared to containing the impact of soil quality degradation and restoring and remediating impaired soils to a level of functionality which is at the very least appropriate for its authorised use both at present and in future. The General provisions in Chapter 1 of the draft directive had foreseen that member states would:

- take soil protection into consideration in policy measures not directly related yet relevant to soil (Art. 3),
- oblige any land user to take precautionary measures to minimise or prevent adverse effects on soil functions (Art. 4) and
- limit sealing through appropriate measures (Art. 5).

Chapter II of the draft provided for measures of risk prevention and mitigation and restoration of soil quality. Specifically, Art. 6 sought to commit member states to identifying so-called risk areas in their national territory within five years from the transposition date of the directive and to make them public. A risk area is an area in which degradation of soil quality has either already occurred or is likely to do so in the near future. The driving forces of degradation are likely to be water and wind erosion, organic matter decline, compaction, salinisation, and landslides. Art. 8 sought to establish programmes of measures for the risk areas; these were to combat the causes of degradation and to be put in place and made public by the member states. These programmes were meant to be geared to preserving known soil functions. They were to be drawn up within seven years from the transposition date of the directive and brought into force no later than eight years after that date. At the very least they were to lay down risk reduction targets, appropriate measures with which to achieve said targets, a

timetable for the implementation of those measures, as well as an estimate of the allocation of private or public means for funding those measures. Member states were also to indicate in their programmes of measures how the measures were to be implemented and how they would contribute to achievement of the environmental targets established.

In respect of soil contamination, Chapter III of the draft directive required member states to take measures to limit the introduction of dangerous substances onto or into soil. These measures were to serve the purpose of preserving soil functions and to avoid putting human health or the environment at risk. The matter of whether the introduction of substances was intentional or unintentional was immaterial. Deposition from the air or due to natural phenomena were exempted from the clause. Articles 10 and 11 required member states to identify confirmed contaminated sites and make this information public in a national inventory. A site can be considered contaminated where there is a confirmed presence, caused by man, of dangerous substances of such a level that member states consider they pose a significant risk to human health or the environment. Art. 13 provided that member states were to ensure that the contaminated sites listed in their inventories would be remediated in accordance with a strategy drawn up by the member state concerned. The strategies had to include at least remediation targets, prioritisation starting with those sites that posed a significant risk to human health, a timetable for implementation, and the funds allocated (for analyses of the draft directive see inter alia HEUSER 2007, 119 f.; HOFMANN 2007, p. 1398 f.).

The draft soil framework directive proved rather weak in terms of the level of protection it could achieve, particularly since it did not identify any quantitative soil protection targets (on this and other flaws in the draft directive see UBA 2007d; HEUSER 2007, p. 119 f.). For the sake of a better standard of environmental protection and in order to avoid unfair competition between the member states a renewed initiative to establish European soil protection law must whatever happens seek to strengthen and harmonise the scope of protection.

6.3.3.2 Hypothetical need to adapt German soil protection legislation

528. As concerns German soil protection law there would have been a need for adaptation to the demands made in the draft soil protection directive, mainly in the fields of contaminated sites law and preventive soil protection.

In respect of the inventory of contaminated sites referred to in Art. 10 of the draft directive it must be said that the *Länder* have long administered cadastres of contaminated sites that identify both existing and suspected sites. The Federal/*Länder* Working Group on Soil Protection (LABO) has recently begun to provide a complete report for Germany (Item 503). Nevertheless, the available information would only have partly met the requirements set out in the draft directive. The definition of contaminated sites in Article 2 Section 5 Federal Soil Protection Act is confined to installations already closed down. Art. 11 Section 2 of the draft

directive, however, had also required the inclusion of sites where potentially soil contaminating activities as identified in Annex II to the draft directive were taking place or had already taken place. It follows that both active and decommissioned sites would have to be featured in the inventory. This would have required an amendment to national law.

The national equivalent of the obligation to remediate contaminated sites as prescribed in Art. 13 Section 1 of the draft directive is reflected in Article 4 Section 3 Sentence 1 Federal Soil Protection Act. It determines that contaminated sites as well as any water pollution caused by contaminated sites must be remediated in such a manner that no hazards or considerable disadvantages for individuals or the general public occur. The remediation strategy envisaged for that purpose by the draft directive does under German law apply to all contaminated site remediation projects and is moreover not mandatory. However, significant elements of the planning required of member states for tackling the problems of contaminated sites (for requirements see HOFMANN 2007, p. 1401 f.) are reflected in Article 13 Federal Soil Protection Act. This states that the competent authority is to require submission of a remediation plan from parties obligated to carry out remediation when the plan calls for a coordinated approach to various measures or in the event of contaminated sites with particularly harmful soil changes or those that hold other hazards for individuals or the general public. The plan must include a description of the remediation objective and a timetable for execution of the measures. Achieving conformity with the directive would have required extending the provisions to all contaminated sites, however, and changing the provision from a facultative to a mandatory one. No provisions for prioritisation of remediation projects based on the risk they pose to human health exist in German legislation on soil protection; however the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance prescribe remediation based on limit values set in the Federal Soil Protection and Contaminated Sites Ordinance which results in a certain setting of priorities for remediation sites depending on the risk they pose (HOFMANN 2007, p. 1402). There is no requirement, however, for well-planned and coordinated determination of the order in which sites should be remediated in view of the risk they pose to human health.

529. The obligation to implement a soil framework directive would have propelled German law forward in the area of preventive soil protection. Article 4 of the draft directive provided for member states to ensure that precautionary measures were taken by any land user whose actions affected the soil in a way that could reasonably be expected to significantly impede the soil functions referred to in the draft directive. Although Article 7 Federal Soil Protection Act contains provisions on preventive soil protection, the resulting obligations to achieve binding preventive soil protection on a large scale fall short of the duties of precautionary soil protection laid down by Community law, owing to limited concretisation of sub-statutory legislation and far-reaching exceptions. According to Article 7 Section 1 Federal Soil Protection Act, the property owner, the actual occupant of a site and the party

who carries out, or causes to be carried out, actions on a site that can lead to changes in soil characteristics are required to take precautions against the occurrence of harmful soil changes. Under Article 7 Sentence 4 Federal Soil Protection Act, however, this apparently comprehensive legal obligation can only be imposed by means of official orders to the extent that it meets requirements stipulated in the Federal Soil Protection and Contaminated Sites Ordinance. In this respect Articles 9-12 Federal Soil Protection and Contaminated Sites Ordinance are authoritative, but they do not cover all relevant pollutants (SRU 2004, Item 786, 828). Added to that is the limited applicability of Article 7 Federal Soil Protection Act, Sentences 5 and 6 of which state that other specialised laws govern the obligation to take precautions in connection with agricultural and silvicultural soil use and with respect to impacts on groundwater. With regard to the agricultural land use that is particularly relevant to endangerment of soil functions, the obligation to take precautions pursuant to Article 17 Section 1 Sentence 2 requires compliance with the principles of good agricultural practice pursuant to Clause 2 of the provision. However, the principles of good practice do not ensure effective preventive soil protection, which can largely be traced to the absence of provisions about chemical impacts on soil in Article 17 Federal Soil Protection Act, which focuses instead on physical impacts on soil. Moreover, the law enforcement authorities are not accorded any capacity to enforce the principles of good agricultural practice (for more on deficits see von STRENGE 2004, p. 184 ff. with further references).

530. Transposition of a draft soil framework directive into German law would have required the following key adaptations:

- Instead of the present empowerment pursuant to Article 13 Federal Soil Protection Act, the competent authority should be required to demand submission of such plans by parties obligated to undertake remediation,
- An obligation to draw up remediation plans, including for contaminated sites whose remediation does not require any coordinated measures and which do not cause any considerable harm,
- An obligation to identify allocated budget resources for the remediation of contaminated sites,
- An obligation to set priorities in remediation projects on contaminated sites having regard to the risks posed to human health and
- Adaptation of the provisions of preventive soil protection in German law to the more rigorous requirements of Community Law.

The necessary adaptations would in part have had considerable effect in practice. Entry into force of the soil framework directive would have created the groundwork for a community legal obligation to undertake coordinated and strategic remediation of contaminated sites, which the organs of the EU might have imposed on Member States. Any dragging of feet in

the process of remediating contaminated sites (Item 502 ff.) would have been halted by limits set by community law. In the area of preventive soil protection there would have been a need to set more binding and far-reaching rules than exist in current law.

6.3.3.3 Regulatory power of the EU

531. Article 175 EC invests the EU with the legislative competence to enact a soil framework directive under Community law. The arguments relating to the subsidiarity clause in Community law which are set out in some of the literature as well as by the German Bundesrat (BUNDESRAT 2006; GLASER 2007; SCHEIL 2007) are not convincing. As is generally known, Article 5 Section 2 EC states that the Community may only take action in areas which do not fall within its exclusive competence if and in so far as the objectives of the proposed action cannot be adequately achieved by the member states and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community (for details on individual demands see CALLIESS in: CALLIESS/RUFFERT 2007, Art. 5 EG marginal note 41 ff. with further references). This principle limits the regulatory power of the EU in favour of the member states in areas where the functions can be performed equally effectively by the member states, having regard to the need for performing the functions and the problem-solving capacity of the subordinate control levels (SRU 2004, Item 1243; KOCH 2004, p. 7 f.). This can however be ruled out particularly in matters that concern transnational environmental protection aspects. The transboundary character of soil protection is often denied by arguing that soil is a static environmental medium and can therefore only be protected locally and in consideration of local conditions (BUNDESRAT 2006, p. 2; GLASER 2007, p. 377). Despite the site-specific nature of the resource, soil protection does affect other aspects that concern member states. For example, long-range transport of pollutants via the air and water pathways results in substance inputs to soil irrespective of member state borders. The effects of wind and water leading to soil erosion are also transboundary in character. One overriding aspect that must also be considered is the function of soil as a carbon sink, source, and storage medium (more in SRU 2004, Item. 821 f. with reference to WBGU 2003, p. 57; HEUSER 2007, p. 121). The impacts on the climate of CO₂ emissions caused by land use changes are clearly not limited to the member states in which these changes in use occur. The fact that these transnational aspects cannot be satisfactorily settled by the member states is illustrated by the serious impairments of soils throughout the EU which have already occurred. Harmonised soil protection policies are also necessary to counter unfair competition among the member states. High standards in soil protection in one member state can prove to be a disadvantage for products grown in that state as compared to products from member states with soil protection standards that are lower or non-existent, and can also lead to relocation of production (HEUSER 2007, p. 121).

6.3.4 Track record and outlook

532. There continue to be grounds for criticism that soil and its functions are in many respects not taken into sufficient consideration even some ten years after the entry into force of the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance. There continues to be a need to establish basic requirements in respect of necessary improvements in soil protection law *per se*, and also in environmental and sectoral planning law that is not geared specifically to soil protection (SRU 2000; 2004). Furthermore it is crucial that soil protection matters become more of a focus point in pertinent planning and cross-sectoral impact assessments within the scope of SEA and EIA. This calls for adequate requirements to be added to the Federal Soil Protection Act and the Federal Soil Protection and Contaminated Sites Ordinance which, when implemented, cannot be circumvented in the context of implementing specialist planning and other environmental law.

Had the soil framework directive been enacted in Germany, it would have required adaptation of practices in the field of contaminated site remediation and improvements in preventive soil protection legislation. The existing regulations steering preventive soil protection under German law, which are extremely unsatisfactory due to the large number of exceptions and the lack of a clear definition of good agricultural practice as concerns soil use, should have been given considerably more weight. This is not to say that these potentially positive effects of a soil framework directive would have corrected the deficits discussed here upon its enactment. Article 3 of the draft Soil Framework Directive, which would have required consideration of soil protection issues in other sectoral policy areas, merely called for a description and assessment of the impacts of individual projects on soil quality. This horizontal clause in the draft directive would have fallen short of the requirements already established in German law to include soil protection concerns in relevant sectoral planning law and other environmental law. The binding nature of soil protection issues in the context of sectoral planning deliberations that is required by German law would not have been reflected in Article 3 Soil Framework Directive.

6.4 Conclusions and recommendations

533. The ongoing trend towards degradation of soils is cause for concern. Soil degradation is generally irreversible, and soil functions can either not be restored by technical means at all, or only partially or at very high cost. The broad distribution of soil protection regulations in other areas of law is generally encouraging since they seek to contain pollution at the source in accordance with the polluter pays principle. However, these requirements are difficult to meet due to disparate local conditions, which means that any existing room for manoeuvre can easily be exploited to favour other interests. As a result, there is a deficit in the practical implementation of soil protection regulations.

For these reasons the following is recommended,

- Take soil protection into account when deriving limit values, and expand existing concepts (e.g. “critical loads”, “like to like”, load model) to include other pollutants, increase the number of measurable quality objectives and integrate them into law,
- harmonise these provisions with the target objectives of other environmental media and set up a consistent system of regulation,
- concretise, standardise, and monitor application and implementation of soil protection regulation and monitor its efficiency.

Agricultural use of soil represented the largest proportion of total land take at over 50 %. Since soil quality is essential to long-term yield one can assume users are interested in preserving soils in good condition. Yet agricultural use of soil subjects it to stress from pollutant and nutrient inputs, physical alterations through erosion and compaction, as well as loss of organic matter. Apart from optimisation measures, which are achieving improvements in some areas, concretisation and monitoring of implementation of good agricultural practice as well as consistent expansion of organic farming are measures that not only mitigate the aforementioned impairments, but also effect improvements in the fields of nature conservation, climate protection and biodiversity.

Expanding the knowledge base

534. In order to raise awareness of soil protection in politics and among the general public, it would be meaningful to develop scenarios similar to those for global warming which illustrate the impacts that continuation of the current trends and the widespread degradation of soil have on the important functions it performs (food supply, clean drinking water, nutrient mass balance, declining carbon storage capacity etc). At the same time there is a need for models that show the effects of foreseeable climate changes on the resource soil. It is only once this basis is established that long-term adaptation strategies can be planned, for example growing crops that are known to provide sufficient ground cover – and thus protection against erosion – in the heavy spring rainfall that has been forecast. Greater account must also be taken of the climatic effects of soil changes.

The database for developing scenarios continues to be inadequate, firstly due to varying methods of collecting data, and secondly due to insufficient amounts of data. One solution might be to maintain and align soil monitoring schemes in Germany. Such alignment requires implementing a system of integrative data management. In particular there is a need for alignment and amalgamation of data about

- Erosion (soil losses, profile shortening),
- Sealing (building cover),
- Chemical alterations (eutrophication, hypertrophication, substance depletion/humus content, acidification, impact of organic and inorganic pollutant inputs), and

- Physical changes (soil compaction).

The objective of this concept is to set up a system of periodic monitoring that is aligned with European standards. Of equal importance are the sharing of research findings, user-oriented development, and communication to polluters.

An evaluation of human and veterinary medical products requires systematic ecotoxicological testing if stable limit values are to be derived that are based on what must be achieved rather than what is feasible.

There is still a need to carry out research on digestates (fermentation residues) as a relatively new organic fertiliser, as the expected increase in use of biomass will result in a significant increase in volume. The gaps in knowledge about volumes, qualities, soil impacts and determination of framework conditions for its use in agriculture must be addressed in short order.

There are a number of different methods of calculating the potential risk of compaction which have not been harmonised owing to the varying results they produce. There is an urgent need for research to find a means of describing the causes and effects of soil compaction in a manner that facilitates its regulation if necessary.

Furthermore, continued publication of the German Federal Government's Soil Protection Report (the original mandate was publication once every four years, beginning in 2002) must be insisted on so as to document the continued development of soil protection in Germany.

Land use

535. Various measures need to be further expanded and supported in order to achieve the Federal Government's declared sustainability objective of reducing new land use to 30 ha per day. This includes land gain by means of activation (remediation of less contaminated sites), brownfield management, unsealing, and ecological urban restructuring. At the same time scenarios must be developed to illustrate how the decline in population can be exploited to positively influence land consumption.

Planning law already allows for key requirements in non-substance preventive soil protection to be met by means of economic and conservative use of soils, minimisation of sealing, unsealing of soils no longer used, prioritising re-use of land (land recycling), and the protection of soils as a natural asset. The infrequent use made of these measures is a problem. The track record in planning law has not yet made any significant progress towards reducing land use. The reasons lie in the poor level of public awareness of the problem, lack of acceptance of the idea of cutting land use in both the political and public realms, and the lack of interest shown by planning authorities in land-saving execution of their plans and projects. Lastly, profit expectations based on appreciation of land value and rising corporate

tax revenues also play a role. All these factors result in planning authorities using their discretionary powers at the expense of economic use of land rather than in its favour.

Since the overall effect of individual measures has not produced any measurable success to date, it is proposed that the following measures set out in the draft 2005 National Strategy on Biodiversity be introduced as binding requirements:

- Establish sub-goals for the reduction of land use at all decision-making levels for the years 2020 (30 ha/day) and 2050 (0 ha/day),
- Confine land use to sites already developed within the limits of cities and municipalities by adopting a ratio of brownfield development to greenfield development of 3:1,
- Execute prioritised projects on greenfield areas after 2020 only on condition that other buildings are pulled down,
- Transform the economic and fiscal framework conditions to encourage the sparing use of land,
- Promote and further develop planning instruments,
- Designate sites for human settlements and industrial estates only when they are based on inter-community cooperation.

In addition, the introduction of tradable allowances for the dedication of building land is recommended, combined with qualitative control of areas by means of spatial planning and physical development planning.

Diffuse pollutant inputs

536. Airborne inputs are gradually declining in Germany and across Europe, but further increases in limit values, for example for NO_x emissions from power plants and the transport sector, remain necessary. Containment of diffuse pollutant inputs at source – by means of Federal Immission Control Act, Technical Instruction on Air (*TA Luft*), Fertilisers Ordinance (*DüMV*), Fertilizer Utilization Regulation (*DüV*), Ordinance on Waste and Sewage Sludge, Sewage Sludge Ordinance, Ordinance on Biowastes, Ordinance on “Utilisation of Mineral Waste and Secondary Products – Substitute Building Materials” (draft), Federal Water Act – must be monitored and its success critically evaluated. Harmonisation of limit values for pollutant inputs to soils is necessary to ensure a uniform level of protection regardless of the product or waste that is introduced. The concept of “Good Quality and Steady Yields” defined in 2002 (BMU and BMVEL 2002) has therefore lost none of its relevance, but ought to integrate mineral fertilisers and certain hazardous organic substances.

Contaminated sites

537. The remediation of contaminated sites is making constant progress in Germany, although its scale is dictated primarily by the limited funds available and not by actual requirements. The recommendations made in 2004 (SRU 2004) still hold true:

There is a need for a national standard for recording data on contaminated sites, in order to facilitate evaluation. It would be desirable, although involving more work, to include additional information such as surface area, remediation objectives, and time planning.

Especially in view of the positive effects of recycling urban brownfields through remediation or re-use, it would make sense to adopt additional means of subsidisation, e.g. tax deductibility of remediation costs or introduction of a charge on resealing with which to co-finance the remediation of contaminated sites.

Soil erosion and harmful compaction

538. It is becoming increasingly important to preserve the physical functionality of soils. Erosion and compaction reduce the performance of soils as concerns both its use by man and its function of serving as the basis of life for flora and fauna. Furthermore, the consequences of altered climate conditions are amplified by erosion and harmful soil compaction.

Sustainable land management that reflects site-specific conditions favours the reduction of pollutant and nutrient inputs into soil, and it also buffers the effects of changing climatic conditions. Moreover, it can even play a role in reducing the extent of climatic change.

The German national ordinance about the principles of preserving agricultural areas in a good agricultural and ecological condition (Direct payments and obligations ordinance – DirektZahlVerpflV) provides for a categorisation of land used for agriculture on the basis of wind and water hazard classes. A close watch should be kept on the actual implementation and efficiency of the planned regulations governing the individual hazard classes under this ordinance.

Loss of organic matter

539. Analysis of the data on the organic C content of Germany's topsoils has shown that a surface area of more than 75 % has humus content in excess of 2 % and can thus be considered as adequately supplied. There is a clear correlation between humus content and land use. Allocation of set-aside land for agricultural use, as recently decided, will have an associated negative impact on the supplies of C stored in the soil.

Since formation of humus is tied to the degradation of organic matter, steps must be taken to ensure that introduction of the desired components of organic fertilisers (slurry, manure, compost, digestates) into soil is not accompanied by inputs of pollutants.

Soil protection law

540. Urban development must not be promoted by dispensing with the environmental impact assessment of physical development plans or with obligatory compensatory measures for impairment of the landscape or performance and functionality of the natural regime. Article 13a of the Federal Building Code must therefore be revised.

The legal provisions that flesh out the notion of favouring urban development over greenfield development must be further developed and geared to making compliance legally binding.

Inclusion of soil protection issues in the enforcement of sectoral planning law and in cross-sectoral impact assessments of SEA and EIA must be pushed forward. This requires setting appropriate objectives in the Federal Soil Protection Act and in the Federal Soil Protection and Contaminated Sites Ordinance that are binding for sectoral planning and cannot be circumvented in the course of planning deliberations.

Better promotion of soil protection in the context of SEA should be achieved through a legal obligation to investigate and document land consumption, and by identifying the most economical planning alternative in terms of land use in the environmental report.

Germany should drop its resistance to the EU proposal for a soil framework directive. In a renewed initiative towards Europeanisation of soil protection law the Federal Government should urge a Community law instrument that goes beyond the failed draft to include progressive and standardised soil protection targets.

The principle of subsidiarity does not require that soil protection policy be left to member states, particularly in view of the fact that climate protection is a transboundary environmental problem.

7.4 Integrated river basin management: Water resources management

581. In view of the great variety of ecological interconnections and the need for effective multifunctional protection of the natural regime, it makes sense not to take a monofunctional approach to river basin districts that is confined to classic water management tasks. In the recent past there has been increasing support for the idea of an integrating approach designed to integrate the development and management of water, landscape and all associated natural resources in combined concepts (BMU, no date; GWP 2004). Multifunctionality of the goals and measures is cited as an important element of such concepts (LOUCKS 2000), as are multidisciplinary and participatory decision processes. In its more recent directives, the European Union has also pursued this integrating approach. The Water Framework Directive (2000/60/EC), for example, is keyed not only to the medium of water, but also to various functions of aquatic ecosystems and to biodiversity as a yardstick for the targeted quality and quantity of water resources.

The following section describes:

- why an integrating management approach that takes account of the ecological interactions and uses in river basins is advantageous;
- what basic conditions and requirements the water-related EU directives (Water Framework Directive, Floods Directive) have created for this;
- what informational and institutional conditions would have to exist in Germany to permit and promote an integrated river basin management system, and what synergies could be achieved by coordinated use of the various instruments.

7.4.1 Reasons for integrated river basin management

582. The many and various functions connected with water cannot be guaranteed solely by a monofunctional management approach confined to water resources. The quantity and quality of groundwater and surface waters, river flood regimes and landscape runoff patterns are all aspects of the natural regime which are also of importance for species and biotope protection, recreation, agriculture and climate protection. For example, measures to improve the water uptake capacity of soils and vegetation can on the one hand reduce torrential runoff or local flooding, while on the other they serve the interests of erosion control, biotope development and landscape improvement (SIEKER et al. 2007). Flood prevention measures in water meadows, such as polder creation or dyke construction, always have impacts – desirable or undesirable – on agriculture and on biotope quality, (e.g. for the Rhine see EVERS 2008; DISSE and ENGEL 2001). The gap in space and time between such interventions and the resulting effects is particularly marked in the field of water

management: Groundwater abstraction may after a certain delay lead to the disappearance of neighbouring or more distant wetland biocenoses; deforestation in the upper reaches of a river may lead to higher flood peaks further downstream; fertiliser application on a plateau above jointed aquifers may cause pollution of springs in the valleys below.

These ecosystem interconnections (HASCH and JESSEL 2004; NNA 2007; see survey in EVERS 2008, p. 54) call for multifunctional landscape management (on the integration of flood control, cf. HENRICHFREISE 2003).

7.4.2 Requirements for appropriate management

583. Appropriate landscape management should – as far present knowledge permits – keep all relevant functions and processes of the natural regime under observation and ensure that interventions and development measures are geared to the multifunctionality of water. Thus measures to develop the performance capacity of the natural regime for drinking water abstraction or flood control should also be utilised for other functions or at least designed to minimise conflicts. Conversely, other uses should be brought into line with the interests of water conservation. It goes without saying that what this means is not “technocratic” planning keyed to optimising the performance capacity of the natural regime, but reconciliation of the various interests in use of the natural regime, and hence a high degree of participation.

Against this background, the ambitions of integrated river basin management currently fall short of the mark. Admittedly it seeks to combine the development of water resources with other demands in a way that minimises conflicts as far as possible. However, a management approach that focuses entirely on water resources development can only function efficiently if at the same time an integrated planning system brings together the sectoral conclusions about needs for environmental action relating to waters, soils, animals, plants, climate and air, and also coordinates them and weighs them against current usage interests. Overall spatial planning currently has only a limited capacity to perform this coordination and decision function, as it is unable to do more than take over numerous environmental planning requirements as they stand – such as water management plans, and also the designation of Natura 2000 areas. At the same time spatial planning does not have the necessary expert competencies to identify and resolve conflicts internal to the environmental sector. A more efficient approach would probably be an environmental planning system which was multifunctional and geared to multiple environmental media from the start, and which prepared the reconciliation process for overall planning and its implementation by means of legal decisions or economic instruments, primarily from an environmental point of view – but also taking account of implementation conditions and user wishes. At present, the closest approach to this goal is landscape planning (HASCH and JESSEL 2004; KAISER 2007, p. 100). As the next-best solution, a future river basin management system should at least be

required to bring about close coordination and integration of data management, planning and implementation between water management plans, nature conservation plans and implementation instruments (EVERS 2008, p. 67), and overall spatial planning (KAPPET 2006). A concrete suggestion for integration of the environmental objectives of the Water Framework Directive and the conservation and development goals of the Habitats Directive was made by JESSEL (2006). Its use was recommended to the federal states in a resolution by the Working Group on Nature Conservation, Landscape Maintenance and Recreation of the Federal States and the Federal Government (LANA) and the Working Group on water issues of the Federal States and the Federal Government (LAWA). The prepare for its implementation there should be cooperation on the provision and allocation of financial assistance for rural development. Differences in the boundaries of the reference areas used for the various planning systems and information bases (especially in geographical or political terms) need not present any genuine obstacles to integrated planning, provided that there is sufficient cooperation between administrative units to ensure spatial representations based on problem-specific boundaries can be prepared for decisions within the political boundaries affected.

7.4.3 Situation regarding integrated management

584. By contrast with the requirements for an integrated management system, what is currently emerging is a not very efficient fragmentation of the approach as work starts on preparing programmes of measures under the Water Framework Directive (see also KAPPET 2006). Parallel plans with different focuses, prepared by different administrations, frequently cover the same areas without making reference to each other (Water Framework Directive inventories and programmes of measures, landscape planning, overall spatial planning, and in some cases integrated rural development planning). In the case of acquisition and monitoring systems it will probably not be possible to make use of synergy effects in data acquisition and maintenance or in monitoring because there has been a lack of adequate coordination with nature conservation. For example, the pilot projects for implementation of measures display a lack of integration and hence of efficiency. Methods developed in pilot studies (LBEG and Forschungszentrum Jülich, no year stated) show marked parallels with methods introduced at state level for soil and water in framework landscape planning (e.g. for Lower Saxony, JUNGSMANN 2004). Since no indication is given that the information needed to identify eligible areas can sometimes be found in framework landscape plans as well, it seems likely that unnecessary duplication of working steps will also occur during state-wide implementation. The Hamelin pilot project, for example, obtained fresh data on erosion risks and surface runoff, although the information was already available in suitable form and with similar spatial resolution in the existing framework landscape plan. Thus little use is made of the opportunities for synergies between measures and resource utilisation efficiency that would exist if the goals of the Water Framework

Directive were merged with the broader spectrum of landscape planning objectives (KAISER 2007). For example, while the Water Framework Directive requires the inclusion of wetlands, it focuses solely on water as the locational factor. Landscape planning, by contrast, considers the entire water-dependent ecosystem, and on this basis it develops multifunctional measures (HASCH and JESSEL 2004; KAISER 2007), though these have hitherto have scarcely found their way into water management plans. Even among water management experts, there are complaints that work on closely related issues of river basin management under the Water Framework Directive and flood control is in progress using parallel and non-integrated methods and models, although in many cases they are based on the same parameters (EVERS 2008). Unlike other European countries which take a centralised approach to data management and transmission, Germany has no concept for a coherent and centrally organised management system based on uniform criteria for geodata on water catchment areas, and no nationwide standards for the designation of flood-prone or other sensitive areas.

Last but not least, it is revealing to note a use of implementation funds that is to some extent decoupled from the planning objectives of water conservation and nature conservation, namely in the case of agro-environmental measures (see Chapter 11.4).

7.4.4 Contribution by the Water Framework Directive and the Floods Directive to integrated river basin management

585. The Water Framework Directive has very successfully initiated an enlargement of the spectrum of work performed and issues addressed in the water management sector. However, the Directive failed to make clear demands for integration with other environmental plans, overall spatial planning and the main instruments for the implementation of agricultural policy. Flood control is not dealt with in the Water Framework Directive.

The Water Framework Directive was not supplemented by provisions on flood control at EU level until the entry into force at the end of November 2007 of a directive focusing specifically on flood control (Directive 2007/60/EC on the assessment and management of flood risks – Floods Directive). Article 4 of the Floods Directive requires the member states to produce a provisional assessment of flood risks at the level of river basin districts by the end of 2011. This requires a forward-looking analysis of risks for which information about the impacts of climate change on the occurrence of floods is also relevant. On the basis of this provisional assessment the member states are required by Article 5 of the Floods Directive to identify those areas for which they conclude that potential significant flood risks exist or might be considered likely to occur. Under Article 6 of the Floods Directive, they then have to prepare flood hazard maps and flood risk maps by the end of December 2013. Flood hazard maps are to cover those geographical areas where there is a low, medium or high probability of flooding, and also scenarios for extreme events. The measure of medium probability of a

flood event is a likely return period of 100 years or more. Flood risk maps show the potential adverse consequences associated with the flood scenarios referred to in the flood hazard maps, for example the number of inhabitants potentially affected or the type of economic activity in the area potentially affected. These maps then form the basis for the flood risk management plans which the member states are required to prepare and publish by December 2015. In particular, the plans are to establish appropriate objectives for the management of flood risks for the potential or probable flood risk areas identified under Article 5 of the Floods Directive, and also measures for achieving these objectives. Under Article 7 (2) of the Floods Directive, the plans are to focus on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity. If considered appropriate, protection is to be achieved by means of non-structural flood control initiatives. Flood control measures relating to river basin districts which are international or affect more than one member state are to be worked out by the member states on a transboundary basis, to take account of the fact that rivers extended across national boundaries.

The Floods Directive explicitly refers to the Water Framework Directive and the coordination of plans under the two directives. In the transposition of these directives into national law, neither the federal nor the level of the federal states makes any clear demands for integration with other environmental protection plans or with spatial planning or urban land used planning. At European level it would only have been possible to include a general instruction in the directives, since one characteristic of European planning systems is their very great diversity (LEE and HUGHES 1995). The Floods Directive has a clear focus on the assessment and reduction of flood risks. Measures are not intended to reduce floods in general, but to do so depending on the expected consequences in the areas affected. One aspect not dealt with is that of desirable flooding. This aspect is not covered by the Water Framework Directive either, and will have to be handled by nature conservation in the planning of waters and their water meadows.

Also, the Floods Directive does not consider the entire area and hence the totality of reasons for changes in the flood regime. Instead its approach is confined to flowing waters and their water meadows. As a result, the Floods Directive cannot be expected to achieve any far-reaching advances in the sense of integrated landscape management. Moreover, the long gap of seven years between the adoption of the two directives means that the EU has also helped to impede integrated river basin management, at least as far as a combined approach to water development and flood control is concerned. Despite the fact that it is closely related, the issue of flood control was largely disregarded during the first phase of transposition of the Water Framework Directive into German law. In many cases a close connection was regarded as "excessively complicated", and administrative authorities explicitly preferred to deal with the two aspects in two successive separate stages (WFD

Conference Berlin 2007, hearing SRU 11-07). The two directives do however demand – and this has largely been successfully implemented – that ecological issues be considered across administrative boundaries and coordinated in cooperation between the water management authorities of different federal states. It remains to be seen whether the implementation of the Floods Directive with its process-oriented control approach lacking clear environmental quality objectives develops as dynamically as that of the Water Framework Directive.

7.4.5 Obstacles arising from the sectoral organisation of environmental authorities and the demarcation of planning areas

586. While the EU directives do not require either extensive fleshing-out of a concept for integrated management of the natural regime, or even close integration of existing plans and measures, they do not prevent such integration on the basis of common data and linked methods and models.

However, the existing structures and traditions of environmental administration (cf. MOSS 2007) do present obstacles to the efficient approach of integrated management. The water management administration, which has evolved from a use-oriented administration, has admittedly shown a marked change of course in the direction of a broader, environment-related orientation since the year 2000. And the demand for public participation has been taken up and implemented within a very short space of time by the water management administration. Nevertheless, goals such as species and biotope protection or soil protection are traditionally not regarded as belonging to the administration's "own" field of activity. They are a matter for the nature conservation authorities, with whom consultation has not been necessary in the past except in cases such as renaturing of rivers and lakes, for example. At present the nature conservation authorities also seem unable to make any great effort to overcome the boundaries of sectoral administrative units. Especially at the upper and middle administrative levels, this tradition of a "pillared" administration (cf. SCHARPF et. al 1976, p. 48; POSSE 1986), which is particularly widespread in the federal system, militates against joint use of basic information and common integrated plans. At local authority level such mechanisms probably have less impact, since sectoral separation is less marked there and implementation of measures in a physical development planning context calls for integration. On the other hand, local authorities have usually assigned many responsibilities for the development and maintenance of waters to water utility associations, which have a less cross-sectional orientation.

Moreover, when it comes to implementation, water administration authorities are used to achieving their objectives independently with relatively extensive resources of their own. What they are not used to is the practice of giving legal force to or implementing water-

specific objectives with the aid of overall spatial planning. In order to cut water pollution by reducing agricultural nitrogen inputs and preventing the ploughing-up of grassland on fairly large, sensitive areas, it would be necessary – preferably in conjunction with nature conservation – to provide and make targeted use of adequate assistance funds from the rural development programmes. In addition, targeted multifunctional use should be made of appropriate nature conservation and water conservation instruments. In this process, some farmers who were formerly “customers” of the water industry will become opponents who will have to be convinced of the need to take part in extensification measures. The nature conservation administration already has considerable experience of this role and of the marked discrepancy that exists under current assistance conditions (see Item 995) between the necessary manpower and the results achieved. Since the water management sector is used to efficient “top down” working, it is reluctant to accept the new role, and is correspondingly hesitant about taking on measures beyond the scope of waters or water meadows.

The Waterways and Shipping Administration of the Federal Government, which reports to the Federal Ministry of Transport, Building and Urban Affairs, plays a special role. It pursues its own objectives on the same lakes and rives as the state authorities responsible for flood control, water management and nature conservation. In the event of encroachments on these waters, any conflicts of objectives are dealt with in the course of the formal authorisation procedures and the associated environmental assessments.

7.4.6 Summary and Recommendations

587. The diverse ecological and functional interactions in river basins create a special need for integrated landscape management. Coupled with coordinated use of instruments, an integrated planning system which was based on multifunctional measures and could possibly evolve from further development of landscape planning could minimise conflicts, promote synergies and ensure efficient use of resources. At present the existing “pillared” administrative structures militate against such an approach. The following measures could pave the way for better integration.

Transposition of the Floods Directive into national law

588. The transposition of the Floods Directive into national law should create the conditions for integrated planning in river water meadows. To this end it should also make the necessary references to the plans and implementation tools of nature conservation and spatial planning. Flood control in smaller river basins should furthermore include measures outside the water meadow region. It should also be taken into account in the programmes of measures and management plans under the WFD.

Joint environmental information system

589. In order to improve practical opportunities for integration, the first step should be to push ahead with work on providing a common basis of data on water, soil, species and biotopes, and regional climate data using common parameters and criteria at the various relevant levels from international to local. This environmental information system should be supplemented by method bases modelled on the nationally accepted method base of the Lower Saxony Soil Information System (NIBIS). Concepts and measures for water conservation, species and biotope protection and area-specific climate protection should not only be based on this, but should also feed newly acquired information into it.

Closer links between water conservation and nature conservation authorities

590. Without further task-related links, the present administrative structure with its clear division into water conservation and nature conservation cannot meet the needs of the integrated approach. Joint planning bodies should be established to link the water management and nature conservation plans based on these information sources at the government – i.e. federal state and district – level. Integration could also be improved by grouping suitable environmental issues of water management with nature conservation (including soil aspects). The suggestions made by JESSEL (2006) with regard to combining programmes of measures under the Water Framework Directive with management plans under the Habitats Directive should be implemented.

Synergies due to integrated planning and joint use of implementation tools

591. Using synergies makes it easier to coordinate plans and helps to deliver a concept adapted to the needs and language of spatial planning. This would be previously coordinated from an environmental point of view and would indicate in concentrated form the remaining need for spatial planning decisions and action. Even today, landscape planning at the various planning levels and maintenance and development plans for nature conservation areas and especially Habitats Directive areas should be used more to integrate the objectives of nature conservation, the Water Framework Directive and flood control (HÜBNER 2007). It is however important to note the differences in definitions and models between landscape planning and the Water Framework Directive (KAISER 2007), though this difficulty does not appear to be insoluble (see von HAAREN 2007). Although the EU directives pursue identical objectives in respect of all final-stage (climax) biotopes, the objectives may differ with regard to habitats that have evolved as a result of cultural history (HÜBNER 2007). In the case of Habitats Directive areas, the nature conservation objectives take precedence (Art. 4 WFD). The same should also apply when species protected in Europe occur outside protected areas (HÜBNER 2007). At any rate the objectives should be drawn up in consultation between the two administrations. When drawing up joint plans outside Natura 2000 areas, nature conservation should take greater account of the

redynamisation potential and the development of natural habitats in river meadows (HÜBNER 2007), in order to make maximum use of synergies with the objectives of the Water Framework Directive and the Floods Directive.

Furthermore, bundling water conservation and nature conservation could give greater weight to their common interests, for example when it comes to the allocation of financial assistance for the development of rural areas. The legal instruments of nature conservation could also be used to implement the objectives of integrated river basin management or of the Water Framework Directive and the Floods Directive. The nature conservation rules also apply to the function of the protected asset “water” in the natural regime, and appropriate compensatory measures should be designed in line with an integrated river basin management concept (KAISER 2007). By contrast, the instrument of Habitats Directive impact assessment and the relevant sectoral contribution of landscape planning display no more than partial congruence with wetland protection under the Water Framework Directive (op. cit.). The reason is that Annex I to the Habitats Directive – inexplicably – fails to list many of the wetland habitats of importance to nature conservation, whereas they are covered by the Water Framework Directive (op. cit.). In particular, the highly protection-worthy habitat types of wet, nutrient-rich sites such as swamp and bog forests and wet grassland should be added to the Habitats Directive in the long term so as to improve the congruence of the different instruments.

Coordination of measures is necessary right down to the level of water resource maintenance measures by water utility associations (see also KRANEFORD 2007).

Finally, there should also be the greatest possible coordination in the field of monitoring under the Habitats and Water Framework Directives.

11 Agriculture

Messages

In the past there has been a lack of adequate progress on reducing adverse environmental impacts caused by agriculture. Developments on the global agricultural markets, coupled with the boom in bio-energy, are increasing the trend to intensification. This will probably further exacerbate existing problems such as pollution by fertilisers or pesticides, and competition for land, especially with nature conservation.

The way EU agricultural policy has been implemented since 2004 has fallen short of expectations with regard to reduction of environmental burdens (cf. SRU 2004a). Rigorous integration of environmental objectives would above all have to find expression in appropriate allocation of financial resources at EU, federal and regional level. It is also necessary to ensure that the use made of such funds maximises the effect for the environment. Instead of systematically strengthening rural development including agro-environmental measures (2nd pillar), the European Council and the federal states have made – in some cases drastic – cuts in the funds available during the EU budget period 2007 to 2013. As a result, the 2nd pillar funds available in Germany are an average of about 23 % lower than for the preceding period. Moreover, spending of the remaining resources by many federal states is neither focused on agro-environmental measures nor targeted for maximum environmental effectiveness. The financial cuts and the lack of environmental orientation of agricultural policy are by no means commensurate with the increased tasks, which include the implementation of Natura 2000 and the Water Framework Directive, and also adaptation to climate change. On a European comparison, German agricultural policy as a whole is no more than mediocre as far as its efforts to integrate environmental interests are concerned.

The prospects of improving this unsatisfactory situation are good. It may be assumed that the review of expenditure on EU agricultural policy 2008/2009 will call into question the payments from the first pillar. In view of high world market prices for agricultural produce, it is rapidly becoming increasingly difficult to justify direct payments. Moreover, the present structure of the actors in the field of European agricultural policy could favour comprehensive reforms of the Common Agricultural Policy (CAP) that attach great importance to environmental objectives. In this connection Germany has a key role in the EU. To avoid any blockade of reforms in German policy, the Advisory Council on the Environment (SRU) advocates a reorientation within the overall concept of liberalisation tempered by environmental and welfare considerations.

It proposes the following individual steps:

- The Federal Government should make every effort to ensure a further reduction of the imbalance between the first and second pillars, over and above the recommendations of

the “Health Check” (interim review of the EU agricultural reform). From 2013 onwards the first pillar should largely be abandoned and the present second pillar should be systematically developed into a policy for rural areas. One major focus here should be on rewards for environmental and nature conservation achievements by land users. Direct payments paid for compliance with the polluter pays principle under good agricultural practice are only meaningful and justifiable if they cannot be demanded without compensation under world market conditions or if their effectiveness is not dependent on the setting of an area.

- In parallel, steps should be taken to strengthen first approaches in various federal states that are designed to improve the efficiency of agro-environmental measures. There is a need to steer them to sites where they are needed. Services should be tendered, and payments be based on the results achieved.
- Compliance with good agricultural practice and cross-compliance requirements, and also the rendering of nature conservation services, should be improved by promoting environmental advisory services for farmers.
- The introduction of a nitrogen surplus levy is necessary to reduce nitrogen inputs.
- To reduce the use of pesticides, a quantitative reduction target should be specified and a risk-based levy system should be introduced.
 - Element inputs into waterbodies and other sensitive habitats should effectively be prevented by creating buffer strips under a reformed mandatory set-aside scheme.
- In the livestock farming sector it is necessary to reduce prophylactic use of antibiotics to the absolute minimum necessary.

With a share of 13 %, agriculture in Germany is a sizeable emitter of greenhouse gases. The first priority should therefore be to prevent additional emissions and to exploit and promote any potential for reducing greenhouse gas emission and storage in the agricultural sector. As a rule this will result in synergies with nature conservation. Organic farming should be rewarded for its diverse large-scale environmental achievements in the form of a conversion premium and basic assistance.

11.1 Introduction

964. The preceding chapters have emphasised the central importance of environmentally sound agriculture for the ecosystem and especially for biodiversity, soils and the water balance. At the same time it is becoming apparent that environmental reforms in the agricultural sector are only making slow progress and that at present they are even taking a step backwards. Whether efforts to make agriculture environmentally sound will be successful depends on close dovetailing of environmental and agricultural policy. The less

ambitious the definition or enforcement of polluters' duties under environmental law, the better incentive instruments such as agro-environmental programmes need to be endowed with public funds and administrative capacity so that environmental protection and nature conservation can be financed on a voluntary basis. Conversely, ambitious legal obligations give rise to lower financial input, but more control input and greater acceptance deficits. Thus the legal provisions and budget appropriations in the agro-environmental sector are the critical indicators of successful integration of environmental objectives into agricultural policy. The following remarks are based on existing proposals by the SRU (see especially SRU 2004a; and also SRU 2002a; 2007a), and investigate:

- the latest situation with regard to the environmental impacts of the agricultural sector;
- the extent to which the existing legal instruments and their implementation (good agricultural practice, cross-compliance) reduce environmental pollution;
- whether agricultural policy since 2007, and especially the design and financing of environmental services, satisfy the need for action;
- what specific measures are necessary to reduce element inputs (nitrogen (N) and pesticides, veterinary drugs);
- whether organic farming as an alternative to conventional farming deserves more funding and
- how to deal with “green” genetic engineering.

Political opportunities and limits for reform approaches in the agricultural sector were analysed. This was used as a basis for strategic recommendations for the reform an environment-oriented agriculture.

Where data was available, German agricultural (environmental) policy at the federal and regional levels was placed in a European context.

11.2 Environmental impacts of agriculture

965. Positive environmental impacts of agriculture include – assuming nature-conserving farming methods – the preservation of a structurally and species rich cultural landscape with functions benefiting the ecosystem and local recreation. Of greater importance, however, are the adverse impacts of agriculture on the ecosystem (EEA 2006, p. 18) and on biodiversity. One of the greatest challenges facing environmental protection and nature conservation has become to conserve use-dependent environmental qualities and to deal with environmental problems in the agricultural sector (SRU 2004a, Item 225 ff.). In spite of this knowledge, environmental protection efforts in the sector have been considerably less successful than in other sectors such as water or air quality control.

966. The release of nitrogen compounds favours soil acidification and eutrophication of lakes and rivers, and speeds up climate change. In 2001 the amount of chemical nitrogen fertiliser used in Germany for grassland and fodder crops alone came to 1,247,000 t/a, or 62 % of the total volume of nitrogen in Germany. Of total nitrogen inputs into flowing waters (approx. 690 000 t in 2000), only about 19 % originates from point sources. The greater part comes from diffuse sources (62 %), mainly from the agricultural sector (UBA 2007a). Agricultural nitrogen inputs into flowing waters account for about 30 % of the mineral nitrogen fertiliser applied in Germany. Areas with a high livestock density are especially problematical. Although the overall figures for Germany show that nitrogen excesses fell by 8 % between 1990 and 2004, from 115.6 to 103.9 kg per hectare of farmland per annum (UBA 2007a), the increased demand for bio energy crops risks to reverse the trend, because previous set-aside areas may be farmed and intensively farmed crops expand (cf. SRU 2007a, Item 27). The fact that nutrient inputs into ecosystems continue to be far too high (see Item 335) shows clearly that either farming in accordance with the legal requirements of good agricultural practice or – more probably – the implementation of these requirement through environmental advice and inspections has hitherto not been sufficient to achieve satisfactory reductions in nutrient inputs into ecosystems. The rules of good agricultural practice should also be designed to minimise such inputs as far as possible. For example, the revised version of the Fertilizer Utilization Regulation (*DüV*) permits very high nitrogen surplus levels in farms with livestock. The only limit is a net surplus after allowing for “unavoidable losses”.

967. For decades now, the use of pesticides in the agricultural sector has resulted in active substances from pesticide being released into the environment. These substances can cause soil and water pollution and influence biological diversity (see also SRU 2004a, Item 338 ff.), and have for many years been found with constant frequency in groundwater and surface waters. Measurements frequently reveal elevated concentrations of active substances in the groundwater and infringements of the limits for drinking water. In the interest of reducing environmental impacts, such inputs should be avoided as far as possible.

968. The use of veterinary drugs in agriculture involves risks to the environment and to human health. There are indications that the use of antibiotics in agriculture is contributing to the development of resistance among humans. Moreover, the veterinary drugs pass via the animal excrement into the soil, either directly during grazing or indirectly via the application of slurry or solid manure. Present knowledge does not permit any definite statement about the extent to which the soil biocenosis is affected by inputs of antibiotics. However, the use of antiparasitic agents in agriculture has been shown to have negative local effects on dung-degrading insects, which could affect the process of nutrient regeneration (SRU 2007b).

969. The agricultural sector also makes a substantial contribution to greenhouse gas emissions, which contribute to climate change. In particular, changes in land use (e.g.

increased ploughing of grassland) and excessive use of nitrogen fertiliser can release additional climate-relevant gases.

11.3 Legal framework for environmentally sound agriculture: Good agricultural practice and cross-compliance

970. Environmentally sound agriculture can be brought about by legal regulations and appropriate enforcement, and/or by economic incentives. The standard aimed at by the legal framework determines the extent to which financial resources for environmental services are necessary by way of compensation. This relationship has changed in Germany and the EU since the agricultural reform of 2003 as a result of the introduction of the cross-compliance system.

Good agricultural practice and its relationship to agro-environmental measures

971. The legal framework relevant to the agricultural sector can be found in a variety of acts and ordinances (nature conservation law, water law, fertiliser law, pesticides law etc.) (SRU 2002a). These define good agricultural practice as the level of environmental and safety-oriented protection which farmers are required to comply with on a mandatory basis and without compensation, in their use of the land (SRU 2002a, Chapter 5.2.7), (Fig. 11-1). The standards of good agricultural practice originate from environmental legislation at European and national level. Following the principle of subsidiarity, the national legislature may lay down stricter provisions for good agricultural practice than the EU. Many rules of good agricultural practice are not expressed very precisely in acts and ordinances. In order to achieve the targeted environmental objective, there is therefore a need for more precise technical specification (PLACHTER et al. 2005) as well as advice and supervision. Both environmental advice and supervision of good agricultural practice are evidently not yet adequate in Germany – judging by the pesticide or fertiliser levels found in the environment, which indicate use beyond the limits of good agricultural practice.

Figure 11-1

**Good agricultural practise of land use
in relation to environmental services**

<i>Environmental objectives</i>	<i>Implementation tools</i>		
Environmental quality objectives and standards exceeding good agricultural practice of land use / Cross Compliance (conservation and development objectives)	Environmental services Agro-environmental measures <ul style="list-style-type: none"> contract-based nature conservation agreements compensation and compensation payment in nature protection areas Agro-environmental measures co-financed by Joint Task "Improving agricultural structures and coastal protection" (Gesetz über die Gemeinschaftsaufgabe "Verbesserung der Agrarstruktur und des Küstenschutzes" – GAK) including organic farming 	Rewarding environmental efforts	Predominantly voluntary
	Good agricultural practice of land use / Cross Compliance		
Operators' duties in legal regulations	Abidance of good agricultural practice of land use / Cross Compliance in everyday agricultural practice, inter alia by expert advice		Obligation
Remediation in areas with adverse effects Compensation of adverse effects on landscape	Sanction of deviant behavior <ul style="list-style-type: none"> Administrative decision, e.g. according to Plant Protection Act Regulatory offense with administrative fine Suspending direct payments in case of violation of Cross Compliance 	Regulation	
SRU/UG2008/Abb. 11-1			

The level of aspirations of good agricultural practice in Germany essentially comprises action-oriented and polluter-related rules that are to be applied everywhere. The rules cover site-specific problems, such as a particularly high risk of groundwater pollution, only rudimentarily and inadequately (cf. Item 454; SRU 2002a, Item 359). The definition of good agricultural practice also delineates what can be regarded as additional services by the agricultural sector, because it goes beyond the minimum requirements and is therefore eligible for rewards (see Fig. 11-1). The revised Regulation on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) has furthermore limited the funding of agro-environmental measures to cases where the obligations assumed go beyond the compulsory basic requirements of cross-compliance (Item 972 f.). In Germany, agro-environmental measures are cofinanced by the federal states (*Länder*), largely via the EU. In some cases they are partly financed by the federal level (via the law about "Improving agricultural structures and coastal protection") or financed entirely by the *Länder* (Chapter 11.4). In the areas that are most sensitive and most suitable for protection, environmental conservation is partly ensured by designating protected areas. This in turn can

be combined with agro-environmental measures. The budget for agro-environmental measures would have to be augmented so that

- sufficient compensation can be paid for measures prescribed by protective ordinances (over and above the social duties associated with ownership and the status quo) (cf. SRU 2002b, Item 339 and di FABIO 1995, p. 127) and also
- it offers adequate incentives to farmers to comply on a voluntary basis and against payment with site-dependent environmental requirements that are not regulated by good agricultural practice or laid down in conservation area ordinances (e.g. socially desirable environmental services).

Currently this is not the case (see Chapter 11.4).

Cross-compliance

972. With the introduction of cross-compliance, payment of financial subsidies from the first pillar of the CAP was made dependent on compliance with various minimum requirements in the field of environmental protection, protection of animals and food safety (Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes). Imposing conditions for support payments serves as an environmental policy instrument that is intended to create negative financial incentives to ensure the implementation of relevant sectoral standards. On the one hand these conditions are “basic operational management requirements” which arise from various EC regulations and directives in the fields of regulation mentioned. On the other hand, cross-compliance is intended to safeguard requirements for “good agricultural and environmental condition” and for the conservation of permanent grassland. The minimum standard of “good agricultural and environmental condition” which EU legislation requires on all land eligible for premiums is to be specified in more detail by the member states. In Germany this has been done for promoted areas by the Direct Payment Obligations Act (*Direktzahlungen-Verpflichtungengesetz – DirektzahlVerpflG*) and the related Direct Payments Obligations Ordinance (*Direktzahlungen-Verpflichtungenverordnung – DirektzahlVerpflV*).

Thus at European level cross-compliance establishes close links between sectoral and funding legislation (NITSCH and OSTERBURG 2007). In Germany it was expected that the cross-compliance rules would ensure better implementation of environment-related sectoral legislation and would, for example, reduce the risk that grassland would be ploughed up as a result of disappearing milk quotas and animal premiums (SRU 2004a, Item 263).

Tying the direct payments to the cross-compliance requirements was also intended to provide better justification for the agricultural subsidies (see Multifunctional agricultural concept in the EU in SRU 2004a, Item 244). Compliance with environmental requirements is now a precondition for payment of public funds. In some cases the cross-compliance

conditions go beyond the level of minimum conditions which German legislation requires farmers to satisfy without compensation, but in some cases they fall short of these requirements.

973. An annual inspection rate of at least 1 % of the participating farms is prescribed for the cross-compliance conditions. For no apparent reason, this inspection density is well below the 5 % inspection rate for farms taking part in agro-environmental measures on a voluntary basis. Moreover, inspections are usually performed after prior arrangement and are mostly confined to written documentation. For this reason the results of such a sample are not necessarily very informative. According to the sample, cross-compliance has evidently resulted in better implementation of environment-related sectoral law in Germany and other European countries (SILCOCK and SWALES 2007; see also Chapter 5). Although in 2005 it was found that infringements of the cross-compliance conditions occurred in 22 % of the farms inspected in Germany, these mostly related to the field of animal identification. Infringements of environmental requirements, especially the Nitrate Directive, were found on only 1.8 % of the farms inspected (Deutscher Bundestag 2007; similar picture in England, see NITSCH and OSTERBURG 2007). In 17 member states the European Commission found that in 2005 a total of 71 % of the infringements were in the field of animal identification and registration, 13 % in the field of GAEC, and 10 % of direct payment recipients failed to comply with the Nitrate Directive (European Commission 2007a).

To some extent standards in other EU member states may vary at regional level (NITSCH and OSTERBURG 2007). In Austria, for example, more specific requirements for farm management in Habitats Directive areas and bird sanctuaries are laid down by the federal states. In Italy the regions may impose more precise definitions of requirements defined at national level, in order to cater for regional situations. In Denmark there are special requirements for certain regions in Natura 2000 areas. Denmark also has a nationwide obligation to establish uncultivated and unfertilised buffer strips beside natural surface waters (see the comprehensive comparative analysis by NITSCH and OSTERBURG 2007).

With regard to the maintenance of permanent grassland, Germany – like most EU countries – has adopted the EU requirements. If the proven decrease is more than 5 % the countries must make further ploughing of grassland dependent on a permit, if it is more than 8 % they may and if it is more than 10 % they must require restoration measures to be taken (Council Regulation (EC) No 769/2004). To date, these requirements have failed to prevent a decrease in the area of grassland. Moreover, they take no account of the ecological quality of the grassland, which means that no priority is given to preserving grassland that is valuable for nature conservation purposes. For this reason the state of preservation of the grassland types endangered throughout Europe, as listed in Annex I of the Habitats Directive, was classified in the German national report on the Habitats Directive as largely “unfavourable” (inadequate or poor) (cf. BfN 2007). Between 2005 and 2006 alone, some 47,000 hectares of

grassland were lost in Germany (Deutscher Bundestag 2007). In Austria, by contrast, ploughing of grassland is subject to a general permit requirement (SRU 2007a, Item 67; DVL and NABU 2005, p. 33). In Germany, areas of grassland particularly deserving of preservation, which are still only partly protected through the Federal Nature Conservation Act (*Bundesnaturschutzgesetz – BNatSchG*) (Section 5, paragraph 4, 5th indent), can be seen from the nationwide biotope maps of the landscape planning authorities.

974. Whether cross-compliance will remain part of agricultural policy in the future depends on whether and to what extent direct payments remain an approach of European agricultural policy. The cross-compliance requirements are minimum obligations which under the polluter pays principle are not eligible for rewards. Basically an association between direct payments and minimum requirements that have to be complied with everywhere is only justifiable if the latter go beyond the requirements of good agricultural practices. Otherwise such payments are only justifiable insofar as generally increased polluter obligations exist in the EU and/or Germany compared with competitors on the global market. In the face of a limited overall budget, however, efficiency considerations indicate that measures which are only necessary on sensitive areas or specific sites should not be demanded as nationwide minimum requirements. It also increases the amount of inspection work involved if the basic set of farms that have to be checked for compliance with demanding, area-specific measures consists of virtually all farms, instead of a largely voluntary subset.

For as long as cross-compliance continues, the conditions should be specified and the inspections performed so rigorously that the objectives are actually achieved (cf. SRU 2004a, Item 269). This applies particularly to the protection of grassland of great importance for nature conservation and especially for water conservation and soil protection. In general, the requirements of good agricultural practice and cross-compliance should be harmonised to avoid the need for a dual inspection system. At the same time the present level of provisions should be at least maintained or, in certain aspects, improved (cf. SRU 2002a, Item 359; 2007b, Item 56).

In detail, we recommend that the following requirements be included in the national implementation of the cross-compliance rules (*DirektzahlVerpflG/DirektzahlVerpflV*) (cf. also SRU 2007a):

- to cater for regional conditions, the Länder should specify in greater detail the requirements defined at national level, e.g. for location-specific and site-specific impacts of biomass use (SRU 2007a, Chapter 4) or for biotope network land,
- a fundamental ban on ploughing of grassland or the introduction of a criterion “preservation of farm-level share of grassland”; here the present level of the provisions must be at least maintained and there must be an absolute ban on ploughing of old grassland and valuable grassland biotopes,

- binding imposition of at least three-stage crop rotation with requirements regarding annual crop ratios. In addition, the specifications for cross-compliance should be supplemented by:
 - the inclusion of further protection obligations under the Habitats Directive and the Birds Directive. To date only a few Articles from the Habitats Directive are mentioned specifically; for example, Article 12 (protection of the species listed in Annex IV) is not mentioned, and
 - compensation for the previous ecological functions of compulsory set-asides.

Admittedly the existing instrument of compulsory set-asides, which the Commission suspended for 2008, was never intended to produce environmental effects. It nevertheless had a number of positive side-effects, especially for the quality of rivers and lakes and those farmland species whose imminent disappearance now has to be compensated for. A more efficient solution than reintroducing set-asides in their previous form would however be to require set-asides on 5 % of arable land, with a requirement that priority be given to buffer strips beside bodies of water and biotopes (see Section 11.5.2). Set-asides should continue to be compulsory, since otherwise it is unlikely that farmers will set aside land on a voluntary basis in intensively used areas where there is an especially urgent need for the buffer and compensation functions mentioned.

11.4 Integration of environmental aspects in agricultural policy in the current funding period

975. The funding of agriculture by means of European and national resources is of crucial importance for the nature and extent of environmental impacts due to agriculture. The allocation of public funds determines whether farmers are given sufficient incentives to avoid environmental damage and to perform environmental services. Direct payments to farms from the first pillar of the EU agricultural policy (market and price policy) are made primarily to ensure secure incomes. They were introduced in 1992 as compensation for the decline in subsidies for production prices. It is not possible to make a clear assessment of the environmental relevance of these payments (SRU 2002a; 2004a). They do however have the indirect effect that for many farmers it is not very attractive to perform environmental services, as they only account for a small share of total income. If farmers are prepared to perform environmental services going beyond the statutory minimum obligations (see Chapter 11.3), they can be rewarded from the second pillar of the agricultural policy (rural development).

11.4.1 Funding the agro-environmental policy

EU agricultural funding

976. The reform of the CAP in 2003 resulted in a shift away from product-related payments towards decoupled support in the form of production-independent premiums for individual farms or areas of land (for implementation in Germany see SRU 2004a, Item 248 f.; GAY et al. 2005, p. 22). Other important changes related to the introduction of compulsory modulation (reallocation of at least 5 % of resources from the first to the second pillar) and the possibility of using up to 10 % of the funds from the first pillar for environmentally sound farming methods (“special forms of agricultural activity”, so-called “national envelope”).

The budget component of the second pillar for rural development (EAFRD Regulation) is of special relevance to environmental protection and nature conservation, since it is partly used to finance the resources for agro-environmental measures. Not only environmental measures can be promoted, but also – for example – synergies with other areas such as marketing or tourism (cf. Item 1000).

In the EU's latest budget decisions the Commission's proposal for endowment of the second pillar was undercut by nearly a quarter by the decisions of the heads of state and government, whereas hardly any cuts were made to the first pillar.

For the budget year 2007 this meant that approximately 43 bn euro was made available for the first pillar of the CAP, compared with 10 bn euro for the second pillar (European Commission 2007b). The consequence of this clear financial priority for income policy was that in Germany, for example, the amount available as EU funds for rural development was 23 % down (at 2004 prices) on the previous period from 2000 to 2006 (DVL 2006). In view of rising agricultural prices, this reduces the incentive to take part in agro-environmental measures.

The fact that payments from the second pillar have to be co-financed by the member states tends to have the effect of inhibiting large-scale implementation of environmental measures. The national shares for the key assistance area “improving environment and landscape” are at least 20 % in regions with the greatest development backlog (convergence goal of the European Structural Funds) or at least 45 % in other regions (Art. 70 of the EAFRD Regulation). The direct payments from the first pillar, by contrast, are financed entirely from the EU budget without any national co-financing. On the demand side a loss of acceptance can also be observed as a result of the discontinuation of the incentive component for agro-environmental measures.

Relative importance of funding policy of the first and second pillars on a European comparison, 2007 to 2013

977. The EU member states can to a certain extent decide the allocation of funds between the first and second pillars, and during the present funding period they have made widely differing use of this facility: Whereas countries such as Austria or Finland attach great importance to the second pillar, the clear focus in Germany, France, the United Kingdom and the Netherlands is on the first pillar. For example, the share of farm income due to agro-environmental measures in Austria and Finland averages 9.6 % and 7.5 % respectively; or as much as 12.9 % and 15.9 % in combination with the compensatory payment. In Germany, by contrast, the share of 2.4 % (1.6 % agro-environmental measures, 0.8 % compensatory payments) is considerably smaller. The same applies to the United Kingdom (2.3 %) and France (2.0 %) (BMELV 2007a, p. 96 ff.).

For Germany the EU funds for the new funding period provide for total resources of 48.4 bn euro, of which 40.3 bn euro (83 %) go to the first pillar and 8.1 bn euro (17 %) to the second pillar (basis: Council Regulation (EC) No 1782/2003; Agra Informa 2007; European Commission, no date).

This means Germany is almost exactly in line with the average of the EU-15. The share for the first pillar is even higher in Denmark, United Kingdom, Netherlands, France and Belgium (between 91 and 95 %). Priorities are clearly different in countries such as Finland, Austria and Portugal, where the share due to the second pillar lies between 34 and 50 % of the total budget (Council for the Rural Area 2008).

In terms of land used for agriculture, farmers in Germany receive an average of 396 euro per hectare (BMELV 2007a, p. 93), which is slightly above the EU average of 369 euro per hectare. Although the decoupling of payments by the EU is a first step towards reducing the level of “blue box” payments as defined by the WTO regime (WTO – World Trade Organisation), payments on this scale are still far from the goal of liberalising agricultural markets.

Regarding the total budget available in the second pillar for the period from 2007 to 2013, Germany with approximately 68 euro per hectare of agricultural land lies exactly on the European average (EU-25) of 68 euro per hectare. This contrasts with the example of Austria, with about 165 euro per hectare of agricultural land (43 % of the total budget), whereas only about 16 euro or 31 euro respectively per hectare are made available in the United Kingdom and France (European Commission 2007c).

In Germany the total available for rural development in the funding period 2007 to 2013 is slightly more than 13.2 bn euro of public funds (EU resources and national co-financing), which works out at about 1.9 bn euro per annum. However, when describing the German position in a European comparison it is important to bear in mind the differences between the

individual *Länder*, especially in any analysis of the characteristics of the second pillar. Here too it is clear from the following that – with the exception of a few *Länder* – no priority is attached to environmentally relevant measures (cf. Section 11.4.2 and Table 11-1).

978. In overall terms, the priorities set in the allocation of funds show clearly that German agricultural policy is more concerned with preserving the EU's historical funding policy than with focusing on the multifunctionality of the agricultural sector and placing greater emphasis on rural development and environmental issues.

11.4.2 Characteristics of second pillar funding in Germany and the individual *Länder*

979. Within the budget for the second pillar, which is relatively small compared with the first pillar, the *Länder* can assign clear priorities to the environmental sector. If EU funds are to be made available, this must be done under the EAFRD Regulation. The ordinance is designed to lay down a uniform procedure for programme planning, financial management and inspections. In terms of content, it sets out three key areas for rural development: improving the competitiveness of agriculture and forestry (Key area 1); improving environment and landscape (Key area 2) and improving the quality of life in rural areas and diversifying the rural economy (Key area 3). To these must be added a “horizontal” Key area 4: the LEADER sector (Liaison entre actions de développement de l'économie rurale – Networking rural economy development activities). This fourth axis is not directly related to any one of the individual objectives, but is intended to support all three objectives on an over-arching basis.

The regulation lays down minimum shares for the individual key areas. These state that Key area 2 (environment and landscape) must account for at least 25 % of total second pillar expenditure (maximum EU co-financing 55 %, or 80 % in convergence regions); Key areas 1 and 3 must account for at least 10 % each (maximum EU co-financing 50 %, or 75 % in convergence regions) and the over-arching Key area 4 at least 5 %. The allocation of the remaining 50 % of the funds is at the discretion of the member states. These requirements specified by the EU show its intention to improve or at least preserve environmental targets and standards in the member states. The minimum level targeted by the EU for the key area “Environment and Landscape” corresponds to the average share spent on agro-environmental measures in the EU during the previous funding period. This was also about 25 % of the funds for rural development or 5 % of the total EU agricultural budget (Agra Informa 2007; European Commission, no date).

980. Key area 2 of the EAFRD Regulation is of special importance for environmental protection and nature conservation, but the other key areas also include items relating to funding of measures relevant to nature conservation. A number of articles in the EAFRD

Regulation offer opportunities that can be used with specific reference to funding in the field of nature conservation.

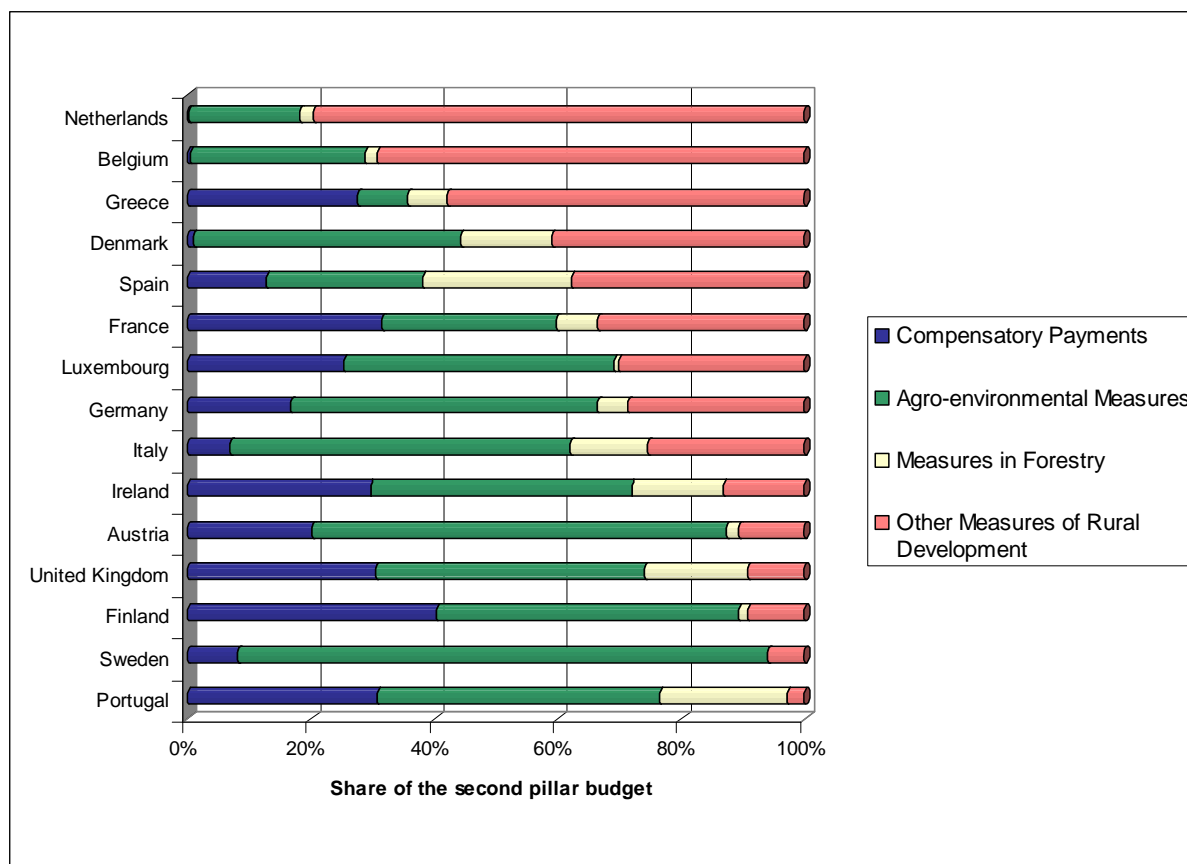
The measures available under Key Areas 2 and 3 are intended to make contributions to implementing the network Natura 2000 in agriculture and forestry, the objectives of the Water Framework Directive, the targets of the Kyoto Protocol on limiting climate change (European Commission 2005a, p. 11) and the Gothenburg commitment to reverse the decline in biological diversity by 2010.

Germany's version of the second pillar on a European comparison
from 2000 to 2006

981. Even in the last funding period, Germany did not make convincing use of its opportunities to set a clear environmental focus in the allocation of funds to the second pillar – though in this respect there were great differences in the budgets of the individual *Länder* (SRU 2004a). On a European comparison, the share of the second pillar accounted for by all environmentally relevant measures (compensatory payments, agro-environmental measures and forestry measures) came to 71.4 % in Germany, or slightly less than the EU-15 average of 75.2 %. Moreover, other countries such as Italy, Austria and Sweden with budgets of over 55 % to 85 % for agro-environmental measures alone made a much clearer commitment to environmental orientation of the second pillar (cf. Fig. 11-3).

Figure 11-3

Allocation of funds to the second pillar 2000 – 2005 (EU-15)



Source: Europäische Kommission 2006c)

The premiums for agro-environmental measures differed widely in the individual member states, but the European average in this funding period was around 89 euro per hectare of contract land per year; in Germany the figure was 79 euro per hectare (GAY et al. 2005, p. 17; European Commission 2003, p. 7).

982. The share of agricultural land devoted to agro-environmental measures also shows that the member states are pursuing different objectives in their allocation policies. In Luxembourg, Finland, Sweden and Austria, more than 80 % of agricultural land was registered, with a premium entitlement that was well above average for EU-15. In Spain, the Netherlands and Greece, by contrast, less than 10 % of agricultural land was bound by such contracts. With 25 % of agricultural land, Germany was again very close to the EU-15 average of 24 %.

Funding of agro-environmental measures in the new funding period 2007 to 2013

983. In the new funding period from 2007 to 2013 the situation for agro-environmental measures has actually become considerably worse. Germany's spending on agro-

environmental measures under the second pillar is only 17 euro per hectare of all agricultural land compared with 51 euro per hectare for other rural development measures (von HAAREN and BILLS 2007).

984. All in all, agro-environmental measures account for only about 4 % of total payments to the agricultural sector from EU, federal and *Länder* resources. This share is much too small to make environmental protection and nature conservation a relevant field of operations for farmers. On a federal average, the share of funds for Key area 2 (improving environment and landscape) is 42 % of the total second pillar funds. This means Germany lies in the middle of the range on an EU-15 comparison. The share of second pillar funds accounted for by Key Area 2 is 82 % in Finland, for example, 73 % in Austria, 61 % in Denmark, and even in France it is still as high as 52 % (Council for the Rural Area 2008).

The differences between the *Länder* have not been reduced compared with the previous funding period. An overall view reveals a clear north-south gradient. In Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, Mecklenburg/Western Pomerania and Saxony the share of Key Area 2 is close to the minimum level, the 25 % of EAFRD funds required by the EU. By contrast, a very different picture can be seen in North Rhine/Westphalia, Hesse, Bavaria and Baden-Württemberg. Here the share of the environmental key area ranges from at least half to nearly two thirds of the total funds (cf. Table 11-1).

The size of the premiums only goes a certain way towards offsetting the additional costs and loss of income arising from the management requirements due to participation in agro-environmental measures. Against this background the Joint Federal/Lander Planning Committee on Agricultural Structures and Coastal Protection (PLANAK) decided in December 2007 to review the funding levels for all agro-environmental measures with a view to adjusting them so as to offset the farmers' loss of income as fully as possible.

Table 11-1

**Allocation of EAFRD funds to the key programme areas in Germany
2007 – 2013 (as percentage of funds available)**

Federal Land	Key Area 1	Key Area 2	Key Area 3	Key Area 4
Baden-Württemberg	17 %	66 %	13 %	5 %
Bavaria	22 %	62 %	11 %	5 %
Berlin and Brandenburg	36 %	32 %	27 %	5 %
Hamburg	47 %	24 %	25 %	5 %
Hesse	28 %	54 %	9 %	10 %
Mecklenburg-W. Pomerania	27 %	24 %	42 %	6 %
Lower Saxony and Bremen	44 %	24 %	25 %	7 %
North-Rhine/Westphalia	28 %	54 %	15 %	4 %
Rhineland-Palatinate	38 %	43 %	11 %	8 %
Saar	17 %	37 %	31 %	15 %
Saxony	22 %	32 %	40 %	5 %
Saxony-Anhalt	31 %	28 %	36 %	5 %
Schleswig-Holstein	32 %	29 %	27 %	12 %
Thuringia	28 %	44 %	23 %	5 %
Key Area 2 = Improving the environment.				
Source: BMELV 2006, Council for the Rural Area 2008				

The range of funding shares is due partly to the provisional financial plans until 2013 and partly to the fact that the funds have to be called for and that this is subject to fluctuations.

11.4.3 Goal orientation of agro-environmental measures

985. In addition to the very low relative share of available funding volume, the unfavourable situation of agro-environmental measures in Germany is exacerbated by the fact that in the past not enough attention has been paid to the need to use the resources in a way that maximises the environmental effect per euro spent. This is clearly confirmed by the few available analyses and evaluations of programmes to date. In most cases the programmes have been offered on a full-coverage basis, and have been geared to requirements specified in the measures and not to the results to be achieved. Despite the reduction in funds available in Germany, it is only in isolated cases that the new funding period has led to more efficient measures.

Experience gained in previous funding period

986. As a whole, the data situation regarding evaluation of the existing agro-environmental programmes is unsatisfactory, both in Europe and in Germany. The most comprehensive meta-evaluation at European level (Oréade-Brèche 2005) reveals weaknesses which are primarily due, however, to lack of data provision by EU member states. The information value of the results is therefore limited. It nevertheless became clear that positive environmental effects were achieved in particular if clear and concrete environmental targets had been specified (Oréade-Brèche 2005; OSTERBURG 2005). Efficiency considerations only play a role in a small number of programmes. The efficiency deficits are due to two factors. On the one hand farmers prefer less demanding measures and the regional authorities prefer income-oriented programming. On the other hand, far-reaching changes of land use led to disappointing overall results, because the agro-environmental programmes were not adequately keyed to the action actually needed in the relevant area. In Germany too, the attempts at evaluation have been inadequate (DEGENFELDER et al. 2005, p. 127). In view of their close orientation to financial data, the monitoring systems provide little support for the evaluation of measures. One major reason for this is failure to express the objectives in sufficiently concrete form. In addition, the lack of clear priorities between income objectives and environmental issues is an obstacle to comprehensive evaluation of agro-environmental policy (DEGENFELDER et al. 2005, p. 126). Following the mid-term reviews, further improvements were made to evaluation methods in the context of “mid-term review updates”, and extensive recommendations were made before the start of fresh programme planning. In many *Länder*, the system InVeKOS-GIS was available for ex post evaluation. This made it possible to compare funded areas with areas that needed funding, thereby permitting better assessment of the accuracy of the measures.

Land use changes prompted by agro-environmental measures

987. In the last funding period, farmers in the EU generally preferred agro-environmental measures that did not require any major changes to existing management forms. Most of the measures implemented, such as reducing substance inputs or growing cover crops, were not tied to specific regions, areas or ecological conditions. As a result, soil protection measures met with great acceptance even on fairly high quality soils, as they are easy to implement even in intensively farmed regions (OSTERBURG 2005, p. 191). On the whole, however, extensification measures concentrated on disadvantaged areas, regions with low livestock densities and farms with production conditions that were already extensive. Here less effort and cost were involved in complying with the programme requirements, which meant that the flat-rate premium calculated on the basis of an average framework of agricultural conditions provided a greater incentive (OSTERBURG 2005, p. 200). The result of this, for example, was that measures to reduce nitrogen excesses were only taken where the nitrogen surplus

was in any case low. On the whole, therefore, it has to be said that the measures were lacking in environmental efficiency.

Unlike the general extensification measures, only a small proportion of the contracts signed were aimed at maintaining biodiversity, which usually involved more sophisticated measures. This is remarkable, as 40 % of the total number of individual measures programmed were keyed to biodiversity (cf. Fig. 9 in Oréade-Brèche 2005). However, many of these programmes had only modest financial budgets. In the last funding period 2000 to 2006, for example, the programme for conservation of arable land weeds in Lower Saxony had only 2.8 million euro (approx. 400,000 euro per annum) at its disposal (WICKE 2007). Moreover, nature conservation measures evidently gave rise to higher administration costs per hectare for both farmers and authorities, because the area under contract was usually smaller than in the case of less ambitious extensification measures or organic farming measures. This could further reduce the attractiveness of nature conservation measures.

All in all, the participating farms reduced land use intensity and production per hectare compared with non-participating farms (SEEDORF 2007). As a rule, however, the participating farms were starting from a lower level of intensity in any case. Farms that converted to organic farming practices showed a marked trend to greater extensification compared with farms taking part in other programmes (OSTERBURG 2005, p. 200).

Ecological effects of agro-environmental measures on biodiversity

988. Even in areas where they were implemented, agro-environmental measures did not succeed in preventing the loss of habitats in line with the objectives of the European biodiversity strategy (see especially Oréade-Brèche 2005). Positive effects were however achieved in the case of some species. 54 % of the species groups showed an increase in population on the test areas. 23 % showed no change (despite agro-environmental measures), and in 17 % of the species groups some species increased while others decreased (Oréade-Brèche 2005). On 6 % of the test areas, the diversity of species showed a decrease. The studies by KLEIJN et. al (2006) on 202 areas in five European countries show that agro-environmental measures had marginally to moderately positive effects on the occurrence of more common species. Red-listed species, by contrast, rarely profited from such measures (KLEIJN et. al 2006).

Programmes that were successful in conserving local biodiversity were in particular those that focused on specific biotope types (e.g. wetlands in Sweden or late mowing of grassland in Belgium) or on specific species (e.g. bird species in UK) (KLEIJN and SUTHERLAND 2003; European Commission 2005b). The analysis by Oréade-Brèche (2005) and various German studies (e.g. DEGENFELDER et al. 2005 for Brandenburg) document the great influence of site-specific attributes (habitat, soil quality etc.) on the actual impact of the measures. One task that proves particularly difficult is increasing botanical diversity on land

that was previously used for very intensive farming. Insects, by contrast, react faster to changes in land use resulting from agro-environmental measures (Oréade-Brèche 2005, p. 28). One important precondition for successful promotion of species and biotopes would seem to be that the measures are designed on a long-term basis (more than 15 years) and that the farmers are actively involved (SCHUMACHER 2007; MICHELS 2007). By contrast, great instability of the funds for agro-environmental measures has a negative impact, since farmers cannot rely on the payments and tend to be discouraged from taking part.

Even if agro-environmental measures have not always been successful with regard to the conservation of endangered species, there is evidence that certain types of land use have marked positive effects on biodiversity in general. This is true in particular of the creation or preservation of landscape structure elements as part of the biotope network (field edges, buffer strips along rivers, set-aside succession areas etc.) and grassland management or the development of extensive grassland. Only a small number of studies have confirmed positive effects of organic farming or grazing of marginal yield land (Oréade-Brèche 2005, p. 50; OSTERBURG 2002). However, the effects of organic farming and of extensification measures are differentiated by a study in Brandenburg. Such measures brought good results on light soils with a high biotic potential (DEGENFELDER et al. 2005).

On the whole, all the studies only show the effects on the individual sites where the agro-environmental measures were implemented. This contribution on specific areas of land can only have a very limited significance for the development of populations or for marked effects at the landscape level if the share of extensified areas is small, as is usually the case in Germany (DEGENFELDER et al. 2005). Further investigations into spin-off effects of the maintenance or improvement of particularly high quality habitats on their surroundings are necessary, as are studies of the impacts of a general reduction in use intensity on adjacent or connecting spaces. By contrast, mostly good – and in many cases well documented – impacts are achieved on land covered by contract-based nature conservation agreements. As a rule the relevant measures belong to clear regional settings and focus on land where action is needed.

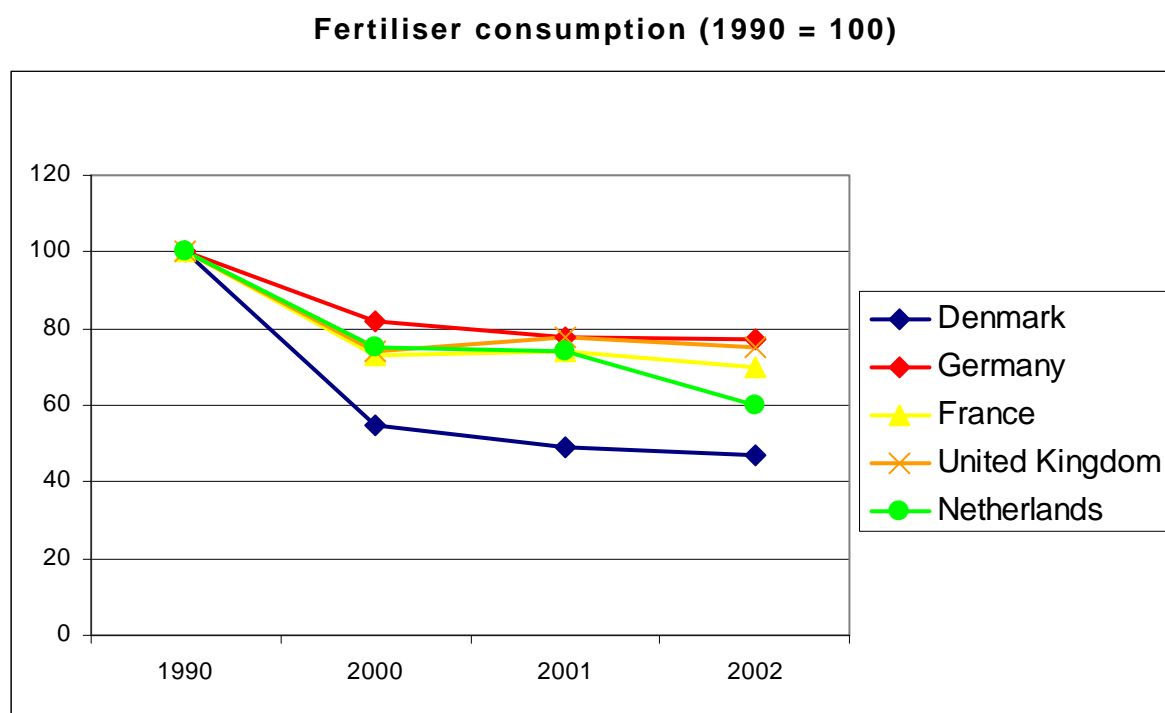
Ecological effects of agro-environmental measures on bodies of water

989. With regard to bodies of water and the water regime, the studies in principle document that agro-environmental measures effectively reduce inputs of fertilisers and pesticides (OSTERBURG and RUNGE 2007; Oréade-Brèche 2005, p. 62; for Brandenburg ZALF 2005). On European test plots, inputs into water were much reduced by means of (drilled) fallow land and green strips. The conversion of arable to grassland land and the planting of winter crops also proved beneficial.

However, the programmes were primarily designed for water conservation areas. In other areas – especially in regions where agriculture is particularly favoured – voluntary

participation tended to be on the low side (DEGENFELDER et al. 2005, P. 127). Some studies even come to the conclusion that the nitrogen balances do not differ significantly between participating and non-participating farms, with the exception of organic farming, which showed a negative balance (DEGENFELDER et al. 2005). Expenditure on nitrogen and fertiliser fell in Germany both on farms participating in the agro-environmental measures and on non-participating farms – but the reduction on participating farms was greater (OSTERBURG 2005). All in all, the use of agro-environmental measures as a means of reducing nitrogen inputs from farm land does not seem to be at all sufficient. In the past, the general slight decline in fertiliser consumption in Germany was partly due to reunification. However, compared with other European states such as Denmark in particular (with a nitrogen tax) or the Netherlands (with a nitrogen surplus levy), the reduction achieved is very modest (see Fig. 11-4).

Figure 11-4



Source: FAO 2006

990. The present inputs of nitrogen from diffuse sources into German waters show how limited the effects achieved locally are in view of the eutrophication of the North Sea and Baltic Sea (EEA 2006; SRU 2004b; Ministry of the Environment 2002; LÄÄNE et al. 2002). Quality standards existing in the EU for surface waters and groundwater have not been adopted in standards or benchmarks for the agro-environmental programmes.

991. On the whole, the evaluations show that the crucial factors for the success of agro-environmental measures, including in relation to water conservation, are evidently the percentage of land, the coherence of the measures, and the consideration of site-specific

conditions (DEGENFELDER et al. 2005). For this reason is it advisable to perform a site analysis or check the objectives and measures of landscape planning before introducing such measures, to ensure better adaptation of the latter to regional and site-specific factors (cf. DEGENFELDER et al. 2005, p. 62). Furthermore, if extensive reductions in nutrient inputs are to be achieved, other instruments such as a nitrogen surplus levy should be used (Item 1006 f.).

Ecological effects of agro-environmental measures on the soil

992. The agro-environmental measures to reduce soil erosion were generally successfully. Measures that proved effective included conversion to grassland, set-asides, green strips, mulch crops, ground cover during critical periods, and the creation of landscape structure elements (Oréade-Brèche 2005). But in achieving the objectives, no use was made of concrete benchmarks or standards as in the USA, for example. Moreover, since the measures were offered on a horizontal basis without directing them to the areas most at risk, their efficiency was low (DEGENFELDER et al. 2005, p. 127).

Ecological effects of agro-environmental measures on the landscape

993. Although the effects of agro-environmental measures on the landscape were rated positive for the EU, this is merely to be seen in relation to a slowing down of the otherwise ongoing process of landscape convergence (cf. Oréade-Brèche 2005). Advantageous factors seem to be establishment and maintenance of a biotope network, diversification of crop rotation, mowing of grassland, conversion of arable land into grassland, and further extensification. However, the agro-environmental measures offered did not succeed adequately in counteracting the general trends towards enlargement of arable fields and “standardisation” of landscapes. This could lead to increasing conflicts between farmers and the rest of the rural population, who evidently perceive landscape changes more strongly than other (abstract) environmental problems (DEGENFELDER et al. 2005, p. 128).

Current funding period 2007 to 2013

994. The Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) has developed the underlying strategy for the agro-environmental measures and defined a number of such measures which are co-financed via the Joint Task of Improving Agricultural Structures and Coastal Protection in addition to the EU funding.

Responsibility for planning, implementation and supervision of the agro-environmental measures rests with the *Länder*. The *Länder* must also integrate the Joint Task measures in the Land programmes if these are to be implemented. Nature conservation measures are not co-financed by the Federal Government. The funding principles, e.g. in the Joint Task framework plan for 2007 to 2010, lay down that tasks which primarily serve the interests of

cultural landscape conservation, landscape maintenance, recreation functions and the protection of animals are to be financed entirely from *Länder* resources.

995. When redesigning the agro-environmental measures, some of the *Länder* have taken account of the individual results of the evaluation. Lower Saxony – previously a typical example of a funding policy that was not very targeted as far as a large proportion of the resources invested – has introduced stricter definitions of eligible regional settings for the new funding period from 2007 to 2013. In addition to service-oriented payments for agro-environmental measures, it is also offering results-oriented measures (NNA 2006). In these assistance programmes, payments for the contracting farmers are calculated based on the occurrence of indicator species on their land. If farmers have an adequate basis of information (e.g. based on landscape plans) about the biotope value and the development potential of their arable land, they should in future be in a position to select for themselves suitable areas of land on which they can most successfully “produce” biodiversity. As a consequence, this gives reason to expect very effective goal orientation of the agro-environmental measures (von HAAREN and BATHKE 2007). Baden-Württemberg has several years’ experience of results-oriented rewards for the preservation of species-rich grassland and for the reduction of nitrogen inputs in water conservation areas. Farmers receive 165 euro per hectare if they achieve a post-harvest nitrogen balance of less than 45 kg/ha. However, the design of the programmes does not take account of either the site-specific issues for agro-environmental measures, or the potential for improving efficiency by means of better adaptation to site conditions. A simulation for Baden-Württemberg showed that the approach of nitrogen targets based on soil properties would not only lead to a reduction of 25% in the amount of fertiliser used, but would also result in slightly higher net yields for the producers (dependent on fertiliser prices) (LINK et al. 2006). In Thuringia too, nearly all agro-environmental measures are offered on a goal-oriented basis with regional settings and on a results-oriented basis for plants and meadow-nesting birds. While these new approaches are generally promising, they are still only isolated instances.

More efficient gearing of agro-environmental measures to specific action needs in specific areas should have been assigned much greater importance in the current budget period, since the funds have been reduced and priority should also have been given to using them for implementing EU obligations such as the European network of protected areas, “Natura 2000” or the Water Framework Directive. New funding requirements could also arise from the fact that decoupling might result in the discontinuation of grazing in landscapes that are to be kept open for nature conservation reasons. If prices for market crops continue to rise as predicted (e.g. Agra Europe 2007), the problem of funding voluntary agro-environmental measures will grow even further.

11.4.4 Summary and recommendations for the further development of agro-environmental policy

996. The existing mix of statutory and funding instruments in Germany has so far met with no more than inadequate partial success in the environmental orientation of the agricultural sector, since either the design or the implementation of the measures, or both, have not been sufficiently effective. Reasons for this could be that:

- Insufficient emphasis was placed on gearing economic incentives to environmental protection objectives: an average of only 4 % of the payments to German farmers is earmarked for agro-environmental measures in the new funding period 2007 to 2013.
- There is a strong north-south gradient in the allocation of funds to agro-environmental measures in Germany, and this is not explained by differences in the need for ecological action.
- In the past, only a small proportion of the budget for agro-environmental measures has been spent on effective measures oriented to environmental objectives and needs, and – despite slight progress in some Länder – the funds are still not being spent more effectively, with income effects frequently exceeding the environmental effects.
- In the agricultural sector – partly because of the large number of actors – it is difficult to enforce legal requirements.
- As far as methods and the basic data available are concerned, evaluations of the effectiveness of agro-environmental methods are not sufficient as a foundation for the further development of sound programmes. There is no examination at all of the efficiency of resource utilisation and the cost of administration and supervision; on the whole, budget transparency in the agricultural sector is very poor.
- Farmers are not sufficiently well informed about the concrete objectives of agro-environmental measures and/or do not receive advice during implementation.
- There is not sufficient incentive to take part in agro-environmental measures because of the low level of payments.

A reduction in total nitrogen excesses in the agricultural sector can evidently not be achieved effectively, or at least not efficiently, by means of agro-environmental measures alone.

997. On a European comparison, Germany with its agro-environmental policy is no more than average. It is not in the leading group, as one might have expected from an industrialised country with substantial needs in the field of ecological compensation and recreation. Other countries such as Austria, Portugal or Finland have placed a much clearer focus in their funding policy on integration of environmental protection in agriculture.

Systematic modulation

998. The Federal Government should use the forthcoming review of EU agricultural policy in the years 2008 to 2009 to initiate a change of policy at European level and in its own country with the aim of making a decisive improvement in the financial basis for an integrated agro-environmental policy as early as 2010, and certainly not later than 2013. Better use should also be made of the existing scope for action under the present Common Agricultural Policy.

To this end, work should press ahead on the transfer of funds from the first to the second pillar through modulation. From 2013 onwards the first pillar should largely be abandoned and the present second pillar should be systematically developed into a policy for rural areas. One major focus here should be on rewards for environmental and nature conservation achievements by the agricultural sector. A continued basic payment to farms would only make sense if there was a need for compensation for basic ecological and social services by agriculture that the agricultural sector could not be expected to perform without compensation under world market conditions and whose effectiveness did not depend on the situation. In the short term there is a need for a reorganisation of set-asides and the consolidation of cross-compliance and good agricultural practice.

999. Following its present suspension, the compulsory set-aside system should without delay be re-implemented in new form with a 5 % share of land, above all in the form of buffer areas alongside waters and habitats, or as other compensatory areas in open country. The set-asides should be allocated on the farms as riparian strips or, if there are no bodies of water, as flowering strips or buffer zones for landscape elements. The can also make a contribution to the biotope network and serve as a source of biomass for energy. It would make sense to link this with the minimum shares of landscape elements on farms that are required under Section 5 of the Federal Nature Conservation Act. Effective environmental advice for farmers (in the context of the CC advice under the EAFRD Regulation) could assist them in deciding the placement of set-asides.

At least at national level there are great advantages in the identical organisation of good agricultural practice and cross-compliance, to simplify enforcement of these minimum polluter obligations and their extension beyond 2013. The new Federal Environmental Code (*Umweltgesetzbuch – UGB*) currently provides an opportunity for this. For climate protection reasons the existing requirements should above all include, in addition to other measures, a general ban on ploughing of permanent grassland or a ban on ploughing of grassland types with particularly high greenhouse gas storage (old grassland, bog land and river meadow grassland) (see additional or alternative possibilities, Item 430 ff.). Not all farms should have to meet more far-reaching and above all situation-specific environmental requirements.

Adequate financing of agro-environmental measures and strict limitation of large-scale offers of funding

1000. In the second pillar, promotion of the competitiveness of farms in Germany should – especially in view of the latest developments on the global market – be cut back considerably in the short term. If the first pillar is reduced in the medium term, a different key assistance area can be created for initiating future-oriented developments of trade and industry in rural areas. Sufficient resources should be concentrated on the second pillar (environment) to do justice to the environmental tasks. The third and fourth key areas can also be used to assist measures which reduce the need for compensation for environmental measures by creating links with fields such as high-price marketing or tourism, or which increase the income of the participating farmers and generate jobs in the downstream sector. On a full-coverage basis the second key area should only offer a small number of measures which have largely proved to be effective independently of their location. Examples of such measures include the creation of landscape structure elements or buffer strips alongside waters, or the conversion of arable land into grassland. It is true of these measures as well that the crucial factors for the success of agro-environmental measures are the percentage of land, the size of the areas, the coherence of the measures and the consideration of site-specific conditions. However, just as in the case of general (low) basic assistance for organic farming, large-scale funding of specific measures can only be justified on the basis of their effectiveness and multi-functionality as long as very little is known about the transaction costs of targeted assistance by comparison with full-coverage offers. It is also possible, without tying the arrangement to a particular regional setting, to provide assistance for the preparation of nature conservation management plans for entire farms (following the model of the “whole farm management approach” in the UK (OSTERBURG 2005; 2007), because it often favours positive environmental effects, especially on biodiversity, if measures are taken at landscape rather than field level. With this in mind, collective participation by neighbouring farmers would also have positive effects (von HAAREN et al. 2008). It is also possible to dispense with a regional setting in the case of results-oriented rewards for environmental services, as currently practised in Baden-Württemberg and Lower Saxony (BRABAND et al. 2003; OSTERBURG and NITSCH 2005). In this model the farmers themselves select the promising sites with the aid of suitable information (e.g. from landscape planning) (von HAAREN and BATHKE 2007). Regarding the issue of the amount and allocation of EU co-financing, the Advisory Council on the Environment expressed its views in detail in 2004 (SRU 2004a, Chapter 4). These views are still valid. Areas and concerns of European importance (especially pursuant to the Habitats Directive) should be financed entirely from EU funds regardless of the prevailing national priorities for allocation of funds.

Improved goal-orientation of agro-environmental measures

1001. In general, the design of future agro-environmental measures should take into consideration the three main challenges mentioned by the European Commission in the “Health Check” (climate change mitigation, biodiversity and sustainable water management). On the whole, it should reinforce the principle of steering agro-environmental measures towards areas with a need for action, and should strengthen long-term and dynamic interactive forms of organisation such as results-oriented approaches in Baden-Württemberg or Lower Saxony (cf. KEIENBURG et al. 2006) or bidding procedures. Such analyses (including farm-specific ones) have long been common practice in the USA and are in successful use, which means one could make use of US experience (see von HAAREN and BILLS 2007; von RUSCHKOWSKI et al. 2008). When delimiting the regional settings for these methods on the basis of landscape planning, attention should be paid to the multi-functionality of the goals and measures. Sectoral approaches confined to a single environmental medium (e.g. water, OSTERBURG and RUNGE 2007) fail to exploit efficiency potential. Particularly in the case of bidding procedures, the price for environmental services by farmers could emerge during the procedure itself. Otherwise the prices for environmental services would not only primarily have to reflect the cost of the measures as in the past, but would also have to include a market component in order to remain competitive in the face of the rising contribution margins of agricultural production (regarding the inclusion of acceptance and region-specific costs, see von HAAREN and BRENKEN 1998).

Support for high-price marketing of landscape maintenance products can generally reduce costs and create an additional incentive for the producers (e.g. von HAAREN et al. 2007).

High-quality evaluations and advice to improve the effectiveness of agro-environmental measures

1002. International experience and evaluations of successful models can be used to improve the effectiveness and efficiency of agro-environmental programmes. To improve the implementation of measures and compliance with good agricultural practice by farmers, adequate funding must be made available for providing environmental advice to farmers. Public relations can be used to make the public more aware of the farmers’ services to the environment under agro-environmental measures, and to strengthen the farmers’ motivation to take part in such measures. To this end, environmental services rendered by the agricultural sector should be given greater importance in the Federal Government’s report on agricultural policy. In the interests of better transparency of developments, the Federal Government should rethink its decision that the Agricultural Policy Report will only be published every four years in the future.

11.5 Further measures to reduce substance pollution

11.5.1 Measures to reduce nutrient loads due to agriculture

1003. For many years, the use of fertilisers in the agricultural sector has been the main source of nutrient inputs into the environment, and hence the principal cause of eutrophication of ecosystems and nitrate loads in bodies of water. For example, the nitrogen balance surplus in 2004 averaged 103.9 kg per hectare of agricultural land (UBA 2007a). The objective of the Federal Government's sustainability strategy is to reduce the overall balance surplus to 80 kg/ha by 2010 (Bundesregierung 2002, p. 114). The nitrogen balance takes account of additions (from mineral fertiliser application, sewage sludge, compost, fodder and the atmosphere) and disposals (via animal and vegetable produce for the market) in the agricultural sector. These are netted out on the principle of the "farm-gate nutrient balance". The resulting nitrogen surplus is expressed in kg per hectare per annum and fluctuates from year to year as a result of weather conditions. Over the period 1990 to 2004 there was an average reduction of about 5 kg of nitrogen (115.6 kg/ha in 1990 going down to 103.9 kg/ha in 2004). However, this trend is not sufficient to achieve the reduction target of 80 kg/ha by 2010.

1004. The reasons for the excesses are to be found primarily in area-independent livestock farming with external purchases of animal feeds (SCHULER and BENNING 2006), and in intensive arable farming (maize, special crops). The increasing application of fermentation residues from biogas systems is also gaining in importance (see SRU 2007a, Item 28). Compared with traditional compost, fermentation products may contain a much larger percentage of soluble nitrogen (compost: 4.4 %; fermentation product, solid: 20.4 %; fermentation product, liquid: 82.9 %) (KEHRES 2007; cf. SRU 2007a). Thus application of fermentation residues results in greater immediate bioavailability of nitrogen than with conventional fertilisers. This must be taken into account in fertiliser planning. When assessing fermentation products, a fundamental distinction should be made between solid and liquid fermentation residues, since differences in their starting products lead to marked differences in their fertiliser effect and pollutant content (KÖRDEL et al. 2007).

After increasing until the late 1990s, total fertiliser application in Germany currently shows a slight decline, but is still above the level of the early 1990s (UBA 2007b). A reduction in the nitrogen surplus is based on the increase in nitrogen efficiency (the ratio of N additions to N disposals) (BACH and FREDE 2005).

11.5.1.1 Revised Fertiliser Utilisation Regulation

1005. The Fertiliser Utilisation Regulation (*Düngeverordnung – DüV*) plays a special role in the reduction of nutrient inputs from the agricultural sector and hence also in the implementation of the Water Framework Directive. This regulation was revised in 2006, and

the last amendment to the regulation entered into force on 27 February 2007. Among other things, the revised regulation on the application of fertilisers, soil improvers, crop substrates and crop improvers in accordance with the principles of good agricultural fertilising practice serves to effect the complete transposition of the Nitrate Directive into German law – which was finally enforced by a judgement by the European Court of Justice (ECJ of 14 March 2002, C-161/00). The aim of the regulation is to reduce the substance-induced risks arising from the use of fertilisers and other soil or crop improvers even outside land used for agricultural purposes. The main aspects of the regulation are:

- The requirement to determine fertiliser requirements properly before every application of fertiliser.
- immediate turning under of applied slurry, liquid manure, poultry droppings or other liquid organic manures on uncropped arable land,
- limitation of the application of organic manures to arable land and grassland to a total nitrogen content of 170 kg/ha (average for the farm land used for agricultural purposes); a limit of up to 230 kg/ha is possible on application for grassland and grass subject to certain conditions,
- a ban on the application of fertilisers with a significant content of available nitrogen or phosphate in the winter months (from 1 November to 31 January for arable land and from 15 November to 31 January for grassland) and on waterlogged, flooded, snow-covered (continuous cover of more than 5 cm) or frozen ground,
- a ban on the application of such fertilisers after the last harvest of the main crop on arable land, apart from two defined exceptions,
- the obligation to perform a soil test for phosphate content at least every six years on every field measuring more than one hectare,
- the requirement to prepare an annual farm nutrient comparison in the form of an area balance or an aggregated field balance. This is to be presented on request to the competent authority. At present, compliance with GAP is regularly assumed to be satisfied by a nitrogen surplus of 90 kg/ha, which is to be reduced to 60 kg/ha by 2011, and a phosphate surplus of 20 kg/ha.
- the prevention of rainwash of nutrients, among other things by ensuring a general minimum distance of 3 m from bodies of water, or 1 m if precise placement of fertiliser is possible. Where the gradient of the arable land is more than 10%, fertiliser application is generally prohibited within a distance of 3 m from rivers and lakes. Measures to prevent rainwash must be taken for the remaining land within a distance of 20 m.

Additional provisions in the regulation regulate the documentation requirement, further restrictions on use and the definition of administrative offences.

In some respect the revised Fertiliser Utilisation Regulation can be regarded as a tightening-up of the version of 26 January 1996. This is in particular true of the obligation to apply fertiliser properly, the defined minimum distances from rivers and lakes, an – albeit slight – extension of the period during which no fertiliser may be applied, and the restriction of the use of farm manure on grassland to 170 kg nitrogen per hectare. Application limits, if one excludes exports of farm manure, have the same practical effect as livestock density limits (OSTERBURG 2007). One point of criticism is the fact that the nitrogen limit for grassland is undermined by a special exception which permits up to 230 kg nitrogen under certain conditions. However, this exception has to be approved by the European Commission and is subject to strict conditions for the farmers. In the meantime Germany has secured an exception limited until the end of 2009. Furthermore, the revised version raises the attributable storage losses for farm manure of animal origin from 10 % to between 15 % and 45 % for slurry and liquid manure, and from 25 % to between 30 % and 40 % for solid manure. The new values are an adjustment to take account of calculations performed on real storage losses of farm manure (BAUMGÄRTEL et al. 2003). For livestock farms these higher loss figures also have the effect of raising the livestock density limit to over 200 kg nitrogen per hectare from animal excrement (OSTERBURG 2007). As a result the effective livestock density limit for arable land is raised compared with the old Fertiliser Utilisation Regulation, whereas it is marginally reduced for grassland.

It remains an open question how far these two innovations in the Fertiliser Utilisation Regulation conflict with the objective of better protection of waters from nitrate and nutrient inputs, and hence also with the implementation of the Water Framework Directive. It should be borne in mind here that the highest nitrogen excesses were found in the case of livestock farms, and that water quality continues to be particularly problematical with regard to nutrient inputs, especially in regions with a high density of livestock or of breeding or dairy farms. For this reason there is an urgent need here to take steps to reduce substance inputs (SRU 2004a; TAUBE et al. 2007; BAD, no date). The maximum application limits laid down in the Nitrate Directive and the new Fertiliser Utilisation Regulation correspond roughly to between 2.2 and 2.7 livestock units per hectare. This results in a discharge of nutrients which many sites and many crops cannot make optimum use of, and thereby causes pollution of the soil and other ecosystems. Efforts should therefore be made to achieve a further reduction in quantities applied (see also SRU 2004a, Item 314).

The nitrogen surpluses ermitted in the revised Fertiliser Utilisation Regulation seem rather ambitious at first sight, but it has to be remembered that for an area balance the NH_3 loss and nitrogen deposition still have to be added. For example, for a crop-growing farm with a livestock density of 1.4 livestock units per hectare this would correspond to a nitrogen surplus of about 115 kg/ha (basis: area) and 140 kg/ha (basis: farm) (GUTSER 2006). In real

terms the figure would thus be considerably higher than the overall balance surplus of 80 kg/ha targeted by the Federal Government for 2010.

Another point of criticism is the way in which balances are to be prepared in the future. Until the revised regulation came into force a farm or farm-gate balance was required, but now it is an area balance.

Nutrient accounting in the agricultural sector

Nutrient accounting serves to determine nutrient efficiency or nutrient losses within a farm or on an area of farm land. It compares the nitrogen inputs and outputs of a clearly defined reference level over a specified period. A basic distinction is made between an area balance and a farm-gate balance. In an area balance, the inputs of nutrients in the form of mineral fertiliser, organic manure (farm manure), seed and symbiotic nitrogen sequestration on an area of land are compared with the outputs in the form of crops. The farm-gate balance includes all nutrients brought onto a farm, such as fertilisers, seed, animal feeds, livestock and symbiotic nitrogen sequestration and all outputs in the form of animal and vegetable products and organic manure. The difference between the two figures serves among other things as an indicator of environmental pollution with nutrients (see also GUTSER 2006).

Particularly for the responsible institutions, the farm-gate balance has the great advantage that it is easier to monitor because it is relatively uncomplicated. The area balance, especially for farms engaged in breeding or dairy farming, is more complicated. For the purpose of calculating the balances, the Fertiliser Utilisation Regulation quotes guide values for nitrogen sequestration per crop and nitrogen excretion by livestock. By contrast, a farm's yield of animal feeds can only be estimated. The two points give rise to considerable uncertainties which make checking and evaluation of balances difficult and pave the way for lack of clarity in the accounts (see also SRU 2004a, Item 306). Particularly in farms that keep livestock, the information value is limited if the balance is calculated without the stall balance and there is thus no possibility of a direct check on whether the production of farm manure calculated on a standardised basis is in line with the fodder yields quoted by the farm. At the same time the administrative input for authorities and farmers is higher (GUTSER 2006). For these reasons the Association of German Agricultural Research Institutions (*Verband Deutscher Landwirtschaftlicher Untersuchungs- und Forschungsanstalten*) also states that the area balance is not suitable for off-farm use of the results and that a farm-gate balance provides more reliable results for a similar input of work (VDLUFA 2007). It would therefore be a good thing to use a combination of farm-gate and area balances to provide traceable documentation of nutrient paths. The preparation of a field balance makes sense in particular for self-checks by farmers and for agricultural advisory services.

So far there has been no systematic review of the effects of the Fertiliser Utilisation Regulation. To be able to conduct an evaluation of the revised regulation, there would be an urgent need to make a speedy impact analysis, especially with a view to undertaking early further planning – where necessary – to reduce nutrient inputs and thus being able to tackle the implementation of the Water Framework Directive (OSTERBURG 2007).

11.5.1.2 Nitrogen surplus levy in the light of experience in the Netherlands

1006. In its Environmental Report 2004 the Advisory Council on the Environment (SRU) suggested investigating the possibility of implementing a nitrogen surplus levy in Germany (SRU 2004a, Item 326). The basis for this recommendation was a number of advantages of this instrument compared with the present efforts to ensure compliance with application standards and the suggested levy on mineral fertilisers. From a conceptual point of view, a nitrogen surplus levy combines an approach of regulation at the actual source of the nutrient pollution of soils and water, the nitrogen excesses, with the efficiency advantages that a levy solution has over regulatory instruments. The SRU continues to take this basic view. However, in the light of the experience since documented in the literature regarding implementation of the nitrogen surplus levy in the Netherlands (Mineral Accounting System – MINAS), new aspects have become apparent in the assessment of this instrument (MALLIA and WRIGHT 2004; OENEMA and BERENTSEN 2005).

One fundamental problem of the use of a nitrogen surplus levy lies in its potential incompatibility with the requirements of the Nitrates Directive, under which annual application of a fertiliser quantity with a nitrogen content of more than 170 kg/ha on agricultural land is not permitted. The high basic levy-free allowances, which have only been reduced substantially in recent years, permitted nutrient excesses that in some cases were well above the conditions of the Nitrates Directive. Since the nitrogen surplus levy does not set any absolute limits, infringements of the EU limit can only be ruled out by using sufficiently high levy rates. Accordingly, the ECH in its judgement of 2 October 2003 found that the Netherlands had not transposed the Nitrates Directive in its fertiliser legislation. The Netherlands were therefore obliged to adapt their fertiliser legislation on the basis of the ECJ decision in order to comply with the limits of the Nitrates Directive. In addition to increasing the levy rates, the Netherlands were required to bring the deadline for the reduction in the levy-free nutrient quantity from 2008 to 2003. In spite of several adjustments to the levy-free allowances for the nutrient balances and the levy rates, the Dutch government failed to comply with this under the MINAS system.

It also became apparent that the Dutch MINAS system caused considerable application problems in the intensive pig and poultry breeding sector (MALLIA and WRIGHT 2004, p. 69 ff.). Since these production systems import nearly all animal feeds and are

characterised by use of only a small farm area, the inaccuracies of measurement and analysis that emerged in the implementation of MINAS resulted in unjustifiably high levy obligations on the part of the farmers in many cases. Even slight discrepancies in the nutrient components of the farms' slurry loads as a result of the area-specific assessment basis gave rise to appreciable burdens, the justification for which was often unclear and hard to understand. In fact the measurement and analysis errors often reached relatively large proportions, which meant that the levies payable were frequently unreasonably high. Although these problems remained within limits at the start of the implementation phase because of the high levy-free allowances for nutrient balances and the relatively low tax rates, the necessary corrections made at the instigation of the European Commission led to a substantial rise in the burden of levies and hence to massive political resistance, which was expressed in objections to the levies and in unlawful practices with regard to data acquisition and slurry disposal. Similarly, the Netherlands National Institute for Public Health and Environment came to the conclusion in two monitoring reports that although MINAS combined effectiveness and efficiency in the dairy farming and arable sectors, assuming sufficiently ambitious levy rates and levy-free allowances, it was not suitable for less land-intensive production methods such as pig and poultry breeding (RIVM 2002; 2004).

This experience is of great relevance for the evaluation of the nitrogen surplus levy. For example, the use of generous levy-free allowances gives rise to a significant limitation of the steering effect of the nitrogen surplus levy. Since the impact of additional nutrient losses is determined by the existing background load and the character of the endangered waters, it cannot be assumed that nutrient losses below a basic allowance cause only negligible environmental damage. For this reason a levy should basically be applied to every unit of the balance surplus. To avoid unnecessary burdens one could use a progressive scale for the levy rate. This would ensure that the nitrogen surpluses in the Fertiliser Utilisation Regulation which are crucial for compliance with good agricultural practice are not appreciably exceeded. Regional differences in nutrient input loads should be taken into account by means of differentiated levy rates.

Special attention needs to be devoted to the determination and checking of balance surpluses as a basis for assessment. Here it is especially important to prevent unjustified levies arising from measurement problems and resulting attempts by farmers to circumvent the problem by illegal means. This problem can be avoided with reasonable precision by using estimates (nutrient excretion according to the Fertiliser Utilisation Regulation) to calculate the nutrient balances from the data of the farm-gate area balance (see Item 1005).

1007. The diversity of the problems involved in implementing various instruments of nutrient policy makes it necessary to exploit the potential of an innovative mix of instruments. In addition to regulatory conditions and price instruments such as the nitrogen surplus levy, ideas under discussion also include novel approaches to flexible quantity regulation such as

trading in water quality rights (EPA 2007). Such trading systems based on river basins or water catchment areas make it possible to take account of all relevant nutrient sources, since operators of point sources and perpetrators of diffuse inputs can produce evidence of specific reductions in nutrient inputs by acquiring avoidance certificates from other emitters. In this way it is possible to activate additional low-cost avoidance measures in agriculture, so that future improvements in water quality will involve smaller financial burdens and therefore hold promise of better political feasibility. In addition, trading in water quality rights could ease the burden on public budgets, because the private transactions create incentives to implement particularly cost-effective measures, thereby reducing the need for financial compensation from agricultural assistance funds (cross-compliance, agri-environmental programmes). Promising preliminary work by the Federal Agricultural Research Centre (*Bundesforschungsanstalt für Landwirtschaft*) indicates that it is in principle possible to use the necessary standardised packages of measures. These include assessment of the effectiveness of measures to reduce nutrient inputs in accordance with clearly definable starting conditions in different soil-climate zones, farm types and land use categories (OSTERBURG and RUNGE 2007). A comparative evaluation of the various instrument options should therefore include trading in water quality rights, in order to explore the potential and synergies of a more closely integrated nutrient policy.

11.5.2 Use of pesticides

1008. The approval and use of crop protection agents (pesticides) is subject to comprehensive regulation (see Chapter 8.6). Approval may only be given if there is reason to expect that application as prescribed will not result in unacceptable harm to man and the environment. It is however known that the intended (i.e. in line with the approval conditions) and proper use is not adequately observed in practice (UBA 2006a; BVL 2007c). The findings in groundwater and the infringements of the maximum residues for German fruit and vegetables (Item 748 f.) also indicate a lack of compliance with good agricultural practice. The checks on observation of intended and proper use are inadequate, and there is a lack of incentives to reduce the use of pesticides. For more than ten years, domestic sales of active ingredients for pesticides have remained more or less constant (Schmidt 2003; PAN 2003).

In October 2004 the Federal Ministry of Food, Agriculture and Consumer Protection published a "Reduction Programme Chemical Plant Protection" (BMVEL 2004). This called for greater efforts to achieve further reductions in risks arising from the use of pesticides, to strictly limit the quantities applied to what is necessary, and to make such applications more transparent. In view of the reduction programme the ministers of agriculture of the *Länder* announced in March 2005 that the use of pesticides could be reduced by 15 % in ten years (AMK 2005). However, the reduction programme did not state any quantitative reduction targets. Without such targets and without concrete, indication-specific measures and

instructions for action (defined in the good agricultural practice) the programme will remain largely ineffective.

The Thematic Strategy for Sustainable Use of Pesticides, published by the European Commission in July 2006 (European Commission 2006b), lacks proposals for a quantitative reduction target or a levy on pesticides. In the opinion of the European Commission there is still a lack of information necessary for this, e.g. about a reference for a reduction target (baseline consumption) or information on a differentiated approach to pesticides or a classification of pesticide active ingredients in different risk categories. In the case of a pesticide levy this would be necessary to achieve a reduction in risk and not merely a reduction in quantity. However, the Commission sees a possibility that in the long term the data collection and indicator development requirements proposed in the pesticides strategy could make it possible to obtain the data needed for defining a suitable reduction target (European Commission 2006b). Moreover, the European Commission proposes that levy systems individually adapted to the member states be designed at member state level. To increase the acceptance of a levy on pesticides, this should be used for the purpose of sustainable use of pesticides, and should not “disappear” into the national budget.

1009. It is regrettable that the European Commission has not submitted concrete proposals either for a quantitative reduction target or for a levy system. Admittedly it is important to gear the goals and levies to the properties of the active ingredients. A general reduction requirement and taxation that fails to differentiate risks involve the risk that pesticides with weak effects will be replaced by smaller quantities of highly effective pesticides. Today, however, there are already a large number of indicators that would be suitable for defining reduction targets, for example application intensity (see below), minimum residues (maximum quantities) in food, and the share of organic farming or integrated agriculture (European Parliament 2003). With regard to a levy on pesticides, there are also indicators that are capable of quantifying the different risks of the active ingredients (BBA 2006). Even if these indicator systems are not yet used in all member states and some of them are not fully developed, the imposition by the European Commission of requirements for a quantitative reduction target and for the introduction of a pan-European risk-based levy on pesticides would have given an important boost to reducing inputs of pesticides.

11.5.2.1 Definition of quantitative reduction targets

Survey of actual use of pesticides (treatment index)

1010. The quantity of pesticide applied – in relation to the approved application rate and the crop area – is known as the treatment index. For example, if only half the wheat crop area is treated with pesticide and the approved pesticide quantity is reduced by 30 %, the treatment index works out at $0.5 \times 0.7 = 0.35$. This individual index is calculated for each individual

application of a pesticide to the crop area in question. The sum of the individual indices for all individual applications is the overall treatment index (ROßBERG 2007). The treatment index is thus an indicator of the intensity of use of the pesticide. One advantage of this method is the fact that, for example, a change from an older pesticide to a new one with a lower application rate does not automatically lead to a reduction in the treatment index, since the quantity of pesticide applied is always seen in relation to the approved quantity of that pesticide, which will be lower in the case of a newer product.

To determine the treatment index, first surveys were made in Germany from 2000 to 2005 in arable, hops, wine and vegetable growing situations. The surveys were conducted by the Federal Biological Institute for Agriculture and Forestry (BBA) on a sample basis, partly in close cooperation with the relevant crop-growing associations. The anonymous surveys asked what quantities of pesticides the individual establishments had applied to their crop areas. On this basis the treatment index was determined and averaged for specific crops and specific soil-climate zones. The surveys are to be repeated at regular intervals to stabilise the indices in the medium term (e.g. to average out differences in climatic conditions in individual years) and make it possible to describe a trend (BBA 2006).

The treatment indices not only differ from one crop to another (ROßBERG 2007), but may also display variations within a crop depending on the growing area (ROßBERG, no date). The differences are largely due to differences in climatic conditions and in the occurrence of diseases and pests. However, variations in the treatment index within a growing area are a pointer to application in excess of what is necessary. The treatment index does not, however, provide any information about whether or not reduced pesticide application resulted in lower yields. In order to convince farms that a reduced application rate does not necessarily mean lower yields, it would make sense to link the treatment index with the yield of the crop area.

Today the treatment index is recognised as a suitable quantitative measure for describing the intensity of chemical pesticide application (European Parliament 2003). The determination of the treatment index is suitable and necessary for defining and monitoring a reduction target, and should be embodied in legislation. Determination of treatment indices would then no longer be dependent on the budget situation and the frequent changes in priorities at political level (PAN 2004).

Definition of quantitative reduction targets

1011. National or EU-wide quantitative reduction targets for the use of pesticides have been recommended by various quarters. For example, the Environment Committee of the European Parliament recommends a reduction of 50 % in ten years (European Parliament 2003), the German Advisory Council on the Environment (SRU) a reduction of 30 % in Germany by 2008 (SRU 2004a, Item 348), the agriculture ministers of the *Länder* a 15 % reduction in Germany over ten years (AMK 2005), and the Pesticide Action Network a cut of

30 % in Germany within four years (PAN 2006). In its comments on the Pesticide Strategy, Denmark also proposes the introduction of a quantitative reduction target. A substantial reduction, it is claimed, is possible at no significant cost to farmers (Council of the European Union 2006). At its meeting at the end of June 2007, the Environment Committee of the European Parliament renewed its call for a quantitative target aimed at reducing the amount of pesticides used by 25 % within five years and 50 % within ten years (European Parliament press release of 26 June 2007).

However, it does not make sense to require a mere reduction in quantity. There is a risk that conventional pesticides might be replaced by highly effective pesticides without achieving any reduction in the overall risk. The treatment index is much more suitable as a target or progress review criterion (Item 1010). The reduction target should be developed on this basis and incorporated in the reduction programme and the strategy. One target could be, for example, to reduce infringements of the mean treatment index for a given crop in a given region to a maximum of 10 % within five years.

11.5.2.2 Financial incentives to reduce pesticide use

1012. From the point of view of environmental economics, excessive use of pesticides is the result of failure by individual users to take all social costs into account. One approach to closing this costs gap is to impose levies on the use of pesticides. By increasing the factor price, such levies serve the purpose of creating incentives to make sparing and ecologically acceptable use of pesticides. At the same time, information deficits on the part of many farmers militate against optimum use of pesticides. According to experts, lack of knowledge about the effects of pesticides on the environment and deficits in the availability and use of technical equipment lead to inappropriate application and hence overdosing of pesticides. Better advice and supervision can help to solve these problems. However, using public funds to finance such services is increasingly running into budget problems (SRU 2007b). It is therefore logical to combine the steering and functions of a levy on the use of pesticides.

1013. Practical experience shows that the steering effect of a levy on pesticides can result in a marked reduction in environmental burdens, especially in the long term. Although the price elasticity of demand for pesticides is relatively low in the short term, over a longer period it can reach significant levels (HOEVENAGEL et al. 1999, p. 39; WAIBEL and FLEISCHER 2001, p. 4). This means that an appreciable reaction to the introduction of a levy on pesticides can only be expected in the medium term. To achieve an immediate steering effect, the levy on pesticides would have to be very high. The lack of elasticity is an indication of the relatively high cost to farmers of a rapid reduction in the use of pesticides. With the existing crop structures and the growing methods employed, farmers have few short-term low-cost alternatives to using the available pesticides.

However, any assessment of the economic burdens of the necessary agricultural adaptation also needs to be made against the background of the market distortions arising from the European agricultural policy. Part of the high economic cost of reducing pesticide usage is probably due solely to the fact that the earnings due to certain crops involving high pesticide inputs are artificially increased by agricultural subsidies. A considerable proportion of agricultural crops are grown while taking advantage of assistance privileges, thereby preserving environmentally unfavourable agricultural structures. Accordingly, it pays the farms receiving assistance to make greater use of pesticides. Under market conditions there is reason to expect not only changes in agricultural structure, but also changes in crop quantities. A further reduction in agricultural subsidies would favour flexible adaptation on the part of farmers, thereby allowing a pesticides levy to have a greater steering effect. For example, by taking the estimates of the Federal Agricultural Research Authority (FAL) regarding the consequences of further deregulation of agriculture and looking at them in relation to the existing standardised pesticide treatment indices for Germany (Item 1010), it is possible to obtain an indication of the impacts of a change in European agricultural policy on the use of pesticides (GAY et al. 2003; ROßBERG et al. 2002). For example, a comparison of treatment index weighted land use for arable crops (cereal, oil seeds, potatoes and sugar beet) in Germany before and after complete deregulation of the market shows that pesticide treatment intensity could fall by more than a third simply as a result of abolishing subsidies and opening markets in the arable sector. The actual trend in pesticide use will however depend on the overall development of the market. The rising market prices currently observed suggest greater intensity of farming in the future, which throws a different light on this optimistic prospect.

1014. Experience in Sweden and Norway confirms the moderate short-term quantity effects on pesticide use when the levy was introduced (HOEVENAGEL et al. 1999). In general it is difficult to separate the effects of the levy from the steering effects of other instruments such as advice, monitoring and changes in the harmful effects of pesticide ingredients. In the countries mentioned, the revenue from the levy was used primarily for advisory programmes. A large proportion of the effects of the levy is therefore attributed to the steering effect of the advisory programmes. Danish experience shows that a simple revenue-neutral system with refunding to the farmers implies the danger of the effects being cancelled out by additional agricultural production (HOEVENAGEL et al. 1999). In spite of the increased production costs, returning the levy revenue raises the farmers' average profits, thereby making it more attractive to enter the market ("revenue recycling effect"). To some extent, however, this effect would also be felt if the revenue were put to earmarked use in the agricultural sector, e.g. for advisory services, though in this case the effect would be considerably less marked than with straight revenue recycling.

1015. One factor of major importance for the environmental effectiveness of a levy is the basis for assessment. A basic distinction can be made here between a value-based levy and one based on active ingredients. Gearing the levy rate to the price of pesticides (value-based levy) is not without its problems. For example if pesticide prices drop as a result of technical advances and falling production costs, there is no guarantee that the reduced burden of levies will be accompanied by a reduction in environmental burdens arising from the pesticides available on the market. But even levies on the quantity of pesticide active ingredients do not have sufficient steering effect, because advances in the development of active ingredients may increase the environmental impact of a given quantity of active ingredients without this having any impact on the resulting fiscal burden.

A more appropriate solution would be a levy on the weighted active ingredient quantity – i.e. weighted to take account its human and environmental toxicity. Only on this basis is it possible to approximately compensate for the marginal harm caused by pesticide use, because this harm depends primarily on the conditions of use. This assessment basis also makes it possible to ensure that a reduction in environmental damage can be achieved by replacing one pesticide with another, even without reducing the quantity (PEARCE and KOUNDOURI 2003). Substitution of individual pesticides evidently results in lower costs for farmers than reducing total use of pesticides by reducing crop quantities or changing the crops cultivated. For this reason, setting the levy rates on the basis of risks, despite a smaller reduction in the total quantity of pesticides applied, can stimulate farmers to replace environmentally harmful pesticides with products containing less harmful active ingredients. Accordingly, the same environmental burden can be achieved at lower economic cost.

1016. One approach to such a risk-based assessment basis could be the risk index SYNOPS developed by the Federal Biological Research Centre for Agriculture and Forestry (BBA 2006). However, this model, which also takes account of the environmental exposure of the active ingredients, is too complex to be used for all active ingredients traded in the EU. A more pragmatic approach would be to confine oneself to assessing the intrinsic properties of the active ingredients, and on this basis to divide the active ingredients into three categories: low, medium and high risk. Assigning the active ingredients to groups avoids comparing the individual active ingredients. This presupposes that each active ingredient can be assigned a single risk index. This is not possible, however, because the different hazardous effects of the active ingredients in the various environmental media cannot be compared and aggregated. Even the differences in toxicity within a given medium are difficult to compare (is toxicity to fishes more serious than toxicity to a water flea (*Daphnia*)?). It is even more problematical to aggregate the entire ecotoxicological properties in the environment in a single index. Even in the SYNOPS indicator mentioned above, only the individual end points of the active substances are compared (e.g. chronic toxicity to *Daphnia*). By contrast, allocation of active substances to groups is perfectly possible if it is

based on the fact that certain threshold values are taken as triggers for the classification of the active substances. On this basis it is conceivable that for all end points (acute toxicity to humans, carcinogenicity, mutagenicity, teratogenicity, hormonal effects, persistence, bioaccumulation, acute and chronic toxicity to fish, daphnia, algae, earthworms, bees) there would be threshold values or yes/no decisions that permit a classification in terms of low, medium and high risk.

A classification of active substances in risk categories is also found in the European Commission's proposal for a revised Pesticides Directive (Europäische Kommission o. J.). The assessment criteria are still missing, however. It would make sense if the assessment criteria for the pesticides levy kept as close as possible to the assessment criteria in the Directive. In that case the classification of the active substances would be based on their inclusion in the annexes of the new Pesticides Directive. Then every buyer or seller of a pesticide product would be able to understand why the levy on the pesticide was higher or lower.

1017. The question of whether a pesticides levy is compatible with German and European law has been investigated by MÖCKEL (2007). According to MÖCKEL, levies on both pesticides and fertilisers can be imposed on manufacturers and dealers by the Federal Government without any major administrative effort. Assuming objective and non-discriminatory implementation, they are compatible with European law and promote the reform process in the Common Agricultural Policy. The protection of the environment and human health which is enshrined in the German Basic Constitutional Law also justifies the associated restrictions on basic rights.

On balance, a risk-based system of levies on pesticides should be introduced as a financial incentive to reduce the use of pesticides. The levy should be designed so that it uses a moderate burden of charges to produce medium to long-term steering effects. Experience shows that the steering effect is greater in the long term as a result of new technical developments and increasing knowledge about alternatives to the use of pesticides.

11.5.2.3 Improving advisory services

1018. The BBA's studies show that the treatment index displays a broad scatter (Item 1010). Education, information and advice can reduce incorrect or excessive application. The advice must however be provided on a regular basis. Advice also includes strategic planning, for example about growing favourable varieties or using crop rotation to avoid pest problems. At present, however, there is more of a tendency to reduce official advisory services in the *Länder*. Their orientation was in any case rather on the economic side (verbal communication from BBA, 17 January 2007). It would make sense to use certified, sworn expert advisors responsible to the nature conservation authority, who would provide advice with the aim of reducing the use of pesticides. Such advisory services could

be financed, in line with the polluter pays principle, out of the revenue from a risk-based levy on pesticides. Thus in the short term at least, the special levy would primarily have a financing function. As a basic principle, pesticide advisory services for smaller farms should be subsidised.

1019. In addition to the measures suggested, attention must be drawn to the possibility of using buffer strips to protect sensitive natural and landscape areas such as rivers, lakes or specific habitats against pesticide inputs. A reformed compulsory set-aside system based on the French model (cf. NITSCH and OSTERBURG 2007) or the national envelope could be used as instruments for this purpose. Furthermore, the good agricultural practice should be expressed in concrete terms that provide information on indication-specific measures and instructions for action.

11.5.3 Veterinary drugs

1020. As a precautionary measure to protect soils and water from inputs of drugs, and to minimise the spread of antibiotic-resistant strains, there is a need in livestock farming to reduce the use of high-performance drugs, such as antibiotics, to the minimum level absolutely essential. To this end it is necessary to create additional requirements and incentives with a view to optimising livestock management conditions. It must be possible to identify the success of the measures from the reduction in consumption of antibiotics, especially since the introduction of the ban on antibiotic supplements to animal feeds. Moreover, agricultural use of “reserve antibiotics” intended for problematical human pathogens should only be permitted in exceptional cases for treating individual animals. For example, the guidelines on the use of antibiotics in livestock farming drawn up by the German Veterinary Council (*Tierärztekammer*) should be given binding legal force. There is also a need to close existing loopholes in the fields of supervision and advice regarding the use of veterinary drugs. It would also be advisable to improve the transparency of drug consumption in this sector in order to permit adequate risk assessment. Here the existing legally binding duty of veterinary personnel to keep records of all pharmacy-only and prescription-only drugs dispensed could serve as a basis for recording the consumption of antibiotics and antiparasitic agents (SRU 2007b).

11.6 Organic farming

1021. Organic farming is an agricultural system that is geared to the idea of closed cycle management and characterised in particular by the fact that it largely refrains from using mineral nitrogen fertilisers and pesticides and that it practises livestock farming in a land-oriented manner (cf. EC Eco-Regulation – 2092/91/EEC). Originally the result of private initiative, organic farming was initially organised in associations that require compliance with certain production rules. Farmers operating in accordance with these rules are accredited,

allowing them to market their produce under the label of the relevant association. Council Regulation (EEC) No 2092/91 and Council Regulations (EC) No 1804/1999, and No 834/2007 created minimum legal standards for the production of produce labelled as being “from organic production”. The requirements of the individual associations go beyond these standards, e.g. with regard to maximum livestock density per hectare, permitted fertiliser quantities or the use of third-party and conventional animal feeds (BÖLW 2006). The remarks below sometimes make a distinction between “EU bio” and “association bio”.

In its sustainability strategy, the previous Federal Government set itself the target of raising the share accounted for by organic farming, in view of its positive environmental effects, to 20 % of the agricultural land in Germany (Bundesregierung 2002). The trend to date suggests that this target will not be met in the near future.

Another important aspect is the question of whether organic farming should be financially supported. In view of its benefits for the environment, organic farming should be assisted nationwide. Admittedly nationwide assistance is at variance with the aim of making efficient use of the available resources on land where there is a special need for action. On the other hand, steering measures of this kind in relation to organic farming would require extensive studies of the impacts of individual measures at various locations and a detailed and differentiated allocation formula for assistance funds. In other words the transaction costs involved would be high. To avoid this, assistance should be offered without spatial restrictions.

11.6.1 Organic farming in Germany

1022. On an EU comparison of organically farmed land as a percentage of total agricultural land, Germany is close to the average, with 4.9 %. The largest organic farming shares are found in Finland (11.4 %), Austria (11.2 %) and Estonia (9.6 %), the smallest in Malta and Ireland, each with less than 1 %. The largest areas of organically farmed land are in Italy (1,067,102 ha) and Spain (992,376 ha), followed by Germany in third place (807,406 ha) (ZMP 2007a).

1023. In Germany the area of organically farmed land increased by 80 % between 1999 and 2006, and the number of farms by 70 %. By contrast, the organically farmed area showed an increase of only 5.8 % from 2006 to 2007. The number of organic farms went up by 2.8 % (BÖLW 2008). One reason for the reluctance to change may lie in the high incomes possible in the conventional sector – partly as a result of subsidies for biomass. At the same time there was a further reduction in assistance for changing to organic farming and maintaining it in 2007. The increase in the area of existing farms, by contrast, is due to the great demand for organic products, the generally high prices and the resumption of subsidies for conversion (BÖLW 2008).

At the end of 2006 some 873,010 ha or 5.3 % of the total agricultural land was being run by 18 046 farms (4.9 % of the farms in Germany). The total increase in organic farm area was divided more or less equally between farms complying with the EU directive and farms complying with association requirements. This means the share due to farms working under the rules of the nine recognised organic farming associations fell from 83 % in 1999 to 68 % in 2007. The share of total organic farming accounted for by these farms fell from 72 % to 55 % (SÖL 2007; BÖLW 2008). Thus compared with 1999 there is a larger share of bio products available – and being bought (cf. Item 1025) – that are produced in accordance with the less exacting requirements of the EU and can therefore be sold at lower prices.

1024. Trends to date show signs of failure to achieve the sustainability strategy and biodiversity strategy targets of raising the organic farming share of land to 20 % by 2010 (Bundesregierung 2002; BMU 2007). This is particularly regrettable in view of the positive environmental effects of organic farming (cf. Item 1026 ff.). The 20-percent target should continue to be actively pursued.

1025. Sales of organically produced foods in Germany more than doubled from 2000 to 2006. In terms of absolute figures, all sales channels profited from this growth, though to differing extents. The called-for expansion of the organic foods markets from medium-sized structures to major trade chains (SRU 2002b, Item 735) was accompanied by a shift in market shares. Whereas there was a drop in the percentage accounted for by producers and also by bakeries, butchers, health food stores and natural food specialists, sectors that succeeded in increasing their market share were the retail food trade and the “miscellaneous” sector, which in particular includes sales of organic food in druggist stores.

11.6.2 Positive environmental effects

1026. Even organic farming, which largely manages without synthetic chemical fertilisers and sprays and which aspires to species-appropriate livestock farming and varied crop rotation, does not automatically “conform to nature conservation requirements” (van ELSSEN 2005). When one considers individual goals, it frequently does not perform so well as more specific measures or targets. Compared with conventional crop growing, however, the diffuse pollutant and nutrient inputs are lower and the number of species, taken over the entire farm area, is usually higher.

Species and biotopes

1027. On organic farms that are very strictly nature conservation oriented, there may be up to three times as many species as on conventional farms (SRU 2002b, Item 735). By expanding organic farming it is evidently possible to combat the increasing species depletion documented on conventionally farmed land, including species formerly widespread in the agricultural countryside (REITER and KRUG 2003). This also applies to birds (HÖTKER

et al. 2004), and to the number and quality of insect communities, for example ground beetles (RAHMANN and PIPER 2007). Depending on management intensity (e.g. weed control) it may be possible to promote weed plant flora. There is no guarantee of this, however. Nevertheless, nature conservation optimisation strategies for species and biotope protection are often easier to integrate into organic farming operations than on conventional farms. Ecological services may be promoted even further by means of farm-specific nature conservation advice (van ELSSEN and MEYERHOFF 2004). One major benefit of organic farming for species lies in the fact that it dispenses with chemical crop protection agents.

Soil fertility

1028. The soil is the main factor for achieving large crops. In organic farming the soil quality is preserved by using organic manures instead of mineral fertilisers and by substantially reducing the use of chemicals. Productivity is lower than on conventional farms (FLIEßBACH et al. 2006). Long-term field trials show that organic farming has positive effects on humus content and microbial activity (MÄDER et al. 2002; MUNRO et al. 2002). However, if such studies include site-specific conditions and crop rotation, it becomes apparent that these factors overlie the differences between conventional and organic farming systems (HOYER et al. 2007). Especially in view of this, a critical view must be taken of the intensification and specialisation tendencies within organic farming.

Surface waters and groundwater

1029. There is a large measure of conformity between the goals of organic farming and those of water conservation (KRATOCHVIL and PLAKOLM 2002). The nutrient balances of organic farming operations for the principal nutrients nitrogen, phosphate and potassium were well below the figures for conventional farms (HEGE et al. 2003). The nutrient balances were determined on a “farm-gate” basis (cf. Item 1005).

Results from long-term field trials show that the migration potential for nitrogen (N) applied in mineral form is evidently greater than when it is applied in organic form as farmyard dung or slurry. After conversion of conventional farmland to types of organic farming, considerable quantities of nitrogen are retained in the topsoil and protected from relocation and leaching into groundwater reserves (KOLBE 2004).

Greenhouse gas emissions

1030. Organic farming uses smaller quantities of mineral fertilisers, purchased animal feeds and chemical/synthetic pesticides than conventional farms, and the overall system therefore makes a smaller contribution to greenhouse gas emissions (FLIEßBACH et al. 2006). The carbon storage function is partly due to the greater humus content of the soil (FLIEßBACH

et al. 2006). Thus an expansion of organic farming would have a positive impact on reducing greenhouse gas emissions (HÜLSBERGEN and KÜSTERMANN 2007).

11.6.3 Funding

Funding of conversion to and preservation of organic farming

1031. Since 1994 the introduction and preservation of organic farming has received assistance from the agri-environmental programmes of the *Länder*. The legal basis for this funding is provided by Article 36 of Council Regulation (EEC) No 2078/92 in conjunction with Council Regulation (EC) No 1698/2005 (EAFRD), and at national level by the Act on the Joint Task “Improving agricultural structures and coastal protection” (*Gesetz über die Gemeinschaftsaufgabe “Verbesserung der Agrarstruktur und des Küstenschutzes” – GAK, GAK-Gesetz*). Co-financing funds are available for this purpose from the EU: its share is 55 % (“old” *Länder*) or 80 % (“new” *Länder* and Administrative District of Lüneburg). The remainder is co-financed by the Joint Task (60 %) and the *Länder* (40 %).

During conversion to organic farming, compliance with the rules leads to lower yields, especially as a result of lower stock densities and non-use of mineral fertilisers and pesticides. What is more, for a certain product-specific period the produce continues to be sold as conventional or transitional produce, which commands lower prices. In some cases, therefore, conversion to organic farming receives more funding than its preservation.

The framework plan for the Joint Task sets out funding principles under which the *Länder* can promote conversion to organic farming and its continued existence. The *Länder* may deviate from the suggested amounts by 20 % upwards or 30 % downwards. This results in the funding ranges shown in Table 11-2. Compared with 2006, the funding principles valid from 2007 onwards as part of the agricultural reform (including abolition of incentive component) were lowered by an average of about 10 %.

Funding for the introduction of organic farming is highest in North-Rhine/Westphalia, Saxony (262 €/ha each) and Rhineland-Palatinate (200 €/ha), while the highest rates for preservation are paid in Bavaria and Hesse (190 €/ha each) (BLE 2007). Moreover, the *Länder* may provide a grant of 35 €/ha, subject to a maximum of 530 euro per farm, in respect of costs arising from participation in inspection procedures under the EC Eco-Regulation.

Table 11-2

Funding ranges for promotion of organic farming

	Funding for introduction of organic farming in €/ha	Funding for preservation of organic farming in €/ha
Arable land	131–224	96–165
Grassland	131–224	96–165
Vegetables	308–528	190–325
Permanent crops	588–1,008	463–794

Source: Federal Ministry of Food, Agriculture and Consumer Protection, BMELV 2007b

The federal organic farming programme

1032. In addition to direct assistance for organic farming, the Federal Ministry of Food, Agriculture and Consumer Protection (*BMELV*) is using the Federal Organic Farming programme (*BÖL*) to pursue the aim of improving framework conditions for organic farming and promoting demand for organically farmed produce. It is funding research projects on various aspects of organic farming and food production and providing information for multipliers and special target groups. The programme has helped improve access to information on organic farming, arouse interest in the subject of organic farming, improve the quality of the market players, reinforce the position of research into organic farming in the broad sense, and enhance the image of organic farming to a certain extent (BECKER et al. 2004).

In 2002 and 2003 the federal organic farming programme was funded to the tune of 35 million euro a year, and thereafter 20 million euro a year. The scheduled annual funding for 2007 to 2015 is 16 million euro (BLE 2007).

Future organisation of funding

1033. Although organic farming does have various positive environmental effects, it does not automatically perform all functions that are desirable from a nature conservation point of view (cf. Item 1026 ff.). Since organic farming receives assistance from resources for agri-environmental programmes, it would, in the interests of efficient focusing of funds from a nature conservation point of view, be appropriate not to provide general assistance for compliance with all the rules of organic farming, but to concentrate instead on compliance with requirements and areas that show the greatest efficiency in achieving environmental effects. On the other hand organic farming is characterised by the fact that it supports a whole bundle of ecological functions, though without taking account of any particular spatial or site-specific needs for action. In the case of organic farming, the efficiency effects that would result from optimised spatial allocation of funding measures might be offset in the field

of transaction cost savings resulting from simple allocation of funds on the basis of whole farms rather than individual areas. This would argue in favour of basic general assistance for organic farming. The size of the transaction costs has not yet been finally investigated, however, so only a provisional recommendation is possible at present. The level of basic assistance should be such that it covers additional expenditure that has genuine positive effects on nature and the environment. In particular, it should support extensive non-use of mineral fertilisers and pesticides, and also the practice of land-oriented livestock farming and the use of varied crop rotation. Organic farming methods that do not meet the requirements of management in accordance with nature conservation principles should not be included in the basic assistance. One example of this is the use of copper as a crop protection agent in special crops such as grapes or hops. There is also another argument for basic assistance. Since organic farmers investing in the conversion of their land and sales channels generally tie themselves to this system on a long-term basis, such farms offer a better basis for long-term implementation of more sophisticated agri-environmental measures. There is little likelihood of such contracts being cancelled at short notice in response to changes in market conditions, as happened last year on many conventionally farmed areas with contract-based nature conservation. In order to promote such “environmentalisation” of agriculture, as called for in the 20% target of the sustainability and biodiversity strategies, it would seem appropriate to continue funding conversion to organic farming in the present way.

In parallel, discussion should be given to further developing the EC Eco-Regulation and the associations’ organic farming rules in a way that seeks to reduce the deficits in the field of nature conservation services. In this context critical questions must be asked in particular about the intensification tendencies currently observed in organic farming (e.g. partial conversion of farms, livestock-free farms and restriction of crop rotation). It must nevertheless be stated that organic farming is generally worth assisting in view of the positive effects on the natural regime that are inherent in the system.

Among other things, the Federal Organic Farming Programme helps to make information on organic farming more accessible and to raise the qualifications of market players (BECKER et al. 2004). In view of factors that inhibit farmers’ readiness to convert their farms to organic farming (cf. ARP et al. 2001; HOLT et al. 2003), SCHRAMEK and SCHNAUT (2004) cite the following as important supporting factors during the conversion phase (in descending order of importance): external advice and training, own experience, and encouragement from their immediate surroundings, and also funding programmes. Among other things, they therefore recommend strengthening advice and information, improving marketing structures having regard to regional conditions, and support networking contacts between organic farming operations. Continuation of the Federal Organic Farming Programme would in principle seem desirable in view of these findings as well.

11.6.4 Recommendations

1034. In view of the wide-ranging environmental services of organic farming over and above good agricultural practice, the simplicity of resource allocation for the administrative authorities and the favourable conditions for long-term continuation of associated agri-environmental measures, the Federal Government should continue to promote organic farming. In particular, the Federal Government's goal of having 20 % of agricultural land farmed by organic methods by 2010 should continue to be pursued and should be enshrined in a strategy for improving the environmental balance of the entire agricultural sector – especially through definition and enforcement of the standards of good agricultural practice (Item 971) and through target-oriented and more extensive agri-environmental measures. Further clarification should be sought of the ideal relationship between a range of widespread agri-environmental measures that on present knowledge is very restricted (including organic farming) and a more effective target-oriented range. To this end there is a need to make and use qualitative evaluations of the programmes. In this connection the role of transaction costs should also be investigated. Funding should be changed to widespread financial support for measures that have genuine positive effects on nature and the environment. Finally, funding of conversion to organic farming should be maintained and the Federal Organic Farming Programme should be continued.

11.7 Opportunities and limitations of an environmentally oriented reform of the Common Agricultural Policy

11.7.1 Introduction

1035. For a long time agricultural policy was regarded as a policy field that was particularly resistant to reform and largely shut off from non-agricultural interests. Until well into the 1980s the Common Agricultural Policy (CAP) remained essentially unchanged in spite of increasing financial, socio-structural and environmental costs. Since the early 1990s there have been three reforms of the CAP within a very short time: the MacSharry reform of 1992, the Agenda 2000 of 1999, and finally in the course of the mid-term review of the Agenda 2000 in 2003. Although each of these reforms was in itself unable to do more than offer rudimentary and by no means satisfactory solutions to the many and various problems of agricultural policy, the reforms as a whole represent far-reaching changes which at least partially refute the idea that agricultural policy is incapable of reform. And they open up the possibility of a further, more ambitious environmentally oriented reform of the CAP (GARZON 2006; GRANT 1997).

Against this background, the present chapter examines the opportunities and limitations of a more ambitious ecological reform of the CAP. Looking back on developments to date in national and European agricultural policy, one has to ask why the agricultural sector was

able to ward off attempts at reform longer and more successfully than other economic sectors, in spite of obviously undesirable developments. On the other hand it is also necessary to ask what factors could explain the sudden changes in the CAP since the 1990s and what role these factors might play in future attempts at reform.

To find answers to these questions, we first identify attributes of agricultural policy that influence its capacity for reform (Section 11.7.2). We then outline the system of agricultural policy actors and decision (Section 11.7.3). Section 11.7.4 investigates the reforms of the CAP to date and identifies obstacles to reform and factors that favour a future ecological reform of the CAP. Section 11.7.5 describes the essential features of two competing models of agri-environmental policy and examines their compatibility with the CAP. The last section describes central elements of a future environmentally oriented reform strategy. On the basis of experience with reforms to date, it stresses the importance of a step-by-step policy in which the reform measures are designed to avoid provoking blockades, but at the same time improve the structure of opportunities for future more ambitious reform stages. As a whole, the chapter shows that the prospects of an ecological reform of the CAP – as described by the SRU in this and previous reports – are better than is generally assumed.

11.7.2 Special features of the agricultural sector: Agricultural policy as social policy for rural areas

1036. The agricultural sector has a number of special features which traditionally serve as grounds for separating agriculture from economic policy in general and making it subject to rules of its own (DAUGBJERG and SWINBANK 2006). The first of these special features, which taken together are responsible for the widespread – though dubious – notion of “agricultural exceptionalism” (SKOGSTAD 1998), is that the agricultural sector is more dependent than other sectors of the economy on factors that are largely beyond the control of the market players (e.g. climate, weather, animal and plant diseases, natural events). This results in substantial price fluctuations on the agricultural markets, which in turn lead to a potentially unstable income situation among farmers. A second special feature is generally seen in the fact that in a growing economy, agricultural incomes tend to lag behind the general income trend. The reason for this is the low price elasticity of demand for agricultural products: the demand for agricultural produce does not grow as fast as the general rise in incomes. A third distinctive feature of agriculture is the fact that it contributes to achieving national goals, such as secure food supplies at stable prices. In the initial phase of national agricultural policies, fear of supply crises was a crucial motive for such policies (SKOGSTAD 1998).

This assumption of a special position for agriculture formed the fundamental argument for agricultural policies based on welfare state considerations, of the kind which emerged in most western countries in the 1920s and 1930s in particular, and which has also

characterised the CAP of the European Union since 1958 (COLEMAN 1998, p. 454 f.). The aim of such a policy is to safeguard agricultural incomes against major price fluctuations, couple them to the general income trend, thereby prevent migration away from rural areas, and guarantee national and European self-sufficiency in agriculture produce (GRANT 1997, p. 6). Article 33 of the Treaty establishing the European Community (EC) lays down this welfare-state function as an official goal of the CAP. It states that the purpose of the CAP is “to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture”. Thus agriculture is the only sector of the economy in which the EU pursues a sectoral income goal (FEINDT 2008).

Unlike other economic policies, agricultural policy in the post-war years focused not so much on maximum freedom of development of a liberal farming sector, sought instead “directly influence with great financial and administrative input the situation of the farming population” (RIEGER 1996, p. 402). In view of the agricultural policies of Europe, Japan and the USA, SHEINGATE (2001) rightly speaks of the emergence of an “agricultural welfare state”.

For a long time the public debate about European agricultural policy focused on the goal of “increasing agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour” (Art. 33 EC). Productivity increases and growth were regarded as necessary preconditions for safeguarding agricultural earnings. It was only in the course of the paradigm change from production-oriented to multifunctional agriculture which began in 1985 and was pursued more vigorously in the 1990s that it became increasingly clear that safeguarding the social situation of the agricultural population did not necessarily require expansion of production, but that agricultural earnings subsidies could also be granted for services that were independent of production (FEINDT 2007b, p. 395 f.).

11.7.3 Agricultural policy actor structure

1037. The welfare-state orientation of agricultural policy is naturally reflected in the agricultural policy actor structure as well. The most important feature of this actor structure is a considerable congruence of interests between political decision makers and agricultural stakeholder associations. As shown by RIEGER (1996), this can be traced to a general change in the understanding of the state in western industrialised countries, leading to a large measure of overlap between state and farming interests. “Only after the societies of Western Europe became welfare states, in other words communities centred round criteria of minimum social safeguards, specific notions of justice, equalisation of regional differences in situations and opportunities, and the comprehensive integration of all population groups, were the agricultural associations in a position to articulate their interests accordingly and – of crucial importance – to justify them as well” (RIEGER 1996, p. 410). A significant part of the political power of the agricultural stakeholder associations and their disproportionate

influence on political decisions compared with other policy areas is thus derived and not of an original nature. It can in principle – and this is of central importance for the prospects of political reforms in the agricultural sector – be revoked by governmental decision makers if their preferences change.

However, the considerable agreement between governmental and agricultural interests since the 1920s and 1930s has favoured the emergence of unusually homogeneous and self-contained policy networks in most EU member states. Non-agricultural interests have systematically been denied access to these decision making structures. This pattern continues to this day in the personnel recruitment of state agricultural administrations. Thus it is a feature of national ministries of agriculture that they employ – right up to ministerial level – an above-average number of representatives of the agricultural sector (farmers, association members). In this way the agricultural sector in the majority of OECD countries (OECD – Organisation for Economic Co-operation and Development) has succeeded in “their own ministries and parliamentary committees as *inside lobby* [...] within the state machinery.” At national level this direct, unfiltered influence on government policy has contributed to the fact that, despite a sharp decline in the number of people employed in the farm sector and despite changes in political priorities, agricultural policy interests have hardly lost any of their influence right up to the present day (FEINDT 2007b, p. 382).

This actor structure is also found at European level. For example, the Agricultural Committee of the European Parliament and the agricultural services of the European Commission regularly include former representatives of national or European farmers’ associations (ROEDERER-RYNNING 2003, p. 7). By contrast, consumer associations and environmental associations are largely excluded from negotiations on the CAP (GRANT 1997, p. 148; KRAACK et al. 2001, p. 67). GARZON (2006, p. 27) therefore characterises the agricultural actor network of the 1990s at EU level as a “closed policy circle excluding other considerations and interests”. This homogeneity is reinforced by the great complexity of the CAP, which makes it difficult for outsiders to join the community of agricultural actors without adopting at least some of its central values and basic assumptions (GRANT 1997, p. 1).

In addition to this tendency to close off the national and European arenas of agricultural policy decisions, the CAP exhibits a number of other institutional peculiarities that play an important role in the prospects for a future agricultural policy reform, and which are therefore described below.

1038. The most important institutional actors in the CAP are the European Commission and the Council of Ministers. In the past the European Council, the regular meeting of the European heads of state and government, has also played an important role in major decisions on policy direction. The precise allocation of competencies between the EU institutions is defined in Article 37 (2) EC. This states that the European Commission has the sole right to make proposals: it presents proposals for legislation, on which the Council of

Ministers takes decisions by qualified majority after hearing the European Parliament. The European Commission is thus the most important actor in the agenda setting phase. Particularly in the decision phase, however, the Council of Ministers is the dominant actor. It can reject the reforms proposed by the European Commission. However, it can only alter the Commission's proposals by unanimous decision or with the consent of the European Commission. In view of this special institutional feature, the European Commission retains considerable influence during the decision process as well. A crucial role here is played by the Commissioner for Agriculture, who takes part in the meetings of the Council of Ministers, where he or she has to present the Commission's proposals and defend them against criticism (GRANT 1997, p. 149 ff.). In the CAP – unlike environmental policy – the European Parliament tends to play a marginal role, since it does not have any powers of veto in the legislation process. Finally, another special feature of the CAP is the great importance of the European Council, which steps into the breach in the event of stalemate situations in the Council of Agriculture Ministers or issues transcending policy boundaries (e.g. agricultural policy and Eastern enlargement, GATT-WTO negotiations) (GARZON 2006, s. 15 ff.).

The interests of the agricultural lobby are represented at European level by the Committee of Professional Agricultural Organisations of the European Union (COPA) and the General Committee for Agricultural Cooperation in the European Union (COGECA) (GARZON 2006, p. 27). Until the late 1970s COPA had a very close relationship with the Directorate General for Agriculture. At the working level COPA had daily contact with the Directorate General. There were monthly meetings between the Commissioner for Agriculture and the board of COPA. This good relationship is illustrated by the fact that the European Commission frequently discussed its agricultural pricing proposals with COPA first and only then informed the national governments (GRANT 1997, p. 169). Since the 1980s the influence of COPA has declined considerably. In the late 1980s, meetings with the Commissioner for Agriculture only took place every four or five months. The main reason for the loss of political influence was internal differences of opinion, which were aggravated by the admission of new members from South European states and subsequently from the East European accession states, and which ultimately resulted in a shift of agricultural lobbying to the national level (DAUGBJERG 1999). Against the background of the need for consolidation of the EU's agricultural budget, which had been growing increasingly urgent since the 1980s, the gap between the interests of COPA and the Directorate General for Agriculture continued to widen (GRANT 1997, p. 169).

In addition to the agricultural producers, there are a number of other sectors of the economy which benefit from the CAP. For example, the successful resistance by the agricultural sector is due in large measure to support from supply industries. These include the manufacturers of pesticides, fertilisers, seed, animal feeds, veterinary drugs and agricultural machinery. These branches of industry have a fundamental interest in the continued existence of a

policy of high agricultural prices and therefore tend to be against radical reforms (GRANT 1997, p. 21 ff.). The financial sector is also involved in agriculture, through the agricultural loans it makes. It too advocates a policy based on growth and productivity increases (GRANT 1997, p. 19 f.). One potentially influential actor is the food industry. Its views on the existing CAP are divided. Whereas companies at the primary stage – such as milk bottling operations – profit from the CAP's intervention prices and purchase commitments, companies engaged in further processing are adversely affected by the high price level within the EU. As groups which in many cases operate on an international basis, they therefore take a positive attitude to more ambitious market liberalisation (GRANT 1997, p. 23).

As indicated above, it is primarily via the Council of Agriculture Ministers that the EU member states exert influence on the CAP. Their positions sometimes differ very widely. A study of the negotiation process for the mid-term review in 2003 provides information about the composition, strength and assertiveness of potential reform coalitions in the CAP (FEINDT 2007b, p. 398 ff.; see also GRANT 1997, p. 160 f., 174). The study distinguishes the following three coalitions of actors:

- A group of advocates of extensive liberalisation, consisting of the member states United Kingdom, Sweden and Denmark, representatives of industry, scientists, and the Directorate General for Trade of the European Commission.
- A coalition of opponents of reform, who want to keep the status quo of the Agenda 2000. This comprises the member states Belgium, France, Greece, Ireland, Italy, Luxembourg, Austria, Portugal and Spain, parts of the Directorate General for Agriculture and the European and national farmers' associations. Since the Eastern enlargement of the EU, the new states also belong to this group.
- A “middle-of-the-road” group which wants reform but has so far fought shy of extensive liberalisation of the agricultural markets. This group includes the European Commission, especially in the person of the former Commissioner for Agriculture (Fischler), parts of the DG Agriculture, parts of the DG Environment, and the member states Germany and the Netherlands. This group is generally supported by environmental and development aid organisations, smallholders, agricultural cooperatives and the media.

In the respondents' opinion, the most influential actors in the CAP were the European Commission and the member states (including the Council of Agriculture Ministers). Within the European Commission they stressed above all the influence of Commissioner Fischler on the reform result, whereas among the member states Germany and France and – some way behind – the Netherlands and the liberalisation-friendly member states United Kingdom, Sweden and Denmark were regarded as particularly influential.

All in all, the analysis of actors shows that there is considerable potential support for future reforms of the CAP. Taken together, the reformers and the middle group can muster clear majorities for reform even after the enlargement, especially since their ranks include the European Commission, the most influential actor in the CAP. However, their powers of assertion depend heavily on the position adopted by Germany. It would take great strategic skills to overcome a joint veto by Germany and France (see Item 1041 ff.). Conversely Germany, whose position is less predetermined by the structure of the national economy than is the case in France (FEINDT 2007b), could certainly count on broad support for reform initiatives of its own.

Furthermore, the actor analysis also shows that a strategy of gradual and ecologically buttressed deregulation (strengthening of the second pillar etc.) (see SRU 2004a) is more likely to be acceptable to a majority than a strategy of radical liberalisation that is only supported by a minority of member states. Admittedly the increase in the number of countries receiving agricultural subsidies in the wake of the Eastern enlargement of the EU presents obstacles to further reforms (DAUGBJERG and SWINBANK 2004). Nevertheless, against the background of future WTO negotiations, which will in all probability lead to further liberalisation measures, such a strategy of ecologically supported liberalisation could become interesting for the East European accession countries as well.

11.7.4 Structural and strategic success factors of past agricultural policy reforms in Europe

1039. Although the existence of a reform-oriented coalition of actors is an important precondition for reforms, it is not in itself sufficient to actually get reforms off the ground. Successful changes in policy are also dependent on a number of other factors. A distinction can be made here between structural and strategic factors (JÄNICKE 1997).

11.7.4.1 Structural factors: External pressure to act

1040. Structural success factors comprise the political and institutional framework of agricultural policy decision processes, and also pressures due to external problems. The first of these – especially the decision rules and actor constellations for agricultural policy decisions in the EU – has already been discussed in the preceding sections. This section therefore confines itself to the pressure of external problems as a supporting factor in agricultural reforms.

The development of the CAP to date shows that external problem pressures have been a crucial – possibly even a necessary – precondition for extensive reforms (DAUGBJERG and SWINBANK 2007, p. 3). In the past such external pressure has mostly been of a financial or political nature. In the case of the MacSharry reform it was the need for consolidation of the EU budget and the inclusion of the agricultural sector in the world trade regime that were the

driving forces behind the reform. In the Agenda 2000 the pressure to reform originated above all from the impending Eastern enlargement, which – if it was not to give rise to an increase in agricultural expenditure – created a need for extensive cuts in agricultural funds in the old member states. In the mid-term review 2003 the pressure to reform came once again from the imminent Eastern enlargement, with the focus on the extension of direct payments to the new members as demanded by the accession states but not provided for in the Agenda 2000. Additional pressure was generated by the new round of WTO negotiations which started in Doha in 2001, during which criticism was levelled at the area-specific and production-related direct payments in particular (GRANT 1997, p. 183 ff.). Since the mid 1980s, growing awareness of the adverse environmental impacts of agriculture has been playing an increasingly important role (GRANT 1997, p. 200 ff.; FEINDT 2008).

11.7.4.2 Strategic factors: Policy feedback, breaking down closed political networks, and compensation payments

1041. Strategy denotes the way in which actors use the political and institutional framework, their own negotiating skills and situation contexts to realise their political goals as fully as possible. In view of their relative weakness compared with more powerful business interests, representatives of environmental interests are especially reliant on strategic action (JÄNICKE 1996, p. 40). The agricultural policy field offers a number of points of attack for strategic action by reform-oriented actors.

Policy feedback: Step by step to major reforms

1042. The existing agricultural policy shows that plausible deficit analyses and convincing proposals for solutions are by no means a sufficient precondition for policy changes and reform. The many and various efforts to block reforms in the CAP are not due to ignorance of the problems or lack of possible solutions. They result primarily from organised resistance by the sectors affected (COLEMAN et al. 1997, p. 453 f.). Radical reforms that may be convincing in theory are often impossible to put into political practice. Proposals for reform – if they are implemented at all – are watered down considerably during the political decision process.

The analysis of past reforms of the CAP shows that strategic behaviour on the part of reform actors – first and foremost the European Commission – can overcome the resistance described: a series of usually small reform steps, each building on the last, added up to far-reaching changes in the CAP that would previously have been regarded as impossible. The crucial factor in this success was that each reform step systematically improved the chances of success of further reform steps (GARZON 2006; COLEMAN et al. 1997).

Political scientists describe this self-reinforcing policy process as policy feedback (PIERSON 1993). Essentially the policy feedback approach works on the basis that political decisions,

once taken, influence the spectrum of future policy options. It thus takes up Theodore Lowi's classic observation that the cause-and-effect relationships between political processes and political programmes can basically work in both directions (LOWI 1972). The observation that political processes determine the quality of legislation is then supplemented by the non-trivial finding that such legislation can in turn exert an influence on future decision processes. The literature has identified a number of mechanisms responsible for this. For example, political programmes can change the relative influence of the actors involved in the decision process, or establish new groups of actors (e.g. beneficiaries of new welfare-state programmes). Since the interests of the actors involved in the political process are influenced by the relevant legal framework, a change in this framework can also bring about a revision of actors' preferences, thereby altering their voting behaviour in decision processes. Finally, political decisions may result in commitments to paths which can only be departed from later at great cost (e.g. infrastructure decision).

One concrete example of how incremental reforms in the CAP succeeded in improving the prospects of subsequent policy changes is the MacSharry reform of 1992. Four years before the reform, the adoption of the agricultural guideline and the introduction of "budget stabilisers" marked a first step towards stabilisation of the rising agricultural expenditure. The agricultural guideline introduced an upper limit for the Community's future spending on agriculture. To supplement this, the budget stabilisers were to trigger automatic reductions in guarantee prices in the individual product groups if certain product-related maximum figures were exceeded. Although this decision did not do anything to alter the structural causes of the rising agricultural expenditure, which gave rise to justified doubts about its direct effectiveness, it did step up the pressure to reach agreement in the subsequent negotiations on the MacSharry reform to such an extent that Germany found itself forced to give up its original resistance to the reform. In the negotiating process, Germany had at first categorically rejected any reduction in the guarantee prices for grain and beef in spite of the prospect of compensation through direct payments. However, as it became increasingly possible that the reform would fail, Germany changed its attitude and abstained from the vote in the Council of Ministers. This was because, if the reform had failed, there was a great probability that the budget stabilisers built into the market systems, in other words price reductions or charges for exceeding certain maximum limits, would have come into operation. Unlike the planned price cuts in the MacSharry reform, however, these would not have been compensated for by direct payments. Thus despite its basically negative attitude, Germany was in the end forced to opt for what it regarded as the lesser evil (GARZON 2006, p. 66 ff.).

COLEMAN et al. (1997, p. 457) describe such reforms, which are needed to facilitate subsequent more ambitious reforms, as "enabling reforms" and define them as changes in political programmes that do not steer a policy directly in a liberal market direction, but

improve the prospects of later reforms. As a further example of such a reform, they cite the transition process initiated by the MacSharry reform under which agricultural subsidies were changed from guarantee prices for agricultural produce to land-related direct payments (COLEMAN et al. 1997, p. 462 f.). This conversion included a number of starting points for more ambitious reforms. Firstly, it weakened the prevailing connection between agricultural subsidies and production volumes. Without this, the extensive decoupling of income aids from production volumes and land area that was decided in the mid-term review would not have been possible. Secondly, the changeover to direct payments made for greater transparency of cash flows in the CAP. For the first time this put outsiders, at least in principle, in a position to follow the use of agricultural funds and make a critical examination of them. Although most member states are still refusing to publish precise figures on the individual direct payments, in recent years there has been a massive increase in public pressure to do so, with the result that more and more governments are now stating concrete figures (see the overview on <http://www.farmsubsidy.org>).

The resulting recommendation for advocates of a more ambitious reform of agricultural policy is that instead of making a comprehensive reform proposal which could easily lead to decisions being blocked permanently, they should go for a “little steps” policy. When doing so, they should try to design the individual reform steps so that they facilitate future reforms. Conversely, they should avoid measures that diminish the prospects of success of future reforms.

Breaking down closed political networks by changing the decision arena

1043. In Section 11.7.3 we showed that agricultural policy decisions are usually taken in highly homogeneous actor networks that are largely closed to non-agricultural interests. Such networks make it very difficult to push through reform proposals. Agricultural policy reformers must therefore seek to shift the negotiations to new decision arenas. There are two ways of doing this.

One is to link agricultural policy decisions with decisions in other policy sectors. This brings new actors on the scene and changes the preferences of the old participants, which in turn can result in the end of existing reform blockages. The most obvious example of this is the link between the agricultural reform and the further development of the international trade regime (GATT and WTO) in the context of the MacSharry reform. This step neutralised protectionist interests in the agricultural sector in the member states by activating the same states' interest in removing trade barriers in other economic sectors. At the same time the entry of new actors into the decision process brought about a reorganisation of the decision-relevant actor constellations, thereby clearing the way for a reform package that transcended the borders of individual policy areas (GARZON 2006, p. 73 ff.). The other way is to bring about a change of decision arena by shifting the decision level – e.g. from the EU level to the

international level. Once again, this is illustrated by the MacSharry reform, which owes a large measure of its success to just such a change of level (GARZON 2006, p. 31 f.). The influence of the international level, however, is not confined to binding decisions under international law in internationally negotiated regimes. Even at the “softer” level of diffusion of innovative reform ideas, international organisations can help to speed up changes in national and European policy. In the late 1980s, for example, the OECD started to compare national agricultural policies and on this basis to identify exemplary policies (best practice) and general reform models. This meant that information about possible reform strategies also became more accessible even outside closed networks of agricultural actors. Although the concrete effects of such “globalisation of ideas” are difficult to measure, the surprising parallelity of reforms in a number of industrialised countries since the 1990s suggests that these information-related factors have an influence of their own (FEINDT 2007a; GRANT 1998).

Short-term compensation for potential losers in strategically important reforms

1044. Finally, the analysis of the MacSharry reform shows that in the agricultural sector it is often not possible to achieve politically acceptable compromises that have long-term effects without making short-term increases in agricultural expenditure. This is primarily due to the fact that in complex policy areas such as agricultural policy there is no generally valid division into advocates and opponents of reform, because the supporting coalitions vary from one measure to another. That being so, achieving a negotiated solution depends on putting together packages of measures which are acceptable to all those taking part. For this purpose it is frequently necessary to buy national concessions in one area of agricultural policy by providing compensation in another. For example, the consent of South European countries to fundamental reforms can be ensured by making concessions in the Mediterranean product categories that are particularly important to them. The MacSharry reform is an example of this reform strategy. Admittedly it did not directly achieve one of its principal goals – an absolute reduction in spending on agriculture – by granting numerous concessions and compensation payments. But the structural changes in agricultural policy that it brought about nevertheless made the road to subsequent cuts in expenditure considerably easier. Such a strategy of compensation is only problematical if the principal aim of the reform is an immediate reduction in agricultural expenditure. If, however, the main aim is to make decisions on institutional course changes such as the changeover of EU income aids from guarantee prices to direct payments, then compensation solutions, provided they make it possible to reach agreement at all, can indeed make sense despite the initial expense (GARZON 2006, p. 66 ff.).

11.7.5 Options for a future agri-environmental policy

1045. The foregoing description of actor constellations, decision processes and reform strategies does not say anything about the contents of an ecological reform of the CAP (but cf. SRU 2002a; 2004a). The following section therefore outlines the basic features of different options for a future agri-environmental policy and examines their compatibility with the political and institutional framework conditions of the CAP, the environmental policy necessities (cf. SRU 2002a; 2004a), and the welfare state goal that is a basic constituent of agricultural policy.

As Chapter 11.2 shows, agricultural activities may have positive or negative effects on the natural environment. This special constellation has led to the emergence of two idealised models of the relationship between environment and agriculture, which also mark the two poles of the possible spectrum of environmentally oriented reform of the CAP. According to FEINDT (2007b, p. 384), these idealised reform models can be described as the Regulation Model and the Public-Good Model. In its pure form the regulation model seeks to use requirements and prohibitions to reduce the environmental harm originating from agriculture, and is thus in line with the traditional approach of regulatory law (command-and-control). In the public-good model, by contrast, the regulatory approach is supplemented by the assumption that environmentally friendly forms of agriculture not only do their best to avoid the environmental harm resulting from agricultural production, but also generate public goods that ought to be promoted by means of public funds.

A look at the agri-environmental policy of the EU to date reveals that the initially dominant regulatory approach, which is reflected in legal acts such as the Birds Directive (1979, Council Directive 79/409/EEC), the Groundwater Directive (1980, Council Directive 80/68/EEC) or the Sewage Sludge Directive (1986, Council Directive 86/278/EEC), has increasingly been supplemented by measures in the spirit of the public-good model (agri-environmental programmes) (FEINDT 2007b, p. 386 f.). The reasons for this trend lie partly in the special problems with regard to acceptance and enforcement of a regulatory approach in agri-environmental policy, and partly in the inherent dynamics of the agricultural policy reforms since the early 1990s.

The great influence of agricultural interests in the entire agricultural policy decision process and the associated considerable difficulties in enacting ambitious and effective statutory environmental requirements for agriculture has already been described in detail in the preceding sections. Against this background, it is not surprising that since the mid 1980s and even more so since the 1990s, the EU has adopted elements of financial compensation for environmentally compliant behaviour, for which it is easier to gain approval in the political decision process. Nevertheless, the environmental sector alone would hardly have been in a position to initiate this fundamental change in the CAP towards a model for multifunctional agriculture. The more profound causes of the change lie rather in the increasingly visible

deficits in the achievement of the CAP goal of appropriate agricultural earnings, and the resulting problem of legitimization of the traditional price-oriented approach of agricultural policy.

For example, GARZON (2006, p. 102) shows that the welfare-state component of the CAP came to the attention of the political actors and the general public in the course of the MacSharry reform of 1992 and even more so during the mid-term review. As a result, questions about the social policy efficiency and fair allocation of agricultural policy measures received greater attention than before. Not until this change in perspective did it become clear that the goal of securing the earnings of the farming population were not being adequately achieved with the existing system of production-related or area-related subsidies. The cuts in agricultural guarantee prices and the reductions in direct payments that have been made in recent decades mainly affect small farmers with low productivity in agriculturally unfavourable regions that increasingly have to depend on a second income to ensure their economic existence (GRANT 1997). Despite the massive flow of funds from the EU budget, agricultural incomes have risen more slowly than those of other population groups (GARZON 2006, p. 28). By contrast, large and highly productive agricultural producers receive EU funds that far exceed the social policy goal of securing incomes. This trend is increasingly being perceived as a failure of the CAP, and it is therefore endangering the fundamental legitimacy of the existing volume-specific or area-related allocation of CAP resources.

This constellation is an important starting point for a future CAP reform that is more closely geared to ecological criteria. Under the new vision of a multifunctional agricultural sector, environmental services rendered by farmers in the spirit of the public-good model can help to place the CAP on a new foundation of legitimacy. These services, however, must not replace the existing regulatory requirements on agriculture, but must supplement the existing provisions and, by creating additional incentives, make a contribution to better implementation of these regulations. Using elements of a public-good model to supplement and support the existing regulatory approach in this way is also compatible with the welfare-state goal of the CAP. With regard to the agricultural policy actor coalitions described in Section 11.7.3, it could also represent a line of compromise that was acceptable to both the deregulation coalition and the middle group. Finally, ecologically motivated payments to farmers, e.g. as part of agri-environmental programmes, are also basically permissible under the WTO rules (*green box*, see GLEBE 2007; SRU 2004a, Item 243).

The alternative model of a purely regulatory environmental policy in conjunction with radical deregulation of the agricultural markets would, by contrast, be very difficult to find political support for within the present political and institutional constellation of European agricultural policy. From an environmental point of view it is the expected enforcement problems in particular that argue against exclusive use of the regulatory approach in European

agricultural policy. And finally, from a welfare-state point of view the question arises as to how one can continue to guarantee security of appropriate incomes in rural areas – especially in unfavourable peripheral regions where agricultural production would no longer be economic.

11.7.6 Summary: A reform strategy for the Common Agricultural Policy

1046. One of the principal functions of the CAP is to ensure appropriate incomes in the agricultural sector. This means that the agricultural policy is in essence a welfare-state policy. Attempts to reform the CAP must take this into account.

In spite of massive expenditure, the CAP has by no means adequately achieved the welfare-state goal of securing incomes. The MacSharry reform's improvements in the transparency of agricultural fund use are increasingly making the public aware of this fact. This has two decisive consequences: for one thing it places more and more pressure on the legitimacy of the existing system of governmental price guarantees and purchase commitments. For another, the congruence of interests between state and agriculture which has remained unquestioned since the beginning of the 20th century is gradually disintegrating, particularly at EU level. The result is not only that the pressure to reform the CAP is increasing, but also that the prospects of a fundamental reform are getting better. This pressure to reform is also increased by the inclusion of agricultural policy in the world trade regime since the 1990s. This makes further deregulation inevitable, rendering it impossible to continue the old system.

The analysis of actor structures also shows that the prospects of a comprehensive reform of the CAP are currently better than is generally believed. Over the past two decades the European Commission has become the principal initiator of reforms. But the majority of member states also take a basically positive attitude to reforms. Among the member states, Germany and France play a crucial role. A veto by both countries can prevent reforms. Conversely, in the event of a national initiative for reform of the CAP Germany also has a particularly good prospect of gaining acceptance of its reform ideas. Furthermore, in many cases it is possible to release reform blockages by making strategic use of the numerous opportunities afforded by the international multi-tier system of agricultural policy (e.g. change of decision arena, linking with other issues, and compensation for smaller member states).

To avoid the danger of reform blockades it may make sense to adopt a "little steps" policy. The crucial factor in the success of such a strategy is that the individual steps in the reform are designed such that they improve the prospects of future reforms. This presupposes that the basic orientation of the reform is known to the actors at an early stage.

1047. Against this background, the SRU recommends the Federal Government to make use of the forthcoming review of the CAP in 2008 and 2009 to initiate a comprehensive ecological reform of the CAP. It should continue on the existing course of supplementing the regulatory approach of agri-environmental policy with elements of the public-good model. Since complete deregulation of the agricultural markets cannot be achieved at present in view of the existing constellations of actors and interests and the continuing welfare-state goal of European agricultural policy, efforts should be made to bring about a systematic change in agricultural subsidies from the present “global donation” of general land-based and farm-based premiums to targeted rewards for socially desirable environmental services. It is important to note that the rewards for environmental services must not replace the existing environmental requirements, but are intended to improve their implementation by creating additional incentives.

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Chapter 5

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Chapter 6

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