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European nature in the plural

Finding common ground for a next policy agenda




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Preface

The European Commission's announcement in 2014 that it would like to study the possibilities of modernising the Birds and Habitats Directives gave rise to heated discussions. Nature organisations have been campaigning, using the hashtag #ITSMYNATURE, to raise public support for keeping EU nature legislation in place. Indeed, the EU directives are important for nature protection. However, more efforts are likely to be needed to halt the biodiversity loss that results from land-use change, climate change and environmental pressure. Halting this loss requires increased societal and political engagement.

The hashtag nicely underlines the importance of people's active involvement as a key to increase their engagement. European citizens enjoy the diversity of nature in many different ways. People may admire the scenery, the many animals and plants, the products and services nature provides, the economic opportunities it offers, or the stories and myths around it. In other words, the 'value of nature' is a rather plural phenomenon. When viewed from this perspective, nature policies within the EU seem to follow a rather narrow approach, dominated by a rather one-dimensional engagement in the plurality of that value. I am convinced that a more active involvement in 'the diversity of nature' could strengthen societal engagement, thus creating opportunities for realising nature-related policy goals.

This report, *European nature in the plural*, aims to contribute to a strategic debate on biodiversity and nature policies beyond 2020, both in the EU and its Member States. Four 'perspectives on nature' have been explored, each departing from a different set of guiding values. We have analysed what nature would look like from each of these perspectives and which type of governance would suit them. Each perspective is based on certain values. Rather than choosing one perspective over another, combining ideas and strategies based on the acknowledgment of the plurality of perspectives might increase the effectiveness of and support for future policies. We think this acknowledgment is key in achieving a more nature-inclusive society. People are a rich reservoir of situated knowledge, capacities and practices, and as such they could be much more engaged in and better positioned to undertake nature-related efforts and programmes.

For us, as an Environmental Assessment Agency with its focus on the science-policy interface, this study also involved an exploration of a new, more open and complex multi-value and multi-level territory in need of a new set of knowledge-gathering and

knowledge-sharing tools. Inevitably, a diverse repertoire of policies is needed to take nature and biodiversity policy to the next phase. What types of knowledge would be needed to effectively negotiate between the various perspectives? PBL will continue to work on these issues in future studies.

This study would not have been possible without contributions from other research institutes, policymakers and stakeholders. An important contribution was by Wageningen University and Research. The scientific review was conducted by an international review group, chaired by the European Environment Agency. Various stakeholders from several backgrounds and countries participated in one or more of the three stakeholder dialogues that were held between late 2014 and mid 2015 in Brussels. These provided the basis for the distinguished perspectives on nature. The European Centre for Nature Conservation assisted in the organisation of these meetings. In addition, five philosophers provided their views on nature in modern society, during a dialogue session, in November, 2015. I would like to thank everyone for their contribution.

Professor Hans Mommaas
Director-General

MAIN FINDINGS

Main findings

European landscapes contain a rich natural diversity that is cherished by many citizens. Protection of this diversity is laid down in policy strategies on European and national levels. Nevertheless, a recent review of the EU Biodiversity Strategy showed that additional efforts are needed to achieve the targets for 2020. Even more effort is required to realise the 2050 vision – which is to protect, value and restore EU biodiversity and the ecosystem services it provides. People consider 'nature' to constitute landscapes, ecosystems and biodiversity. Recent reviews and trend analyses have shown there to be three overall challenges for the coming decades, with respect to nature conservation: ensuring sufficient space and favourable conditions for nature, improving nature considerations in economic sectors, and encouraging people's engagement in nature-related efforts.

For this study, we explored four 'perspectives' on nature in 2050, with the aim to inform a future agenda for nature policies beyond 2020. The rationale behind working with perspectives is that broadening the concept of nature may lead to greater citizen and business engagement in efforts that would benefit nature. The perspectives on nature cover a range of guiding values about nature protection and describe what people perceive to be nature:

- In *Strengthening Cultural Identity*, people feel connected with nature and landscape, and consider this an integral part of their local and regional communities and essential to a fulfilling life.
- In *Allowing Nature to Find its Way*, people feel strongly about the great intrinsic value of natural processes and species, and they define nature by its dynamic processes and believe it should be left to its own devices.
- In *Going with the Economic Flow*, nature must suit people's lifestyles, and businesses and individual citizens take the initiative in nature development.
- In *Working with Nature*, people try to work with natural processes and strive for an optimal, long-term delivery of ecosystem services, for the benefit of both society and the economy.

These perspectives structure arguments and provide inspiration, but should not be considered blueprints for the future or to cover the whole spectrum of possible and desired futures. On the contrary, it will be a challenge to transcend the individual

perspectives, to combine them in such a way that caring for nature can be combined with other societal goals, and a broad societal support for nature policies can be achieved.

Considering the four perspectives and their approaches to address the challenges for nature policy leads to the following topics to be debated with the aim of ensuring a broader societal basis for nature policies:

Formulating a many-faceted vision for European nature
It is clear that reaching the policy vision of 2050 is a challenging undertaking. A policy vision that explicitly takes the multiplicity of perspectives on nature as its point of departure, could stimulate voluntary efforts that go beyond regulation, and lead to new coalitions being formed of citizens, businesses and authorities.

Tackling policy challenges using approaches from a range of perspectives
It must be debated what such a vision would mean for dealing with the three policy challenges:

- *The necessity of a shared agenda for nature areas*. An agenda that is shared by all stakeholders would help to ensuring sufficient space and favourable conditions for nature in protected nature areas. Such an agenda would contain the ecological objectives, supplemented with external economic and societal aspirations and targets, per protected nature area and its surroundings. Point for discussion would primarily be how to balance ways of earning money within a nature area with caring for its biodiversity value. Furthermore, the impacts of climate change are expected to increase, requiring substantial efforts to protect all species. In addition to stringent measures to mitigate climate change, it may be appropriate to discuss the focus of conservation targets, which could range from preserving current ecosystems to supporting species and ecosystems in their response to the changing climate.
- *Increasing nature's relevance for a sustainable future of economic sectors.* Embedding or mainstreaming nature considerations in other sectors – such as agribusiness and the renewable energy sector – is more likely to succeed if the core values and individual challenges of each sector are acknowledged and understood. This also could mean, however, that 'nature' will be defined differently than in current biodiversity policy documents, and that differences in definition will be a subject for debate.
- *Strengthening the connection between people and nature.* A many-faceted vision acknowledges that there are many different opinions about what constitutes 'desired nature'. This could stimulate voluntary efforts to care for nature. Particularly promising would be to address nature in such a way that it will foster a sense of place, thus yielding a broad range of ecological and societal benefits.

Vision development on regional level
A many-faceted vision is relevant not only on EU level, but also on lower levels. The regional level is of major importance since actual challenges and the implementation of measures occur on this level. For the regional agenda, nature and ecosystems can become increasingly relevant when used to address certain challenges,

such as that of climate adaptation to address flooding and heatwaves. Natural means may range from forests in mountainous areas retaining water and carbon sequestration, to individual trees in streets decreasing local temperature. Developing a many-faceted vision on a regional level would encourage a broad range of nature-related efforts, and could increase the legitimacy of nature policies. The multi-perspective approach, with the involvement of local stakeholders, could help to develop such visions, leading to synergies and conscious choices to achieve the desired type of nature.

Summary

I Introduction

Since the beginning of the 19th century, Europe has arguably seen more change in land use and management than in the previous centuries. Wildlife distribution and landscape textures are the result of complex interactions between nature and people, over the ages. The basic physical qualities of rock, soil and climate provide the underlying structure and continue to exert influence, but millennia of human activity, and the use and management of both land and water have shaped local details. Human activity itself is driven by economic, social, and environmental forces, and the interactions between them have produced landscapes and types of nature that are specific to and characteristic of Europe, and which contain a rich natural diversity that is cherished by many citizens.

EU citizens consider nature to be important, and 8 out of 10 regard the impact of biodiversity loss as serious. Only 1 in 6 feels that too much emphasis is being placed on nature conservation, and the majority of people believe that the prime responsibility for nature conservation should lie with government. However, people appear to be less familiar with nature policies; for example, 3 out of 4 have never heard of Natura 2000, the network of protected areas (Section 1.1).

On the other hand, people were found to have a much broader notion of nature than that reflected in policy documents. For example, half of the people in the EU consider city parks and garden plants to be nature, too. Furthermore, people relate to nature in many different ways (Figure 1). The term 'nature' means different things to different people, both within and between countries, and depending on age, education and living environment (Section 2.2).

This report – which is the result of our Nature Outlook study – includes many different types of nature and a broad range of people's motivations for caring for nature. Including these motivations in policy-making and implementation may increase the engagement of people, organisations and businesses in nature conservation and nature development. It is crucial for policymakers to be aware of the differences in value that people attach to nature, as people tend to lose interest or even become obstructive

Figure 1

People differ in how they value nature

Source: PBL

when they feel their own viewpoint is not being acknowledged. Furthermore, the range of motivations could be linked with nature policy approaches.

This report discusses policy approaches that are complementary to the main approach of the EU Birds and Habitats Directives, particularly regarding the establishment and maintenance of protected areas (Natura 2000). We assumed these protected areas to remain in place in the future. The mid-term review of the EU Biodiversity Strategy to 2020 concludes that more is needed to halt biodiversity loss in Europe by 2020. The implementation of nature regulation is showing progress, but at an insufficient rate, and its integration in other policies is showing no significant progress at all. Both the Council of the European Union and the European Parliament have requested the European Commission to propose actions to achieve the 2020 headline target (Section 2.3). Nonetheless, nature seems to have a relatively low priority on the general political agenda.

It remains uncertain whether the headline target will be achieved and how challenges for nature policies can be addressed. This study distinguishes three nature policy challenges to achieving the vision of halting biodiversity loss by 2050 (Section 2.6):

- Ensuring sufficient space and favourable conditions for nature, which is particularly challenging in highly urbanised regions (high pressure on nature) as well as in those that face land abandonment and depopulation (loss of specific habitats). In addition, climate change will also have an increasing impact on the conditions for nature. This requires effective management of nature areas and sufficient funding.
- Increasing nature considerations in economic sectors ('mainstreaming'), which involves integration in a wide range of policies that are needed to set coherent priorities and are supported by adequate funding. The environmental pressure from sectors such as agriculture will decrease but is believed to remain considerable.

Furthermore, renewable energy production will become increasingly important and, therefore, will compete more and more with other landscape functions.
- Encouraging people's engagement in nature-related efforts. Greater public awareness, understanding, and support are essential, with respect to nature. Nature-related efforts may vary, and, for example, include active engagement in the conservation of natural landscapes, the purchase of eco-friendly food products, and investments in nature parks. Increased urbanisation in the future will make it more difficult to further enhance people's relationship with nature, in particular that of children, but it will also offer possibilities for creating additional green space, which in turn will have a positive impact, for example on human health.

Our report is intended to provide inspiration for dealing with these challenges and to fuel the strategic debate on biodiversity and nature policies, with a focus on the period beyond 2020.

II Multiple perspectives on nature

For this study, we explored the use of a multi-perspective approach to increase the opportunities that could be included in future nature policy design. In earlier studies, PBL has applied this research approach on national and sub-national scales, which revealed both the synergies and conflicting differences between certain perspectives on nature. It has supported the formulation of shared agendas and provided opportunities for increasing society's engagement in nature. This study applies this research approach at the EU level, with the aim to inspire the debate on strategic policy-making with regard to nature in Europe. The perspectives structure the different arguments in the debate, linking them to the underlying guiding values and deep-seated beliefs. Taking different perspectives into account during policy design can stretch the usual limits of thinking. What could we learn from the perspectives? And how do they address future challenges?

We developed four, stylised perspectives to explore what certain sets of values and actor roles would mean for nature by the year 2050 – the long-term time horizon of the EU Biodiversity Strategy. The perspectives represent distinct visions about the future of nature, describing why people would want a particular type of nature in the future, what this desired nature would look like, and how that vision could be realised. Even though a single perspective can only represent one viewpoint, within a broad spectrum of opinions, each represents a characteristic way of thinking about nature and society:
- In *Strengthening Cultural Identity*, people feel connected with nature and landscape, and consider this an integral part of their local and regional communities and as essential to a fulfilling life.
- In *Allowing Nature to Find its Way*, people feel strongly about the great intrinsic value of both natural processes and species, and nature is defined by dynamic processes and should be left to its own devices.

Nature Concert Hall in Latvia – connecting nature and people.

- In *Going with the Economic Flow*, nature suits people's lifestyles, and businesses and citizens take the initiative in nature development.
- In *Working with Nature*, people try to use natural processes and strive for optimal, long-term delivery of ecosystem services, for the benefit of both society and the economy.

Although each perspective represents a different relationship between people and nature, they are not mutually exclusive – in all likelihood, people's own narratives combine elements from all of them.

The perspectives are described in detail in the text box '*Four perspectives on nature*' and in Chapter 3. They were designed using a bottom-up approach, as far as possible. Three stakeholder dialogue workshops were organised, each with around 30 representatives from environmental, research and economic sectors (for dialogue reports, see www.pbl.nl/natureoutlook), and supported by interviews with individual stakeholders. During the first dialogue, participants drafted four perspectives. These drafts subsequently were structured and elaborated in storylines by the project team and discussed further in the second dialogue. During the third dialogue, participants used the perspectives to discuss a range of nature-related societal issues. Following the third dialogue, the project team used various sources to elaborate and further enhance the perspectives' storylines. To capture deep-seated beliefs about nature, five renowned philosophers each wrote an essay and presented their individual visions at the event 'Nature in modern society, now and in the future' (November 2015). A literature review was also carried out for the most influential narratives on nature in the EU. Visualisations and maps were used to concretise the perspectives. Finally, a modelling framework was used to structure the perspectives and increase plausibility of the storylines.

Perspectives show broad range of approaches to deal with policy challenges

These four perspectives on the future of nature each contain a different repertoire of approaches to address policy challenges. Table 1 shows the approaches from the four perspectives to the three challenges that were identified. Approaches to ensuring space and favourable environmental conditions for nature range from expanding and connecting existing nature areas to promoting the responsibility of communities for

Four perspectives on nature

In *Strengthening Cultural Identity,* people identify with where they live. They feel connected with nature and landscape, and consider this an integral part of their local and regional communities and as essential to a meaningful life. From this perspective, nature is always nearby and accessible. Green in cities is well-designed and at people's doorstep.
Landscape aesthetics is important, and characteristic elements, such as hedgerows and stone walls, have therefore been renewed and expanded, and historical buildings have been restored. People prefer locally produced food; olives, beers and cheeses are considered as the best ambassadors for EU nature. The landscape can be experienced, for example, by cycling, sailing and angling. Old cultural landscapes are cherished, including in remote areas – landowners receive support to preserve them. New landscapes are created, for example through redevelopment of abandoned industrial sites, and by making (former) canals more attractive. Local communities, groups of citizens, farmers and entrepreneurs, take the initiative in *Strengthening Cultural Identity*.
Regional authorities facilitate these groups and coordinate the initiatives, as landscape is considered a public good. One of the EU roles could be to financially support local initiatives (Section 3.2).

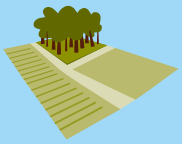
In *Allowing Nature to Find its Way,* people feel strongly about the intrinsic value of natural processes and species, and feel responsible for providing nature with sufficient space and time to develop. Nature knows best – plants grow where they fit the best, water flows freely and animals have room to migrate. Nature is defined by dynamic processes, it destroys and creates. It is believed to be resilient when its dynamics are provided with sufficient room. Therefore, a large nature network has been developed that also includes wildlife corridors and rivers. Rivers within the network are free to meander, allowing fish to migrate. Ecotourism takes people to places where they can observe wolves, bears, deer, salmon and pike and where they can experience nature's tranquillity and greatness. From this perspective, nature elements within cities also have a 'wild' and dynamic character, with parks and rivers boasting a wide diversity of plants and animals. New wild nature is connected to socio-economic agendas, offering new income sources from tourism, and sustainable forestry, angling and hunting. In *Allowing Nature to Find its Way*, government authorities and private investors fund the development of dynamic natural systems, linked with the local social-economic agenda. The coordination of initiatives is provided at supra-national level to ensure that all initiatives together lead to a coherent nature network (Section 3.3).

In *Going with the Economic Flow,* the focus is on nature that suits people's individual lifestyle. Public authorities are responsible for ensuring a basic network of nature areas, while businesses and citizens take the initiative in nature management and development outside these areas; for example, for leisure or health, or as an attractive living environment. Beautiful private estates are developed with villas, shady tree lanes, meadows and lakes. Residents can enjoy the tranquillity of these areas – just as many birds will. Private parks are developed within cities, too, and memberships or entrance fees are common. Farming and forestry have sufficient room for efficient food and wood production. Nature managers have created ways to generate funds to co-finance nature conservation; for example, in the form of upmarket nature adventures or production of wind energy in nature areas. In *Going with the Economic Flow*, initiatives are primarily undertaken by private actors, such as businesses (including real estate, health and insurance), nature organisations, philanthropists or private landowners. Governments guarantee no net loss of biodiversity, for example through regulation that prescribes compensation for the degradation of nature reserves. Governments also stimulate private initiatives for nature protection (Section 3.4).

In *Working with Nature*, functions of nature are considered the basis for human life. People use natural processes and strive for an optimal, long-term delivery of services from these natural systems to society and the economy. For example, agriculture fully utilises biological processes with respect to soil, pollination and natural pest control. Integrated agricultural and forestry systems have become common in dry regions. Cities contain many trees, plants and water streams, providing water retention, and fresh and cool air for their inhabitants. Upstream forests, bogs and marshes and wide riverbeds decrease the risk of floods. An integrated approach to land-use planning is important to allocate functions in such a way that the benefits of various ecosystem services can be ensured. From the *Working with Nature* perspective, citizens behave as conscious consumers, with a healthy diet that contains less meat. Green frontrunners from business, finance, health and nature organisations, citizens' organisations and research, all have been cooperating in the transition towards a green society. Possible roles of government are those of stimulating innovation and innovation networks, pricing external effects and paying for ecosystem services (Section 3.5).

Table 1

Approaches for dealing with challenges for nature policies

Challenge	Strengthening Cultural Identity	Allowing Nature to Find its Way	Going with the Economic Flow	Working with Nature
				
Ensure sufficient space and favourable conditions for nature by:	Promoting responsibility of communities to maintain and develop local landscapes	Establishing a large EU-wide nature network that is resilient to harmful human impacts	Facilitating private initiatives, and protecting a basic nature network	Protecting areas that deliver regulating ecosystem services
Improve nature considerations in economic sectors by:	Facilitating the use of a regional identity as a brand for local enterprises	Spatially separating economic activities from nature	Leaving the responsibility to economic actors	Stimulating nature-based innovation; setting up pricing instruments and smart regulation
Encourage people's engagement in nature-related efforts by:	Fostering people's sense of place and connectedness to local communities; acknowledging the wish for regional aesthetics/quality	Responding to people's admiration for nature's dynamics and the wish to be at one with nature	Promoting the responsibility of private actors and their willingness to act	Encouraging conscious and responsible ways of production and consumption

their local landscape. The challenge of improving nature considerations in decisions made by economic sectors points to 'mainstreaming' of nature in the policy agendas of other sectors. Here, approaches range from actively using nature-based solutions in production to separating economic activities from protected nature areas.
Lastly, approaches to encourage people's engagement in nature-related efforts appeal to people from their position as citizens (in community or individual activities) and consumers.

All in all, there is a broad range of possible approaches, which are not fully exploited in current nature and biodiversity policies. It must be noted that current policy and practice are also creating storylines, often subconsciously. In practice, combinations can be made of two or more perspectives. Elements of the perspectives can be seen in the EU Biodiversity Strategy to 2020, the Nature Directives, and in current practice.
The perspectives can be compared against current policies, in certain cases highlighting the possibility of a different policy angle.

III Policy agenda beyond 2020: topics for debate

What could we learn from the perspectives, in order to inform a future policy agenda? They are not blueprints of the future, but show how different perspectives could play out for nature in the EU and, in this sense, provide a basis for debate, the development of new concepts and policy, and, potentially, for future action. It is clear that achieving a policy vision for 2050 is a challenging undertaking. Halting biodiversity loss cannot be achieved through nature regulations alone. This has already been recognised in the current EU Biodiversity Strategy with the introduction of the concept of ecosystem services, but could be elaborated further. Broadening the scope of policy strategies is needed for nature conservation and development, it could stimulate voluntary efforts that go beyond regulation, and lead to the formation of new coalitions between citizens, businesses and government authorities.

If one agrees that a broad, many-faceted agenda is needed for EU nature, several topics for debate become apparent. First, there is the question of what a many-faceted vision would look like. Second, the implications of such a vision for the three identified policy challenges should be debated. The third topic concerns the question of which role a many-faceted vision could play at sub-national levels, particularly the regional level. These topics are intended to challenge the parties involved, with the aim of drawing key players into a debate on the basis of nature policy.

Formulating a many-faceted vision for European nature
Through its systems of governance, society has chosen to formally protect the most characteristic and most threatened elements of nature. But what type of nature, broadly defined, would society prefer and what does it expect from nature in return?
The perspectives suggest different answers, ranging from self-sustaining natural systems to green areas found in cities. Nature includes more than biodiversity and ecosystem services alone, and could be approached in a broader way. The consequences of using multiple perspectives would become apparent in vision formulation and target setting, and the design of the strategies to achieve these. On the one hand, this may lead to conflicting differences between the type of nature aimed for by current policy and that which people desire. This is something that would need to be debated. On the other hand, taking on board multiple perspectives might help to bridge gaps between various interests and appeal to shared motivations to embrace and protect nature.

Tackling policy challenges using approaches from a range of perspectives
A many-faceted vision would include a variety of perspectives on nature. This also implies a variety of preferred solutions to deal with the three policy challenges identified in Section I, leading to a number of dilemmas and questions, from which we derived three topics for a debate on future policies (Chapter 5):

- The necessity of a shared agenda for nature areas;
- Increasing nature's relevance for a sustainable future of economic sectors;
- Strengthening the connection between people and nature.

a) The necessity of a shared agenda for nature areas

The challenge of ensuring sufficient space and favourable conditions in protected nature areas requires adequate funding and effective management. A many-faceted strategic vision implies that each nature area works with a shared agenda that includes the targets of all stakeholders. Ecological objectives, typically, are supplemented with external economic and societal aspirations and targets. Examples derived from the perspectives include regional branding, economic revitalisation of depopulating regions, attracting private investors and start-ups with new, sustainable business opportunities, and securing partnership funding to enhance ecosystem services. This has the potential to increase societal support for the implementation of Natura 2000 or a European Green Infrastructure (TEN-G). Points for discussion are, firstly, how to balance ways of earning money in nature reserves, while caring for the intrinsic value of nature, and, secondly, which financial arrangements (by public and private parties) would best support nature management.

Subject for debate would also be that of climate-proofing nature conservation strategies. So far, climate change has had a limited impact on biodiversity. However, the impacts of climate change on species and habitats are expected to increase. The ambition of keeping global temperature increase within two degrees Celsius contributes to reducing the negative impacts on species and habitats. Nevertheless, the efforts required to protect all species could be substantial. Besides stringent measures to mitigate climate change, it may be appropriate to discuss the formulation of conservation targets – ranging from static targets to more fluid, dynamic regimes. Whether the aim of conservation is to conserve species, maintain resilient ecosystems or ensure the delivery of ecosystem services in a specific area, depends on the aim and will result in different adaptation strategies.

b) Increasing nature's relevance for a sustainable future of economic sectors

The challenge of improving nature considerations in economic sectors could also benefit from a many-faceted vision. Relevant sectors are agriculture, fisheries and forestry – already included in the EU Biodiversity Strategy to 2020 – but also, for example, energy and transport. Embedding or mainstreaming nature considerations in other policy domains is essential to tackle biodiversity loss and wider pressures on nature in general. This is more likely to succeed when the core values and individual challenges of each sector are acknowledged and understood. Taking the sustainable development agenda of the economic sector would be a good starting point. This could mean, however, that nature and biodiversity need to be defined in different ways than currently in policy documents, and that these definitions need to be debated. For example, for agriculture, biodiversity is a vested interest. Nevertheless, achievement of target 3a of the EU Biodiversity Strategy – to increase the contribution from agriculture towards maintaining and enhancing biodiversity – shows 'no significant overall progress' (EC, 2015a). Apparently, the relevance of nature and biodiversity for farming is not plainly evident.

Nature can foster a sense of place.

Approaches for agriculture under the four perspectives differ with respect to its desired mix between nature and agriculture, and the actors engaged (Section 4.3).
Besides conservation and protection of current farmland species, these approaches suggest a focus on protecting functional biodiversity in farmland areas, or separation of conservation and production targets. This focus is likely to differ per location, and, among other things, depends on the situation and indicated future challenges.
Local citizen involvement could increase the public support for nature-inclusive farming practices, and businesses could become more actively involved within the value chain by including their impact on natural capital in their decision-making processes. A food-systems approach, for example, would involve food processing and retail companies as well as consumers, and would consider all food-system opportunities for reducing the negative impact of agriculture on nature.

c) Strengthening the connection between people and nature

A many-faceted vision would acknowledge that people see, perceive and define nature in different ways. A discussion on the various types of nature society prefers would, in itself, already increase engagement. A many-faceted vision could stimulate voluntary efforts, ranging from people's active involvement in nature conservation to the conscious consumption of nature-friendly produce. From the four perspectives in our study, *Strengthening Cultural Identity* is the perspective that is least apparent in the vision for 2050 of the EU Biodiversity Strategy. This perspective addresses nature in such a way that it will foster a sense of place, the connection between people and the local landscape – which has been shaped by their community. These landscapes may have been formed by long-established land-use traditions or by more recent land-use practices. Although this is a matter to be addressed, in the first place, by local communities themselves, the EU could stimulate the further development of unique and varied landscapes. Explicitly including cultural identity, or 'love of home' ('oikophilia'), in the vision could be useful, in addition to nature conservation and the promotion of ecosystem services. This would underline people's sense of responsibility and attachment, which has always played an important role in our relationship with nature.

Increasing the relevance of nature for the flood prevention agenda – where the Isar flows into the Danube.

Vision development on a regional level

A many-faceted vision is not only relevant on an EU level, but also on lower levels. Nature can be of increased relevance for future regional challenges. The expected, EU-wide variation in demographic and economic developments makes urban regions, as well as those prone to depopulation, of particular interest for nature considerations in regional visions. For example, in cities, ecosystems that deliver climate adaptation services, such as flood protection, and that decrease social inequality (e.g. nature at the doorstep), offer possibilities for addressing the challenges faced by cities. Synergies between nature and water policies could be utilised to a greater degree. Vision building and using nature as a solution can be achieved via alliances between the nature sector, citizens, investors, healthcare services, water managers and others, and enabled via a variety of policy instruments. For certain areas, the vision-building process may reveal that not all the envisaged objectives can be combined, and only one of these may have to be chosen. A topic for debate could be that of how strategies on EU and national levels could provide room for such a regional vision-building, being aware of the fact that this could include a shift in responsibilities.

Developing a many-faceted vision on a regional level would encourage a broad set of nature-related efforts – as it would do at EU level. On a regional level, the advantages of a multi-perspective approach would become even more tangible, because it is applied to concrete issues, in collaboration with the actors involved.

FULL RESULTS

Introduction

1.1 Context and aim of the study

The European continent contains a rich natural diversity, which is highly valued by many citizens. In recent decades, the European Union and its Member States have sought to secure effective protection of biodiversity, not only for its intrinsic value but also for its contribution to human well-being and economic prosperity, including the provision of ecosystem services. Central to this has been the establishment of the unique Natura 2000 network, which contributes to the vision elaborated in the *EU Biodiversity Strategy to 2020* (EC, 2011a): 'By 2050, European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human well-being and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided'. A global vision has been laid down in *The strategic plan for biodiversity 2011-02 and the Aichi biodiversity targets* (CBD, 2010). Nevertheless, *The mid-term review of the EU Biodiversity Strategy to 2020* concludes that more is needed to halt biodiversity loss in Europe by 2020. The implementation of nature regulations is showing progress, but at an insufficient rate, and its integration in other policies – in particular, for agriculture and forestry – shows no significant progress (EC, 2015a).

Nature, generally, seems a relatively low priority on the policy agenda. Nevertheless, EU citizens consider nature protection as important; 8 in every 10 EU citizens regard the impact of biodiversity loss as serious (EC, 2015b). Only 1 in 6 people say that too much emphasis is placed on nature conservation, and the majority believes that government holds the primary responsibility for nature conservation (Farjon et al., 2016). Citizens seem unaware of nature policies and 3 out of every 4 people have not heard of Natura 2000.

But what is 'Nature'? Environmental scientists often think in terms of one unified nature (naturalism), whereas *multinaturalism* is a more appropriate term to capture the different ways people understand and appreciate nature (Latour, 2017). Multinaturalists maintain that there is no universally agreed concept of nature; instead, specific ideas, histories, values, and beliefs, together, construct what is considered 'nature' in any particular

culture – also all forms of 'nature' are related to a specific repertoire of policy measures. The public has a much broader perception of nature than that reflected in contemporary policy documents. For example, half of the people consider city parks and garden plants as part of nature (Section 2.2). All around us, people are involved in various practices that influence their personal relationship with nature, such as when producing food or exploiting natural resources, or in outdoor leisure activities. Nature does not mean the same to everyone – not to individual citizens, but also not to non-governmental organisations and businesses. People have different opinions about what nature is and why it is important to them. These different opinions translate into different aspirations and different desired futures.

This Nature Outlook study by PBL Netherlands Environmental Assessment Agency explores a 'stylised' multi-perspective approach for nature policies. The rationale behind this is that broadening the notion of nature may lead to greater citizen and business engagement in biodiversity across Europe and the subsequent implementation of more efforts that would benefit nature. Awareness of the differences in the values that people attach to nature is crucial, as people tend to lose interest or even become obstructive when their own viewpoint is not fully acknowledged.

This study applies the multi-perspective approach on an EU level, with the aim to inspire strategic debate on nature policy across Europe. The focus is on achieving the vision for 2050. The perspectives structure the various arguments in the debate, linking them to the underlying guiding values and deep-seated beliefs. Taking into account different perspectives during policy design can stretch the usual limits of thinking. The power of using perspectives is making the future tangible, broadening the thinking about the future, and raising awareness among stakeholders about the different perspectives, while creating different futures. The report explores what can be learned from a multi-perspective approach, and closes with food for thought for a next biodiversity strategy, in which nature is placed more at the centre of society. This could also help the EU and its Member States in their contribution to the Sustainable Development Goals (UN, 2015).

Previously, PBL has applied a multi-perspective approach on national and sub-national scales (PBL, 2012; PBL, 2013). This has led to a shared agenda and opportunities for increasing societal engagement, as included in the government vision on nature *The Natural Way Forward* of 2014. Although the multi-perspective approach has led to a broader vision in the Netherlands, it is too early to evaluate the impacts. In the government vision document, the Dutch Ministry of Economic Affairs (2014) requests PBL to carry out the next nature outlook on an EU scale, using the multi-perspective approach. With this request, the ministry aims to provide inspiration for strategic discussions on EU policies beyond 2020 that are related to nature, with nature defined in a broad sense.

Relation with the fitness check of the Birds and Habitats Directives

The EC has carried out a fitness check of the Birds and Habitats Directives, but the Commission Staff Working Document (EC, 2016), including the policy conclusions drawn from the fitness check, was not yet available during our Nature Outlook study. Therefore, we assumed that the currently designated Natura 2000 areas will remain in place, and included these in each of the four perspectives on nature. A picture of broad political and public support emerges from surveys (Section 2.1), public consultation on the fitness check, and policy documents (Council of the European Union, 2015; European Parliament, 2016). Moreover, Natura 2000 is an important base for nature protection, which cannot easily be replaced by alternative policy measures (Jones-Walters et al., 2016). Even more so, this base will likely not be sufficient to stop biodiversity losses and achieve the 2050 vision of the EU Biodiversity Strategy. Apart from better implemented management plans for Natura 2000 sites, additional approaches are needed outside these protected nature areas. The Nature Outlook looks into these additional approaches.

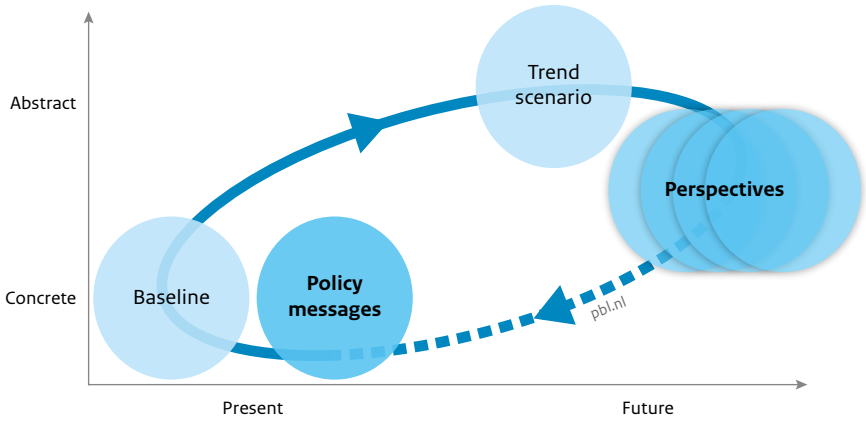
1.2 A multi-perspective approach

To capture the various ways in which people value nature, a range of perspectives were developed to represent possible scenarios towards 2050. This distant horizon enabled people to dream and to think about alternative futures and the outcomes spanned a broad range of contemporary visions from within the EU, but did not cover the whole spectrum. Four perspectives for 2050 were subsequently elaborated, each exploring a desired future state of nature and the possible ways of getting there, including new coalitions and governance.

Figure 1.1 shows all the elements included in this study. The scenario elements are connected in a cyclical way. They represent different moments in time and differ in abstractness.

The baseline for this Nature Outlook (described in Sections 2.1 to 2.3) was based on literature review and policy frames or philosophies in nature conservation. This report describes the current state of nature in Europe on the basis of existing literature (EC, 2015a) and goes on to identify the key drivers and pressures including current policies and policy gaps. In addition, to explore current appreciations of nature, we used information from a survey on citizens' views of nature and the value they award to it, carried out in nine EU Member States (Farjon et al., 2016).

Figure 1.1
Position of the main elements of the Nature Outlook



Source: PBL

Policy messages reported in this study are indicative; policymakers are invited to draw their own conclusions, using the perspectives (indicated by the dotted line).

The *Trend scenario* (Sections 2.4 and 2.5) presents a possible future course of some socio-economic and physical trends, such as agricultural development and climate change, and their expected impacts on nature. The scenario provides a business-as-usual context for the perspectives and is based on a literature review, incorporating scenario studies, such as on population, economy, climate change and land use. A modelling framework was used to derive the impacts from these trends on biodiversity and ecosystem services in 2050 (Prins et al., 2017). For pragmatic reasons, the study was restricted to terrestrial and freshwater systems and does not include the marine environment. Lastly, the current state of nature and the *Trend scenario* suggest which challenges need to be tackled by nature policies in the coming decades (Section 2.6).

The perspectives present desirable future states of nature and pathways that may be followed to achieve these desired states (Chapter 3). Each embodies a set of principles (*why*), a desired state of nature that may be realised by 2050 (*what*) and a pathway that could be followed to achieve that state of nature (*how*), each also representing a distillation of the outcomes of various activities as described below:

- Three stakeholder dialogues were held, each with around 30 representatives from the environmental, research and economic sectors. In the first, preliminary perspectives were generated, prior to subsequent elaboration in the second, via the employment of visualisation techniques and the use of detailed design templates for cities,

farmland, river/riparian and nature areas. In the third dialogue, possible messages for policymakers were derived (PBL, 2014, 2015a, b), supplemented with ideas generated from individual interviews (Dammers et al., 2017).
- To capture deeply held beliefs about nature, five renowned European philosophers each composed an essay describing their vision of nature. They presented and debated their visions during the conference on *Nature in Modern Society – Now and in the Future*; Mommaas et al. (2017) provide the essays and a synthesis of the dialogue.
- An extensive literature review, including on the most influential narratives on nature in the EU (references in Dammers et al., 2017).
- The modelling framework was used to structure the perspectives, using maps to describe the variety and breadth of nature throughout the EU (Prins et al., 2017).
- Insights into the impacts of perspectives on biodiversity and ecosystem services were derived using a semi-quantitative method, based on expert judgement (Prins et al., 2017).

In Chapter 4, an overview is provided of how the perspectives accommodate the challenges for nature policy, how biodiversity and ecosystem services work in practice, and how these could be combined.

Finally, points of discussion in the development of strategies to address the challenges that lie ahead were extracted by comparing the perspectives against current policy strategies, and by identifying differences between perspectives. This comparison revealed topics for debate on nature and biodiversity policies beyond 2020 (Chapter 5).

TWO

Challenges for nature policy

This chapter describes the societal context of nature conservation and provides an overview of the key issues facing emerging nature policy as drawn from recent policy evaluations. Furthermore, this chapter describes future trends and their impacts on nature targets, and identifies three long-term challenges.

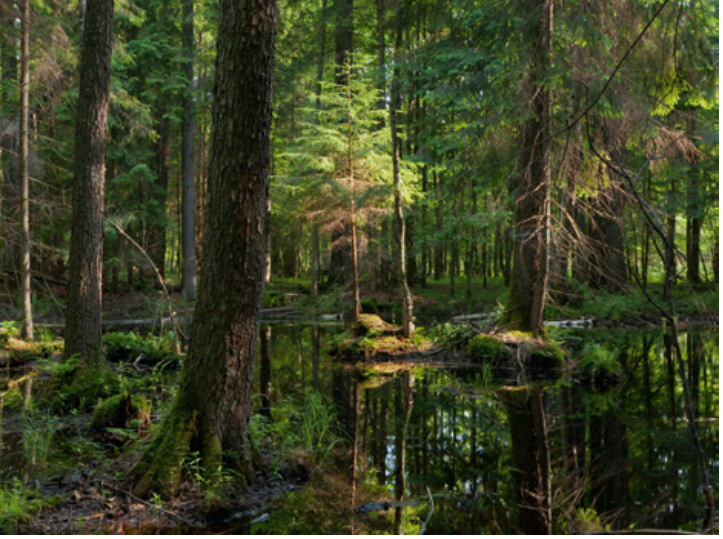
2.1 How did society approach nature in recent history?

When thinking of future policy approaches, one needs to take notice of the history of the debate surrounding nature conservation. Since the 19th century, this debate has been based on a range of concepts about nature, perceptions of challenges and reflections on the relationship between people and nature (Mace, 2014), and most remain more or less visible in contemporary thinking about nature and nature-related policies and practices in the EU today. Although the traditions of nature conservation policy differ considerably between European countries (Ferranti et al., 2010; Koppen and Markham, 2007), some overarching trends of the general structure of nature protection practices and nature policies can be observed.

'Nature for itself' was the dominant philosophy in nature conservation for almost a century. However, in recent decades, there has been a shift of opinion (Adams, 2013). Since the increase in wealth in the 1960s, people's perception of nature has grown to embrace three other framings: 'Nature despite people', 'Nature for people' and 'People and nature'. These overlap in time, are not limited to a specific period and, in one way or another, are still present in the most recent policies (Gustafsson, 2013). Although they are visible throughout Europe, the chronology and impacts of these framings may differ between Member States.

'Nature for itself': creation of nature reserves

Initially, nature conservation emerged from the perception of mainly artists and philosophers, who believed that the beauty and intrinsic value of nature was spoiled by



Forest within the Białowieża nature reserve in Poland.

human activities, such as the industrialisation, urbanisation and reclamation of the commons. Mace (2014) labels this concept as 'Nature for itself'. According to Europeans, 'unspoiled' nature was not located in wilderness areas – as in the United States – but, first of all, in productive traditional landscapes that result from a long tradition of land reclamation and cultivation.

The creation of nature reserves and national parks and the acquisition of land by private and public organisations was regarded as the best way to address the threats posed by human activity. The UK's charitable organisation National Trust was founded in 1895 and acquired its first nature reserve, Wicken Fen, in 1899. The first national park in Europe, Sarek in Northern Sweden, was created following a decision by the Swedish Parliament in 1909. In Italy, the 'Touring Club Italiano', an organisation dedicated to the promotion of the beauty of the Italian landscape (Osti, 2007), proposed the establishment of national parks in 1911. In the divided Polish territory of the 19th century, ideas of nature protection were tightly linked to shaping public awareness of the Polish identity (Glinski and Koziarek, 2007), exemplified by the launch of the Commission for the protection of Natural Monuments in 1905 within the structure of Polskie Towarzystwo Krajoznawcze, the Polish Country-Lovers Society. Efforts elsewhere in Europe to establish protected areas also forced local people to abandon their self-sufficient farms; for instance, in France, when the first national nature park, the Oisans, was created (Claeys-Mekdade and Jacqué, 2007). Today, the protection of certain areas is the cornerstone of the Natura 2000 network, which was established under the EU Nature Directives in the 1990s.

'Nature despite people': limit impact of human activities

In the 1970s, scientists such as Savante Odén and Bernhard Ulrich warned about the local threat to lakes and forests posed by human-induced, acid atmospheric deposition (Ulrich et al., 1979; Meadows et al., 1972). By 1983, 'acid rain' and 'das Waldsterben' were firmly established as major political and environmental issues across Europe. Elsewhere, Diamond (1975) described the impact of human activities on isolated nature reserves in terms of the island theory of Wilson and MacArthur (1967). This demonstrated that discrete populations of certain species were at risk of extinction, due to their isolation in nature reserves, surrounded by vast, uninhabitable agricultural and urban areas, just like islands in the ocean. In 1979, the first World Climate Conference organised by the

World Meteorological Organization expressed concern that 'continued expansion of man's activities on earth may cause significant extended regional and even global changes of climate' (IPCC, 2004). In time, it became more and more evident that the global impact of people on nature could not be effectively mitigated by the designation of protected areas alone.

There was a growing influence of technical concepts and governmental laws in nature management practices. The assumption was that complex problems could only be addressed by scientific and technical methods that are considered unbiased and rational (Ferranti et al., 2013b; Koppen and Markham, 2007; Fischer, 1990). Nature (or, from 1985 on: 'biodiversity'), in this framing, was conceived as an ecological system, mostly appreciated for its intrinsic value, that can be tuned to its optimal condition by bio-physical experts that speak 'truth to power'. Examples of these types of influence are the introduction of the concept of critical loads, at the 1979 UN-ECE Convention on Long-Range Transboundary Air Pollution, the concepts of minimum viable population sizes (Shaffer, 1981) and ecological networks (Bennett, 1991; Jongman and Smith, 2000). The growing influence of bio-physical knowledge and the focus on issuing regulations accumulated in the EU Habitats Directive and led to the inclusion of ecological considerations in sectoral policies. For example, the Water Framework Directive aims at protecting and enhancing the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems.

'Nature for people': integration of utilisation values

The importance of our natural environment as a condition for human life has been acknowledged since ancient times (see text box). However, since the mid 1990s, it has become evident that the integration of conservation efforts and nature policies into other sectors would be crucial to meaningfully address the decline in habitats and species. This knowledge, together with the difficulties of funding the management of designated nature areas, prompted the increased popularity of the utilisation value argument: nature benefits human society (Mace, 2014). Well-known components of this argument include ecosystem services, natural capital and nature-based solutions. Policy-relevant scientific research projects, such as the Millennium Ecosystem Assessment (2005) and The Economics of Ecosystems and Biodiversity (TEEB, 2008), have stimulated the broad adoption of this argument and firmly placed it on the policy agenda.

The concept of ecosystem services soon became connected to economic valuation (Daily, 1997; Gantioler et al., 2008). New policy concepts emerged, such as biodiversity offsets (Bull et al., 2013), payments for ecosystem services and the Sustainable Use programme of the Convention on Biological Diversity. In addition, new collaborations emerged between stakeholders from business and industry that gave rise to an economic approach to nature conservation, such as the EU Business and Biodiversity Platform.

Within the 'nature for people' framework, government intervention is considered important, such as the pricing of negative external impacts. There is, however,

Fences blocking rivers were forbidden in medieval times

The roots of protecting nature for sustainable use actually predate the 'Nature for itself' framing. In some countries, rivers were protected even earlier than terrestrial landscapes. In Sweden, a king's declaration (first described in 1440) and an official law that was adopted in 1734 stated that no river could be entirely blocked and at least one-third of a river's width had to be kept open for public services, such as shipping, fishing and moving timber; one-sixth of a river's width was considered the minimum for migratory fish species (Calles et al., 2013). In Vienna, sturgeons were once a staple food and, thus, intensively fished; fences blocking the Danube were forbidden, even in medieval times (Friedrich, 2013).

Free-flowing Vindelälven river in Sweden.

also a contrasting market-oriented frame, known as the 'Promethean response' (Dryzek, 2013). This is characterised by the claim that nature 'for itself' does not exist, other than as a storage system for matter and energy, and that the ingenuity of humans guarantees that the earth is an unlimited resource for their ever-increasing wealth.

'People and nature': boosting the connection

In recent years, a more nuanced framing seems to have risen in prominence, marking a return to the appreciation of the beauty of nature that dominated the 19th century, with the development of the European Landscape Convention and related rural development policies. In this framing, nature is considered to be part of a social-ecological system with a reciprocal, dynamic relationship between humans and nature (Carpenter et al.,

2009; Mace, 2014). Nature is not something 'out there', but rather a culturally appropriated concept (Hajer and Versteeg, 2005) or a cultural artefact (Haraway, 1991). Nature is something that can no longer be distinguished from artefacts and society (Latour, 2004) because, today, humans affect natural processes at a global scale.

People are not just motivated by the utilisation or intrinsic value of nature, but also by their connectedness with nature as a key component of a meaningful life, the eudaemonic value of nature (Restall and Conrad, 2015; Bieling et al., 2014; De Groot et al., 2015). As a result, nature has become an essentially negotiable concept, one that is not only represented by scientists, but also by poets, architects, farmers and laymen (Latour, 2004). People who take leadership roles with respect to biodiversity are mainly motivated by eudaemonic and moral values, as was shown in the BIOMOT project, in which 105 frontrunners in various EU countries were interviewed. The top four motivations for being involved in biodiversity-related efforts were 'curiosity and learning', 'value in itself', 'living a worthwhile life' and 'future generations' (De Groot et al., 2015). Nature policy arguments need to be framed to fit the multiple values and goals of people, according the BESAFE project. Overemphasising economic arguments could alienate those people who are motivated mainly by ethical and moral concerns (Bugter et al., 2015).

The main challenge in 'people and nature' is that of using and strengthening people's connection with nature in nature management practices and participatory planning. People are motivated to contribute to local solutions for nature, as individuals (Schmid, 2017), as members of a local community (Scruton, 2017) or as stakeholders involved in self-organisational processes (Ostrom, 2009). Most people are driven by a combination of reasons for wanting to care for nature. Therefore, combining arguments that stem from various motivations, as well as tailoring to local situations, may foster people's engagement in nature protection (Bugter et al., 2015).

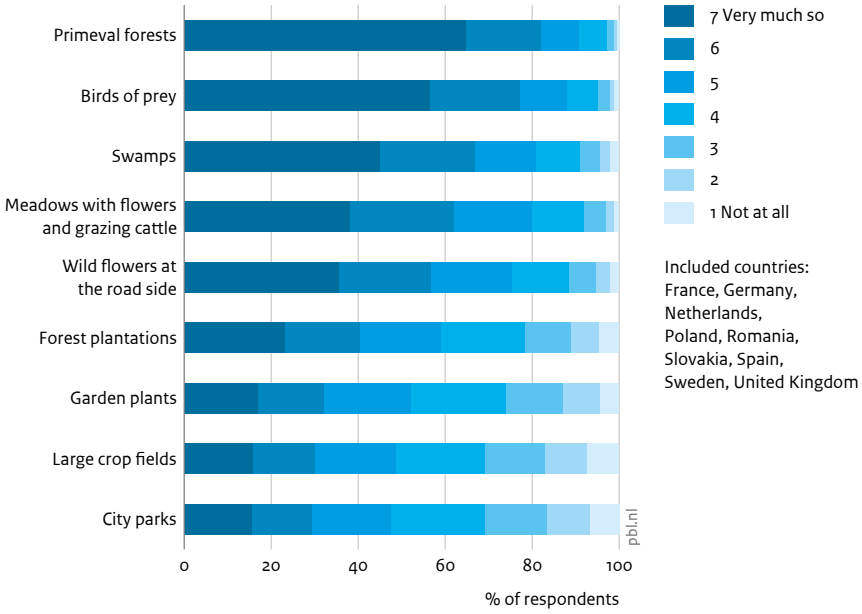
2.2 People's conceptions of nature

The various ways in which society has approached nature, over the past century, are still present in today's thinking about human-nature relationships. Preferences differ not only between policymakers, but also between individual citizens. People have differing images of nature and value nature for various reasons. Some people may be enchanted by nature's beauty, while others appreciates nature's ability to produce timber or clean air. How people value nature is partly based on their beliefs and motives, which, more or less subconsciously, influence how they talk about nature and act in relation to it. Although the relationship between beliefs and behaviour is not straightforward, insights into the connection between the two are relevant for the debate on the future of nature policies. This connection is all the more pertinent when one considers that a decline in support for nature policies can go hand in hand with an ongoing awareness of the need for nature protection (Buijs et al., 2014).

Figure 2.1

People's conceptions of nature, 2014

To what extent do you consider a certain type of nature to be real nature?



Source: GfK; analysis by Wageningen UR

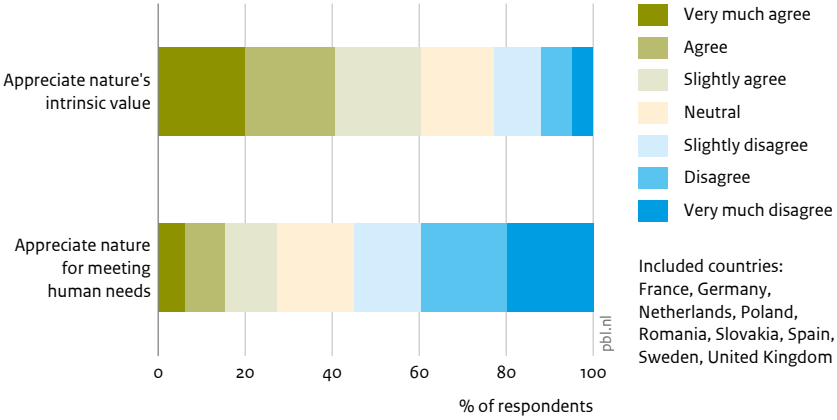
Half of the respondents considered garden plants and city parks as real nature, to a certain extent (Farjon et al., 2016).

Though the attitude of citizens towards nature policies is surveyed regularly with EU Flash, Eurobarometer and national surveys, the diversity in images and values is not well-known; only very few Europe-wide surveys have been carried out on related subjects, such as cultural values (Inglehart, 1997, 2008) and environmental attitudes (Dunlap and York, 2008; Hawcroft and Milfont, 2010). Therefore, a major survey of the general public in nine Member States was conducted to reveal the diversity in people's appreciation of nature (Farjon et al., 2016). The main outcomes are described below.

European citizens have a broad conception of nature

A majority of respondents considered all the suggested examples of nature to be natural, to a greater or lesser extent (Figure 2.1). Although city parks and large crop fields were rated as the least natural, half of the respondents still considered them to be natural in some way. In contrast, 90% of the respondents saw primeval forests as 'real' nature. Differences in ranking between the nine Member States were small.

Figure 2.2
Opinions about the values of nature, 2014



Source: GfK; analysis by Wageningen UR

About 60% of respondents indicated to appreciate nature's intrinsic value. However, half of the respondents did not have a very strong preference for any particular type of nature (Farjon et al., 2016).

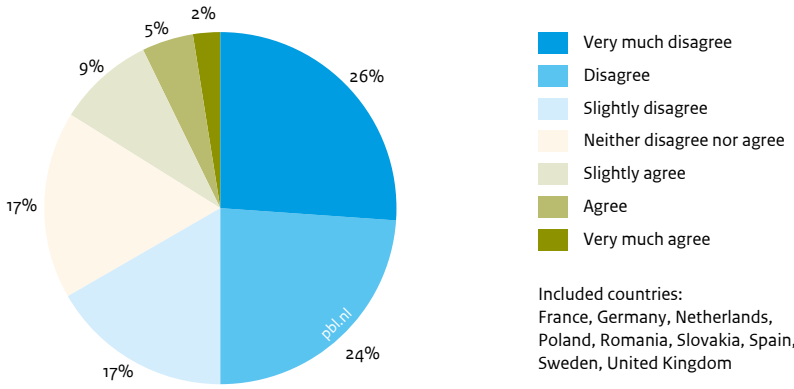
The majority of European citizens agree with the intrinsic value of nature
Responses to six propositions about moral issues concerning the relationship between nature and people revealed that attitudes vary widely (Figure 2.2). However, most people (about 60%) agree more with an ecocentric view of nature; they more or less agreed with the intrinsic value of nature, which includes biodiversity, wilderness and the integrity of wild animals. Far fewer people (around 25%) indicated to primarily support the anthropocentric notion that nature is valued for meeting the needs of society, rather than be left in its natural state. This predominance of ecocentric over anthropocentric views was found in all the participating Member States, in line with the findings of earlier surveys on environmental attitudes and the value of nature (De Groot et al., 2011).

Furthermore, the survey shows that young people, those with a tertiary education and city dwellers agree more with nature's intrinsic value, compared to older people, those who have had only a primary education and those who live in the countryside.

Majority of people support the preservation of nature
Two thirds of all respondents disagreed with the proposition that too much emphasis is being placed on nature conservation (Figure 2.3). This implies a broad agreement on the current level of nature protection. On this issue, the differences in opinion between Member States were rather small. Among the Slovaks and the Dutch, about one in five agreed with the proposition, whereas for the Germans and the Swedes this was one in eight; the other nationalities scored somewhere in between. Also, two thirds of all

Figure 2.3
Opinions about nature conservation, 2014

Too much emphasis has been placed on nature conservation



Source: GfK; analysis by Wageningen UR

Two thirds of the respondents did not think nature conservation receives too much attention (Farjon et al., 2016).

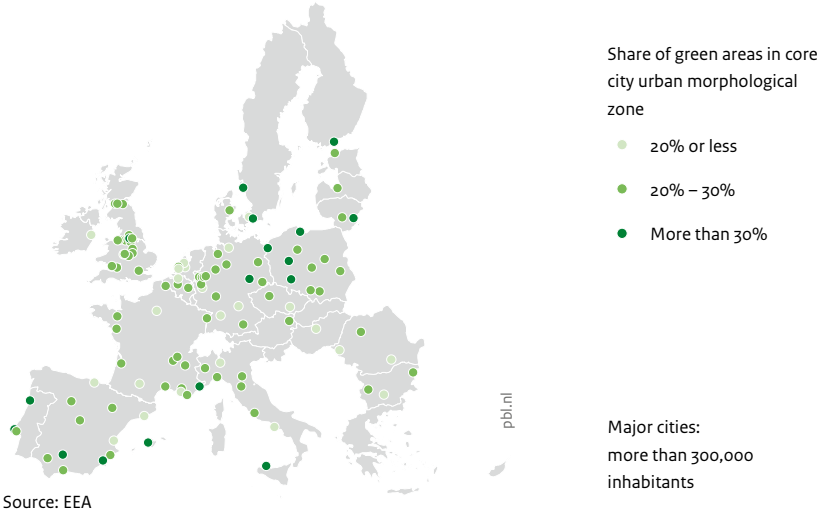
survey respondents considered the government as the primary organisation with responsibility for the protection and management of nature and the environment (Farjon et al., 2016).

All in all, the survey showed the majority of EU citizens to have a broad and non-anthropocentric view on nature, and to consider nature conservation to be important. The results show some variation between population groups and between countries, but first and foremost, nature preference seems to be a matter of the individual.

2.3 Current state of nature

Over the centuries, land use in Europe has created a wealth of different ecosystems hosting a diversity of species. Acknowledgement of the importance of Europe's wider landscapes to nature is found within the European Landscape Convention (2000) and the Pan-European Biological and Landscape Diversity Strategy, which was endorsed by 54 European countries in Sofia, in 1995, and was revised and republished in 2011. European Countries have taken considerable measures to conserve 'special nature', including the establishment of the Natura 2000 network of protected areas which is considered as the 'cornerstone' of EU policy on nature. In 1995, the first protected areas under the Birds and Habitats Directives were designated, and, in 2014, the percentage of land designated as part of the Natura 2000 network, per country, varied from

Figure 2.4
Share of green area in major cities, 2006



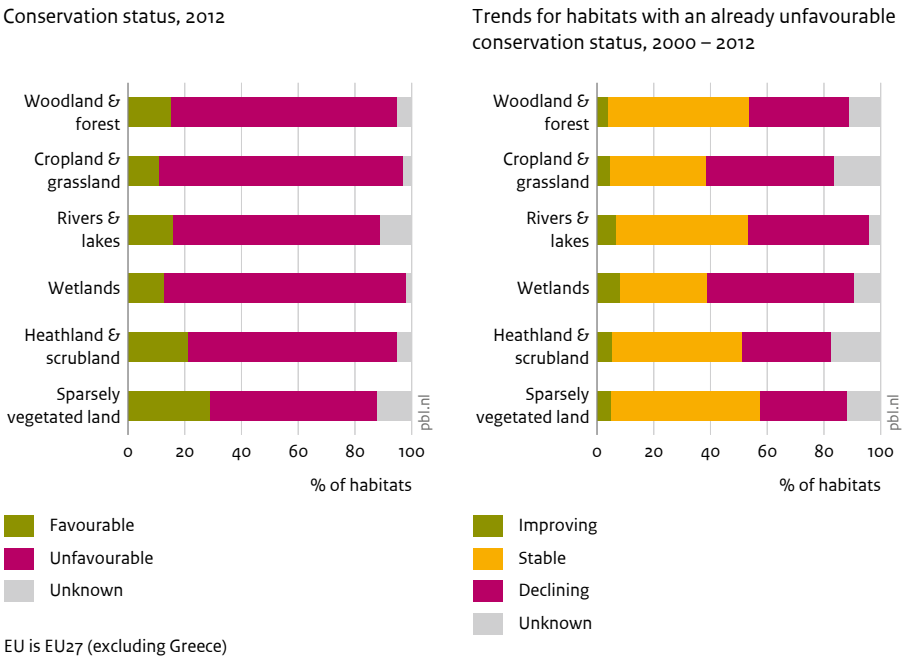
Source: EEA

8.5% (United Kingdom) to 38% (Slovenia). Part of this variation is due to landscape differences between countries, with relatively few nature conservation areas in urbanised and intensively farmed areas, such as in southern England or northern France, but it is also due to differences in national conservation policies. The designation of Natura 2000 sites is included in the target of the EU Biodiversity Strategy to 2020 to fully implement the Birds and Habitats Directives. The other targets are: Maintain and restore ecosystems and their services; Increase the contribution of agriculture and forestry to biodiversity; Ensure the sustainable use of fisheries resources; Combat Invasive Alien Species; Step-up the effort to tackle the global biodiversity crisis.

About 30% of the EU territory consists of forest and woodland, roughly 30% of cropland, including permanent crops, and 13% of grassland. Open natural vegetation covers around 17% of the area. Rivers, lakes and wetlands amount to less than 5%. Since 1990, the surface area of the main ecosystems has changed considerably. In particular, urban and industrial areas have expanded, as well as heathland and scrubland, while the area of agricultural land has decreased. Furthermore, forest and woodland, farmland and grassland have become more homogeneous, due to an increase in field size and the removal of hedgerows, trees and small copses (EEA, 2010). At the moment, 5% of the EU consists of urban or industrial areas, providing the everyday environment for the majority of the EU population. The amount of green urban areas varies between cities (Figure 2.4). The amount of green, together with its spatial pattern and qualities, such as accessibility, determines the ability of cities to provide recreational facilities, contribute to a healthy environment, and to adapt to climate change.

Figure 2.5

Conservation status and trends for habitats included in the Habitats Directive, in the EU



EU is EU27 (excluding Greece)

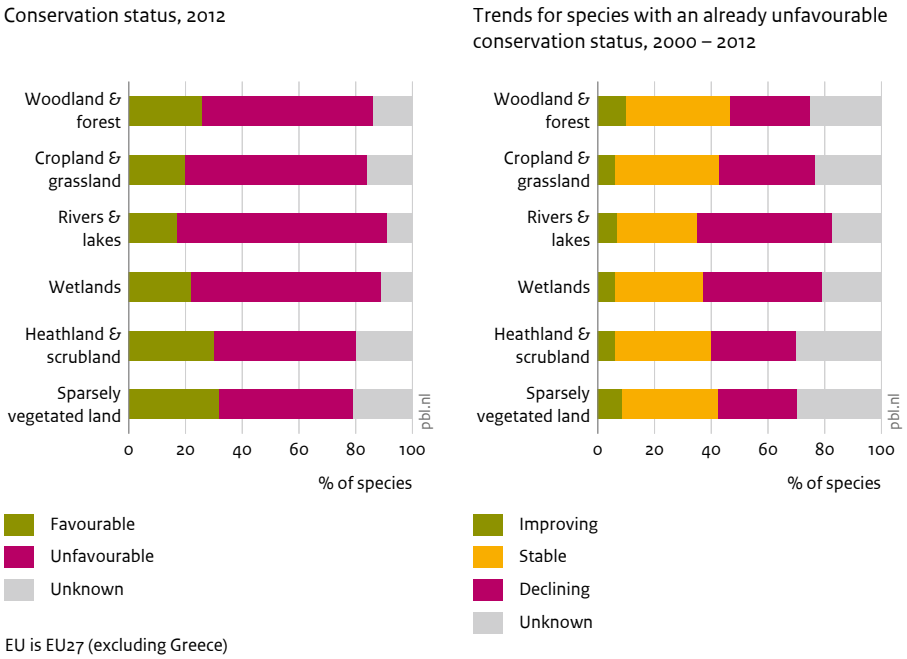
Source: EEA State of Nature in the EU 2015

Europe is the home of 260 mammalian species, 500 breeding bird species, 150 reptile species, 500 fish species, 10,000 butterfly and moth species, and 20,000 species of vascular plants, among other species. Supported by conservation efforts, several species populations have increased over recent decades; particularly, the larger mammals and birds, such as European bison, beaver, wolf, white-tailed eagle and Eurasian spoonbill. These positive developments do not mean that all species are in good condition. On the contrary, the European Red List of Threatened Species (IUCN, 2015) shows that between 2.5% and 59% of species in the various target groups are threatened.

Under the Birds and Habitats Directives, the designated features are monitored every six years. On the basis of these assessments, an overall picture emerges of the status and trends of those species and habitats, and of the main, associated ecosystems across the EU. The status for species and habitats in agricultural areas is the least favourable, with only 11% of species and 20% of habitats in a favourable conservation status. However, 48% of bird populations achieve a favourable status. Species in rivers, lakes and wetlands fare less well than others, as well – although birds there are doing relatively well. In general, there is further decline for more ecosystems, species,

Figure 2.6

Conservation status and trends for species included in the Habitats Directive, in the EU



EU is EU27 (excluding Greece)

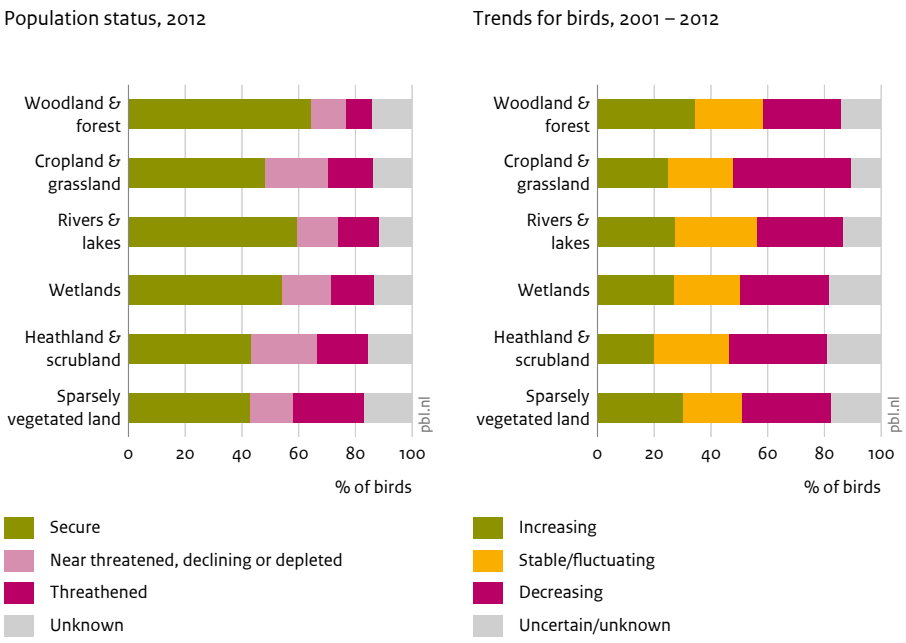
Source: EEA State of Nature in the EU 2015

and habitats which already are in an unfavourable conservation state, than there are those that show improvement (EEA, 2015a).

Overall, it is clear that there has been limited improvement in the conservation status of those species and habitats that have been protected under the Birds and Habitats Directives since 2006. Although the unfavourable condition of a major number of species and habitats did, in fact, remain stable and did not deteriorate any further, additional efforts are required – as is indicated in the relatively high number of assessments that show deterioration, compared to those that show improvement (Figures 2.5, 2.6 and 2.7). The main threats reported for species and habitats include habitat loss (in particular due to urban sprawl, agricultural intensification, land abandonment, intensively managed forests and river modification), pollution, over-exploitation (in particular fisheries), river dams, invasive species and climate change (EEA, 2015b). In urban areas, the main threat is that of urban sprawl (EEA, 2015c).

Figure 2.7

Population status and trends for birds included in the Birds Directive, in the EU



EU is EU27 (excluding Greece)

Source: EEA State of Nature in the EU 2015

The results contributed to the conclusion in *The Mid-term review of the EU Biodiversity Strategy to 2020* that more is needed to halt biodiversity loss in Europe by 2020. The Council of the European Union (2015) and the European Parliament (2016) have asked the European Commission to formulate actions to bring the 2020 headline target within reach. Implementation of nature policy is showing progress, but at an insufficient rate, and integration in other policies – in particular for agriculture and forestry – shows no significant progress. Reversing current trends requires the implementation of existing nature policies and the mainstreaming of nature considerations in others (EC, 2015a). Other relevant policy areas are clean air, water, climate and energy, transport, circular economy, regional development and territorial cohesion. Furthermore, increased involvement of people and them taking ownership of the issues remains important. Moreover, securing sufficient financial resources to enable conservation management and ecosystem restoration remains an important long-term challenge. Greater public awareness and understanding of, and support for, biodiversity protection is considered essential (European Parliament, 2016).

2.4 Trends shaping the future

Future developments will change the main pressures on nature, the relationship between society and nature, and thus the context of policy-making. Global trends will continue to have a significant impact within the EU (EEA, 2015d). Growth in population, in particular urban population, and the economy in regions such as Africa and South Asia, will increase the global demand for resources (OECD, 2012). The growing middle class is projected to consume more animal products, more wood and more energy. This trend is expected to increase the pressure on natural resources and increase global trade. The related increase in emissions will further increase climate change, which, in turn, is likely to change ecological circumstances, such as hydrological cycles, for living conditions and for producing food and wood (IPCC, 2014), and increase the competing claims on natural resources (OECD, 2012). In addition to the ecological impacts, demographic and economic developments probably will also change the global geopolitical context. Economic growth in countries such as China, India and Brazil is expected to cause, and is already causing, a gradual decrease in the economic importance of the EU (OECD, 2014), although the impacts of environmental change to economic growth are rather uncertain.

However, dynamics in macroeconomic trends in the EU are very different from those on other continents. This section briefly summarises the contextual future trends in the EU, in a situation without new policies. Challenges to be addressed by nature policies in the coming decades can be derived from those trends. The projections are based on existing knowledge and historical trends. The uncertainty about future trends remains considerable, although the general direction of the described trends is widely accepted. An example would be the exact impact of climate change, which is uncertain due to the uncertainties in the bio-physical system, as well as the unknown rate of adaptation response by society and in the environment. A full elaboration on the subjects in this section can be found in Prins et al. (2017).

2.4.1 Ageing population and modest economic growth

Population projections for the EU as a whole vary from slight decreases to slight increases. Where projections differ is usually related to varying expectations of migration rates (Mamolo et al., 2014; EC, 2015); without net immigration, the EU population will probably decline. In addition, the age structure of the population is expected to change. It is expected that one quarter of the population will be aged 65 and over. As a result, the old-age dependence ratio will increase considerably; the EU would move from having about 4 working people to 1 person over the age of 65 (4:1), to only 2 (2:1). Since the group of working people is not expected to grow, growth in labour productivity will be the sole source for GDP growth in the EU. Therefore, the average long-term economic growth in the EU is expected to be modest, with an annual growth of 1% to 2% (EC, 2015).

Ageing population … with time to enjoy nature.

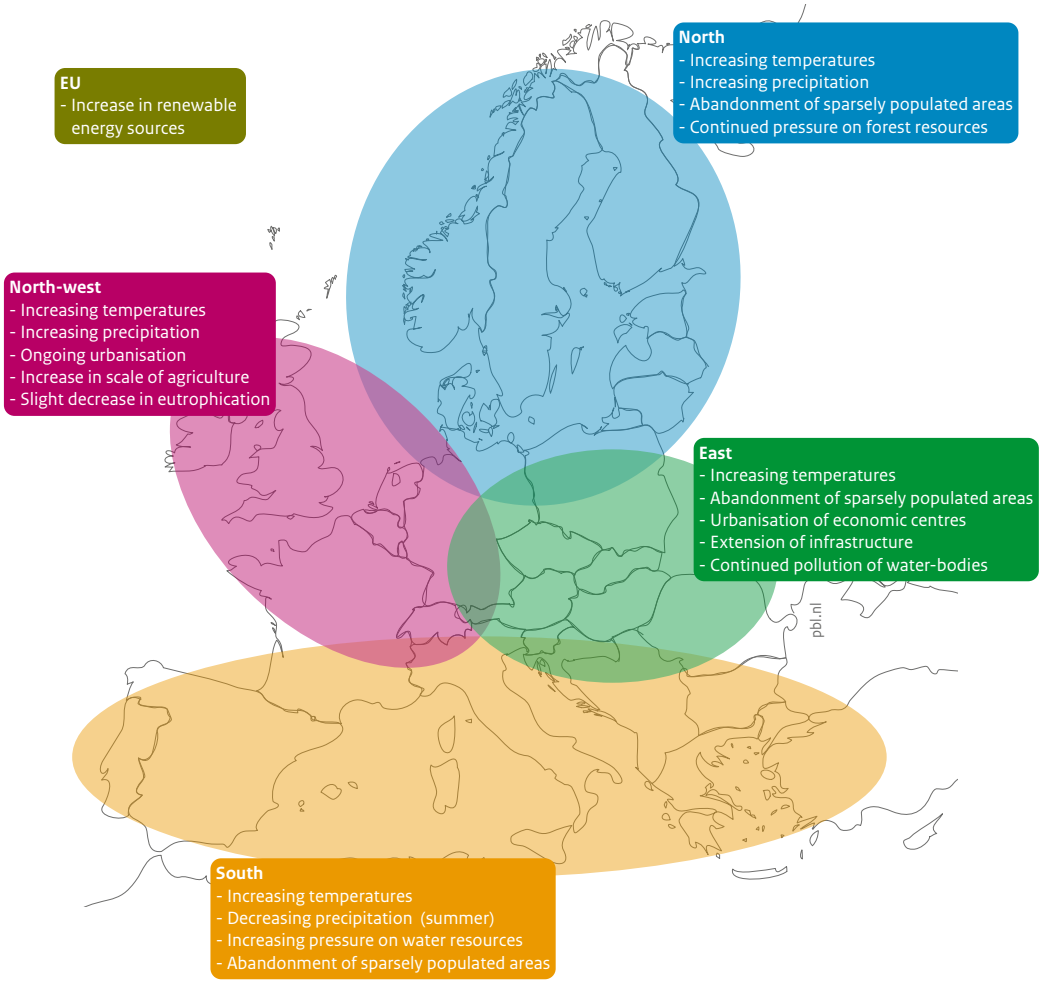
2.4.2 Polarisation of regions: urbanisation and intensification versus depopulation and land abandonment

The trend of people moving to urban economic centres is expected to continue. On the one hand, highly economic viable regions will become more densely populated and urbanised, while regions on the EU's periphery will face declining economic activities and an ageing population. The ongoing importance of global trade will boost the economic vitality of highly urbanised regions from London, Paris and Bonn to Milan and in associated corridors to those eastern European capital cities with access to the global market (Figure 2.8).

These developments are also seen in the economic sectors closely related to nature. Output of the agrofood sector is still expected to grow by 10% to 20% in value; however, contribution to the Gross Domestic Product will remain low (Lotze-Campen et al., 2014; Witzke et al., 2014). Growing demand for food and feed in the rest of the world will lead to increasing pressures on the global market and, therefore, domestic production in the EU will remain important. The growth in agricultural output is in particular the result of increased yield per unit and increased added value per unit of physical product. Such developments are projected to lead to a decline in crop area by up to more than 10%, compared to 2010. An important factor determining the degree of decline is the assumed level of liberalisation of agricultural markets. With regard to grazing areas, developments are less clear across different projections from the literature, ranging between +10% and –15%, compared to 2010 (Prins et al., 2017). The trend of concentrations of large farms in the most accessible regions is expected to continue. This trend could result in large, capital intensive farms, where mechanisation, robotisation and ICT could play an important role, especially in the north-western and – parts of the – eastern EU, while abandonment will increase amongst small farms in less suitable, mostly mountainous, areas (Allen et al., 2014).

Pressures to increase the intensity of forestry will continue. Wood and paper consumption in the EU are expected to increase in the immediate future before stabilising after 2030 (UNECE and FAO, 2011). However, a considerable increase in the use of biomass for energy could change this trend. Due to fragmented ownership and the multifunctional use of forests and forest products, it is uncertain whether the increased EU demand can be met domestically or whether imports from North and South America or the Russian Federation

Figure 2.8
Trends towards 2050



Source: PBL

will become necessary. In any event, global demand is projected to continue, leading to increased pressures on both global and domestic markets.

2.4.3 Climate change: mitigation and adaptation

Various climate change projections have been developed that include various ambition levels of climate change mitigation policies. Those projections estimate an increase in global mean temperature that ranges between 1.5 and 6 °C by 2100, from pre-industrial levels (IPCC, 2014). Realisation of national contributions to emission reductions

(so-called Intended Nationally Determined Contributions) as part of the Paris Agreement would likely limit the temperature increase to between approximately 2.6 and 3.1 °C (Rogelj et al., 2016). Therefore, besides policies following from the Paris Agreement, more mitigation measures as well as increased use of adaptation measures can be expected in the coming decades.

Mitigation: towards a carbon-neutral economy

Considerable changes are expected within the energy system, driven by the wish to mitigate climate change and the desire to become self-sufficient in energy (EC, 2011b). Energy consumption in the EU is expected to remain at current levels. Renewable energy targets and the development of smart grids clear the way for a considerable boost of renewable energy sources with expectations of up to 50% of electricity production being derived from renewable sources, by 2050. Wind energy will continue to play an important role whereas biomass and waste will be the most important renewable source for steam and heat supply (Capros et al., 2013). Plans for major hydropower development exist in the Balkan and the Danube catchment, for the greater part outside the EU, but with hydrological consequences for river basins in the EU, such as the Danube (Zarlf et al., 2015). Also, many Member States have or are expected to develop plans of about 20,000 new, small hydropower plants in small streams and tributaries (Liu et al., 2013).

Need for adaptation to climate change impacts

Impacts of climate change in the EU include higher average temperatures and changing precipitation patterns (EEA, 2012a). The most noticeable impacts in winter are expected to occur in the northern regions of the EU, with a pronounced increase in temperature and higher precipitation levels – warmer and wetter. In summer, the impacts are anticipated to be more noticeable in the southern regions of the EU, and characterised by more frequently occurring and longer-lasting dry spells (Figure 2.8). The effects of these developments on agriculture and urban areas are diverse, and so are the challenges that relevant decision-makers will have to face, such as in flood defence, flood prevention – even in southern regions of the EU – and heat stress. In addition to extreme weather events, the growth stages of crops are also expected to change, which could require additional adaptations within the agricultural sector.

2.4.4 Partial improvement in water and air quality

The trend of decreasing nutrient emissions to freshwater bodies is expected to continue. For phosphorus, this mostly reflects improvements in wastewater treatment in eastern and southern Europe, due to the effectiveness of the Urban Waste Water Treatment Directive and the availability of new technology. Full implementation of this directive is expected to result in a 5% reduction in the phosphorus discharge to rivers in the western part of the EU and 8% in the east. The overfertilisation of agricultural soils in western Europe will be reduced by a more efficient use of fertiliser, stimulated by the Nitrates Directive. Nitrate emissions from agriculture will continue to decrease, slowly, in western Europe as fertilisation surpluses decrease, but this is a long process. As it is

today, the amount of nitrogen in groundwater will remain a considerable source of nitrogen in waterbodies, due to the substantial 'loading' by agriculture in the past. For eastern Europe, an increase in nitrogen use is expected, leading to continued pollution of water bodies (Alexandratos and Bruinsma, 2012; Prins et al., 2017).

Progressing implementation of air quality legislation, together with structural changes in the energy system, will lead to a decline in sulphur dioxide emissions in the EU towards 2030, almost 70% below the 2005 level. Most of these reductions will come from changes in power generation. Also for NO_x emissions, implementation of current legislation will lead to a reduction of about 60%. These changes emerge from measures in the power sector and implementation of emission standards for road vehicles. With respect to NH_3, only slight changes in total emissions in the EU-28 are expected up to 2050, although NH_3 emissions are also subject to targeted controls in the agricultural sector and will be affected as a side impact of emission legislation for road transport (Amann, 2012).

2.4.5 Description of the Trend scenario used

A *Trend scenario* was used to define upcoming challenges to be tackled by nature policies without the introduction of new policies. The scenario's assumptions are based on the expected trends for relevant drivers of biodiversity and ecosystem services, and largely follow the A2 marker scenario of the Volante project (Table 2.1; Pedroli et al., 2015; Prins et al., 2017). Population numbers are expected to peak in the coming decades and to decrease afterwards. GDP growth is assumed to be at a rate of 1.5%, annually, for the coming decades, declining to 1.3% after 2030. However, population dynamics and developments in economic activity vary considerably between EU regions. The *Trend scenario* includes current policies on, for example, trade, climate mitigation and agriculture. Under currently implemented policies on climate mitigation, global mean temperature is projected to increase by approximately 2 °C by 2050 (and to 4 °C by 2100) (OECD, 2012; IPCC, 2014). Mandates or targets for blending first-generation biofuels are expected to be abolished after 2020. No changes in nature policies are assumed, while economic activities outside Natura 2000 areas are assumed to continue to have a negative impact on nature quality.

The *Trend scenario* results in an increase in agricultural output of almost 20% by 2050, compared with 2005 levels. Production from forests increases by 10%, under the *Trend scenario*. These developments lead to changes in land use, from which three major trends towards 2050 can be distinguished. Firstly, urban areas will expand by 25% between 2005 and 2050, resulting in 6% urban areas across the EU. Secondly, the area used for agriculture – cropland, as well as pasture – is expected to remain almost stable over the same period – the decrease will be only 2%. However, since production is increasing, on average, these areas will be used more intensively. Finally, regrowth of forest is expected to occur in large parts of natural grassland areas, leading to a 16% increase in forest areas and a proportional decrease of 30% in the areas with open natural vegetation.

Table 2.1
Scenario assumptions for socio-economic developments in the EU

Drivers	Assumptions in the *Trend scenario*
Population	-1% (2005–2050)
Economy	1.4% growth (per year)
Trade policies	No change in trade policies
Climate mitigation policies	No stringent climate policies (+ 2 °C by 2050)
Agricultural policies	No change, stable budget
Environmental policies	Air quality: current legislation (according to Amann et al., 2012) Implementation of Water Framework Directive
Nature policies	No change

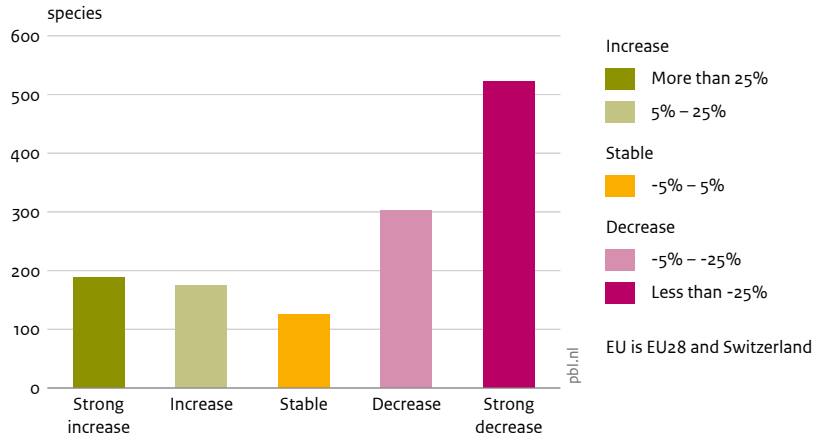
2.5 Impacts on biodiversity and ecosystem services

Developments under the *Trend scenario* will lead to different impacts across species and ecosystem services. These impacts were analysed using a framework of quantitative and spatially explicit models (Prins et al., 2017), including BioScore 2.0 (Hendriks et al., 2016), GLOBIO-aquatic (Janse et al., 2015) and a number of ecosystem services models (Petz et al., 2016). Impact on terrestrial biodiversity is indicated as the change in the probability of species occurrence, based on changes in area and abiotic circumstances. In order to assess the impact of the *Trend scenario*, the probability of occurrence was calculated for more than 1300 species (butterflies, breeding birds, vascular plants and mammals). The species included those in specific locations as well as those that occur widely across Europe, and most are protected under the Birds or Habitats Directive. For aquatic biodiversity, the indicator 'mean species abundance' was used, which is the average abundance of original species with respect to the natural reference, on a scale of 0% to 100%. This indicator is comparable to the Ecological Quality Ratio used in the Water Framework Directive. Ecosystem services, such as natural mechanisms to suppress pests and diseases, carbon sequestration and erosion control, were assessed using indicator models. The recreation capacity of the landscape was assessed in expert consultations. From the broad range of ecosystem services (see Common International Classification of Ecosystem Services), a selection was made of those that could be assessed in a way that would be meaningful to this study, in terms of responsiveness to trends and availability of indicators and models.

Trends are negative for most of the reviewed terrestrial species
By 2050, the impact of the *Trend scenario*, expressed as the probability of occurrence, will be negative for most terrestrial species included in the scenario, compared with the situation of 2005 (Figure 2.9). Although some species will benefit from the changes that take place under the *Trend scenario*, the majority of the 1300 species show a moderate to

Figure 2.9

Number of assessed species in the EU, classified by the change in probability of occurrence under the Trend scenario, 2005 – 2050



Source: PBL results from BioScore 2.0 model

The average probability of occurrence will be negatively affected in the majority of terrestrial species investigated – the probability will decline particularly for many vascular plants. Each species included in the BioScore 2.0 model was classified according to the change in its probability of occurrence over the total area of the EU-28 and Switzerland, between 2005 and 2050, under the Trend scenario.

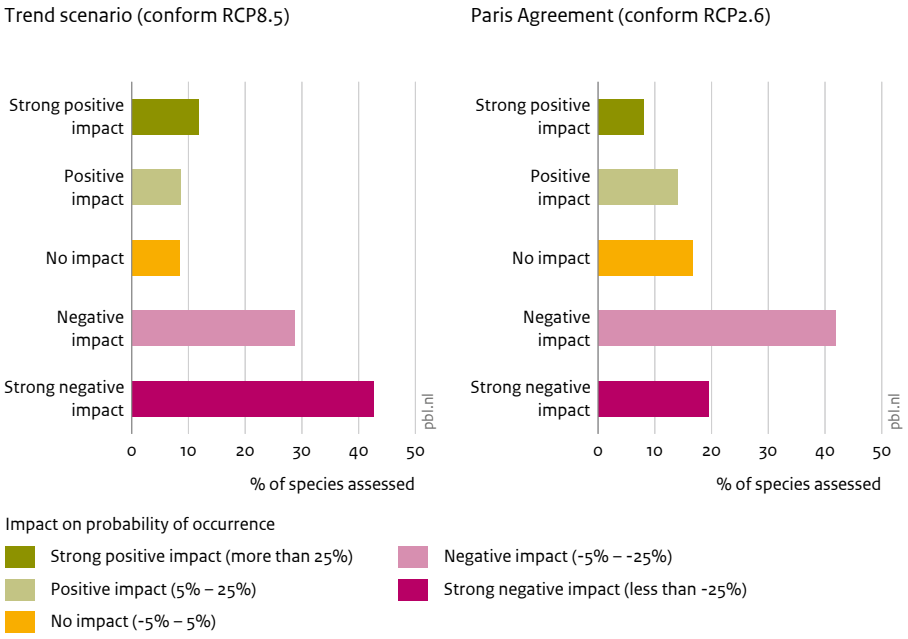
strong decrease. The largest share of species that show a strong decrease in their probability of occurrence are found among the group of vascular plants.

These impacts on species under the *Trend Scenario* are the result of several developments. A key driver is climate change, which has negative impacts on most species, in the majority of regions. Only the species that have the possibility to move their habitat towards the north or to higher mountain ranges are positively impacted by climate change. Figure 2.10 shows the impact of climate change on the change in probability of occurrence of species under the *Trend scenario*. A considerable share of the species assessed is strongly negatively impacted by the expected changes in climate. Achieving the objective of the Paris Agreement on climate change – to limit global temperature increase to well below 2 °C, instead of 4 °C by 2100 or 2 °C by 2050, as was assumed in the *Trend scenario* – decreases the strongly negative impact for many species.

Such large effects of climate change are also reported in various studies on specific species groups. Studies on European butterflies and breeding birds show that the vast majority of species is expected to be negatively affected by climate change (Settele, 2008; Huntley, 2007). Most species will have to move considerably towards the north and will lose a large amount of space with a type of climate that would suit them.

Figure 2.10

Impact of climate change on species in the EU, 2005 – 2050



EU is EU28 and Switzerland

Source: PBL results from BioScore 2.0 model

The trend for the majority of species included in the BioScore 2.0 model (as shown in Figure 2.9) is largely due to changes in climatic conditions between 2005 and 2050 under the Trend scenario. If the objective of the Paris Agreement (to limit climate change well below 2 °C by 2100) would be achieved, these negative impacts are likely to be lower.
RCP points to the Representative Concentration Pathways: greenhouse gas concentration trajectories developed in the context of the fifth Assessment Report of IPCC (Van Vuuren et al., 2011; IPCC, 2014). RCP2.6 and RCP8.5 refer to the expected additional radiative forcing (the difference between the sunlight that is absorbed by the earth and the energy that is radiated back to space).

According to three scenarios explored in Huntley et al. (2007), the potential future distribution of breeding birds is reduced on average by 20%. In a study on European bumblebees, more than 75% of the modelled species were found to lose over 20% of their suitable area, even under a modest climate scenario (Rasmont et al., 2015).

However, in addition to uncertainties in projected emissions and climate sensitivity, the response of species to changes in climate is rather uncertain, too. Particularly uncertain is the ability of species to adapt, compared to the rate of change in climatic conditions, and the expected change in their annual cycles. Observed changes in plant

communities in European mountainous regions show a shift of species towards higher altitudes, resulting in an increase in species richness in boreal-temperate mountain regions and a decrease in Mediterranean mountain regions (Kovats et al., 2014). For example, for birds, changes in breeding periods, migration times and breeding habitats have been observed. The BioScore 2.0 model calculates the amount of suitable habitat per species. Climatological conditions are an important factor determining habitat suitability. The model may underestimate the impact of climate change, because it does not take into account, for example, any limitations on the dispersal capacity of species or any limitations caused by physical barriers such as roads. However, the model may also overestimate the impacts of climate change, for example, because species may be abler to adapt to their changed environment than assumed in the model.

The expected trends in land-use change, being mainly regrowth of forests on natural grasslands and urbanisation, cause different impacts across species. The probability of occurrence of the majority of species that live in open natural vegetation, such as marshland, heathland and grassland, is negatively impacted due to the disappearance of their habitats. In contrast, species living in forests are likely to profit from the same trend in land use. A substantial share of the species that live in agricultural areas will be affected, on the one hand, by land abandonment, and by expanding cities and business sites on the other. In addition to trends in land-use change, the expected amelioration of air quality is likely to have positive impacts on species' probability of occurrence. Trends in other environmental conditions, such as those resulting from changes in agricultural intensity, are expected to have contrasting directions across the EU, and therefore mixed impacts on species. Altogether, these trends result in mixed impacts across the species assessed and across the EU. However, the negative impacts dominate.

Mixed to negative trends for aquatic biodiversity

Predicted changes in land use and nutrient loading are expected to result in only limited changes for aquatic biodiversity, compared with the current situation (Prins et al., 2017). In most waterbodies, the change in Mean Species Abundance will be less than 5% and, in a restricted number of regions, positive responses are anticipated due to the abandonment of agricultural land and/or further nutrient load reduction; in the others, a deterioration in aquatic biodiversity is projected due to agricultural intensification.

However, the expected increase in the number of hydropower installations, as well as in the effects of climate change, is expected to result in an increased negative impact for certain regions (these pressures are not included in the applied version of the GLOBIO-aquatic model). The increase in air temperature will cause higher water temperatures, but so will the discharge of cooling water from energy production and hydromorphological changes, such as the construction of reservoirs. Currently, in certain rivers, a marked rise in temperature is being observed, well above that experienced in the atmosphere. For example, the Rhine has increased by three degrees Celsius over the last century and, both here and elsewhere, this can be expected to form a growing threat for fish populations, including salmon and sea trout (Almodóvar et al., 2012; Baisez et al., 2011).

Mixed change in the delivery of ecosystem services

Although the balance between the supply of and demand for ecosystem services, on average, displays only limited changes, two related trends towards 2050 can be distinguished that differ between regions. On the one hand, the supply of several regulating and cultural services within densely populated areas is expected to decrease because of urbanisation, while demand remains the same or even increases. On the other hand, in areas of land abandonment, the supply of certain services is increasing, sometimes without there being a demand for these services within those areas. Services such as water retention and carbon sequestration can be functional, even at a considerable distance from densely populated areas, while others are less or not at all functional.

A thriving agricultural production heavily depends on maintaining a healthy population of invertebrates for pollination and natural predation for pest control. Although economic projections expect the agricultural sector to increase its production, both those ecosystem services are predicted to decline between 2000 and 2050, largely because of the loss of natural habitats on both a local and landscape scale, especially in close proximity to farmland. These declines are expected to be particularly substantial in the intensively farmed regions of north and north-western Europe, including, for example, the Great Plain in Romania and the Po plain in Italy. In contrast, more natural and sustainable systems are more likely to remain unchanged in central and eastern Europe.

The risk of erosion is expected to decrease across Europe, due to the natural regeneration of forest areas following abandonment. Only limited mitigation of erosion is expected to be delivered by the characteristic habitats that dominate Alpine areas in both central and southern Europe.

The expected urbanisation would cause a deterioration in the balance between demand and supply with regard to recreation. With a rising urban population, demand for recreational services will increase, particularly around urban centres. At the same time, more open space will be occupied by urban development, which depresses the potential delivery of recreational services.

Stürck et al. (2015) analysed the ecosystem service delivery of water retention and carbon sequestration for the *Trend scenario* (e.g. Volante marker scenario A2) up to 2040. Changes in these services are driven by the intensification of land use on the one hand, and by land abandonment and reforestation on the other. The amount of water retained by vegetation and which is thus prevented from contributing to peak flows is expected to decline, overall, but does show a mixed trend across Europe, (Stürck et al., 2015). For instance, reforestation and land abandonment in the Mediterranean result in enhanced retention of water due to precipitation, while the intensification of farming in western Europe is expected to encourage a decline in such retention. The largest decline is expected to occur in western, central and eastern Europe, as is a slight increase in Finland and Sweden and parts of the Mediterranean.

Overall, the amount of carbon sequestered by vegetation is projected to increase, particularly in Sweden and Finland, central Europe and the Mediterranean. This is mainly the result of agricultural abandonment and, especially, of the related increase in forest cover, given the role of forests as one of the main carbon sinks (Stürck et al., 2015). Relatively small amounts of carbon are sequestered in France and certain parts of eastern Europe (Czech Republic and Bulgaria).

2.6 Challenges for nature policy

From the previous sections, three challenges can be distinguished that are of particular interest for nature conservation and nature policies for the coming decades. These challenges appear from recent policy evaluations and may become more pressing due to future trends.

Ensure sufficient space and favourable conditions for nature
The implementation of effective management of Natura 2000 areas remains an important challenge beyond 2020. This requires increased involvement of people and them taking ownership of the problem, as well as the provision of sufficient financial resources (Section 2.3). Negative, external influences on Natura 2000 areas remain and they continue to adversely affect the conservation status of the network (Section 2.4). Although the degree to which is very uncertain, the impact of climate change is becoming increasingly important (Section 2.5).

Ensuring space and favourable conditions for nature outside the network is even more challenging. Landscapes have become more homogenous in recent decades (Section 2.3), a trend that is likely to continue (Section 2.4). Demand for recreational services will increase due to urbanisation, while the pressure rises on urban green and landscapes in highly urbanised regions. The intensification of agriculture, often in the same urbanised regions, will make it even more challenging to retain natural, functioning landscapes with the variety of biophysical conditions to sustain characteristic features and provide valuable ecosystem services.

In more remote regions, specific semi-natural habitats that contribute to highly valued but man-made landscapes, will continue to be subjected to the opposite pressure of extensification and land abandonment, ultimately leading to their disappearance and that of the associated biodiversity. In contrast, the growth in renewable energy with its demands on land (solar and wind power), rivers (hydropower) and forests (biomass) will add further pressure on land and water.

Improve nature considerations in economic sectors

Mainstreaming of nature considerations in businesses and sectoral policies is expected to remain a challenge, in the coming decades. Until now, attempts to do so in agriculture and forestry policies have been inadequate (Section 2.3). Current initiatives of businesses and industries are still in their infancy with respect to both the share of businesses involved and the practical implementation. Frontrunners collaborate, for example, in the EU Business and Biodiversity Platform and the Natural Capital Coalition (naturalcapitalcoalition.org). However, knowledge about ecosystem services, natural capital or nature-based solutions and subsequent concrete benefits is often scarce and uncertain, which makes it difficult to incorporate ecosystem services into current business models.

The reduction in negative impacts from economic sectors on nature fits more readily into contemporary business models, although natural resources often represent only a small share of a company's costs. Impacts from economic activities associated with agriculture, forestry, energy or leisure on nature and the quality of ecosystems will remain substantial. Increases in average global consumption per capita, in the coming decades, will lead to continued pressures on global natural resources (Section 2.4), and increases the need to minimise the impacts per capita.

Encourage people's engagement in nature-related efforts

The need to increase people's involvement in Natura 2000 areas is being recognised by the EC (with the Natura 2000 motto: 'for nature, for people'). The majority of people believe that nature conservation is important, and they have an ecocentric view on nature (Section 2.2). On the other hand, many people are not familiar with the term biodiversity or Natura 2000, suggesting there is a gap between what policymakers think is important for the public and what could make people more enthusiastic about nature. Given that political will is necessary to ensure the delivery of the Nature Directives, public support is essential to provide that mandate (Section 2.3).

People's ongoing migration to urban areas (Section 2.5) will decrease their exposure to nature and their daily interaction with it, if nature – in a broad sense – is not easily accessible; a negative impact on well-being may well result. Furthermore, a constituency of young people will grow up with having little experience of nature and, therefore, may be less likely to support nature in the future. The expected change in population structure (e.g. more elderly), may also have its impact on the relationship between society and nature.

Perspectives on nature in 2050

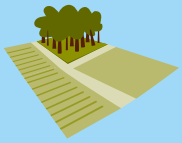
This chapter presents the four stylised 'perspectives' that were developed in this study: Strengthening Cultural Identity *(Section 3.2),* Allowing Nature to Find its Way *(3.3),* Going with the Economic Flow *(3.4) and* Working with Nature *(3.5). Together, they explore the normative uncertainty – the variation in desirable futures of nature. They differ from the* Trend scenario *(Section 2.5), which explores future societal and physical trends under business-as-usual conditions.*

3.1 Introduction

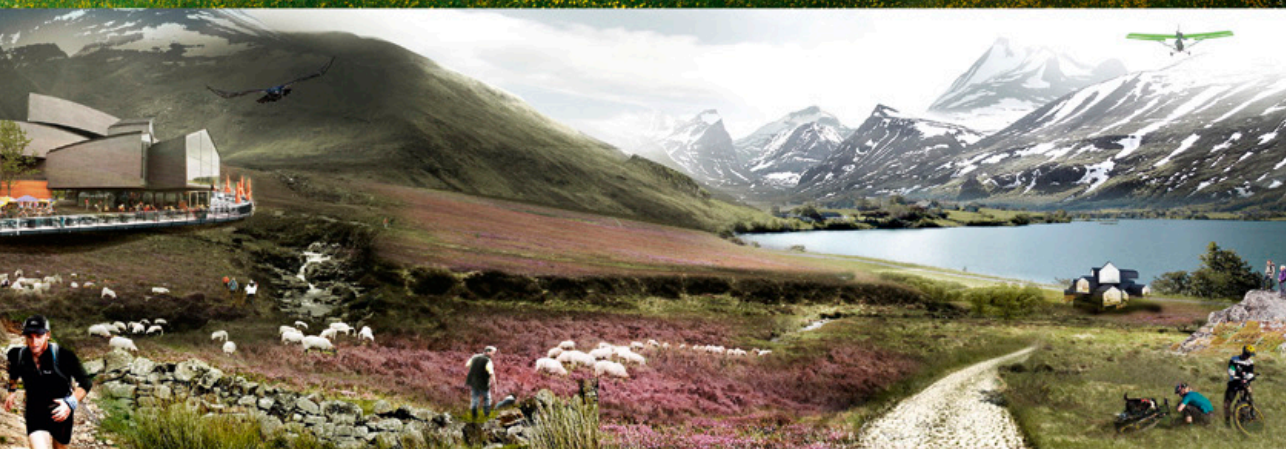
Together, the perspectives explore what certain sets of values and actor roles would mean for nature. They represent distinct visions about the future of nature by the year 2050, describing why people would want a particular future, what this desired nature would look like, and how it could be realised. Even though a single perspective can only occupy one viewpoint on a broad spectrum of opinions, each represents a characteristic way of thinking about nature and society. Each perspective tells a story about the future of nature in Europe (Schwartz 1991; Blom 2012). Each perspective embodies a set of principles (*why*), a desired state of nature (*what*) and possible ways to realise and organise this state (*how*). The perspectives are not mutually exclusive; in practice, many combinations exist. This chapter explores each perspective as if this were the only possible future.

The principles (*why*) consist of the values that guide the perspective and the challenges to which the perspective provides a response (Table 3.1). In *Strengthening Cultural Identity,* the guiding principle is people's love of the beauty of the places where they live, and nature is considered an essential element of the identity and subsistence of local communities. In *Allowing Nature to Find its Way,* the intrinsic value of nature and providing enough space for the dynamics of natural processes is considered important. *Going with the Economic Flow* is a strongly anthropocentric perspective, where private citizens and businesses have the lead and nature is valued as a source of economic growth or as a cherished accessory. In *Working with Nature*, natural processes are considered essential for the prosperity of society, and people are seen as partner of nature.

Table 3.1
Overview of the four perspectives

Perspectives ***Characteristics***	**Strengthening Cultural Identity** 	**Allowing Nature to Find its Way** 	**Going with the Economic Flow** 	**Working with Nature** 
Guiding value	Love of places where people live; sense of place; nature is part of community	Intrinsic value of nature and natural processes; people are responsible for diversity of species	Individual freedom of choice in how to care for nature	Services of nature are considered essential for human life
Approach	Connecting people with nature	Increasing the resilience of nature areas	Giving room to private actors to engage with their own nature	Realising the transition into a green society
State of nature	Nature is always nearby and accessible	European nature network realised; urban nature as wild as possible	Outside reserves, nature is a cherished accessory to other land uses	Nature is diverse and functional, delivering all kinds of services
Leading actors	Local communities	Governments	Businesses and individuals	Innovation networks

Various techniques were used to develop the perspectives, such as stakeholder dialogues, literature reviews, visualisations (for instance artist impressions), and model calculations (Section 1.2). A background report by Dammers et al. (2017) describes the way these techniques were used and how the results were integrated – including a list of the stakeholders involved. That report further elaborates on the perspectives, providing in-depth information, also including the examples and literature references that inspired their design. For readability reasons, references have not been incorporated in the text of the following sections; key references can be found in the reference list.



3.2 Strengthening Cultural Identity

In Strengthening Cultural Identity, *people identify with the place where they live. They feel connected with nature and the landscape, and consider these as integral parts of their local and regional communities and as essential to their well-being. The connection between people and nature is restored and enhanced. In 2050, under this perspective, European landscapes are highly valued for their beauty, cultural diversity and their role in community building. Nature is used and shaped to contribute to good and sustainable living and to provide recreational environments, as well as for the production of regional products. Many investments are made in maintaining and developing urban green-blue infrastructures, accessible nature areas, and rural landscapes.*

3.2.1 People connect with landscapes

In *Strengthening Cultural Identity*, nature is considered important for the identity of local communities. Nature represents people's appreciation for the beauty of the place where they live. Local inhabitants consider the area 'theirs', and the protection of it to be a shared and collective responsibility. Nature is not only considered as a cherished remnant of the past, but also as something that is being shaped by current communities, thus providing the landscapes of the future. People, for example, respect centuries-old trees, are curious about ancient buildings and ruins of castles, and are proud of their traditional local and regional cuisine. At the same time, groups of citizens are converting former harbours, industrial sites and office areas into green living, working or recreational areas.

The main approach, from this perspective, is to appeal to people's love of nature, in order to connect or reconnect them to nature. Since the appreciation of the beauty of their local environment is considered people's main motive for protecting cultural landscapes, it is believed that local communities are best equipped to care for nature. This has its roots in conceptions such as sense of place, indigenous and local knowledge systems, territorial cohesion, and the belief that cultural diversity is one of the key points of value in the EU. Cultural landscapes provide the diversity, beauty, intriguing stories and sense of place that define the European continent. Management, restoration and renewal of landscapes are therefore relevant activities for this perspective on nature.

From this perspective, lifestyles centre on the local environment; people prefer to live and work in an area to which they feel connected; they actively support and dedicate their time to various activities within the area. They buy locally produced food or regional food products from other regions in Europe. Holidays are spent both close to home and in faraway places, but in both instances people like to experience the local culture.

City parks provide attractive nature at people's doorsteps.

3.2.2 Nature is always nearby

Greened urban areas

From this perspective, in 2050, green spaces in and around cities and towns are highly appreciated and provide attractive nature at people's doorsteps. Aesthetically attractive and very accessible green-blue infrastructures, such as public parks, 'green' schools, rivers and lakes, are found everywhere. Organic farms, kiosks, restaurants and workplaces flourish near these structures. City centres – the showcases of cities – are decorated with trees, and roads leading into them are lined with stylish rows of trees. Also, linear and vertical gardens have been created. Citizens are actively involved in their environment through urban farming and allotment gardens. People transform former harbours, industrial sites and office areas into green recreational areas, nature areas and urban farms. The identity of such transformed areas and business areas is enhanced by works of art, architecture and landscape architecture.

People like to live in villages in the countryside nearby urban centres, thus slowing down the ongoing expansion of cities. Private citizens, farmers and foresters use the agrarian landscapes and forests around cities in a multifunctional way. Rural lands provide ample possibilities for relaxation, sports, work locations and regional food production. Fields are small and contain many landscape elements, such as hedgerows and flowers along field margins, and are managed in a multifunctional way.

Appreciation of historical landscapes

Land that was prone to abandonment but with a highly valued character has been recolonised by people. Some of them earn a living with nature-related activities, others have their roots in the area and have now returned, and still others own second homes. Vineyards, pastures and woodland pastures are being maintained, even in remote areas. Production of regional food specialities, tourism, and spiritual activities are of importance in regions with highly valued landscapes. People enjoy local dishes.
The diversity of species and habitats reflects Europe's cultural diversity. Local energy production provides renewable energy as well as additional income for the rural population. Wind, solar and biogas installations are small-scale and designed to fit with regional characteristics. In keeping with the local characteristics of rivers, rural communities build many small hydropower installations in small rivers.

People are curious about ancient buildings in historic landscapes.

These installations produce energy for local use and make consumers less dependent on large power companies.

Infrastructure upgraded for water recreation

Rivers, lakes and beaches are publicly accessible. Tourism and recreation are important activities. Rivers and lakes are used, for example, for angling, canoeing and hydro-speeding. River restoration projects are subject to landscape design, even more so, because of their importance for recreation. Cultural heritage, such as old dykes, brickworks and watermills, is being redeveloped and, where possible, former harbours are reconnected to rivers. The identity of coastal resorts has been enhanced by redesigning boulevards, restaurants and hotels, often by internationally renowned architects and landscape architects.

Small dams for hydropower and irrigation and locks for navigation are carefully integrated into the landscape; for example, by using traditional materials or new designs. Large dams that dominate the landscape enhance regional identities.
Fish passes have been constructed in the rivers and streams in which salmon, trout and/or eels are important for angling or for the regional cuisine. Particularly countries such as Ireland, Sweden and the Baltic States, are popular with anglers.

Nature areas are accessible

From this perspective, in 2050, semi-natural systems are extensively managed, such as alpine pastures, coppice woodlands and wood pastures, and flourish in many regions of the EU. This is particularly true for nature areas around urban areas, national parks and highly valued cultural landscapes. Nature areas are accessible via well-developed recreational infrastructures, including networks of walkways, bicycle paths and treetop paths, well-designed visitor centres, watchtowers and tree hotels, and ICT information programs, such as Google Nature View. These infrastructures offer many possibilities for experiencing nature. The infrastructures incorporate old farm houses, rural estates, and pilgrim roads, as well as new elements designed by landscape architects. In many nature reserves, farmers raise traditional cattle, such as Scottish sheep breeds and Iberian pigs; local people and tourists harvest berries, mushrooms and timber. Fishing and hunting is practiced widely.

Landscape art contributes to a river area's identity.

Renaturing sites who have lost their function: Tempelhof Berlin

By 2050, many former harbour areas, industrial sites and office districts have been renatured. An example is the Berlin Tempelhof, which was a meadow for grazing sheep along the southern edge of Berlin. From the 1920s onwards, it was developed into an airport, but this airport was closed again at the end of 20th century, when the government decided in favour of expanding Tegel Airport. Initial plans by the Berlin Senate involved transforming the former airport into a housing development site. However, grass root movements mobilised thousands of citizens to vote against these government plans. The Tempelhof re-opened to the public in 2010, as a leisure location, consisting of tarmac runways and green areas, which were in part developed as a public area for recreation and nature. The airport buildings together with the emerging park landscape and the areas at the edges of the former airfield merged to form what became known as 'Tempelhofer Freiheit'.

3.2.3 Communities take the initiative

Local communities have the lead

From this perspective, globalisation of the economy and of social life has sparked a counter-reaction towards increased appreciation of the local environment. Also, increased welfare has raised environmental and social awareness and people's appreciation of the quality of their living environment. These trends have triggered local communities to take the initiative in caring for the environment. Citizens, local businesses and local government authorities cooperate to conserve and create regional quality by sharing resources – money, ideas and expertise. They have started many initiatives, such as local food production and consumption, arrangements for eco-, agro- and river tourism, and restaurants in city parks. Producing and selling local products is an important economic activity. Groups of volunteers take the initiative in landscape development. Municipalities are investing in upgrading and developing green-blue infrastructures, and protect them from uncontrolled urban development. Entrepreneurs have opened new bars, restaurants and hotels near parks and rivers and

Cheese is a highly appreciated local product.

in cultural landscapes and nature areas. Regional authorities facilitate these initiatives, as cultural landscapes and nature areas are considered public goods that the market can only provide to a limited extent. This is done, for instance, by organising regional dialogues and by creating storylines about the future of the regions, taking their history as a starting point. National and EU authorities are removing barriers for such initiatives and are co-financing initiatives.

Facilitation and funding to boost cultural landscapes

Throughout the EU, authorities facilitate dialogues between experts and citizens, stimulating them to create the storylines and helping them to fund the investments, since many actors on different scales are involved in 'making' the landscape. Furthermore, landscape awareness and community building are stimulated by green educational programmes, particularly focused on connecting young people with nature. Local communities are regulating the management of nature areas, including the harvesting of, for example, mushrooms and timber. Nature policy explicitly addresses the importance of strengthening regional qualities by investing in cultural landscapes and the protection of iconic species, such as orchids, eagles and trout.

Funds play an important role in financing the required investments. They consist of public money (visitor tax, real estate tax) and private money (green shares, landscape auctions). These funds guarantee that investments can be financed. On the EU level, 'Europe's diversity of landscapes' is considered an umbrella theme. Rural and regional development funds are pooled in a dedicated and enlarged EU landscape fund.
The protection and development of cultural landscapes is mainstreamed in nature, agricultural and other policies. Regions receive financial support to maintain their cultural landscapes, including those that would otherwise disappear due to depopulation. The EU also stimulates the regional exchange of knowledge on landscape development and regional branding.

3.3 Allowing Nature to Find its Way

In Allowing Nature to Find its Way, *nature is appreciated for its intrinsic value and believed to be resilient when given enough room. By 2050, a large network will be established existing of large undisturbed nature areas, connected by corridors. Natural processes provide the dynamics to sustain complete natural systems and healthy populations of species. Common ground for nature development is found by relating nature development to the socio-economic agenda. This requires a receptive government, which implies joint vision building. The EU has taken the initiative, as the extended nature network transcends individual Member State borders.*

3.3.1 Intrinsic value of nature, dynamic ecosystems

In *Allowing Nature to Find its Way*, people feel nature is important for its intrinsic value. They feel responsible for the preservation of biodiversity. Society only needs to create the right conditions and, subsequently, let natural processes run their course. This perspective is concerned with developing complete natural systems over large areas, rather than with conserving single species.

This perspective responds to the ambition of halting the expected further decline in unspoiled nature areas. The establishment of a European nature network is such a response; this also increases nature's resilience to certain impacts, such as human-induced climate change. Various types of nature are restored and conditions are created to re-establish pristine nature or create new nature. The network of large nature areas provides enough space for the dynamics of natural processes, such as flooding, erosion and animal migration, to be self-sustaining. The network includes the restoration of historical analogues of wild nature, but also new types of natural systems could be developed; not only to enhance dynamic natural balances, but also to accommodate the demand for wilderness as an experience and to help realise local social and economic agendas; for instance, by creating new possibilities for nature-based tourism.

This perspective expresses a new appreciation of wild, dynamic nature, of people seeking a counterweight to their increasingly regulated lives, society and landscapes. People choose natural, 'wild' surroundings for their leisure activities or weekend and holiday destinations. They desire to rediscover the values of freedom, spontaneity, resilience and wonder embodied in nature.

3.3.2 A continent-wide nature network

Diverse natural elements are entering cities
Wild nature is penetrating the cities. In urbanised regions, corridors have been developed that connect – through agricultural and cultural landscapes – to large untouched nature areas. Parks are connected to nature reserves in adjacent rural areas, and renatured rivers that run through cities contribute to the diversity of species in urban areas. Within the green infrastructure, room for dynamics and variation has been

Left: Climbing trees allowed in wild city park.
Right: Rediscovering the value of freedom and wonder embodied in nature.

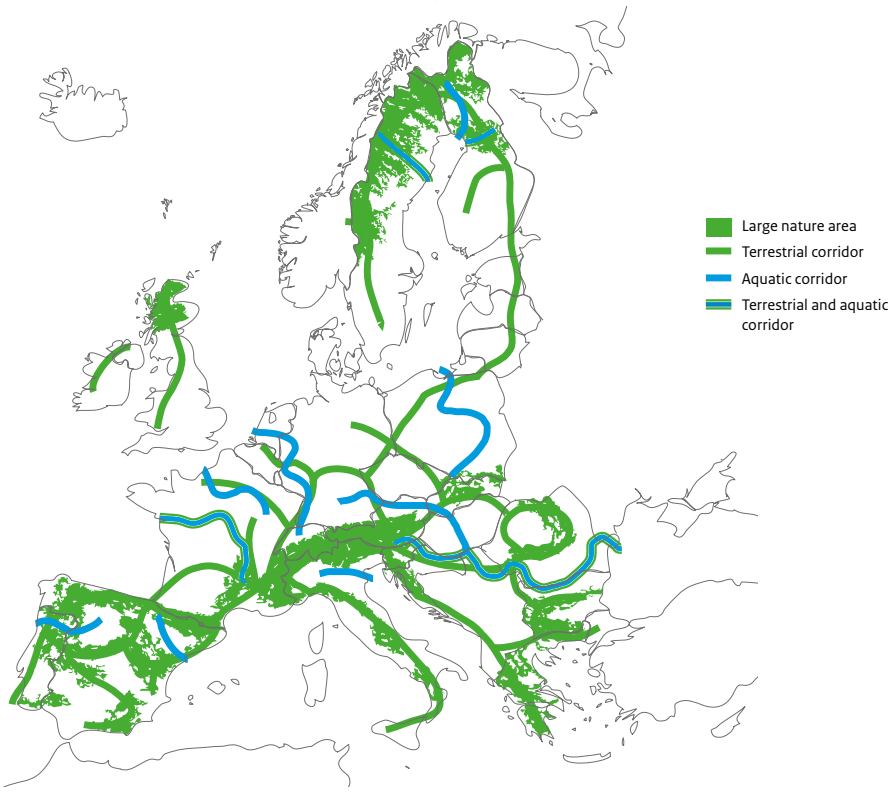
created; for example, river banks designed to prevent flooding, or bee-friendly parks and meadows. These parks, rivers and ponds also provide opportunities for people to experience wilderness nearby. Children are encouraged to experience nature. The parks are accessible, despite the presence of certain health risks, such as disease caused by ticks. Many cities provide habitats for species such as beavers and falcons.
Office buildings and residential towers are designed in such a way that they provide nesting possibilities for various bird species, bees and other insects.

Separation of agriculture and the nature network
By 2050, a large European nature network has been realised, consisting of large nature reserves and corridors that connect them. Figure 3.1 sketches the potential network. This nature network facilitates sustainable populations of species, including large herbivores and top predators. The network consists of estuaries and dunes, dynamic river valleys, bogs and fens, woodlands containing old-growth stands, arctic areas, and alpine areas, in various gradients, connecting them to form complete landscapes.
The largest nature reserves are situated in the Carpathian ranges and the Pyrenees, and in areas previously threatened by desertification, such as parts of the Iberian Peninsula and the Pannonian Plain. By 2050, the amount of wilderness – with only little human influence – has increased substantially, compared to 2015. Regulated access allows people to experience sublime natural scenery. In many nature reserves (European 'Kruger Parks'), safaris are being held and other forms of ecotourism are practised, and lodges and other upmarket and sustainable types of holiday acommodations can be found. Ecotourism means responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves environmental education of guests.

Nature corridors between nature reserves enable species migration. They contain natural landscape elements, such as rivers with wooded banks, natural water systems, or floodplains. Highly important small nature reserves outside the network form stepping stones for migratory animals and enhance the diversity of local species (see Section 4.2). Agriculture that was once within large nature reserves has been relocated. Small nature reserves are buffered by low-input farming or forestry. Outside the nature network, agricultural and forest production can be intensive.

Figure 3.1

Nature network in Allowing Nature to Find its Way



Source: PBL

This map was designed using data from the Pan-European Ecological Network studies (Bouwma et al., 2002; Biro et al., 2006; Jongman et al. 2006), as well as data from other studies.

Rivers, lakes, wetlands, and coasts have become more natural

By 2050, rivers, lakes and coasts in Europe have become much more natural than they were in 2015. In small rivers and streams that are not used for navigation, natural dynamics have been reintroduced by allowing them to meander. Small rivers and watercourses, including their banks, play an important role in connecting nature areas. Floodplains of rivers that have become part of the nature network, such as the Loire, Elbe, Rhine, Ebro and Danube, have been restored. Wetlands that were cultivated in the past and were not protected, now provide important habitats for various bird and fish species. The banks of rivers and lakes have been greened, providing natural gradients between land and water.

Wetlands provide important habitats for various bird and fish species.

Rewilding Europe

By 2050, several millions of hectares of land throughout Europe have been rewilded on marginal areas of less importance to agriculture. Via large-scale conservation programmes, core wild areas have been restored and protected, connections have been realised and top predators and keystone species have been protected or reintroduced. Around 2010, several organisations and individuals undertook rewilding efforts. One of them was the Rewilding Europe initiative, which contributed to rewilding 1 million hectares of land by 2020, in 10 different locations, including the Danube Delta, the Carpathians, the Velebit mountains and western Iberia. For example, in the Rhodope Mountains (Bulgaria), reintroduction of native large herbivores (Tarpan horses, Fallow deer and Bison) restored natural grazing dynamics and, as a result, some of the valleys which were overgrown have opened up again. A large amount of work has been done to support the local entrepreneurs in their efforts to connect their businesses with wildlife, wild nature and wilderness. Through these initiatives, the EU recognised rewilding as a new, complementary conservation approach, with the potential to extend scope and impact of EU nature policy in a cost-efficient manner.

From this perspective, river barriers for migratory fish such as shads, salmon, and sturgeons have been tackled, to a large extent. For example, fish passes near the two dams in the Iron Gates and the Gabčikovo Dam in the Danube now enable migration of Danube salmon, shads and sturgeons. Fish passage solutions have been created near locks that are necessary for navigation, and dams that are essential for hydropower or irrigation. New hydropower is restricted to run-of-river hydropower or low dams with small reservoirs. Dams that were no longer essential have been removed. Estuaries that, in 2015, were blocked by dams, such as the Haringvliet and the IJsselmeer in the Netherlands, have been partially or completely opened up again.

3.3.3 Joint vision building

Governments have taken the initiative
In *Allowing Nature to Find its Way*, nature rehabilitation has been placed high on societal and political agendas, influenced by public opinion on the loss of highly iconic species (such as the Iberian Lynx) and the threats to near-pristine areas such as Białowieża Forest. Public authorities have taken the lead in nature conservation and development, while avoiding science-based, top-down planning. In this way, they behave receptively, facilitating joint vision building based on close communication with various actors and sectors and on various levels. The EU has taken the initiative, as the extended nature network transcends individual Member State borders. This also reduced any transaction costs related to transborder negotiations. To facilitate the implementation of a nature network, cooperation with other public authorities, business organisations, nature organisations and citizen groups has been sought.

Nature development has been linked to socio-economic agendas
By 2050, nature is being developed through an ambitious EU programme and investments by national or regional governments and co-financed by the EU.
The original budgets for nature policy, rural development and cohesion policy have shifted towards nature development. Private actors, including landowners, leaseholders, hunters and the tourism sector, can also acquire nature areas or receive tax reductions that contribute to the – limited – amount of nature management required. Public authorities, landholders, nature organisations and others collaborate on the management of international parks and surrounding areas.

To create new nature reserves, land has been acquired or long-term contracts have been signed with private landowners to ensure nature conservation and to financially compensate them for the restrictions on how they use the land. Moreover, to convert farmland of marginal value into nature areas with extensive agricultural management, stimulation programmes have been introduced and then gradually extended.
To stimulate these initiatives, funds are being generated, programmes are being launched to promote wilderness, and local and scientific knowledge on species and habitats is being combined. National and regional water policies, supported by the EU, are creating more space for rivers to meander and more possibilities for fish to migrate. In cases where old dams needed to be relicensed, new standards led to the removal or reduced height of some of them.

Urban planning is focused on regulated urbanisation and is led by concepts such as ‘green wings’ and ‘green belts’. Where necessary, to create corridors or stepping stones, rural development funds are used to enhance large natural elements present on farmland.
In 2050, nature reserves are ‘European parks’ with a high protection status. Legislation is focused on reducing the human impact on these parks. Activities with little impact on biodiversity are allowed. Linking nature development to the local socio-economic agenda has provided common ground for developing consensus.

3.4 Going with the Economic Flow

Going with the Economic Flow *reflects people's freedom to use nature for their own purposes. From this perspective, nature is considered a resource for economic growth, although private actors also have various other motives for conserving nature. A basic network of nature reserves is publicly funded and managed via trusts; other nature areas are privately funded. Outside the reserves, nature is considered an accessory to other land uses, based on initiatives by businesses and individuals.*

3.4.1 Nature is a private matter

In *Going with the Economic Flow*, nature is i-Nature; fitting people's individual lifestyles. It reflects everyone's freedom to choose their individual lifestyle, without interfering with that of others. This includes the freedom to care for nature. There is a strong belief that individuals and the private sector are very capable of taking responsibility for the management of nature areas and for eco-friendly production. Moreover, nature is believed to be resilient and able to recover from any environmental impact.

From this perspective, responsibility is left primarily to private actors to value and use nature. This may provide opportunities for businesses and contribute to economic growth. Also, it may stimulate private actors to engage in, contribute to and finance nature conservation. A basic amount of natural space is considered a public good that should be protected and which is predominantly publicly funded. Nature outside reserves is considered a private good that can be used by businesses, nature organisations and citizens, for example, for leisure activities or in health care, or as an attractive living environment.

From this perspective, lifestyles show large variations; while some people are willing and able to pay for beautiful homes in a green environment and for high quality food that has been produced in an environmentally friendly way, and spend their holidays in beautiful nature areas, others are financially unable to do so, or deliberately choose a different lifestyle as they are not prepared to spend money on such things.

3.4.2 Nature as an accessory

Urban green domains
Scattered across the cities, there are parks and other green spaces of all shapes and sizes. From this perspective, large well-designed parks are found nearby upmarket business locations and residential districts. Many of the parks or green spaces are privately owned, fenced and not freely accessible – and if they are, visitors are invited to spend money. The owners are private parties or groups of residents. Public parks are scarce and small. Wealthy neighbourhoods are greener than poor neighbourhoods, and many wealthy people also own second homes in rural areas. Abandoned land or vacant plots along urban fringes, provide space for uncultivated, temporary nature.

Left: Park in business district: time for lunch.

Right: Large scale, intensive agriculture on fertile soils leaves room for nature elsewhere.

Homogenous production landscapes

From this perspective, suitable, highly accessible agricultural areas in Europe are dominated by market-driven farming. Nature is limited to field margins, with low production potential. Further intensification and scaling up of agriculture not only involves the use of more fertilisers and pesticides and increased mechanisation, but also the use of robotics and precision farming, to use input more efficiently and achieve homogeneous crop growth. This includes, for example, field expansion, efficient irrigation or water table management. Harvests have especially increased in eastern Europe, with more input of fertilisers and pesticides. Livestock is stabled all year round and animal diets are precisely targeted to their production. Although large-scale uniform agriculture is the standard, there is a niche market of organic farming, providing high quality food.

In mountainous and arid areas, large-scale agriculture appeared infeasible, and a large amount of farmland was therefore abandoned. In southern Europe, for instance, large agricultural areas spontaneously changed into dryland wilderness. In some cases, this resulted in improved habitats for migratory birds.

Recreation areas and private properties as guardians of nature

A state-owned basic network of nature reserves, throughout Europe, is well-protected with respect to land use; however, environmental regulation is only minimal. Along the coasts, many holiday resorts, restaurants and hotels have been built. A great diversity of facilities, from low-cost to upmarket, has been created. Particularly in regions of high tourist value, private companies have invested in the landscape, including in bird watching and hunting reserves. Those parks are only accessible to paying visitors or to the members of that particular nature management organisation. Nature in mountainous areas is being used for all kinds of leisure activities, such as hiking and paragliding. Forests close to densely populated areas meet the demand for leisure activities. These forests also contain many hotels and restaurants. In addition, there are natural parks built on private property, at travelling distances from economic centres.

Coastal areas are favoured locations for second-home development.

Private estates contributing to nature

In 2050, many estates in beautiful locations have been developed in private initiatives, thus contributing to nature. Several examples of such estates already existed decades before. One such example is that of an estate in Scotland, of 50,000 acres, set up by a multimillionaire. In addition to restoring peatlands and planting native forests, his goal was to reintroduce wolves and bears, species that had been extinct for centuries, thus also offering opportunities for wildlife safari tours. Part of the money earned by providing these facilities and services is spent on the management and further development of the nature reserve. Along a similar vein, the abandoned village of Aldeaia da Cuada on Flores Island, Azores, was restored by two entrepreneurs. They turned it into a holiday destination, with houses that can be rented out to holidaymakers. Tourist activities are geared towards nature tourism, such as boating, hiking, fishing, diving, and bird watching.

Wealthy people are able to buy land, build their own homes and enjoy their gardens. Much of the coastal areas and many of the beaches are privately owned and therefore not publicly accessible for recreation.

Rivers are optimised for navigation, power generation and irrigation

Rivers are being canalised, creating optimal conditions for navigation, power generation (hydropower, cooling water) and irrigation. New dams for hydropower or irrigation are increasing fragmentation of aquatic ecosystems. In southern Europe, rivers are intensively used for irrigation and tourism, leading to lower river discharges, such as from the Guadiana and Guadalquivir Rivers. The use of hydropower reservoirs has been intensified, since energy storage has become increasingly important. Risks of land degradation, flooding, mud floods, and droughts are mitigated through technical solutions (dams, dykes), or, when calamity cannot be avoided, financially compensated through insurances.

The use of hydropower reservoirs has been intensified.

3.4.3 Businesses and individuals taking the lead

Authorities set the playing field for private initiatives
In *Going with the Economic Flow*, authorities stimulate private initiatives for the public good. By 2050, public responsibility is limited to a basic network of nature reserves. Budgets for nature policy are limited to financing or co-financing existing nature reserves. Local and regional authorities are responsible for nature protection within the reserves. The management of those reserves is outsourced to privatised nature management organisations (in trusts). The EU is concerned, most of all, with nature from the perspective of creating a level playing field for economic actors and providing a basic quality of life for all. The role of government is to guarantee no net loss of biodiversity; for example, by implementing measures that would obligate developers to compensate for any damage to a nature reserve caused by the development. Environmental policies focus on good human health and risk management, securing public health and safety against natural risks. Local and regional authorities facilitate forestry, agriculture and tourism in nature reserves, because this adds to the diversification of local economies.

Private initiatives lead to unexpected partnerships
Leisure companies enter into partnerships with nature organisations to create upmarket nature areas and parks with a focus on 'experiencing nature'. Project developers are included to develop attractive green residential and office areas. The nature organisations are interested in such a partnership because of the other parties' knowledge of marketing and the financing aspect, and private companies wish to increase their corporate social responsibility. Funding is organised by nature management organisations and institutional investors and includes entrance fees, organised sponsoring, lotteries and/or crowdfunding. Project developers, together with government authorities, finance small parks and greenery by demanding higher real estate prices. Local government authorities set up public-private partnerships, involving estate owners, to design those parks and areas of greenery. The estate owners and/or tenants commission landscape companies to manage these green areas.

Other sectors, such as tourism, construction and health care, have become more involved than they were in the past. This was achieved by making citizens, business and nature organisations responsible for nature outside the reserves. In this way, more money is generated for nature conservation. The quest for renewed economic growth has led to a strong push for increasing efficiency, visible outside nature areas as the intensification of land use in agriculture and forestry, wherever economically feasible.


INFORMATION
BIO BRIDGE

3.5 Working with Nature

In Working with Nature, the sustainable use of nature is essential, to ensure that it provides and will continue to provide services for the benefit of current and future generations. A paradigm shift to a holistic approach was followed by a transition towards a green society, including the ways in which people behave. This transition has been set in motion by 'green' frontrunners from society, business, research, and government. They invest in research, engage in innovation networks and the pricing of the external costs related to production and consumption.

3.5.1 Nature considered essential for human life

In *Working with Nature*, nature is considered essential for the prosperity of society. The earth is seen as the home that humans share with other living creatures, and society is considered a part of nature. The natural systems that continue to deliver goods and services in the future, form the natural capital. These ecosystem services ensure a certain level of welfare, functioning of society and individual well-being. Protecting natural capital ensures that it is sustainably used and will not become depleted. Economic growth is redefined in terms of well-being, and this includes regular assessments of the natural capital that countries contain and businesses depend on.

From this perspective, the focus is on a green society in which production and consumption make the best use of the services delivered by nature, while minimising the impact on the environment. Production becomes nature-inclusive and includes different ways of working with nature, ranging from nature-based solutions, such as natural mechanisms to suppress pests and diseases in agriculture, to biomimicry, such as designing industrial products inspired by natural forms.

From the *Working with Nature* perspective, citizens behave as conscious consumers, with a healthy diet that contains less meat. As conscious consumers, they will also consider the eco-friendliness of their clothing and housing, they prefer particular modes of transportation and ecotourism-related holiday destinations. As working with nature has become the mainstream lifestyle of the conscious consumer, it is inexpensive and facilitated by government and, therefore, feasible for the majority of the population.

3.5.2 Nature is diverse and functional

Nature ensures a healthy urban climate

In 2050, many trees, green roofs, and parks can be found throughout most European cities. These green elements provide a healthy living environment, including a pleasant climate. The parks in and around cities vary in size, from small playground parks with grass, bushes and trees, to those that are large, containing forests, meadows, ponds and marshes, which purify the water, reduce flood risks and sequester carbon. Community gardens host a wide range of fruit and vegetables as well as flowering plants to attract large numbers of insects, including bees. Streets are lined with a broad variety of tree species, which are adapted to the local climate. Hospitals are surrounded by

Nature and health: therapeutic gardening.

Agroforestry

In France, since the 2010s, about 3,000 hectares of agroforestry have been planted each year, which in 2050 have increased to more than half a million. Agroforestry is an example of 'smart agriculture', which appeared to be necessary in most southern and central European countries. Already before the year 2000, an agroforestry project was implemented near Montpellier, and similar projects were located in the Pyrenees, Languedoc-Roussillon, and Picardie. Several studies projected that the Montpellier climate would change in the future, with higher temperatures and more frequent droughts. The challenge was to make food production more efficient, sustainable and able to cope with the projected effects of climate change and water stress. Growing multiple crops in one field proved beneficial, as different crops require different levels of water or nutrients at certain periods of the year. Production levels were found to be higher with multiple crops, compared to growing single crops. Successful combinations proved to be trees and cereals, such as walnut trees and wheat, maize or sunflower crops, or tree intercropping in large wheat fields. Also, leguminous crops were grown to increase nitrogen availability to benefit crops with high nutrient demands.

'therapeutic' gardens or other green areas that promote patient health. Roofs are usually greened, containing mosses and herbs, lawns and shrubs, and enable rooftop farming or provide solar energy. Recycled materials are used in new buildings that, in turn, can also be recycled. Urban expansions are located in areas with minimal risks of natural hazards, such as flooding, avalanches or landslides.

Agricultural landscape designed to deliver nature-based solution

In 2050, the benefits of nature are included in farming practices and are optimally used. There is a focus on regulating services, supporting agricultural production and thereby preventing natural hazards. Soils are managed in ways that promote soil biodiversity and enhance nutrient cycling, soil formation and primary production. The use of fertilisers is reduced by applying fallow techniques, winter cropping and diversified crop rotations.

Worms enhance soil fertility.

Working with natural systems in the soil reduces the need for water in periods of drought and the risks of flooding in periods of heavy rain. Pests are controlled by the abundant presence of their natural predators in field margins or on small nature plots between fields. Flower beds near arable land, greenhouses, orchards and vineyards provide habitats for natural pollinators. In areas with very low precipitation, drought-tolerant crops, usually combined with trees (see text box *Agroforestry*), are used to reduce the amount of water needed for irrigation. In agricultural areas that are susceptible to erosion and drought, such as in the mountainous regions of eastern and southern Europe, natural elements have increased to prevent water runoff, increase water storage and reduce evaporation. Finally, in *Working with Nature*, agricultural landscapes are important locations for generating renewable energy, such as in large wind parks.

Water retention and peak-flow reduction

Forests and peatlands in upland areas retain water and reduce peak flows during high river discharges, and reduce water shortages during periods of drought. Floodplains of rivers, such as the Danube, Elbe and Rhine, are being maintained or developed to serve as retention basins during peak flows. Those floodplains consist of extensively used grasslands and include distributary channels and river bypasses. Buildings are absent, except for stilt houses and floating offices. Hydropower generation is restricted to run-of-the-river hydropower; one third of all water discharges are not hindered by dams. Research on fish migration resulted in fish passes being built without mortality during upstream and downstream migration, and these solutions are implemented in nearly all hydropower plants. Fish passage solutions for hydropower installations and sluices are effective all year round, with an ecological flow of about one-fifth of the total flow. Large dams with large reservoirs can be circumvented with bypasses functioning as small rivers to make fish migration possible and avoid high mortality in reservoirs.

Range of services delivered by forests

In 2050, in mountainous areas, commercially exploited coppices and forests provide alternative sources of biomass. Forest compositions, with respect to tree age and species, have become more diverse than in 2015, to accommodate various needs. Forests are not very susceptible to the pests and storm hazards that have increased all over Europe because of climate change. Both old and new forests deliver many ecosystem services, such as carbon sequestration, erosion prevention, and water

Room for the river Elbe as well as other nature.

retention. The focus on these services decreases wood and pulp production, but this demand is also relatively low since much wood and paper is being recycled.

The overall condition of pasture and heathland is good, as the number of grazing animals is kept in line with the carrying capacity of these systems. Semi-natural grasslands dependent on mowing regimes are in good condition, as the increased demand for biomass stimulates farmers to mow and harvest the grass. Degraded peatlands have been restored and their management ensures that the amount of stored carbon is maintained, which therefore only allows extensive agriculture.

3.5.3 Innovation networks take the lead

Fundamental change in the use of natural resources
From this perspective, in 2050, a transition towards a green society has been made. Collaborations across various production chains, such as those of food, feed, fibre, chemicals and energy, are essential. This takes place within innovation networks in which green frontrunners from various sectors meet to discuss ways of producing and consuming and share knowledge. Public investments in research that focuses on the greening of society create a fertile basis for further innovation. The way the economy and society use natural resources has changed, fundamentally. Private, civic and public organisations know how to integrate the sustainable use of resources into daily practice. In education, a new approach is used; people from private and public sectors educate themselves and learn from one another (life-long learning). Businesses use sustainability criteria to market their products and services.
Measures that are taken by governments include the pricing of the external costs of production and consumption, gradually making environmental standards more stringent, abolishing tax reductions on company profits, communicating best practices, changing regulations that hinder innovation (e.g. intellectual property rights), and publicly rewarding 'champions of green innovation'. Businesses use sustainability criteria to market their products and services. '*Gross Natural Product*' is introduced as an indicator for sustainability, to complement Gross Domestic Product (GDP), the economic indicator for material wealth.

Ecological design: Flower Tower.

Innovation networks introduce a great diversity of natural services

In cooperation with businesses and research institutes in the EU, governments are developing ambitious programmes, stimulating innovation networks, from local to European levels. Public investment in fundamental and applied research that focuses on the greening of various sectors has increased, significantly. The active involvement of companies and environmental organisations is an important precondition. The EU and national governments carry some of the risks on behalf of the innovators, to increase their willingness to participate. These networks use open innovation approaches based on agreements, complementary interests and shared ambitions. Innovation networks are organised around various issues such as restoration agriculture, renewable energy, recycling of buildings and new ways of financing green cities. Activities that are undertaken include research, designing, prototyping, marketing, testing and applying new solutions.

Responding to challenges

Section 4.1 links the three key challenges for nature policies described in Chapter 2 with the approaches for addressing those challenges in the four perspectives as described in Chapter 3, including a brief description of the related benefits and drawbacks. Section 4.2 explores how each approach would contribute to achieving the targets of the EU Biodiversity Strategy to 2020. Since, in reality, all perspectives exist simultaneously within a certain geographical area, the challenge will be to motivate stakeholders to support a joint vision. Stylised cases in Section 4.3 show the variety of motives and actors on a regional level and the synergies that might arise from the combinations of perspectives.

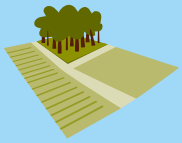
4.1 Perspectives show a range of approaches

Table 4.1 links the approaches from the perspectives described in Chapter 3 with the challenges for nature policies identified in Section 2.6. In this section, these approaches are further explained and linked to the policy challenges.

Ensuring sufficient space and favourable conditions for nature
This challenge contains various elements, such as that nature areas in highly urbanised regions are maintained in an appropriate condition to accommodate intense, external pressures; sustaining semi-natural areas that are dependent on traditional land practices in the face of depopulation and abandonment; and ensuring effective management and finance within the Natura 2000 network. The state of nature as desired in each of the perspectives largely determines the approach to ensure 'good quality' space for nature.

In *Strengthening Cultural Identity*, the maintenance and enhancement of valuable landscapes is carried out in collaborations between citizens and local enterprises, facilitated by local government. 'Nature' in these landscapes not always needs special environmental conditions. Governments facilitate local initiatives and guarantee funds, supplemented with public money, generated for example by visitors and real estate taxes, and by private money, such as from green shares or landscape auctions. Landscapes need periodic management, which requires a reservoir of volunteers,

Table 4.1
Approaches for dealing with challenges for nature policies

Challenge	Strengthening Cultural Identity	Allowing Nature to Find its Way	Going with the Economic Flow	Working with Nature
				
Ensure sufficient space and favourable conditions for nature by:	Promoting responsibility of communities to maintain and develop local landscapes	Establishing a large EU-wide nature network that is resilient to harmful human impacts	Facilitating private initiatives, and protecting a basic nature network	Protecting areas that deliver regulating ecosystem services
Improve nature considerations in economic sectors by:	Facilitating the use of a regional identity as a brand for local enterprises	Spatially separating economic activities from nature	Leaving the responsibility to economic actors	Stimulating nature-based innovation; setting up pricing instruments and smart regulation
Encourage people's engagement in nature-related efforts by:	Fostering people's sense of place and connectedness to local communities; acknowledging the wish for regional aesthetics/quality	Responding to people's admiration for nature's dynamics and the wish to be at one with nature	Promoting the responsibility of private actors and their willingness to act	Encouraging conscious and responsible ways of production and consumption

a stable stream of sufficient funding and viable business models for agricultural and forestry enterprises.

In *Allowing Nature to Find its Way*, the large nature network allows for self-sustaining nature. Such a network requires supra-national coordination and the creation of joint visions for transborder sites. Initial management and purchasing of the land would be primarily funded with public money, although a strong link between nature development and the local economy could generate additional private funding. Once established, management efforts are usually low. The establishment of the nature network is an adaptive response, providing a permeable landscape that allows the movement of species and increases the resilience of ecosystems, for example to the impacts of climate change. Rivers and mountain ranges as well as land that has been abandoned could ensure sufficient space for corridors or large nature areas. In urbanised regions, the need to establish integrated, nature-based flood protection also provides opportunities for nature networks. Finally, the creation of dynamic, undisturbed river systems, calls for other rivers to be made available, or for alternative modes of transport

to shipping, and an alternative to hydropower energy production and the provision of cooling water.

From the perspective of *Going with the Economic Flow*, ensuring sufficient space for nature in a basic network is a public responsibility. Here, it is believed that nature is resilient and, for example, will adapt to climate change by itself. Outside the basic network, nature protection is left to private initiatives. In this perspective, private investors and new business start-ups are attracted to exploit new, sustainable economic and ecological business models related to tourism, hunting and angling, real estate development and renewable energy that also benefit the conservation objectives for the area. Private actors earn money from activities linked to nature and invest in nature management. Therefore, where nature is being protected depends on individual preferences or economic value. Most conservation or nature development efforts take place in peri-urban areas and highly valued tourist areas, such as mountains and coastlines. For nature areas in regions with other considerable economic interests, such as fast growing urban areas and large estuaries with ports, there is a delicate balance between investments that negatively affect nature and related compensation measures in an effort to sustain the structure and function of the nature network.

In *Working with Nature*, nature areas are cherished primarily for the delivery of regulating and recreational ecosystem services. Essential is the development of payment mechanisms for these ecosystem services; for example, water management boards paying nature conservation organisations for water retention and purification, carbon-emitting companies paying for carbon sequestration, and recreational organisations paying for recreational services. Furthermore, strong environmental and spatial planning is required to secure a high quality delivery. This raises awareness of the importance of these areas, on the one hand, and increases administration and enforcement costs, on the other. The total amount of land reserved for this delivery of regulating services, means there is a smaller area available for growing crops. As people consume in a responsible way (wasting less food and eating less meat), this is not regarded as problematic, and the smaller area is sufficient to meet the demand. With respect to the impacts of climate change, the focus in this perspective is on managing a dynamic response of ecosystems in such a way that key ecosystem functions and services are preserved.

Improving nature considerations in economic sectors

Mainstreaming nature considerations in sectoral decisions has two sides: the reduction in negative impacts from economic sectors on nature, and economic sectors making more use of natural processes and natural capital.

From the perspective of *Strengthening Cultural Identity*, regional brands – using emblematic species or typical landscapes as their trade mark – offer opportunities for viable business models, and, in turn, these models form a foundation for landscape care. There is a risk of free-riders, whose economic activities lead them to profit from

a scenic landscape without contributing to its management, and the local approach to such management does not tend to stimulate multinationals to include nature considerations in their decisions.

Allowing Nature to Find its Way provides room for economic activities outside the nature network. The nature network is buffered by extensively used farmland, which reduces the impact of intensive farming on nature areas. The incentive to include nature considerations in production chains equals that under the *Trend scenario*.

In *Going with the Economic Flow*, actors focus on the delivery of raw materials from natural resources. Private actors provide a balance between services, which may lead to a focus on the provisioning services (e.g. food, wood, hunting, fishing and tourism). Regulating services, which have long-term or less visible benefits are probably undervalued, increasing the risk of substantial damage from extreme events. A critical question, therefore, is how to guarantee the various services, in the absence of well-functioning markets.

In *Working with Nature*, authorities influence the balance between the various services, through regulation and pricing instruments. By 2050, a transition towards a green society and a circular economy has taken place. Innovation networks of frontrunners from business, finance, health, water management, NGOs, schools and research institutes continue to explore nature-based solutions. Difficulties flow from the lack of knowledge and uncertainties about the delivery of services. The most critical part of the transition, possibly, were the barriers as they existed under the 2015 regime, including the vested interests and behavioural patterns of consumers.

Encouraging people's engagement in nature-related efforts

The ways in which people connect with nature differ in each of the four perspectives.

From the perspective of *Strengthening Cultural Identity*, fostering people's sense of place is essential, as is the engagement of local communities. People's sense of place here means they feel strongly connected and committed to the nature that surrounds them. The British philosopher Scruton (2017) argues that local communities play an important role, as does 'oikophilia' – the Greek word for 'love of home' and people's desire to protect it. Important components of oikophilia are accountability and attachment. Community efforts involve caring for the landscape, but also the purchase of locally produced goods. Stories about nature conservation could be integrated into the regional identity; for example, in the use of emblematic species or landscapes as part of the branding of a region. This helps to stimulate contact between inhabitants as well as social cohesion, promote tourism, increase income, and could enhance funding for nature management to secure the 'brand' identity. A question to be answered, is that of how 'engagement of local communities' could work in a context of ongoing urbanisation, and what governments could do to facilitate this engagement, among other things, in the light of ongoing globalisation.

From the perspective of *Allowing Nature to Find its Way,* people experience wilderness, and have encounters with wild animals. Such encounters can have a deep, epiphanic effect on people (De Groot et al., 2015) and may influence and motivate them for a long time, making nature an integral, meaningful part of their lives. However, these types of experiences are less easy to achieve than in the other perspectives, since nature and society are highly separated and social inequity with respect to access to nature might increase. The engagement of local people is important in locations where nature areas are being developed. Such development could – to some extent – revitalise regions prone to land abandonment and depopulation. This perhaps could be arranged through co-financing via EU agricultural, regional or cohesion funds.

In *Going with the Economic Flow*, the focus is on private actors taking responsibility. In his work on the art of ecological living, the German philosopher Schmid (2017) argues that it is entirely up to individuals to act on behalf of the environment. From this perspective, many people are allowed to enjoy nature and nature-based businesses are being boosted. A drawback may be that only the wealthier people will be able to do so, and in that case access to nature would be limited for the majority of people. This perspective very much builds on private initiative, which may accentuate inequity in social well-being more than is the case today.

In the perspective of *Working with Nature*, public attention to ecosystem services and nature-based solutions may offer avenues for inspired citizens, communities and businesses to engage with nature in novel ways. The perspective particularly addresses people as consumers, and raises awareness of the impacts of consumption. As it is difficult to change behaviour, this requires sustained government intervention.

4.2 Opportunities for species and ecosystem services

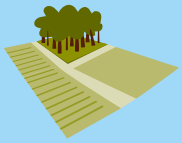
Each of the four perspectives has its own long-term vision. Although these visions differ from the one formulated in the EU 2020 Biodiversity Strategy, all include opportunities for contributing to achievement of the EU vision (EC, 2011a). This section highlights the relative merits or drawbacks of the four perspectives, in relation to common and endangered species (as proxies for biodiversity), and regulating and recreational ecosystem services. Provisioning ecosystem services (e.g. food and wood) also were assessed but are not included in the table, as we assumed these will be delivered in sufficient amounts to meet demand in all perspectives. A full elaboration of the assessment is provided in Prins et al. (2017).

Strengthening Cultural Identity

From this perspective, the focus is on 'nature near people'. Common species benefit from the increase in parks and green and blue elements within cities and the establishment of attractive landscapes for recreation around them. In addition, the latter would also benefit almost two-thirds of the European human population,

Table 4.2

Opportunities for biodiversity and ecosystem services, per perspective

Species/services	Strengthening Cultural Identity	Allowing Nature to Find its Way	Going with the Economic Flow	Working with Nature
				
Common species	Greenery and parks within and landscapes around cities provide habitats	The nature network provides habitats	Private parks and country estates provide habitats	Nature-based solutions provide habitats
Endangered species	Characteristic agricultural landscapes provide habitats	The nature network provides high quality habitats	Abandoned areas provide habitats	In particular, peatlands, wetlands, coastal systems and, to some extent, forests and floodplains provide habitats
Regulating services	Attractive landscapes provide pollination and natural mechanisms to suppress pests	The nature network provides water retention and carbon sequestration	Abandoned areas provide carbon sequestration; Private parks and country estates provide pollination and natural mechanisms to suppress pests	Supply of all regulating services
Recreational services	Attractive landscapes in urban regions provide recreational possibilities	The nature network provides possibilities for upmarket ecotourism	Private parks provide recreational possibilities	Greenery in and around cities provides recreational possibilities

as well as help sustain pollination services and natural mechanisms to suppress pests and diseases. In addition, the emphasis on conserving and enhancing culturally important landscapes results in more biodiverse farmland with additional benefits for characteristic species and habitats. Sites and facilities that allow recreational pursuits, such as angling and swimming, can also enhance water quality, while river restoration projects could and should be designed to benefit migratory fish such as salmon and sea trout.

From this perspective, no additional efforts are undertaken to protect all endangered species – except for those that are highly appealing to the public. Local initiatives vary across the EU, leading to scattered and uncoordinated conservation-related efforts. Species and habitats that require large, extensively managed or undisturbed nature areas are not likely to benefit.

Allowing Nature to Find its Way

From this perspective, a European nature network of large nature areas and corridors delivers major and long-lasting benefits for both common and rare species and is able to sustain viable populations of top predators. The large size of these areas and networks means that most external impacts are mitigated. Abiotic and biotic processes are sustained by natural dynamics and provide a range of suitable conditions for a wide array of species and habitats, both generalist and specialist, and the extent and quality of marshlands and natural grasslands has increased considerably, compared to under the *Trend scenario*. Corridors connecting large nature areas increase ecosystem resilience to change and extreme events. Species are able to migrate through the permeable landscape and colonise or recolonise adjacent areas. Aquatic biodiversity, including migratory fish species, benefit from the restoration of rivers, as this has considerably improved water quality and connectivity, compared to the situation under the *Trend scenario*. The large nature areas contribute to water retention and carbon sequestration, and, near cities, will deliver some recreational value.

From this perspective, no attention will be paid to species associated with the manmade mosaic landscapes, or to the ecosystem services that depend on the interwovenness of nature and human activities, such as pollination and natural mechanisms to suppress pests and diseases. Furthermore, the dynamic processes in the nature network have been assessed by landscape experts as being very unattractive to the majority of tourists.

Going with the Economic Flow

Here, private initiatives, such as landscape parks or privately owned country estates, benefit common and widespread species, and deliver pollination services and natural mechanisms to suppress pests and diseases. Liberalisation of agricultural policies can have positive impacts, such as a more efficient use of inputs, thus reducing polluting emissions. Although the efficient use of land may increase land abandonment elsewhere, it also provides opportunities to establish new nature areas or to improve the functionality of existing ones, as well as a wide range of related benefits. In addition, these nature areas offer opportunities for broad-based ecosystem services, most notably that of carbon sequestration.

These approaches also have their limitation, because of the scattered and uncoordinated character of private initiatives and land abandonment. Spatial coordination is not envisaged and private initiatives limit accessibility for recreation. Liberalisation of agricultural policies is expected to result in increased mono-functional

land use, with fewer habitats available for species associated with agricultural landscapes and with a lower level of attractiveness for recreation.

Working with Nature
From this perspective, the focus is on the supply of regulating services, such as pollination and natural mechanisms to suppress pests and diseases, and water retention, storage and purification, which also provide semi-natural habitats. This is to the benefit of peatlands, coastal systems and their associated species. The nature envisaged from this perspective clearly contributes to the supply of several ecosystem services, such as flood prevention, water retention, pollination and natural mechanisms to suppress pests and diseases. This provides accessible and attractive nature within and around cities, also greatly to the benefit of recreation.

As forests are planted for functional use instead of biodiversity (with only a moderately positive effect on forest species), this perspective does not focus on targeted efforts to remove bottlenecks that hinder the effective conservation of endangered species.

4.3 Examples of combinations and coalitions

Elements of all the perspectives can be found in the present, throughout the EU, with some more dominantly present than others. This section elaborates several examples of stylised cases, on a regional level or sectoral scale, including challenges and combinations of policy approaches from the various perspectives. The challenges, here, are defined broadly, including those related to economic development and climate adaptation. The cases concern cities (Section 4.3.1), a transnational nature network (Section 4.3.2) and agriculture (Section 4.3.3). They do not cover all regions and sectors within the EU, but are only intended to illustrate how differing perspectives could be combined, in order to create synergies and build coalitions, and to reveal potential conflicting differences.

4.3.1 Adaptive, inclusive, and sustainable cities

The first case concerns cities and the challenges as expressed in the urban agenda (EC, 2014). By 2050, as much as 80% of the European population will live in cities. Cities provide good opportunities to start businesses and are a breeding ground for innovation. However, they also face ever greater societal challenges with respect to the environment, health and social cohesion. The EU is developing an Urban Agenda that incorporates three challenges that relate to nature:

- creating cities that are adaptive to climate change and pollution;
- inclusive cities, improving the social quality of life;
- sustainable cities, referring to the reduction in the urban footprint.

In 2016, in an informal meeting, the EU ministers responsible for urban matters entered into the Pact of Amsterdam (NL EU, 2016), which elaborates working method, concrete

actions to be taken, and the themes for the EU Urban Agenda. Several synergies between that Urban Agenda and nature-related efforts are immediately apparent. More accessible green areas provide social benefits, as nature offers an environment for interaction between different social and ethnic groups, thus improving social networks (Ten Brink et al., 2016). A greener environment offers opportunities to experience nature. There is a growing evidence base for the positive impact of nature within people's everyday environment on their well-being and health. It improves stress recovery capacity, encourages physical activity, and promotes social interaction (Hartig et al., 2014; Lovell et al., 2015; Ten Brink et al., 2016). Furthermore, green spaces in cities can reduce heat stress, help the city to adapt to climate change and reduce air pollution.

The four perspectives include various spatial strategies that could contribute to addressing the urban challenges (Figure 4.1). In general, these ideas can be divided into two groups: increasing accessible nature at the doorstep and introducing nature-based solutions. Coalitions of various actors, such as private citizens, real-estate developers, healthcare professionals, water managers, spatial planners and researchers can use these strategies to tackle the urban challenges. Coalition composition may vary, depending on circumstances and on the strategy pursued.

Dispersed green

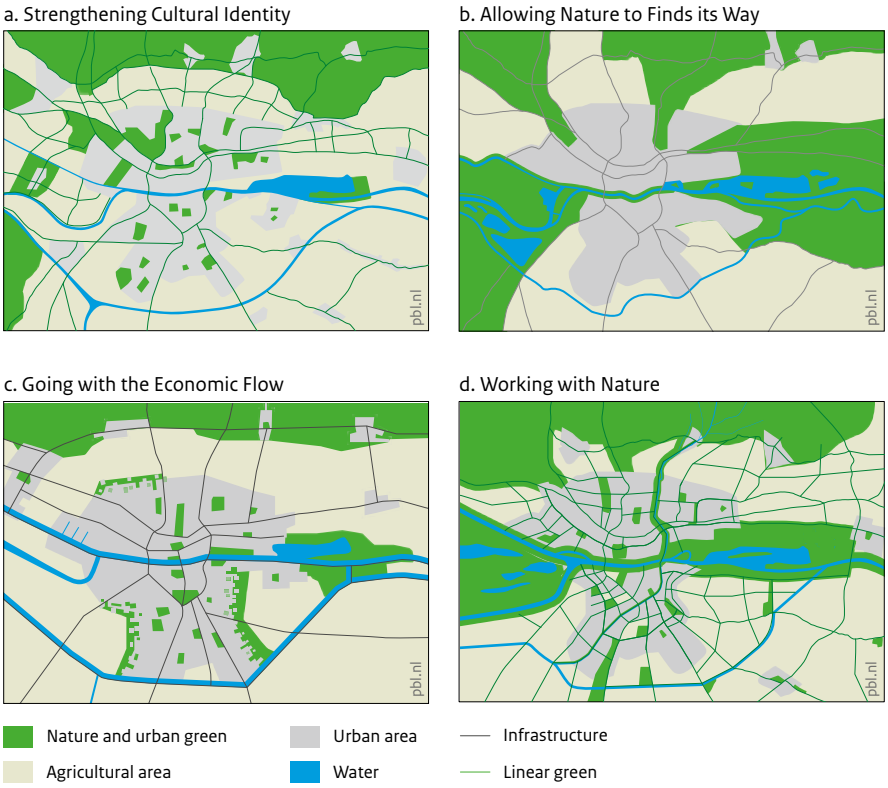
The greenery within cities is based on certain perspectives-related principles, such as more accessible nature at the doorstep (*Strengthening Cultural Identity*, Figure 4.1a), every building supporting a green roof, every district including a water retention pond (*Working with Nature*, Figure 4.1d), and more privately owned green spaces in wealthier districts (*Going with the Economic Flow*, Figure 4.1c). Most green patches are typically small and not necessarily interconnected. The dispersed-green strategy is well suited to private and community actors who are able to respond effectively to incidental and local circumstances, such as high housing vacancy rates or declining real estate markets (brownfields, temporary nature).

Tiny blue-green networks

The design of coherent networks of small blue-green patches provide more space for water to flow through all districts of the city. The networks consist of a wide array of nature-based solutions, such as green roofs and walls, small retention basins and ditches, and natural playgrounds. The strategy of having these tiny networks could best be incorporated into the works and planning of municipal public services with respect to water management, waste processing and recycling and transportation. The renovation of, for instance, sewerage and drainage systems, parking lots and road networks, and the reconstruction of canals offer new opportunities to create green networks that can function in small areas. This strategy is illustrated best in *Working with Nature* (Figure 4.1d).

Figure 4.1

Spatial pattern of nature in urban areas



Source: PBL

a. *The dispersed-green strategy in* Strengthening Cultural Identity *improves the quality of life for all citizens, as nature is always nearby.*

b. *The robust blue-green corridor strategy in* Allowing Nature to Find its Way *allows for optimal nature-based solutions for water retention and purification and for heat stress reduction in some urban districts.*

c. *The dispersed-green strategy in* Going with the Economic Flow *improves the quality of life in wealthy urban districts.*

d. *The tiny blue-green networks strategy in* Working with Nature *improves adaptation to heat stress and air pollution in all urban districts.*

Peri-urban areas

Outside cities, in peri-urban areas, the pressure on land is expected to increase, over the coming decades, due to the need for climate adaptation strategies that reach beyond urban borders and the demand for recreation. A promising combination of motivations in such regions could incorporate the care for landscapes, use of nature-based solutions and regional branding. This could encourage the formation of coalitions of small and medium-sized enterprises, 'multifunctional' farmers, local authorities (with responsibility for greening the urban fringe for recreation, and the creation of wetlands and floodplains) and citizens – ranging from volunteers in landscape care to wealthy citizens creating estates within traveling distances of cities.

Robust blue-green corridors

The design of robust networks of blue-green areas connect the heart of the city with a network of nature reserves on the urban fringe (see also text box *Peri-urban areas*). This strategy is illustrated in *Allowing Nature to Find its Way* (Figure 4.1b). Because of the size and robustness of the corridors, this strategy offers more opportunities for water retention and heat stress reduction than smaller networks, allowing for lakes instead of ponds and natural rivers instead of bioswales. This strategy, therefore, is more effective in terms of adaptation to climate change. Water managers, urban planners, healthcare professionals and nature conservationists may form alliances to realise these corridors.

Although the strategies described above can be combined, there may be conflicting objectives. For example, local and private initiatives in the dispersed green strategy can potentially be conflicting with the biodiversity and ecosystem services aimed for in the robust blue-green network. This network requires coordination to make it work.
A drawback of the robust network is the distance between nature and homes, making the strategy less effective in terms of social benefits than both other strategies.

4.3.2 A transnational nature network

This section discusses an example of a transnational network, linked to the issue of depopulation and land abandonment, mostly apparent in mountainous regions.

Combatting depopulation

One way to address that issue is to try and counter depopulation and economic decline. This approach is illustrated by conclusions from the Carpathians Environment Outlook 2007 (UNEP, 2007): 'The current development pattern in the Carpathian region is leading to losses of traditional knowledge, livelihoods, practices and values. It is therefore critically important that culturally sustainable and coherent policies be formulated and implemented for the Carpathians, in order to halt and reverse this trend before it is too late. Rural depopulation menaces the traditional character of the Carpathians

countryside. Policy measures must be implemented, and incentives developed, so that people remain in their villages as guardians of the landscape, traditional knowledge and livelihoods'. Communities, farmers and tourists that appreciate the man-made landscapes could try to find new models to maintain those landscapes (*Strengthening Cultural Identity*), including the exploitation of those with a high touristic value through private initiatives (*Going with the Economic Flow*). Furthermore, an economic impulse could be given to foresters harvesting wood for industrial purposes and – increasingly – biomass (*Working with Nature* and *Going with the Economic Flow*).

Creating new regional identities

An alternative approach would be to accept depopulation, while creating new regional identities and developing new sources of income. One way of achieving this, would flow from embracing the development of a transnational (and transregional) nature network, such as designed in the perspective of *Allowing Nature to Find its Way* (Figure 3.1; Prins et al., 2017). The large nature areas within the network are located in regions that presently already have a high proportion of nature areas. The development of such a network would be challenging, not least because of its transnational character and spatial restrictions (Section 4.1). However, it may also allow the achievement of multiple targets in these areas.

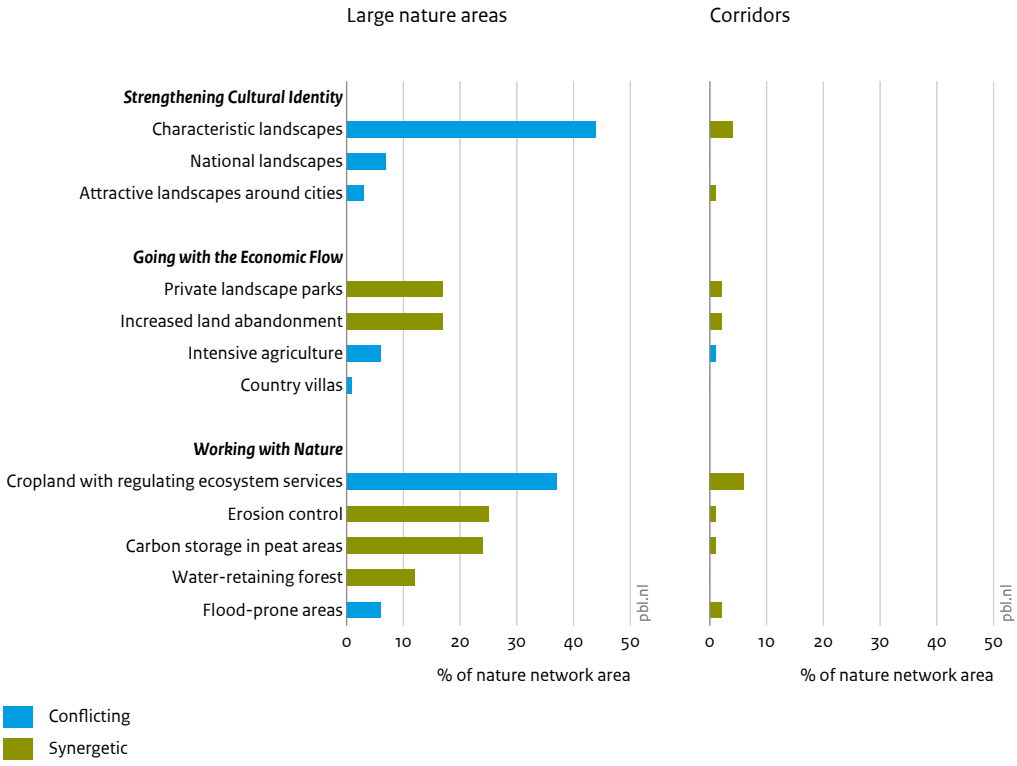
Nature network: synergies and differences

Synergies and differences between aims become visible when overlaying maps of the nature network from *Allowing Nature to Find its Way* with maps of the interventions that are incorporated in the other three perspectives (Figure 4.2). This reveals that more than 40% of the large nature areas in the network overlap with the characteristic landscapes identified in *Strengthening Cultural Identity,* and almost 40% overlap with crop areas where pollination measures are promoted in the perspective of *Working with Nature*. However, characteristic agricultural landscapes or crop cultivation cannot easily be combined with large nature areas, where dynamic processes are allowed.

There are synergies between the large nature areas and regions prone to land abandonment (*Going with the Economic Flow*). Nature in *Allowing Nature to Find its Way* could also deliver erosion control services. However, human activities mostly disappear from the large nature areas; therefore, this service will hardly be necessary in those areas. The nature network work would have a positive effect on the regulating ecosystem services that can be delivered over long distances, in particular water retention and carbon storage in peatlands (*Working with Nature*). Furthermore, adapting rivers and their banks to climate change can be combined with the corridors that connect nature areas. Recreational purposes may enhance the restoration of small rivers and contribute to corridors on a local scale. Private parks can also be expected to make a contribution, especially in mountainous regions. However, as those parks would depend on private initiatives, combinations that include a wilderness perspective would be more difficult to achieve.

Figure 4.2

Spatial overlap of the nature network in *Allowing Nature to Find its Way* with nature elements in the other perspectives



Source: PBL

A large proportion of the nature network from Allowing Nature to Find its Way *overlaps with areas that have different objectives in the other perspectives. Some of these objectives can be combined with the objective of the large nature network, while others are likely to be conflicting.*

Altogether, most friction can be expected with regard to the maintenance of mosaic landscapes. It would be a challenge for spatial design to reconcile 'rewilding' with highly valued cultural landscapes and their associated biodiversity.

4.3.3 Viable and sustainable agriculture

A third example of combinations of perspectives concerns practices in agriculture. On average, agricultural production per hectare will increase, and a further concentration is expected of large and intensive farms in accessible regions and many small farms in less suitable, mostly mountainous areas that are prone to land

Nature network: examples of rivers

A transnational nature network could also include rivers (Figure 3.1) and wetlands. Many water courses have been dramatically affected by flood defence mechanisms, canalisation, hydropower installations, sluices and dams. To create an ecologically functioning network, joint thinking and nature-related efforts are needed to deliver more natural dynamics and fewer barriers for fish migration. A good example can be found in the Loire basin in France, where barriers have been removed and re-naturalisation has taken place, although in practice, it will be difficult for most rivers to remove all barriers. For example, major hydropower dams require major solutions and traditional fish ladders may not be adequate; new solutions may be necessary, such as the fish migration rivers at the Ottenheim hydropower plant or the Traisen river in Austria. For the latter, a new stream of around 10 km has been created, highlighting the role of spatial planning in river basin and hydrological management.

abandonment (Section 2.4.2). Ambitions for the agricultural sector, as a whole, have been laid down in three long-term objectives of the Common Agricultural Policy (CAP):

- viable food production;
- sustainable management of natural resources and climate action;
- balanced territorial development.

Greening of the CAP is an important strategy for making the industry more sustainable. This should be an easy task, as 'the preservation of biodiversity is key for the production of food and feed, and is therefore in the vested interest of farmers' (European Parliament, 2016). So far, however, this argument seems to be less than compelling, and target 3a of the EU Biodiversity Strategy to increase the contribution from agriculture towards maintaining and enhancing biodiversity shows no significant overall progress. Apparently, preservation of biodiversity is not seen as a vested interest by (all) farmers – at least not the whole range of biodiversity. Analysis of the impact on agriculture within the various perspectives, suggests four strategies and policy actions that may link nature with agricultural challenges.

Nature based solutions in farming

Further development and stimulation of nature-based solutions for farming (*Working with Nature*) could contribute to viable and sustainable food production through a reduction in the need for costly fertilisers, pesticides and irrigation. In particular, management of soil biodiversity is important for the long-term viability of farming practices. Parts of the land could incorporate strips for pollinators and predators, where appropriate (depending on crops). The importance of a high diversity of wild pollinators

Wild pollinators are essential for horticulture.

for stability in pollination and crop yields has been underpinned recently by IPBES (2016). Other measures encourage innovation and subsequent implementation (practical research, risk insurance, use of precision farming) and discourage negative externalities on production via regulation. An example of a nature-based solution is a system change to agroforestry in the Mediterranean – as an alternative to persisting with intensive systems and the need to transport irrigation water over long distances. Improved water management and drought-resistant crops and cattle become increasingly important.

Attractive farming landscapes

New approaches could be developed for the enhancement and management of attractive landscapes (*Strengthening Cultural Identity*) and the enhancement of multiple ecosystem services, where the need arises (*Working with Nature*) – such as in highly valued landscapes and in peri-urban areas (Section 4.3.1). The purpose of an attractive landscape where farmers deliver multiple services can easily be combined by the greening of the landscape for the delivery of other services. Support from agricultural funds could be more targeted, with higher financial support for multi-functional and highly valued landscapes. Or existing funds could be pooled in a dedicated EU landscape fund, co-financing landscape restoration and development, thus stimulating the diversity and identities of landscapes throughout Europe.

Intensive agriculture on the best land

It may be worth considering, for certain regions, to differentiate between the best land for intensive agriculture on the one hand, and land for expanding nature reserves on the other. This is known as the 'land-sparing' strategy. The strategy of developing more robust nature areas, buffered with extensively managed farmlands (*Allowing Nature to Find its Way*) could be combined with intensive use of the best and most versatile soils (*Going with the Economic Flow*). By expanding nature areas, reducing edge effects and making room for dynamic processes, those areas become less vulnerable to pollution events and other disturbances from agriculture and other sectors. Intensification in one place creates space for nature in another. In a review on the sustainable intensification of European agriculture (Buckwell et al., 2015), it was argued that the focus should be on showing how high intensity, productive agriculture can be combined with much higher environmental performance standards.

Including value chains and consumers

Nature-inclusive agriculture requires engagement by other actors than farmers alone; included should also be food processing industry, retail and consumers. Consumers play an important role to ensure the success of strategies, such as 'local production for local consumption, in an attractive landscape' (*Strengthening Cultural Identity*) and 'conscious consumption, decreasing the consumer footprint' (*Working with Nature*). For local products, it is important that governments protect product names with designations of origin, geographical indication or traditional specialities. Production could also be linked to consumers through emerging voluntary sustainability initiatives such as standard-setting and certification within international supply chains.

The mix of strategies will depend on the food system that society would want, and on the desired relationships between agriculture and nature. Policies can influence three developments in particular: 1) farmers embracing the use of nature-based solutions, 2) the ratio between intensively and extensively managed farms that operate within an attractive landscape, and 3) the extent to which consumers are involved in food production methods. Alliances to achieve a socially desired situation would extend beyond primary producers, and also include, for example, processing companies, retailers, consumers, investors, and innovative research. The care for landscapes and the services they provide could bring together citizens, tourism entrepreneurs, caterers, farmers and local government authorities. A sustainable future for the food system is no 'one-size-fits-all' future, but one that will differ between regions. Taking these futures as a starting point and combining them with perspectives on nature, could increase the involvement of actors from the food system in nature-related efforts.

Policy agenda beyond 2020: topics for debate

Although a large variety of perspectives was stylised and reduced to four for this study, the elements that are likely to become points of discussion in the development of strategies to address challenges ahead, can be derived from them. These points were extracted by comparing the perspectives' approaches to those challenges (Table 4.1) with current policy strategies, and by identifying possible differences between those approaches. This comparison revealed subjects for debate on nature and biodiversity policies beyond 2020 (Sections 5.1 to 5.3).

5.1 Formulating a many-faceted vision for European nature

It is clear that people see, perceive and define nature in very different ways. European Member States democratically chose to protect biodiversity and to implement measures to protect the most characteristic and the most threatened species, habitats and ecosystems. However, for people nature is not limited to that. Adopting a broader picture of nature in policy-making encourages more people to engage in the debate and finally to support a strategy. How could a nature-inclusive society be created? Which types of nature does society prefer and what does it want from nature? Who is responsible? The perspectives suggest a variety of answers, ranging from self-sustaining natural systems to green areas in cities. To encourage people's engagement in nature-related efforts, a policy strategy beyond 2020 could involve multiple perspectives or *multinaturalism* as a point of departure, acknowledging that there are many different types of nature (Section 1.1) that also differ between regions.

Policies could address nature in a more inclusive way, in addition to the current technocratic approach. Multinaturalism encourages a broader set of targets and actions (Section 4.1) that may appeal to a larger and more diverse group of people with a greater variety of ideas, histories, values and beliefs. This may lead to conflicting differences between the type of nature that current policies aim for, and that which individual people prefer – these differences need to be on the table. On the positive side, taking on

board multiple perspectives might also help to bridge gaps between various interests and appeal to shared motivations to embrace and protect nature.
This is also recognised in other studies. For example, the BESAFE project concludes that many decision-makers and other stakeholders respond positively to a wide range of economic, ethical and moral arguments. It may therefore be highly effective to bundle packages of positive arguments, which should be seen as complementary rather than as alternatives, and to tailor this bundle to local circumstances (Bugter et al., 2015).

Using multiple perspectives in policy design would become apparent in vision formulation and target setting, and the design of strategies to achieve these. Multiple perspectives will also create a broader range of criteria to assess whether a policy is effective or not. Potential indicators could include the area of intact, functioning ecosystems, available space for dynamic processes, good ecological quality (*Allowing Nature to Find its Way*), sufficiency of ecosystem services delivery, sustainable use of biological processes (*Working with Nature*), the number of successfully boosted local identities, the number and/or area of highly valued landscapes or species, perceived connectedness with places (*Strengthening Cultural Identity*), profits from sustainable land use, and number of private initiatives (*Going with the Economic Flow*). Not all of these criteria are easy to grasp or to measure, but without these, there is a danger that we may fail to take account of the personal interpretation and valuation of nature.
The majority of these indicators is included in frameworks of ecosystem services, such as the MAES framework (2016) or the IPBES framework (2016).

5.2 Tackling policy challenges using approaches from a range of perspectives

The challenges that nature policy will be facing, over the coming decades, call for additional ways of thinking, besides traditional conservation. Taking note of the range of perspectives on nature that exist in society would be of great value to inform a policy strategy beyond 2020, which has to address the challenges of encouraging people's engagement (Section 5.2.3) and increasing nature considerations in other sectors (Section 5.2.2). When dealing with the challenge of ensuring sufficient space (Section 5.2.1), the Birds and Habitats Directives – in particular the designation and maintenance of Natura 2000 sites – form an essential element. However, for implementation and sustainable funding, the acknowledgement of various perspectives could help to make progress on these issues.

5.2.1 The necessity of a shared agenda for nature areas

Responding to the challenge of ensuring sufficient space and favourable conditions for nature, requires a certain level of support for protected nature areas, many of which have been designated as Natura 2000 areas. Halting the deterioration and/or enhancing the conservation status of species and habitats embraced in the Nature Directives

requires effective management of protected nature areas and securing the necessary funding to support the Natura 2000 network (EC, 2015a). This not an easy task. The Habitats Directive contains compulsory conservation objectives and sufficient funding is needed to persuade many land managers (outside the nature sector) to cooperate in nature management. This may raise the question of whether new economic activities within or surrounding Natura 2000 areas as a means to fund necessary nature management should be allowed. Multiple objectives and a shared agenda can make it attractive for private and public stakeholders from outside the nature sector to provide financial means for nature area management. This section elaborates on the ingredients of a shared agenda and funding, from the four perspectives. It describes protected nature areas, followed by ideas for a transnational nature network, and closes with a reflection on different approaches to climate adaptation strategies.

Protected nature areas

The development and implementation of a shared agenda per area in collaboration with other sectors has the potential to significantly improve the effectiveness of policies to protect nature areas, secure public support and achieve a more effective implementation of management plans. A shared agenda should include the conservation objectives of maintaining and restoring specific land-use systems and landscapes, but flexibility could be allowed around how these are achieved. Fundamentally, the agenda is informed by economic and other social drivers.

Several, good examples of a shared agenda on protected nature areas already exist in practice or are being developed; for example, in the context of LIFE – the EU's funding instrument for the environment and climate action. Inspired by the perspectives (Chapter 3), the following ideas can be considered for a shared agenda (Section 4.1):

- the integration of stories about nature conservation into the regional identity;
- revitalisation of regions prone to land abandonment and depopulation;
- exploiting new, economically and ecologically sustainable business models;
- development of pricing mechanisms for ecosystem services delivered by nature reserves.

Points for discussion include, firstly, how to balance ways of earning money in protected nature areas with caring for the biodiversity (natural value), and, secondly, the financial arrangements that would best support nature management.

A local agenda – broader than biodiversity – would likely increase the engagement of economic actors, which may encourage more private funding for nature. This could typically involve agriculture and forestry, but could also attract new allies from tourism (visitors' taxes), the renewable energy sector (wind turbines), real estate development or philanthropy. Pricing ecosystem services may increase funding, too. Because of their unique activities in the supply of several ecosystem services, the role of public authorities, however, would also remain indispensable.

A transnational nature network

In a recent call, the Council of the European Union (2015) and European Parliament (2016) have asked the Commission to make a specific proposal for the development of a trans-European network for green infrastructure (TEN-G) by 2017. The call encourages the joint development, in conjunction with the Member States, of a strategy on European wildlife corridors for targeted species. In our study, such a network has been elaborated in *Allowing Nature to Find its Way* (Section 3.3). Apart from positive impacts on endangered species and habitats, the network can provide opportunities for generating new economic activities and the provision of ecosystem services, in particular water retention and peat conservation (Section 4.3.1). It would be a major undertaking to achieve such a connected network. Therefore, a shared agenda is essential, containing objectives of all stakeholders.

From this perspective, building shared visions, securing public investments (acting as a catalyst for private investment) and creating the necessary environmental conditions are considered preconditions for such a network. Top-down planning alone would not work, but 'activating' governance may – uniting conservationists, project developers, rural inhabitants, farmers, foresters, hunters, anglers and others. An important point for discussion is what the functions of such a transnational network would be, as this would influence its design and its connection with agendas of other sectors and actors. Prominent challenges for design and spatial planning are how to reconcile the needs of dynamic natural systems with those of highly valued cultural landscapes and, similarly, how dynamic river systems could provide transport and hydropower.

Adapting conservation strategies to climate change

So far, climate change has had a limited impact on nature (EC, 2015a), with the exception of invasive species of which spread is facilitated by climate change. However, the impact of climate change on individual species, communities and habitats is expected to increase, even if the ambition of keeping global temperature increase within 2 °C can be achieved (Section 2.5). Where climate change is driving a transition towards a new ecological state, the consequences for nature need to be discussed, including a move away from static conservation targets and the development of more dynamic regimes. In addition, the extent of protection depends also on our guiding values and risk perception, including viewpoints on the resilience of nature and the level of the precautionary principle.

Adaptation strategies for climate change with respect to nature conservation would differ for each of the perspectives (Section 4.1), mainly depending on the kind of nature envisaged. One strategy would be to ensure other pressures are minimal, so that species habitats and ecosystems can easily adapt to climate change, such as in the nature network in the perspective of *Allowing Nature to Find its Way*. Another might be to ensure actions to maintain the 'sufficient' provision of ecosystem services. Alternatively, adaptation strategies could be developed that embrace the creation of new regional identities based on the sustainable, long-term management and protection of

characteristic landscapes. As climate change will continue to drive increasingly significant impacts on nature, a combination of these strategies seems logical. In a truly shared agenda, this includes the search for synergies with adaptation initiatives emerging from the regions and economic sectors (Section 4.3).

5.2.2 Increasing nature's relevance for a sustainable future of economic sectors

Current policy strategies are clear on the necessity to embrace other sectors and embed biodiversity concerns in sectoral policies. *Mainstreaming* is more likely to succeed if these issues are aligned with the core challenges and guiding values related to nature, including the economic interests of primary producers and businesses in the value chain. Mainstreaming is, and will become, increasingly relevant for many sectors besides agriculture, fisheries and forestry, such as energy production, water management, tourism, and transport.

Section 4.3.3 shows the value of a multi-perspective approach for mainstreaming in the agricultural agenda. In addition to the sustainable management of natural resources, viable food production and balanced territorial development are long-term objectives of the Common Agricultural Policy (CAP). The perspectives point to strategies that differ with respect to the preferred land-use pattern. One can distinguish between the 'land sparing' approach – separating conservation and production aims – and the 'land sharing' approach, in which nature and production aims are intertwined. In the last approach, the delivery of ecosystem services and the cultural value of mixed landscapes play important roles. There is no 'optimal' strategy – choices could differ between regions.

Perspectives also differ in terms of the actors engaged, ranging from local citizens and communities to large-scale production-consumption chains. While engagement of 'neighbours' can increase support for nature-inclusive farming practices, the inclusion of impacts on natural capital in companies' decisions is a way to mobilise businesses in the value chain. Both directions are currently being explored in frontrunner groups, such as the biodiversity and business platform, research projects and pilot studies. Sustainable Development Goal 12, to 'ensure sustainable consumption and production patterns', links to the producer-consumer chains. Engagement of a multitude of actors, corresponds to a food systems' approach, which was recently advocated by the International Resource Panel of UNEP (2016). This approach considers opportunities within all food system activities, and looks at solutions from a range of viewpoints, helping to identify several points of intervention by different actors for the improvement in food system outcomes.

5.2.3 Strengthening the connection between people and nature

A many-faceted vision would acknowledge that people see, perceive and define nature in different ways. A discussion on the various types of nature society prefers would, in itself, already increase people's level of engagement. Such a vision could stimulate voluntary efforts, ranging from people's active involvement in nature conservation to

Involvement of people, ideas from the stakeholder dialogue

The inclusion and involvement of people in nature was a recurring theme in the three Nature Outlook stakeholder dialogues that were held. Several messages for policymakers were formulated, which were grouped into three broad categories (PBL, 2015b):
Education and experience: Increase the integration of nature into official school curricula. Stimulate forest kindergartens and forest schools within nature areas, or encourage more classes to be held outdoors. Similarly, rather than relying on school books, teachers could adopt other educational approaches that involve the senses (sight, hearing, touch, smell, taste) and use particular types of video games to spark curiosity.
Connection and access to nature: Make nature accessible to everyone. Often, nature is inaccessible and/or far away, and popular outdoor pursuits, such as hiking, orienteering, camping and lighting campfires are restricted. Furthermore, people's enjoyment of nature may be restricted because of reduced mobility, poverty, lack of knowledge of nature areas, or they are simply not familiar with those areas. By making this link, decision-makers, healthcare practitioners and the general public could become better equipped to identify and exploit synergies that benefit both nature and the wider social and health agendas.
Community involvement: Facilitate local involvement of citizens, business and governments in the promotion of tourism, local production for local consumption, and the appreciation of landscapes. Adapting national nature conservation schemes to local needs is important, as is the recognition of local knowledge and characteristics by government authorities.

the conscious consumption of nature-friendly produce. Engaging people to act positively for nature is an indispensable challenge for any future vision. Section 4.1 provides an overview of possible approaches, suggested by the four perspectives, to enhance people's involvement in nature-related efforts, in their roles as consumers, members of local communities, investors and so on. In addition, the stakeholders that were involved in the Nature Outlook indicated a range of possible other measures to increase this involvement; for example, via education and personal experience (Text box *Involvement of people, ideas from the stakeholder dialogue*). The importance of relating people – groups and local actors, with their diversity of knowledge, capabilities and practices – to nature, was also highlighted during the 2014 Italian Presidency of the Council of the European Union, in the *Charter of Rome on Natural and Cultural Capital*.
It is clear that, when connecting people with nature, people's search for a 'fulfilling life' (eudaemonic values) can be an extremely motivational tool to encourage positive behaviour (Section 2.1), and that these non-material values become more important as wealth levels increase (Section 2.2).

Addressing nature in such a way that it will foster a sense of place
With respect to current policies, the guiding value in the *Strengthening Cultural Identity* perspective could provide a significant added value, with local identity and community action as key elements. Local identity and sense of place express the connection between people and landscapes, as it is shaped by the community. Focusing only on utilitarian and intrinsic values fails to resonate with views on human well-being or with what people believe to be the 'right way' to act towards the environment, and may not lead to the fairest or most desirable environmental policy outcomes. Although intrinsic and utilitarian values are important for nature and landscape conservation, the relationship between people and nature seems to be missing (Chan et al., 2016). This relationship includes cultural identity or 'love of home' ('oikophilia', see Scruton, 2012; Scruton, 2017). People's appreciation for landscapes and nature also could influence future nature policies in a positive way. Although 'identity' is difficult to measure, it is an important element in people's perceptions, compared to other elements that indeed can be quantified.

5.3 Vision development on a regional level

Many-faceted visions are relevant not only on an EU level, but also on national and regional levels. The importance of nature and biodiversity policies being on multiple spatial scales is highlighted in *Multi-level governance of our natural capital*, the opinion of the Committee of the Regions (2014). The multi-perspective approach is well-suited to link nature considerations with regional agendas, where it is often necessary to promote and protect nature outside the protected area network. However, this still leaves the dilemma of how nature could best make a positive contribution to the many and varied challenges faced by regional and national government authorities. The approach can be used by policymakers on a sub-national level, where it is necessary to tailor approaches, use elements of different visions to suit specific situations and mobilise public support.

The expected developments with respect to population and economic growth, and their distributions across the EU, make urban areas as well as those prone to land abandonment particularly interesting for nature development. Urban areas are of interest because of the large share of the population that lives in these areas. In areas prone to land abandonment, nature will get the upper hand over human activities, anyway. Several opportunities exist to manage this land-use trajectory, ranging from active and even permanent management to no management at all. Climate change adaptation and (re)connecting people with nature will probably raise important challenges in many regions.

In particular, ecosystem services that deliver climate adaptation services and inclusive nature, such as *nature at the doorstep*, offer possibilities for the challenges that cities have to deal with. Vision building and actions can be achieved via alliances between the nature sector, citizens, investors, healthcare services, water managers and others, all enabled by a variety of policy instruments, including the support for a range of green and blue-green networks across the local urban landscape (Section 4.3.1). This approach is in line with the Urban Agenda for the EU as stated in the 'Pact of Amsterdam' and would serve the Sustainable Development Goal 11 'Make cities inclusive, safe, resilient and sustainable' (UN, 2015).

For areas prone to land abandonment, there is the question of which types of nature are desirable and which efforts and means can be afforded to maintain this nature. Depending on a region's rate of abandonment, means available and the attractiveness for tourism, man-made mosaic landscapes could be difficult maintain. However, even then, there would be various opportunities, requiring different types of actions, and with varying impact on the delivery of ecosystem services and the occurrence of species.

Developing a many-faceted vision on a regional or EU level would involve a broad set of actions, as presented in Table 4.1. On a regional level, the advantages of a multi-perspective approach would even become more tangible, because it would be applied to concrete issues, in collaboration with the actors involved.

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