PBL Netherlands Environmental Assessment Agency

PERSPECTIVES ON THE FUTURE OF NATURE IN EUROPE: STORYLINES AND VISUALISATIONS

Background Report

WAGENINGEN UNIVERSITY & RESEARCH

Perspectives on the future of nature in Europe – storylines and visualisations

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PBL Netherlands Environmental Assessment Agency is the national institute for strategic policy analysis in the fields of the environment, nature and spatial planning. We contribute to improving the quality of political and administrative decision-making by conducting outlook studies, analyses and evaluations in which an integrated approach is considered paramount. Policy relevance is the prime concern in all of our studies. We conduct solicited and unsolicited research that is both independent and scientifically sound.

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Summary

Throughout Europe, people experience and value nature in various ways, but they also experience the decline in biological diversity. Although successes have been achieved, nature policies have not been effective in all respects. Halting biodiversity loss and restoring ecological systems in the EU requires substantial action, in addition to current measures implemented under the EU Birds and Habitats Directives. More effective implementation, more coherence with other policies and greater engagement by other sectors and the public are needed. A closer connection between the ways in which people experience and value nature and nature policy may enhance their engagement in nature-related efforts.

A more fundamental reflection on nature policies may be helpful. This has been done by PBL in its Nature Outlook study, which presents alternative 'perspectives' on the future of nature in the European Union. The synthesis report *European nature in the plural*[1] is primarily intended to provide inspiration for current strategic discussions on EU policies that are related to nature beyond 2020, whereas the current report provides complete versions of the storylines and visualisations of the perspectives. Thereby, it enables policymakers and stakeholders to derive more specific insights and ideas from the perspectives. The report may be used to generate insights for policies, facilitate communication and boost engagement in nature among other sectors and citizens. In order to stimulate this, the report explains how policymakers and stakeholders could use the perspectives to create joint visions.

The Nature Outlook project consists of a baseline, a trend scenario, four perspectives and several policy messages. These components have been constructed not only from literature review and visualisations, but also by using the results from a philosophers' dialogue on the relationships between people and nature in Europe, as well as several stakeholder dialogues on the future of nature.

The **baseline** was created by analysing past and current debates on nature conservation and development in the EU. To identify the different views of nature, a literature review of scientific articles was conducted. The articles, however, pay little attention to policies and practices in eastern and southern EU Member States. Therefore, we interviewed scientists from these Member States. The descriptions of the views were substantiated by a survey of citizens' images and valuations of nature in nine EU Member States. The results from the survey are presented in a separate report entitled *Citizens' images and values of nature in Europe*.[2]

The debates on nature conservation and development can be summarised in four different views of nature that define four different challenges for nature policy and related policies. According to the 'nature for itself' view, the main policy challenge is to stop the decrease in areas of unspoiled nature. In the 'nature despite people' view, the impacts of human activities on habitats should be limited and the resilience of nature should be improved. 'Nature for people' emphasises that the utilisation value of nature should be integrated into business and nature management without depleting natural resources. And 'people and nature' stresses that the connection of people with nature and related policies should be strengthened and used.

[1] Van Zeijts et al. 2017.
[2] Farjon et al. 2017.

The **trend scenario** was based on a literature review, mainly including other outlook studies exploring trends with impacts on nature, and scientific publications providing insight into the impacts of these trends on nature. The scenario includes not only quantitative trends, such as population development, but also qualitative trends, for example, shifting values, and non-quantifiable challenges, for instance, strengthening citizens' connection with nature. Detailed information on quantifiable challenges, such as halting biodiversity loss, can be found in the report *Perspectives on the future of nature in Europe: impacts and combinations*.[3]

The *trend scenario* explores eight socio-economic and physical trends, for the period up to 2050. Under the business-as-usual assumption, population trends, value changes, economic trends, agricultural developments, trends in forestry, transport developments, energy developments and climate change are expected to cause a further decline in unspoiled nature. Negative impacts of human activities on nature will be reduced, but not enough to halt biodiversity loss. The integration of the utilisation value of nature into business and nature management will hardly change. Whether people, on average, will be more connected with nature and related policies will depend on the region in which they live.

The Nature Outlook describes four **perspectives**: 'Strengthening Cultural Identity', 'Allowing Nature to Find its Way', 'Going with the Economic Flow', and 'Working with Nature'. Each perspective tells and visualises an alternative storyline about a desirable future state of nature in the EU, and a possible pathway towards realising that desired state of nature. The perspectives are normative scenarios and should not be considered as blueprints.

The perspectives were constructed through dialogues with stakeholders, interviewing experts, a literature review, and by combining different visualisation methods. The dialogues were set up to establish a series of informal discussions in which experts involved in nature policy and related policies developed the outlines of the components of the Nature Outlook study. In these informal discussions, experts from various organisations and sectors met, face to face, to exchange values, views and insights, to challenge one another, and to develop new ways of thinking. Three stakeholder dialogues were organised. During the first dialogue, participants drafted the four perspectives. These drafts subsequently were structured and elaborated in storylines by the scenario team and discussed further in the second dialogue. During the third dialogue, participants used the perspectives to discuss a range of societal issues related to nature.

A philosophers' dialogue was organised in which four internationally renowned speakers participated to create an inspirational and thought-provoking exchange of ideas on the roles of nature in modern society, both now and in the future, and to feed these ideas into the perspectives. The lectures by the speakers and the results from the dialogue are presented in the book *Nature in Modern Society – Now and in the Future.*[4]

Furthermore, a great number of scenario studies, policy documents, visions, scientific reports and other publications were analysed as part of the literature review, to complement and improve the perspectives.

During the development of the perspectives, four visualisation elements were combined: maps, icons, artist's impressions, and photos. These elements capture the essence of each perspective and depict the perspectives in a concrete way to

[3] Prins et al. 2017.
[4] Mommaas et al. 2017.

communicate them to policymakers and stakeholders. Maps of imaginary nature, river, rural and urban areas show which types of land use and nature could occur in these areas. Stylised maps provided the starting point and the basis for the final maps shown in this report and were presented to the participants of the dialogues for feedback. Icons were designed to symbolise the essence of each perspective. Artists impressions were made to visualise the perspectives in a concrete way. And photos were added to illustrate important aspects of the perspectives, on a local level.

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, their 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 to produce regional products. Many investments are made in maintaining and developing urban green-blue infrastructures, accessible nature areas, and rural landscapes.

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.

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.

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 towards a holistic approach was followed in 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.

The **policy messages** were derived from the perspectives and also from the other components of the Nature Outlook. A first set of policy messages was derived during the third stakeholder dialogue. During this dialogue, participants were asked to identify a large number of policy issues related to nature, nature policy or related policies. The scenario team analysed the results of the third dialogue, held several brainstorms, had discussions with key policymakers, and again conducted a literature review. This ultimately resulted in a number of headline messages, which are presented in the synthesis report. These messages are not conclusive. On the

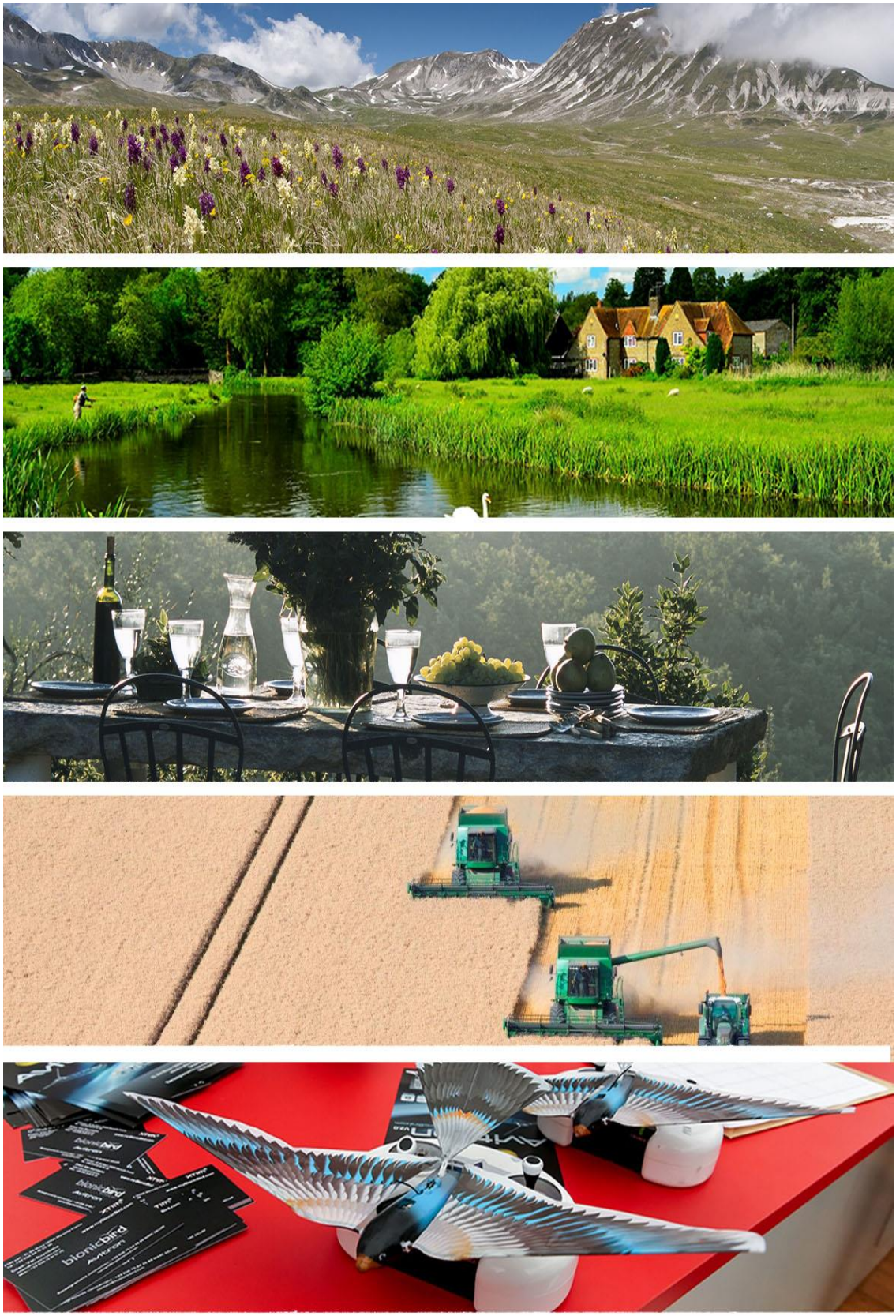
contrary, the users of the report are invited to derive concrete messages themselves, or even better, with other people involved in nature policy and related policies.

This report describes how readers can derive their own policy messages. To do this successfully, it is important to think not in terms of a unified nature as a background for all human activities (*naturalism*), but rather to think in terms of the multiple ways in which people and other beings are linked with one another (*multi-naturalism*).

Deriving policy messages from the Nature Outlook starts with creating stimulating conditions by organising a series of informal dialogues that precede or run parallel to formal decision-making processes. Informal dialogues can be organised at all levels, from the EU to the local level. When organising such dialogues, arranging unexpected encounters, creating shared understanding and building joint visions are important activities. Building a joint vision can be considered as a design activity that, to a large extent, is characterised by 'bricolage' (improvisation). There are four ways of practicing bricolage which can be summarised as follows:

- *Making a pastiche* refers to the choosing of a single perspective as a source of inspiration for building a joint vision. For example, a perspective could inspire a vision in which freshwater biodiversity is increased by allowing more space for rivers to meander and distributaries to form, thus providing additional spawning areas for fish and more natural areas for other species.
- *Constructing a palette* refers to combining elements from various perspectives into one joint vision by allocating different types of land use to distinct sub-areas that are not interrelated. For instance, a vision could, as indicated in one perspective, stimulate small-scale farming at one location, while also allowing large-scale farming, as indicated in another perspective, at another location.
- *Fashioning a collage* refers to combining elements from various perspectives into one joint vision by allocating different types of land use to adjacent sub-areas. For example, a vision, inspired by several perspectives, could allocate a new office area, a new city park and a blue space for water retention to locations adjacent to each other, each designed in a mono-functional way, but that would nevertheless provide a boost for the other locations.
- *Creating an assemblage* refers to combining elements from various perspectives into one joint vision by allocating the different types of land use to the same sub-area. For instance, a vision for a nature reserve, inspired by all perspectives, could include a connection with another nature reserve, have a limited number of well-designed treetop walkways and other pathways within the reserve, several upmarket lodges along the edge of the reserve, as well as a limited number of windmills at specific locations within the reserve.

Since perspectives are no blueprints, they do not provide *all* the elements that may be relevant for a joint vision. Therefore, participants of informal dialogues are invited to add their own ideas and to jointly generate more ideas in addition to those provided by the Nature Outlook. A policy vision that explicitly takes the multiplicity of perspectives on nature as its point of departure, could stimulate efforts that go beyond regulation, and lead to new coalitions of citizens, businesses and public authorities.



Throughout Europe people experience nature in a variety of ways: the beauty of a mountain with orchids, the sense of a cultural landscape, the connection to nature through regional cuisine, nature as a production factor in agriculture, and nature as a source of inspiration for new products. Photos: Hollandse Hoogte

1 Introduction

Throughout Europe, people experience and value nature in various ways, but they also experience a decline in nature. Although successes have been reached, nature policies have not been effective in all respects. Better implementation, more coherence with other policies and greater engagement of other sectors and citizens are needed. A more fundamental reflection on nature policies may be helpful. This has been done by PBL in the Nature Outlook study, presenting alternative perspectives on the future of nature in the European Union. This report provides the complete versions of the storylines and visualisations of the perspectives. The report may be used to generate insights for policies, to facilitate communication and to boost engagement of other sectors and citizens with nature.

1.1 Rationale of the Nature Outlook

Although Europe is a relatively small, densely populated and highly urbanised continent, it has a variety of natural systems.[5] Europe offers room for woods, forests, shrubs, heathlands, grasslands, wetlands, and sparsely vegetated lands. There is a great deal of regional differences. Depending on morphological, hydrological and climatological conditions, tundras, mountains, rivers, coasts, steppes and also deserts can be found. Furthermore, throughout the continent there are agricultural landscapes with high natural and cultural values, such as open fields, enclosures, uplands, (highly irrigated) *huertas*, and (savanna-like) *montandos*. And there are cities providing favourable conditions for various species and habitats.

Throughout Europe, people living on the continent or visiting it experience and value nature in various ways.[6] Tourists hiking in the mountains experience some of the beauties and the grandeur of nature. Farmers incorporate nature as a production factor in the way they work their land and earn an income through it. Restaurant holders share nature in the menu or through the wines that they serve to their visitors. Researchers and designers may experience nature as a source of inspiration to develop new products (bio mimicry). Inhabitants of regions may relate to the cultural landscape through a shared sense of belonging, even glorifying elements of it in regional and national anthems.

Since people not only experience and value nature in various ways but also experience decline in nature, there is a long history of nature in Europe. More than a century ago, industrialisation, urbanisation and reclamation of commons were already seen as a main threat of nature and landscapes. In response, private and public organisations in many European countries created nature reserves and national parks. Since the 1970s, many efforts have been made to protect species and habitats and to improve environmental conditions. The European Union and the Member States have put a broad range of environmental legislation in place, aiming to improve the quality of air, water and soil. Since the 1990s environmental concerns have also been integrated in sectoral policies, such as agricultural, energy, and transport policy.

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[5] Renes 2009.
[6] Mommaas et al. 2017.

Examples of recovered species: white-tailed eagle, European bison, and wolf. Photos: Image Select, Thinkstock, and Image Select

In the last 35 years, nature policies of the EU and the Member States have been successful in some respects. An important achievement is the creation of the Natura 2000 network of protected areas to almost one fifth of EU land area.[7] Moreover, the Birds and Habitats Directives – where fully and properly implemented – have led to a slowed down decline in or even recovery of species and habitats.[8] Examples are bird species, such as geese and eagles, mammal species, such as beavers and European bison and large carnivores, such as bears and wolves. Furthermore, environmental conditions have improved. Throughout Europe, the quality of air, water and soil is much better now than it was 25 years ago, and some toxic chemicals causing non-natural mortality among species, have been phased out.

Notwithstanding these achievements, nature policies have not been effective in all respects. The State of Nature Report, the Mid Term Review of the EU Biodiversity Strategy and the Fitness Check of the Birds and Habitats Directives indicate that Europe is not on track to meet its target of halting the loss of biological diversity.[9] Overall, biodiversity loss and degradation of services provided by nature have continued: particularly species linked to freshwater, coasts and farmland continue to decline. Natural services, such as pollination are also decreasing.

Improving the conservation status of species and habitats requires better implementation of EU nature policy, more coherence with other policies, such as agricultural policy, regional development policy and energy policy, and greater engagement of other sectors and citizens.[10] Implementation gaps exist for various reasons, for example, procedural time lags, lack of financial resources, lack of knowledge and difficulties working across different governance levels. Although some progress has been made, policy measures related to nature protection and, for instance, food production, still tend to be not coherent. And despite various efforts to involve other sectors and citizens, they could be more engaged in nature policy.

Therefore, it is important to reflect on nature policies and related policies, not only at the European level, but also at the national, regional and local levels. Making nature policies and other policies related to nature more effective may not only require some incremental changes, but also some fundamental rethinking of policies.[11] Key questions include: 'How can nature policy be better implemented?', 'How can it be better integrated into sectoral policies?' and 'How can other sectors and citizens be more engaged?'.

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[7] EEA 2015a.
[8] Milieu Ltd. et al. 2015.
[9] EEA 2015a; EC et al. 2014; Milieu et al. 2015.
[10] EEA 2015a.
[11] Ibidem.

In order to find better answers to these questions it may be necessary to first answer some more fundamental questions, such as: How is nature experienced and valued?', 'What are the important challenges for nature policy and related policies?', 'What states of nature could be realised in nature, rural, urban and other areas?', 'How can existing coalitions united around nature be boosted and new coalitions be built?', 'Which modes of governance could make policies related to nature more successful?', and 'Which measures could make these policies more effective?'.

1.2 Relevance of the Nature Outlook

The Nature Outlook reflects on these fundamental questions to stimulate debate on nature in Europe. The approach is to present alternative perspectives on the future of nature in Europe and to derive ideas from these perspectives that may help to increase the desirable impacts of policies related to nature in the EU. In this approach, nature is understood in a broad sense, including the various ways in which people experience and value nature. The Nature Outlook is a scenario study published by PBL Netherlands Environmental Assessment Agency. PBL is a national institute for strategic policy analysis in the fields of nature, environment and spatial planning and has a legal task to publish a Nature Outlook every four years. PBL conducted the Nature Outlook in cooperation with Wageningen Environmental Research and Wageningen Economic Research. The European Centre for Nature Conservation has assisted in organising stakeholder dialogues.

Previous Nature Outlooks conducted by PBL were focused on the national level. However, the Dutch government requested PBL to focus this Nature Outlook on the level of the European Union. The synthesis report, *European nature in the plural,* is primarily intended to provide inspiration for current strategic discussions on EU policies that are related to nature beyond 2020.[12] Considering alternative futures for nature is not only relevant for the revisions of nature policy after 2020 but also for other policies related to nature, such as water, agriculture, energy, and cohesion policies. The synthesis report presents the highlights of the Nature Outlook.

This report provides extended versions of the storylines about the future and the visualisations of the future. Thereby, the report makes it possible for policymakers and stakeholders to derive more specific insights and ideas from the perspectives. In addition, the report explains the techniques which have been applied while writing the essays and developing the visualisations of the perspectives. Furthermore, it describes the activities that have been performed and the choices and assumptions that have been made. Finally, the report explains how the perspectives can be used to develop joint visions, for instance, on regional development. The impacts on biological diversity and the services provided by natural systems (as generated in the perspectives) are presented in the report *Perspectives on the future of nature in Europe – impacts and combinations.*[13]

The Nature Outlook study can be used by the European Commission, particularly by DG Environment, and by national governments, especially the ministries responsible for nature policy. But the foresight study can also be used by other DGs, such as DG Agriculture and Rural Development, DG Regional and Urban Policy and DG Energy and by the European Parliament. The same is true for regional and

[12] Van Zeijts et al. 2017.
[13] Prins et al. 2017.

local authorities, nature conservation organisations, agricultural organisations and, for companies, such as real estate developers and health insurance companies. This report is primarily published for experts working for the aforementioned institutions and organisations. In addition, it is relevant for researchers who intend to conduct similar scenario studies. The report differs from the State of Nature Report, published by the European Environment Agency (EEA), since it explores desirable future states of nature instead of analysing the current state of nature.[14] It differs from the report on Global Megatrends, also published by EEA, because it focuses on desirable future states of nature in Europe; however, it does include insights into global megatrends.[15] And finally, this report also differs from the EU Biodiversity Strategy, developed by the European Commission, as it is a foresight study rather than a policy vision.[16]

1.3 Usability of the report

Experts can use this background study in the following ways. The trend scenario provides **insights** into the challenges that nature policy and other policies related to nature may face in the future, such as, reversing the decline in biodiversity and guaranteeing the services nature provides. The perspectives on the future of nature provide an overview of the states of nature that policymakers and stakeholders may find desirable and the policy efforts that are required to realise these states of nature, for instance, cooperation and financing mechanisms. The perspectives are not mutually exclusive; readers may use elements from all of them to build their own visions or to develop joint visions on the future of nature.

The perspectives provide insights into the possibilities of combining different types of nature, for instance, large natural areas and green living environments. They also give insights into the possibilities of combining different modes of governance, such as initiatives taken by local communities, governments or the private sector, or the possibilities of combining different policy measures, for example, regional quality funds and development companies. Furthermore, the perspectives give information about the possibilities of combining nature policy with other policies, e.g. with water policy or urbanisation policy. By stretching the different views on nature and by exploring the possibilities of combining them, new solutions may be found. This report offers a broad range of insights, but it does not provide an exhaustive list of possible combinations. The aim of the report is first and foremost to help experts searching for possible policy combinations.

In addition, the perspectives can facilitate **communication** between experts about the future of nature in Europe. Sharing storylines about nature's future is a powerful way of building a shared world, more so than sharing 'hard facts'.[17] Elaborating the storylines for their own country or region may help organisations and groups to make their own ambitions more explicit and more open for discussion.[18] The perspectives may also help to understand the ambitions of others better and to discover shared interests. This could lead to alliances, for example between nature conservationists and the construction industry, building homes and offices near newly developed green park-like environments.

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[14] EEA 2015a.
[15] EEA 2015b.
[16] European Commission 2011.
[17] Blom 2012.
[18] Mommaas et al. 2017.

Furthermore, the perspectives can help boost the **engagement** of public authorities, business and citizens with nature and their involvement in nature policy. This can be achieved by discussion with experts from nature and other organisations, paying more attention to the variety of meanings of nature for people and to initiatives taken by communities and companies. The storylines and visualisations can also stimulate discussions about measures that could be deployed to stimulate initiatives taken by communities or companies. In addition, the perspectives may help to investigate the ambitions of other organisations and groups to develop new and better forms of integration, for example by treating farmers who (want to) participate in agricultural nature management as entrepreneurs and not as grant recipients.

The perspectives are less useful in cases where policy debate is highly focused on policy implementation. In such cases, policymakers and stakeholders are primarily focused on current policy in the short term rather than the longer term and are also less open to alternative policy options. The perspectives are also less appropriate for highly politicised discussion, and when relationships between policymakers and stakeholders are characterised by a lack of trust. This is also why they would be less inclined to take alternative policy options into consideration.

1.4 Structure of the report

Chapter 2 gives a methodological explanation of the storylines about the future and visualisations of the future that have been created as part of the Nature Outlook. It presents the baseline, the trend scenario, the perspectives and the policy messages, and describes the activities that have been undertaken to create the storylines and visualisations for these components of the Nature Outlook. It also explains the choices and explicit assumptions made.

Chapter 3 presents the baseline, describing different forms of framing nature by organisations and groups and the most important policy challenges that can be derived from them. Chapter 4 presents the trend scenario, exploring a possible future of socio-economic and physical trends which influence nature in Europe. By doing this the chapter provides a context for the future states of nature that are presented by the perspectives and it indicates the magnitudes of the policy challenges that are met by them.

Chapter 5 introduces the perspectives that meet the policy challenges explored in the trend scenario. Chapters 6 to 9 discuss the separate perspectives. Each chapter presents 1) a set of principles guiding the perspective (why), 2) a desired state of nature that may be realised in the future according to the perspective (what) and 3) a pathway that may be followed to reach that state of nature in the perspective (how). The socio-economic and physical trends explored in the trend scenario are taken into account. Chapter 10 presents several ways in which (elements of) the perspectives can be combined in order to create joint visions, for instance, on regional development.

Appendix 1 lists the people who have participated in one or more of the stakeholder dialogues that were organised to develop the perspectives and to derive the policy messages from them. Appendix 2 lists the people who have been interviewed to complement the insights from the dialogues.

2 Scenario approach

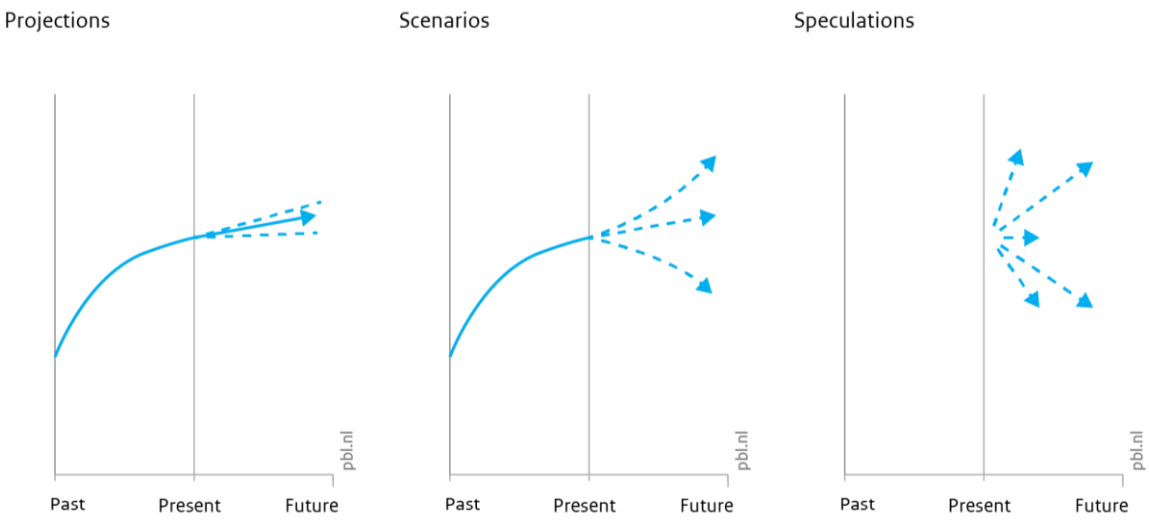
A scenario study such as the Nature Outlook may help to find new ways for implementing policies, for realising coherence between them and for engaging other sectors and citizens. The Nature Outlook consists of a baseline, a trend scenario, four perspectives and several policy messages. These components have been constructed not only from literature review and visualisations, but also by the results from a philosophers' dialogue on the relationships between people and nature in Europe and several stakeholder dialogues on the future of nature.

2.1 Nature Outlook as a scenario study

As noted in Section 1.2, a more fundamental way to reflect on nature policies and related policies may help to find new ways for implementing nature policies, for realising coherence with other policies and for engaging other sectors and citizens. For a fundamental reflection, it is important to focus not only on nature policy and related policies, but also on socio-economic and physical trends that influence nature and on current trends as well as future trends. In this way, socio-economic and physical trends can be taken into consideration that otherwise would be forgotten, and policy options that otherwise would be excluded. Among other things, this may be useful to further implement the EU Biodiversity Strategy to 2020.

There are various methods available to explore the future of nature in Europe, for instance trend extrapolations, computer simulations, and creative brainstorming.[19] Figure 2.1 gives an overview of the main methods. The degree of uncertainty related to future courses of relevant trends is decisive in this respect. Box 2.1 gives an overview of the key concepts used in this chapter and their definitions.

Figure 2.1: Projections, scenarios and speculations.



Source: PBL

[19] Wright and Goodwin 1998.

Projections provide statements about future trends with an impact on nature, based on knowledge about past trends, and are meant to be as accurate as possible. Certain bandwidths in relation to these trends are taken into account. Speculations include statements about alternative futures of nature, based on creative ideas or images about what these futures might look like. Usually, there is no link with past or present trends. Scenarios take an intermediate position. They make statements about alternative futures of nature, based on knowledge about the past and the present.

Scenarios have an advantage over projections because they can be more inspiring. The reason for this is that they explore different directions in which nature policy may develop in the future, for instance in the direction of developing large-scale natural areas or in the alternative direction of creating new parks and other green areas in urbanised regions. In addition, scenarios do more justice to the uncertainties regarding the long-term future since they explore alternate directions in which socio-economic and physical trends with an impact on nature may evolve.

Scenarios have an advantage over speculations because the statements about the future they provide are more substantiated. Moreover, they offer more insight into the ways in which desired future states could be realised. As a result, scenarios can provide policy messages that are more practical and concrete and therefore more useful for nature policies and related policies.

Box 2.1: Key concepts related to the Nature Outlook and their definitions

A **baseline** provides a systematic overview of the various aspects of the policy issue under consideration, the policies aimed at influencing the issue, and the societal and physical trends with a significant impact on the issue and the policies under consideration.
Policy messages provide an overview of the most important policy challenges in the medium-to-long-term future and the policy options to deal with them. They are derived from systematic comparisons between the scenario base, the trend scenario, and the perspectives.
Perspectives explore several desired future states of nature and various policies that may realise them. The future trends and challenges as explored in the trend scenario were also taken into consideration.
A **projection** is an estimate of a likely future state, based on a study of present trends often obtained by using deterministic models.
A **scenario study** explores several *possible* future states and socio-economic and physical trends that may create them and/or some *desired* future states and policy developments that may achieve them.
A **speculation** provides imaginative statements about the future, based on expectations or creative ideas; knowledge or data about the past only play limited roles.
Story lines consist of coherent descriptions of several possible and/or desirable future developments which can lead to possible and/or desirable futures. The storylines of the Nature Outlook are based on a literature review and on creative and logical thinking by the authors.
A **trend scenario** describes the future state of nature and the trends that may create it, as expected by scenario developers, policymakers and/or stakeholders. This is usually a plausible future, featuring no surprising changes. For the Nature Outlook, a trend scenario was made for comparisons against the perspectives.
Uncertainty is defined as indetermination regarding future developments. In foresight studies, the main determinants of uncertainty include complexity and / or dynamism of societal and physical systems and the perspective-dependent insights into the future.
Visualisations are images representing possible or desirable futures. For the Nature Outlook maps, photos, computer generated impressions (visuals) and other elements were made to represent various types of land use, landscapes, species, habitats, and people's interactions with nature.

2.2 Components of the Nature Outlook

Conducting a scenario study is an eclectic activity in which various methods are applied, such as stakeholder dialogues, literature reviews, visualisations or model calculations, and insights from various sources are tapped, including expert judgements, literature, imagination, and quantitative data.[20] Scenario building is a global approach rather than a rigorous method. Therefore, it is not self-evident that all the components of a scenario study that could be distinguished, in theory, will always be included, in practice. The Nature Outlook, however, does include all components: a baseline, a trend scenario, four perspectives and several policy messages.

Normally, a **baseline** would present the current state of nature in the EU, current policies related to nature and how these have evolved, historically. The baseline used in this Nature Outlook, however, focuses on the different views of nature that play a role in past and present debates about nature conservation and on the policy challenges that can be derived from them. A basic assumption is that we should not think in terms of a unified nature as a background for different views on nature (*naturalism*) but in terms of multiple ways in which all living things are linked with one another (*multi-naturalism*).[21] Challenges are important ingredients for the trend scenario and the perspectives. In addition, the European Environment Agency has recently published the State of the Nature Report that provides extensive overviews of and detailed insights into the current situation of nature in Europe.[22]

The **trend scenario** presents a possible future course of socio-economic and physical trends, such as agricultural development and climate change, and their expected impact on policy challenges, for instance that of agricultural intensification on biological diversity. By doing this, the scenario may be helpful for agenda setting. The trend scenario provides a context for desired future states of nature and the possible pathways that can lead to these future states explored through the perspectives.[23] It also provides insights into the possibilities and limitations for desired states of nature and related pathways. This may be relevant for designing policies, for instance, by vision building.

Only one trend scenario has been developed, since the focus of the study is on perspectives and not on developing several trend scenarios. Moreover, comparing the perspectives with more than one trend scenario would make the study very complicated and would make it very difficult to use its results. Four perspectives compared with two or three trend scenarios would generate eight or even twelve possibilities.

The **perspectives** present desirable future states of nature and pathways that may be followed to realise these desired states. Since the perspectives explore *desirable* futures they can be considered as normative scenarios, in contrast to the trend scenario which explores a *possible* future and can be considered as a descriptive scenario.[24] Each perspective embodies a set of principles (*why*), a desired state of nature that may be realised in 2050 (*what*) and a pathway that could be followed to reach that state of nature (*how*). The principles consist of the guiding values and the policy challenges addressed by the perspective. The desired state of nature distinguishes between natural areas (including forests), river areas (including

[20] Dammers et al. 2013a.
[21] Latour 2017.
[22] EEA 2015a, 2015b.
[23] Dammers et al. 2013b.
[24] Descriptive scenarios are also called 'exploratory scenarios' (IPBES 2015).

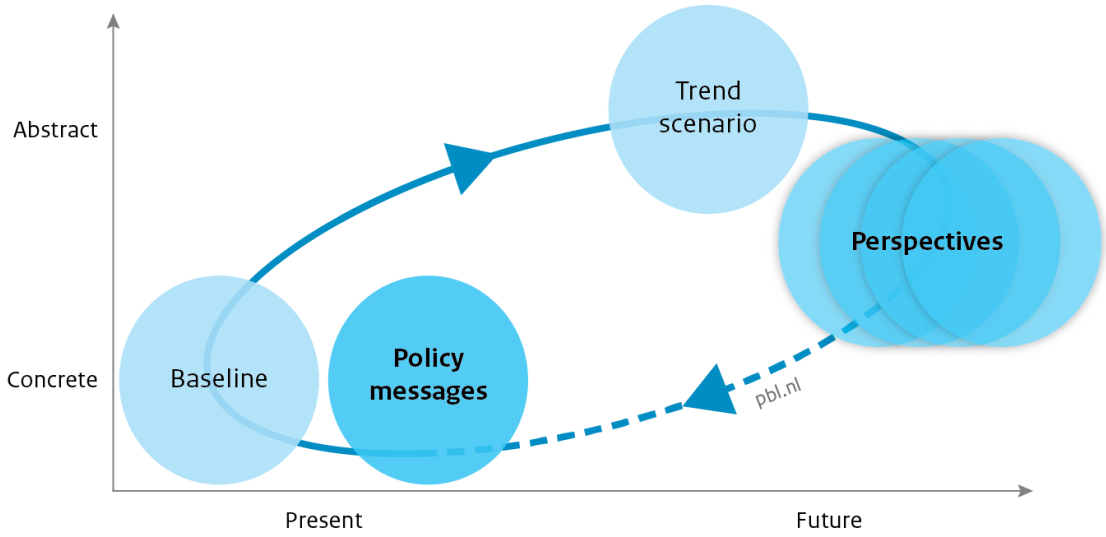
coast), rural areas and urban areas. The pathway comprises the coalitions that will act for nature and may cause adaptations of nature policy and related policies in the years to come and the conditions that may stimulate these adaptations. It also describes the mode of governance that may be applied and the measures that may be taken when these adaptations have taken place.

The **policy messages** provide strategic arguments to organisations and groups involved in nature policy and related policies. The messages are focused on the short term, but they are formulated from the point of view of the long-term. Policy messages can be derived from the baseline and the trend scenario, for instance, the identification of the policy challenges and the exploration of how they may change in the future. Other policy messages have been derived from the individual perspectives, for example, insights into the potential of further engaging other sectors in nature policies and related policies and the conditions under which they may become more engaged.

Policy messages can also be derived by comparing the perspectives with one another. By doing this, suggestions can be formulated to combine parts of the perspectives, such as enlarging natural areas, creating upmarket recreational facilities near these natural areas, and introducing mechanisms to let the owners or the users of the facilities contribute to the management of the areas. This may be relevant not only for designing nature policies and related policies, but also for policy implementation.

This report does not contain policy messages, as such. Chapter 10 provides assistance for defining messages. Policymakers and stakeholders are invited to derive other policy messages, preferably in collaboration with each other. This is indicated by the dotted line in Figure 2.2.

Figure 2.2: The Nature Outlook as a scenario project.



Source: PBL

As Figure 2.2 shows, the baseline, the trend scenario, the perspectives and the policy messages are connected in a cyclical way. First, there is a cyclical movement in time. The baseline focuses on the past and the present situation. The trend scenario explores a *possible* situation that may occur in the long term and the perspectives explore *desirable* situations that may be realised in the long term.

Policy messages focus on the short term since they are formulated for current policymaking.

Second, there is also a cyclical movement in the level of elaboration of the scenario components. The baseline is concrete as a lot of knowledge about the past and the present situation is available. The trend scenario and the perspectives are more abstract since we know a great deal less about the future, particularly if the focus is on the long term. And policy messages are formulated in a more concrete way in order to provide the users of the Nature Outlook with relevant strategic arguments.

By following the cycle, users are assisted to think and act in a more versatile way and thus enabling them to adequately face and address new challenges. This particularly happens when settings are created in which experts from various sectors jointly go through the cycle to discuss policy challenges and to find adequate responses to them (see Chapter 10).

2.3 Applied methods

The baseline, trend scenario, perspectives and policy messages can be developed in various ways, applying a variety of methods, such as stakeholder dialogues, literature reviews, visualisations and model calculations. All these were applied in this Nature Outlook. In this way, the scenario team tried to combine the strengths of the methods and compensate for their weaknesses.[25] This report discusses the dialogues, the literature reviews and the visualisations. The model calculations are described in the PBL report *Perspectives on the future of nature – Impacts and combinations*.[26] Table 2.1 gives an overview of the applied methods; the text below gives a clarification.

Table 2.1: Methods applied for storylines and visualisations of the Nature Outlook

Components of Nature Outlook	**Applied methods**
Base situation	Literature review Interviews Analysis of views of nature
Trend scenario	Literature review
Perspectives	Stakeholder dialogues Philosophers' dialogue Literature review Visualisation
Policy messages	Analysis of other components of Nature Outlook Literature review

The **baseline** was created by analysing past and current debates among and between organisations and people involved in nature policies. From these debates, different views of nature were derived. These views are highly intertwined with the practices of these organisations and groups.[27] To identify the different views of nature, a literature review of scientific articles was conducted. The articles,

[25] Dammers 2010.
[26] Prins et al. 2017.
[27] Mol 2017.

however, pay little attention to policies and practices in eastern and southern Member States of the EU. Therefore, we selected and interviewed certain scientists from these Member States (see Appendix 2).

The baseline describes four substantially differing views of nature: 'Nature for itself', 'Nature despite people', 'Nature for people', and 'People and nature'. These views of nature were derived from the great number and variety of views by departments responsible for nature policies, nature conservation organisations, scientists and many other organisations and groups. All these views were consolidated into four clearly contrasting and internally consistent views. The descriptions of the views of nature include the dominant images and valuations of nature, the preferred strategies and main policy challenges.

The descriptions of the views were substantiated by a survey on citizens' images and valuations of nature in nine EU Member States.[28] The survey showed a great variety of views on nature among the people within each Member State, but it also indicated that these views are more or less comparable between the nine Member States. The survey furthermore found broad agreement on the need to preserve nature. Citizens consider governments to be primarily responsible for the protection and management of nature. The results of the survey are presented in the report *Citizens' images and values of nature in Europe* and were used in the literature review.[29]

This report presents the **trend scenario** as a storyline about the future, rather than a description of the results of model calculations. The trend scenario was based on a literature review, mainly other outlook studies exploring trends with impacts on nature and scientific publications providing insight into the impacts of these trends on nature. Particularly the report on impacts and combinations[30] and the Global Megatrend Report[31] provided valuable insights. As a result, the trend scenario presented in this report differs slightly from the trend scenario described in the other report. Not only quantitative trends, such as population development, are included, but also qualitative trends, such as shifting values, and not only quantifiable challenges, such as halting biodiversity loss, but also non-quantifiable challenges, such as strengthening citizens' connections with nature.

The time horizon of the Nature Outlook is 2050. One reason for this is that the EU Biodiversity Strategy and other relevant policy documents use the same time horizon. Another reason is that a focus on the long term is necessary to explore different states of nature and different pathways to realise these states of nature. And this is needed to inspire experts who are involved in nature policy and related policies. A third reason is that a focus on 2050 helps to surpass the period until 2020, on which many policy discussions are now focused.

The trend scenario assumes a business as usual development of the socio-economic and physical trends. Trends that were dominant in recent years are assumed to develop more or less in the same direction in the years to come. However, it is taken into account that recent events, such as the economic crisis, have an influence on the direction of the future trends.[32] Besides, it is assumed that current policies will be continued, including existing Natura 2000 regulation, environmental regulations and so forth. Since the directions in which future trends evolve can

[28] The survey was held in France, Germany, the Netherlands, Poland, Romania, Slovakia, Spain, and the United Kingdom.
[29] Farjon et al. 2016.
[30] Prins et al. 2017.
[31] EEA 2015.
[32] IGEAT et al. 2006.

never be certain, the bandwidths within which the trends may occur are also presented in the trend scenario.[33]

The **perspectives** were constructed on the basis of the results from stakeholder dialogues, interviews with experts and literature review. Besides visualisations were created. The most important reasons for using these different methods is that the future of nature, like any future, is uncertain, particularly in the long term, and that the results of each method can be used to check and complement the results of the other methods. A first stakeholder dialogue has been organised to define the perspectives and a second one to elaborate them.

PBL organised the stakeholder dialogues in cooperation with the European Centre for Nature Conservation. The dialogues were set up to establish a series of informal discussions in which experts involved in nature policy and related policies developed the outlines of the components of the Nature Outlook. In these informal discussions experts from various organisations and sectors who are or may be involved in nature conservation and development meet face to face to exchange values, views and insights, to challenge one another, and to develop new ways of thinking.[34]

Stakeholder dialogue on the future of nature in Europe. Photo: Ruben Jorksveld

Participants in the stakeholder dialogues consisted of employees from several agencies from the Member States responsible for nature policy, from European umbrella organisations for, among other things, nature conservation, farming, hunting, urban planning, small villages, mining, and human health, from research institutes, and from Directorate-General Environment. The main criteria for participation were: having in-depth expertise about nature and related sectors, being able to reflect on the long-term future, being able to think beyond the limits of one's own professional domain, and together represent a great variety of viewpoints on nature, nature policies and related policies. [35] The stakeholder

[33] Dammers et al. 2013.
[34] Allmendinger and Haughton 2008.
[35] Dammers, 2010.

dialogues produced many valuable ideas and insights. Appendix 1 gives an overview of the participants; the results have been published in separate reports.[36] The perspectives were defined during the first stakeholder dialogue by asking the participants to generate a large number of guiding ideas about the future of nature in Europe. Examples of guiding ideas were 'Sustainable Use of Nature as Conservation', 'Wilderness at the heart of society', 'Nature, business and innovation', 'Connectivity between all citizens and nature', and 'Boxed Nature'. After that, the guiding ideas were clustered on the basis of their substantive consistency. This resulted in four combinations: 'Nature as Foundation of Society', 'From the Past to the Future', 'Paradigm Shift', and 'Nightmare for Nature and People'. Finally, the participants were invited to elaborate the guiding ideas by generating ideas about the image of nature in 2050 and the pathway to 2050. The ideas were expressed in words, by making photo collages and by sketching on maps. In this way, the prototypes of the perspectives were constructed.

The scenario team analysed the results and elaborated them into coherent storylines about the future. These storylines represent the essence of the perspectives and integrate the many insights they contain in a meaningful way, thus stimulating the use of the perspectives.[37] During the elaboration of the storylines about the future three criteria were applied: maximum contrast between the perspectives, maximum consistency within the perspectives, and each perspective should be desirable for some groups in society.[38] In applying these criteria, all perspectives were made more pronounced and some of them even changed, in important respects.

Since 'Nature as Foundation of Society' and 'Paradigm Shift' were relatively similar, the team put more emphasis on the creation of an enlarged European nature network in the first perspective and more emphasis on greening the economy and behavioural changes in the second perspective. As 'Nightmare for Nature and People' was framed rather negatively (appealing to only few people) the team changed this perspective to an economically driven perspective that could be held by people with a liberal worldview. In this way, a set of diverging, imaginative and plausible storylines was created. The team also changed the names of the perspectives: 'Nature as Foundation of Society' was changed to 'Wild Nature', 'From the Past to the Future' to 'Cultural Nature', 'Paradigm Shift' to 'Functional Nature' and 'Nightmare for Nature and People' to 'Boxed Nature'.

In the second stakeholder dialogue, the scenario team presented the results of the analyses and the elaborations to the participants and discussed the results with them. The change of 'Nightmare for Nature and People' to 'Boxed Nature' generated discussion. Some participants explicitly warning against such a future. The team, however, emphasised that the Nature Outlook does not question the need for EU-wide nature policy – most notably the Birds and Habitats Directives – but also that this perspective exists in real life and therefore should be included in the study.

After that, the participants were asked to further elaborate the perspectives. This happened in four rounds in which the participants 1) added information, 2) made the perspectives more inspiring, 3) enhanced their relevance for policymaking and 4) made the advantages and disadvantages of the perspectives more explicit. In these rounds the participants added many relevant ideas. Examples are the importance of creating nature areas which are large enough to allow economic activities without compromising biodiversity objectives in 'Wild Nature', the need to

[36] PBL 2014; PBL 2015a; PBL 2015b.
[37] Schwartz, 1991.
[38] Van der Heijden, 1996.

scale up local initiatives, for instance by sharing best practices, in 'Cultural Nature', the relevance of strengthening local food production as well as large-scale sustainable farming in 'Functional Nature' and the significance of identifying contributions to biodiversity that could be made by private organisations and groups in a market-based setting in 'Boxed Nature'.

The scenario team processed the results of the second dialogue while further developing the perspectives. This happened in the same way as with the results of the first dialogue. In addition, interviews were held with stakeholders from sectors which were underrepresented during the stakeholder dialogues, such as agriculture, tourism, transport, paper industry and business. Appendix 2 provides an overview of the respondents. Further elaboration of the perspectives led to their final names. 'Wild Nature' became 'Allowing Nature to Find its Way', 'Cultural Nature' became 'Strengthening Cultural Identity', 'Functional Nature' became 'Working with Nature' and 'Boxed Nature' became 'Going with the Economic Flow'.

A philosophers' dialogue has been organised to create an inspirational and thought-provoking exchange of ideas on the roles of nature in modern society, now and in the future and to feed these ideas into the perspectives and into the other components of the Nature Outlook. Four internationally renowned speakers were invited to present their views and discuss them with each other and with the audience. The results of this dialogue have been used to strengthen the philosophical dimension of the perspectives.

Philosophers' dialogue — from left to right discussion leader Matthijs Schouten, Annemarie Mol, translator, Wilhelm Schmid, Roger Scruton, and Bruno Latour. Photo: In2Content

The fundamental insight that we should move from thinking in terms of a unified nature as a background for all human activities (*naturalism*) to thinking in terms of multiple ways in which people and other beings are linked with one another (*multinaturalism*) has become the basic assumption of the Nature Outlook. Examples of philosophical insights that have been integrated in the perspectives are: the variety of notions of nature that can be distinguished, the relevance of paying more attention to non-economic notions (repertoires) in nature policy and related policies, and the contributions to nature conservation made by green communities and individuals practicing ecological lifestyles which are considered as examples of such notions. The results of the philosophers' dialogue have been

published in the book *Nature in Modern Society – Now and in the Future.* [39] More information about this dialogue and the book can be found on the webpage: Philosophers' dialogue.

A great number of scenario studies, policy documents, visions, scientific reports and other publications have been analysed as part of the literature review to complement and improve the perspectives. Many valuable insights have been derived from the literature, such as, the insights that changed thinking (paradigm shift) should be supplemented by changed behaviour to realise a green economy, that regional quality funds and regional quality teams are crucial to improve landscapes, that governments can take the lead in nature conservation and development without practicing top-down planning solely based on scientific knowledge, and that property developers and nature organisations can develop attractive green residential and office areas. During a third stakeholder dialogue the scenario team presented the results of the literature review and discussed them with the participants. Ideas generated by the participants, for instance, about how to better connect people with nature, were helpful to further elaborate the perspectives and also to define the policy messages.

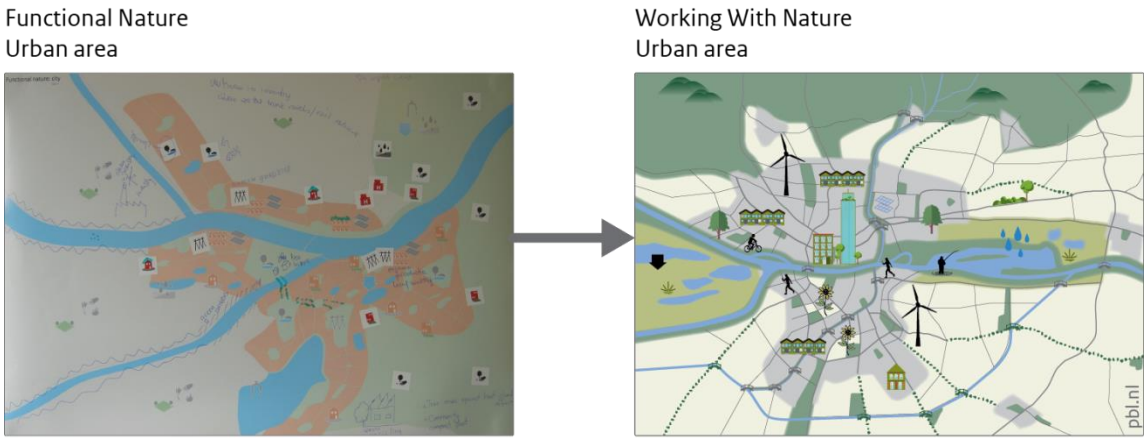
In order to provide more specific insights into what nature may look like in 2050 and at which locations within the EU, the trend scenario has been quantified and the perspectives have been elaborated in a semi-quantitative way. [40] The impacts of the explored trends on nature (biodiversity, ecosystem services) have been calculated by the BioScore 2.0 and Globio-Aquatic models. For the perspectives, land-use changes and impacts on biodiversity and ecosystem services have been estimated by expert judgement. The overall results of the model calculations have been integrated in the versions of the perspectives presented in this report.

Visualisations are helpful to capture the essences of the perspectives, to imagine the perspectives in concrete ways and to easily communicate them with policymakers and stakeholders.[41] Stylised maps including basic geographical information were enriched by adding stickers during the stakeholder dialogues provided the starting point and the basis for the maps included in this report (see Figure 2.3). They were also presented to the participants of the dialogues for feedback. The maps indicate on the regional level for natural areas, river areas, rural areas and urban areas which land uses and which types of nature could occur on which locations. Icons have been designed to symbolise the essence of the perspectives. Artist impressions have been made to visualise the perspectives in a concrete way on the local level and photos have been added to illustrate important aspects of the perspectives on this level. Many photos in this report have been selected from the photo collages made in the first dialogue.

The results of the methods were applied to build the perspectives have been integrated by the scenario team. This happened in various ways, for instance, by letting team members who were involved in the model calculations, the literature review and the visualisations participate in the dialogues, by discussing the results of the various methods in special sessions, and by asking team members to add their insights to the work of other team members who had applied different methods.

[39] Mommaas et al. 2017.
[40] Prins et al. 2017.
[41] Tisma et al. 2012.

Figure 2.3: An example of a stylised map that was enriched during one of the dialogues and that provided a starting point and a basis for a map included in this report.



Source: PBL

The **policy messages** were derived from the perspectives and also from the other components of the Nature Outlook. A first set of messages was derived during the third stakeholder dialogue. In this dialogue the participants were asked to identify a great number of policy issues related to nature, nature policy or related policies. Examples of such issues are: how to better balance multifunctional land use with nature conservation, how to reduce the impacts of climate change on nature, and how to better re-engage people with nature. After that, they were asked to elaborate some policy messages related to these issues using the perspectives. Examples of such messages are: integrate functions to create more nature and apply a holistic landscape approach, stimulate innovative solutions that not only include benefits for nature but also include nature as part of the solution, and make nature more cool, sexy and fun and use different media to communicate this.

The scenario team analysed the results of the third stakeholder dialogue, held several brainstorms, had discussions with key policymakers, and again conducted a literature review. On the basis of this, some headline messages have been selected which are presented in the synthesis report *European nature in the plural*.[42] These policy messages are not conclusive. On the contrary, the users of the report are invited to derive concrete messages by themselves or even better with other people involved in nature policy and related policies. Therefore, the approach to do this is presented in the final chapter of this report. This approach consists of organising a series of informal dialogues between policymakers and stakeholders to build a joint vision on the future of nature at the EU, national, regional or local level. The approach is not only described but also visualised by maps, indicating how elements from different perspectives can be included in a joint vision.

[42] Van Zeijts et al. 2017.

3 Past and present views and challenges

The debates on nature conservation and development in the EU can be summarised in four different views of nature that define four different challenges for nature policy and related policies. According to 'Nature for itself' the main policy challenge is to stop the decrease in areas of unspoiled nature. In the 'Nature despite people' view the impacts of human activities on habitats should be limited and the resilience of nature should be improved. 'Nature for people' emphasises that the utilisation value of nature should be integrated into business and nature management without depleting natural resources. And 'People and nature' stresses that the connections of people with nature and related policies should be strengthened and used.

3.1 Different views of nature

A basic assumption of the Nature Outlook is that people and other beings and the environment are linked in multiple ways with one another. As a consequence, 'nature' is not a universally agreed upon concept. According to the French philosopher Latour we should, therefore, not think in terms of *naturalism* but of *multinaturalism*.[43]

Table 3.1: Four views of the relationships between people and nature

Views *Elements*	**Nature for itself**	**Nature despite people**	**Nature for people**	**People and nature**
Image of nature	Intrinsic and aesthetic values Nature is separated from people	Intrinsic value Scientific and technocratic	Utilisation value Scientific and technocratic	Cultural value Nature and culture are intertwined
Preferred solutions	Creation of nature reserves and adoption of laws	Environmental regulations based on scientific knowledge	Economic valuation of nature and include potential financers of nature in policy	Participatory planning and citizens' initiatives
Policy challenges	To stop the decrease in areas of unspoiled nature and cultural landscapes	To limit the negative impacts of human activities on natural areas and to improve the resilience of nature	To integrate the utilisation of nature into business and nature management	To strengthen and use connections of people with nature and policies related to nature

[43] Latour 2017.

This is illustrated by the debates on nature conservation and development which are held since the 19th century in Europe. These debates can be summarised in four different views of nature that are still visible in nature policy and related policies in the EU and its Member States today. Nature policies are based on values and beliefs about nature and perceptions of the relationships between people and nature. Such values and beliefs are embedded in views of nature. These views influence the development and implementation of nature policy and related policies in various ways. However, the specific ways in which they influence policy making and the levels of influence they exert are not easy to detect. Although traditions of nature policy and related policies differ considerably between the Member States, some overarching views of nature can be observed.[44]

The debates showed many commonalities across European countries since nature protection emerged during the second half of the 19th century.[45] The same is true for the discourses on the relationships between people and nature. Nature protection emerged from the perception of artists, philosophers and other people, who believed that the beauty and intrinsic value of immaculate nature were threatened by the industrialisation of society. This 'Nature for itself' view was dominant for almost a century. Since the 1960s, however, three other views of nature have gained influence: 'Nature despite people', 'Nature for people', and 'People and nature'. These views are not only held by individuals but also by organisations and groups and are more or less institutionalised. The views coexist, overlap in time and are still present in current policies.[46] Although the views are discernible across Europe, the chronology and the influence they have differ between Member States. Table 3.1 provides summaries of the views, the sections below describe them.

3.2 Nature for itself

Until the 1960s, the dominant view of nature was 'Nature for itself'.[47] Nature was experienced as something of great beauty, unspoiled by human activities. It was conceived as something that was separate from people, with its own intrinsic value. Initially, artists, philosophers, teachers and naturalists promoted this image of nature. According to Europeans familiar with the long tradition of cultivation and reclamation of land for the production of food, wood and living, most immaculate nature was perceived in landscapes that were the result of a long tradition of human land use and not in areas of unspoiled nature as in the United States.[48] These Arcadian landscapes were experienced as being unspoiled by developments that were considered main threats of nature: industrialisation, urbanisation and reclamation of commons.

The creation of nature reserves and national parks by acquisition of land and the adoption of laws by private and public organisations were regarded as solutions to stop these threats to nature. In Europe, the first governmentally protected area was the Drachenfels in Germany (1836), which was set up at the request of Goethe. The citizen-run English National Trust was founded in 1895 and acquired its first nature reserve, Wicken Fen, in 1899. The first national park – Sarek in northern Sweden – was created in 1909. In Italy, the Touring Club Italiano was

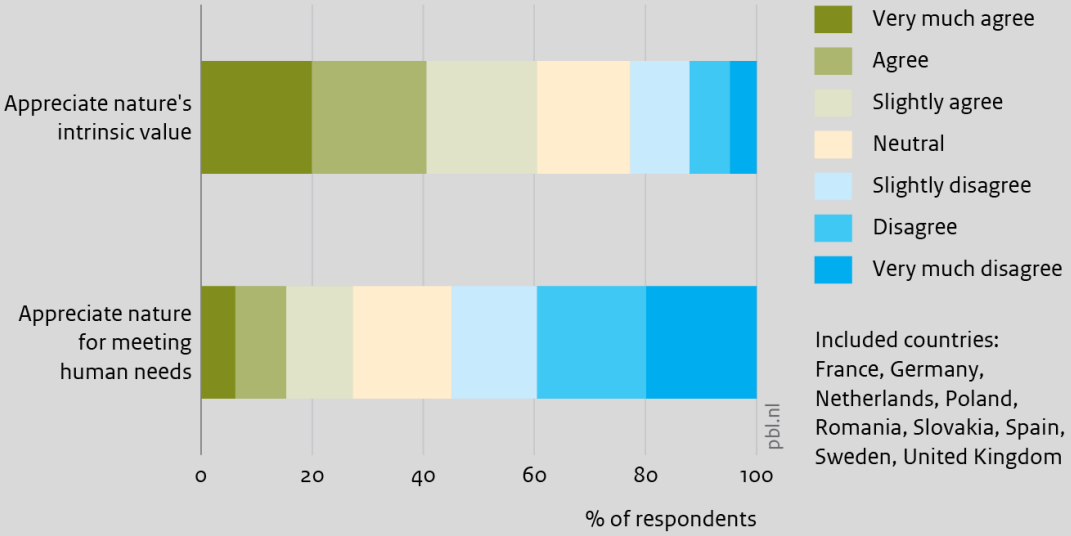
[44] Ferranti et al. 2010; Mace 2014.
[45] Koppen and Markham 2007.
[46] Gustafsson 2013.
[47] Mace 2014.
[48] Pleininger et al. 2006.

promoting the beauty of the Italian landscapes and proposed in 1911 the creation of national parks. Besides the love for the beauty of unspoilt nature, the protection of nature and landscapes was also driven by the desire to promote the national identity, for instance in Poland.[49] Furthermore, the process of protecting unspoiled landscapes revealed a dilemma as local people were forced out of self-sufficient farming in favour of an aesthetic presentation of the area; for instance, when the first French national nature park, the Oisans, was created.[50]

Box 3.1: Majority of EU citizens endorses intrinsic value of nature

The survey on citizens' images and values of nature which has been held for the Nature Outlook reveals that attitudes related to nature vary widely among citizens of the EU (see Figure 3.1). Most citizens (six in ten) agree with an ecocentric view of nature. They endorse the intrinsic value of nature, including biodiversity, wilderness and the integrity of wild animals. There is far less support (one in four) for the anthropocentric notion that nature should be used for meeting human needs. The predominance of ecocentric views over anthropocentric views was found in all studied Member States. This is in line with the results of other surveys on environmental attitudes and nature values.

Figure 3.1: Opinions about values of nature.[51]



Source: Gfk; analysis by Wageningen UR

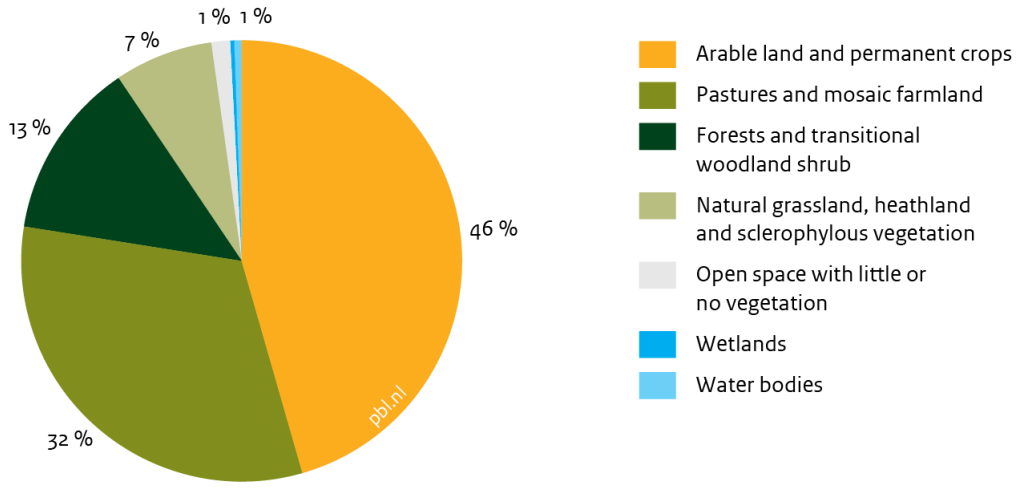
The view 'Nature for itself' is still prominent today, both in the valuation of nature by citizens and in European nature policies. Nowadays the majority of European citizens endorse the intrinsic value of nature, rather than its utilitarian value (see Box 3.1). Furthermore, there is broad agreement on the need to preserve nature.[52] Two thirds of all respondents of the survey on citizens' views and values of nature, which has been held for the Nature Outlook, disagreed with the proposition that too much emphasis is being placed on nature conservation.[53]

[49] Glinski and Koziarek 2007.
[50] Claeys-Mekdade and Jacqué 2007.
[51] Farjon et al. 2016.
[52] TNS 2013, 2015.
[53] Farjon et al. 2016.

The view 'Nature for itself' is reflected in the EU Habitats Directive (1992) and thereby in the EU Biodiversity Strategy (2011).[54] Especially the designation and legal protection of Natura 2000 area by national governments and the first target of the Biodiversity Strategy to halt the deterioration in the status of species and habitats are examples of this view. The fact, however, that almost one in three habitat types protected by the Habitats Directive are (partly) dependent on farming activities, such as grazing and mowing illustrates that it is not only relevant to protect natural areas but also to protect traditional landscapes, as indicated by this view of nature.[55]

The main policy challenge defined by 'Nature for itself' is to stop the decrease in areas with unspoiled nature, such as areas of wilderness nature and traditional cultural landscapes, and by doing that halt the deterioration of species and habitats. This policy challenge is as relevant today as it was 150 years ago. An indication is that in the period from 2000 to 2006 one fifth of the land uptake by urbanisation was related to natural areas, such as forest, shrubs, natural grasslands, and wetlands (see Figure 3.2).[56] And overall, the loss of biodiversity has continued in Europe.[57] Although the decline in cultural landscapes is not measured at the EU level, there is a lot of evidence of this trend. The main causes are urbanisation, agricultural intensification and abandonment of farmland.[58]

Figure 3.2: Land uptake by urbanisation between 2000 and 2006.



Source: EEA, 2013

3.3 Nature despite people

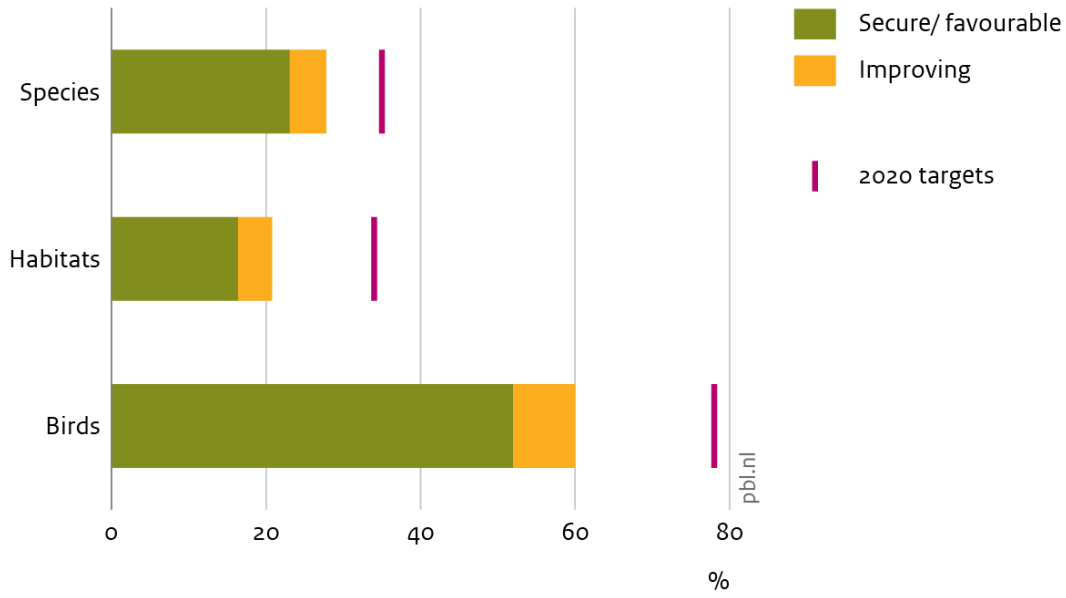
In the 1970s and 1980s, increasing scientific knowledge and awareness of the impacts of human activities on natural and semi-natural habitats brought about a new view: 'Nature despite people'. Scientists such as Diamond warned that populations of animals were at risk of extinction due to their isolation in nature

[54] European Commission 2011.
[55] Halada et al. 2011.
[56] EEA 2013.
[57] EEA 2015a.
[58] Estel et al. 2015; Pedroli et al. 2007; Pleininger et al. 2006.

reserves that are surrounded by vast inhabitable areas, mainly agricultural areas and urban areas.[59] Odén and Ulrich warned against the threat of acid atmospheric depositions which were induced by people for lakes and forests.[60] 'Acid rain' and '*Waldsterben'* became major political issues in Europe. The first World Climate Conference organised in 1979 by the World Meteorological Organization expressed concern that 'continued expansion of people's activities on earth may cause significant extended regional and even global changes of climate'.[61] It became evident that negative impacts of people on nature could not be limited by the designation of protected areas alone.

In these decades, the influence of scientists and governments in nature conservation strongly increased.[62] This was reflected in the growing influence of technical concepts and governmental laws in nature policy. It was assumed that complex issues, such as nature conservation can only be addressed adequately by scientific and technical methods which were considered as unbiased and rational. In this view, nature was conceived as an ecological system which was appreciated for its intrinsic value and which could be tuned to its optimal condition by biophysical experts. This reflects a science-based technocratic approach in which experts 'speak truth to power'.[63]

Figure 3.3: Progress towards the targets of the European Biodiversity Strategy to improve the status of species and habitats covered by EU nature legislation.[64]

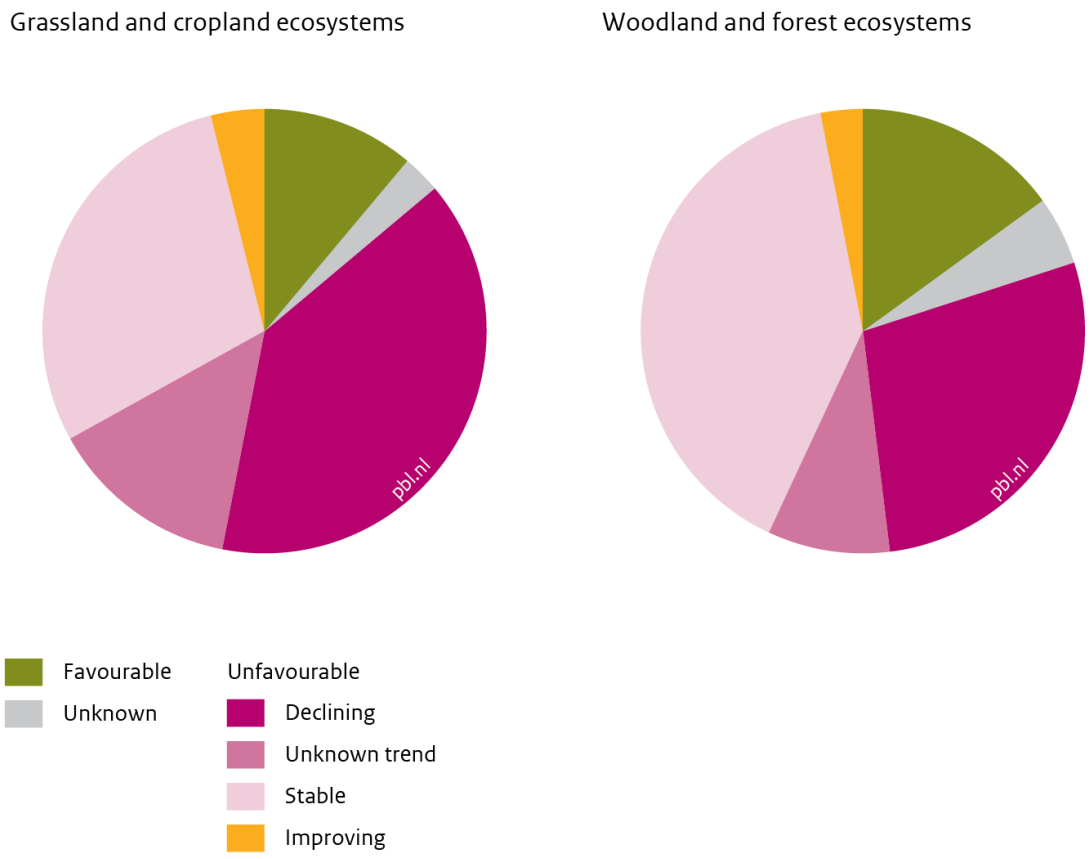


Source: EEA, 2015

[59] Diamond 1975.
[60] Ulrich, Mayers and Khanna 1979.
[61] IPCC 2004.
[62] Feranti et al. 2013b.
[63] Fischer 1990.
[64] EEA 2015a.

Since the 1970s, EU environmental policy and related policies have been dominated by regulations based on scientific knowledge.[65] More recently, however, there is a declining trend for the EU to define strict and extensive limits to reduce the impacts of human activities on the environment. Well-known examples of EU policies aiming at limiting negative impacts of human activities on nature are the Nitrates Directive (1991), the Water Framework Directive (2000), the Clean Air Policy Package (2013) and the environmental requirements of the Common Agricultural Policy and Rural Development Policy.

Figure 3.4: More deteriorated assessments than improved assessments of conservation status of habitats associated with grassland and cropland ecosystems (left) and woodland and forest ecosystems (right) in the period from 2000 to 2006.[66]



Bron: EEA, 2015

[65] Jordan and Adelle 2013.
[66] EEA 2015a.

According to the 'Nature despite people' view the main policy challenge is to limit the negative impacts of people's activities on natural areas and to improve the resilience of nature. Recently the mid-term review of the EU Biodiversity Strategy confirmed the urgency of this challenge.[67] The mid-term review shows that the number of species and habitats with favourable or improved conservation status has increased slightly since 2010 (see Figure 3.3). However, many habitats and species that had already an unfavourable status remain so and some have deteriorated further (see Figure 3.4). The state of nature report shows that agriculture and other modifications of natural conditions induced by people are the most prominent 'pressures on terrestrial natural systems'.[68]

3.4 Nature for people

In the late 1940s the importance of the natural environment as a condition for human life was already acknowledged. This was the driver for the introduction of land evaluation both in western and eastern Europe.[69] In the mid 1990s, it became evident that the integration of nature policies with other policies and sectors would be crucial to sufficiently address the decline in habitats and species. Moreover, financing the management of the Natura 2000 network became an major issue in EU nature policy. This gave emphasis to another view of nature: 'Nature for people'.

This view is based on the idea that nature provides goods and services which are essential for human development, such as food, water, pollination and climate regulation.[70] The motive to protect nature, is no longer based on intrinsic reasoning but on utilitarian values and the costs associated with the services nature provides. Concepts related to this view are 'ecosystem services', 'natural capital' and 'nature-based solutions'. Scientific projects, such as the Millennium Ecosystem Assessment (MA) launched in 2003 and The Economics of Ecosystems and Biodiversity (TEEB) started in 2007 stimulated the broad adoption of this view and firmly placed it on the policy agenda.

The concept of ecosystem services was quickly connected to economic valuation.[71] Besides, the ecosystem services approach suggests integrated land management, since multiple, overlapping ecosystem services can coexist in one landscape. Following this trend, stakeholders considered to be potential financers of Natura 2000, such as representatives of business and industry, were increasingly included in the policy process. This stimulated the emergence of new collaborations for nature management.

Besides, new policy concepts emerged. Mechanisms, such as biodiversity offsets, payments for ecosystem services and no net loss were proposed to balance ecosystem services, applying monetary and other economic principles.[72] In 2015, the European Commission and the European Investment Bank launched a new financial instrument: the Natural Capital Financial Facility. This instrument provides co-funding for projects using payments for ecosystem services to develop 'biodiversity offsets', 'green infrastructure' or innovative businesses that contribute

[67] EC et al. 2014.
[68] EEA 2015a.
[69] Haber 1982; Rickler and Schönfelder 1986; Ruzicka and Miklos 1982
[70] Pimm et al. 1995.
[71] Daily 1997.
[72] Bull et al. 2013.

to biodiversity and climate adaptation. In 2008 the Commission launched the EU Business and Biodiversity Platform. The aim of this platform is to facilitate communication and coordination and to stimulate natural capital accounting, innovations for biodiversity and business, and financing for biodiversity.

According to 'Nature for people' the main policy challenge is to integrate the utilisation value of nature into business and nature management without depleting natural resources. Examples are the introduction of nature-based solutions and mechanisms to balance ecosystem services and to avoid shifting ecological costs to future generations. For instance, the recognition and demonstration of the wider socio-economic benefits of natural areas (e.g. by storing carbon or reducing damage from extreme weather events) may attract funding for conservation measures and other investments in and around sites.[73] Natural elements may also provide various services for agriculture, such as natural pollination and natural pest reduction.

3.5 People and nature

In recent years, a fourth view has gained prominence: 'People and nature'. According to this view nature is not something 'out there', but a culturally appropriated concept.[74] Nature is a cultural artefact that can no longer be distinguished from other artefacts and society. Today people influence natural processes at such a large scale that we have entered a new geological era: the Anthropocene'.[75] The survey held for the Nature Outlook shows that European citizens have a broad conception of nature: nature is almost everywhere (see Box 3.2).

According to the 'People and nature' view the ecosystem services approach counting, mapping and monetising the value of nature has important limitations and is unlikely to be able to cover the many ways in which people value nature.[76] The approach is criticised as a narrow, technocratic foundation of nature policies which may even undermine these policies[77]. People are not just motivated by the utilisation values or intrinsic values of nature, but for instance also by the eudaemonic value of nature: the contribution of their connectedness with nature to a meaningful life.[78]

This image of nature as a cultural artefact has changed thinking about the way we should deal with nature and also of the actors that should be involved in nature policies. The participation of a wide range of local stakeholders is considered to be essential. This should make it possible to address the variety of values and beliefs about nature and to find local solutions. The exclusion of local stakeholders in the implementation of Natura 2000 is considered as a major cause for the delay in implementation.[79] Because of this the administrative and science driven approach has shifted to a more participatory approach. The EU Biodiversity Strategy, however, does not include a target for participation. The increased role of participation reflects broader trends in EU policies related to nature, such as Rural Development Policy, Regional Development Policy and Water Policy.

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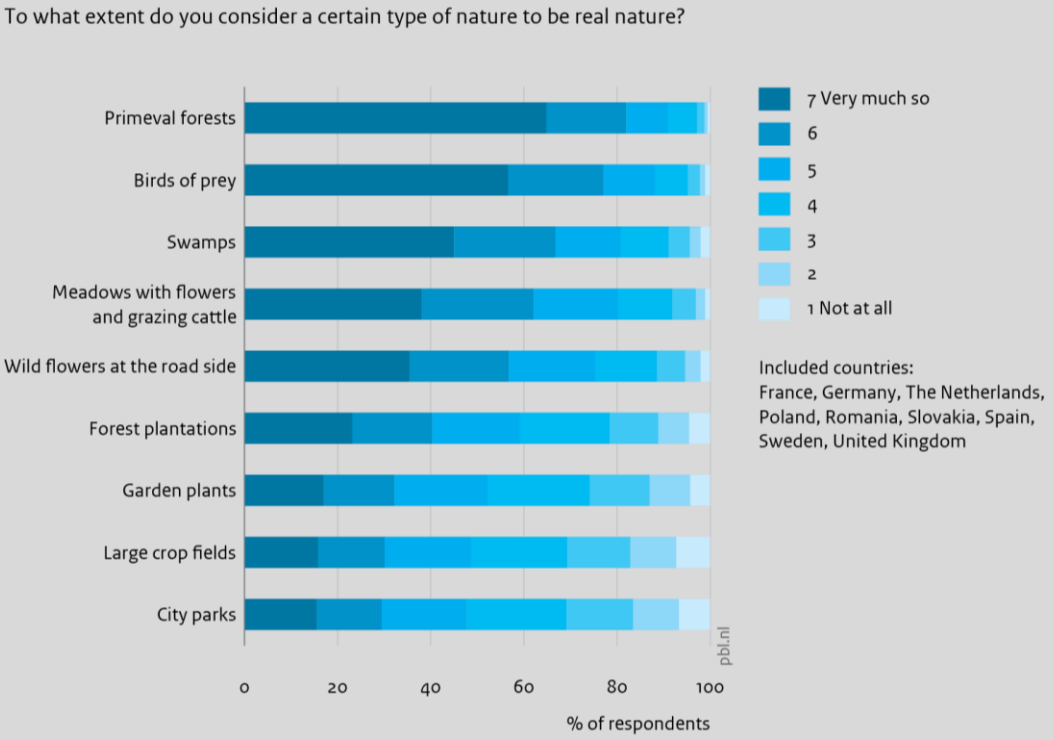
[73] European Commission 2013.
[74] Hajer and Versteeg 2005.
[75] Crutzen 2002.
[76] Eser et al. 2014.
[77] Turnhout et al. 2013.
[78] De Groot et al. 2015.
[79] Milieu 2015; Bouwma 2015.

Box 3.2: Peoples conceptions of nature

In the survey, which was held for the Nature Outlook, people were asked to give their opinion about the degree of naturalness of certain types of nature. A majority of the respondents considers all presented examples of nature to be natural (see Figure 3.5). Although city parks were rated as the least natural, half of the respondents considered them to be natural in some way. Primeval forests were seen as the most natural type of nature by nine of ten respondents. This ranking by citizens closely matches that of experts, whose ranking was used for selecting the types of nature. There were not many differences in ranking between the nine Member States.

Figure 3.5: European people have a broad conception of nature.[80]



Source: Gfk; analysis by Wageningen UR

The image of nature related to this view includes a moral issue too. According to Sijmons, we are strong enough to change the earth, and therefore we are also responsible for the consequences, such as the extinction of species and climate change. The excuse that we are too insignificant to act has become invalid.[81] Nature has become a negotiable concept that is not only represented by scientists, but also by poets, architects, farmers and laymen.[82]

The regained prominence of the landscape approach which views the functioning of social ecological systems from a local and an integrated perspective is also part of the 'nature and people' view.[83] Related concepts are 'oikophilia' (love for the place where you live), 'place attachment' and 'landscape stewardship'.[84]

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[80] Farjon et al. 2016.
[81] Sijmons 2014.
[82] Latour 2004.
[83] Raymond et al. 2014.
[84] Brown et al. 2015; Raymond et al. 2015.

In the 'People and nature' view, the main challenge for nature policy and related policies is to strengthen and use the connections of people with nature and with these policies. People can be connected with nature and contribute to nature conservation and development as individuals but also as members of local communities or participants of supra-local networks.[85] Since experiences of nature (ranging from parks to forests) at a young age stimulate involvement in actions which are beneficial for nature at a later age, an additional policy challenge is to stimulate nature experiences of the youth.[86]

[85] Schmidt 2016; Scruton 2016; Hajer 2011.
[86] De Groot et al. 2015.

4 Future trends and challenges

This chapter presents the trend scenario, exploring eight socio-economic and physical trends, for the period up to 2050, with their influence on the policy challenges. Under the business-as-usual assumption of population trends, value changes, economic trends, agricultural developments, trends in forestry, transport developments, energy developments and climate change are expected to cause a further decline in unspoiled nature. Negative impacts of human activities on nature will be reduced, but not enough to halt biodiversity loss. The integration of the utilisation value of nature into business and nature management will hardly change. Whether people on average will be more connected with nature and related policies will depend on the region in which they live.

4.1 Expected trends

The trend scenario, as described in this chapter, presents eight future socio-economic and physical trends and their expected influence on the challenges for nature policy and related policies. The scenario provides a context for the desired states of nature and the pathways to achieve them, which are explored in the perspectives. It also provides an important element of the perspectives, namely that of the main policy challenges that are addressed by them. The basic assumption in the trend scenario is that the trends will develop in a business-as-usual way. For every trend, first the past and present course is described followed by the expected future course.

Declining population and growing demographic dualisation
Over the 1990–2010 period, the population of the EU grew from 480 million to more than 500 million.[87] On average, Europeans, today, live longer than they ever did before. As a consequence, almost 20% of the current population is over the age of 65.[88] Population growth and reduction in household size – stimulated by growing welfare levels and further individualisation – have led to a larger increase in housing demand and thus to more urbanised areas. As a consequence, the number of households has grown from 170 million to 210 million. More people have settled in urban areas, while people have moved away from rural areas. As a result, the urban population has increased to more than 70% in 2010.[89]

[87] Eurostat 2015a.
[88] Eurostat 20151b.
[89] United Nations 2014.

In the coming decades, the population of the EU is expected first to peak and then to decrease to 490 million people in 2050.[90] This may ease environmental impacts, but would not curb them. Projections vary, however, between a decrease to 450 million and an increase to 570 million people.[91] This is mainly caused by migration, which is a highly uncertain factor. Depending on economic trends and trends related to international security, Europe may continue to be an immigration continent but may also become an emigration continent.[92] By 2050, Europeans will live longer than today: more than 25% of the population will be older than 65 years.[93]

Ageing population with spare time to enjoy nature. Photo: Image Select

A number of western Member States is expected to gain population. The same is true for urban areas and other economically successful areas in western and eastern Europe. The urban population is expected to grow further to more than 80% in 2050. Especially in north-western Europe, more people are expected to settle in cities. Because of this trend, the demand for built-up areas is expected to grow in these countries and areas. The trend will also cause further fragmentation of natural areas and transformation of natural areas and cultural landscapes into built-up areas. This will increase the existing dilemma, since the demand for green spaces in and near cities will also grow. The ageing of the population and growing welfare will cause a growth in the demand for recreation and tourism as well as for second homes and cottages.

At the same time, some eastern Member States and economically less successful regions in western Europe will become more depopulated.[94] This is particularly true for peripheral regions. In these countries and regions, a vicious circle of limited economic growth and population shrinkage is expected, causing a declining demand for built-up areas. These diverging trends indicate a growing demographic dualisation.

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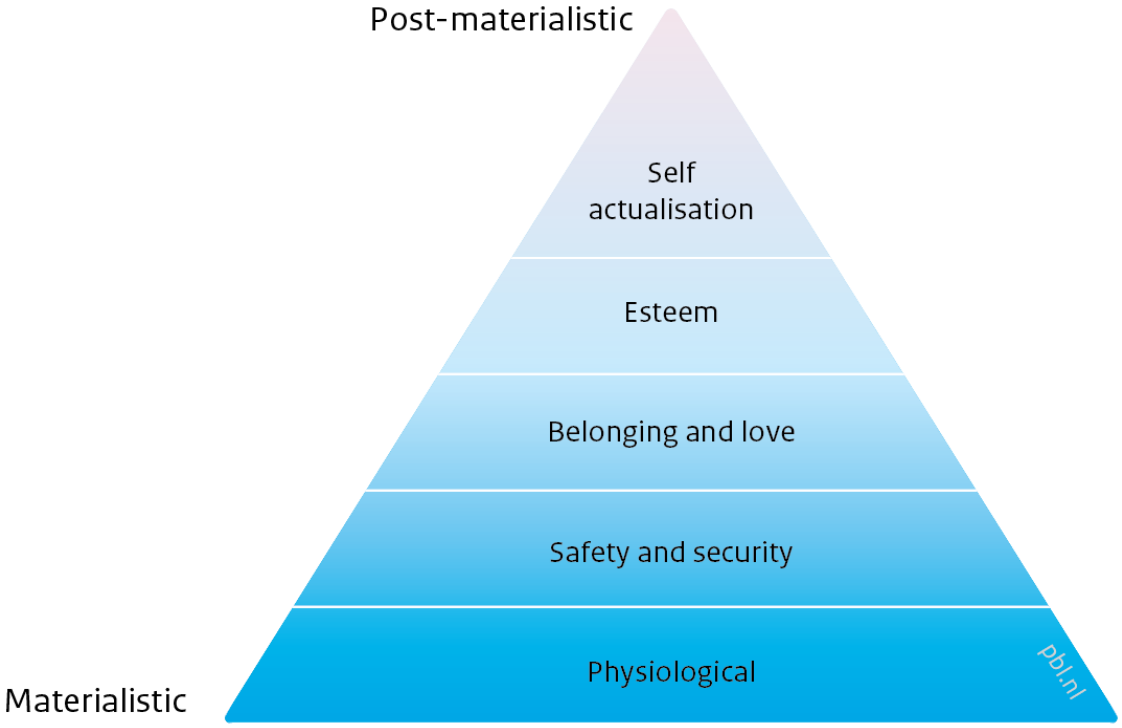
[90] Pedroli et al. 2015.
[91] Prins et al. 2017.
[92] Mamolo et al. 2014.
[93] United Nations 2013.
[94] MCRIT 2014.

Less pronounced tendency towards post-materialistic values
In the last decades, cultural values in Europe, have shifted from predominantly materialistic values to post-materialistic values.[95] Materialistic values give priority to physiological needs and safety & security needs while post-materialistic values emphasise the needs for esteem and self-actualisation (see Figure 4.1).[96] This value shift has been stimulated by growing wealth, extended social security and higher education.

Figure 4.1: Hierarchy of needs: from materialistic to post-materialistic.



Source: Maslow, 2013.

The cultural values are also expected to change in the years to come. Possibly, a further shift from materialistic to post-materialistic values will take place. A reason for this is that the values of today's youngest generation are less materialistic than those of older generations. Another reason is that an increasing number of people is expected to attain higher education. However, the change will be less pronounced than in the last decades because a lower economic growth and a decline in social security are expected.

The possible further shift in cultural values may also imply greater appreciation of natural values and more concerns for the environment.[97] However, this is rather uncertain, since the dualisation of demographic trends and of economic trends (see below) may cause also a dualisation regarding cultural values: in economically successful and densely populated areas people may be more inclined to post-materialistic values while people living in less successful and less densely populated areas may be more inclined to connect materialistic values. The further

[95] Inglehart 2008.
[96] Maslow 1943.
[97] Farjon et al. 2016.

development of the infrastructure for social media and other information and communication technology will allow people to be more and more connected 'always and everywhere', not only in urban areas but also in natural areas.

Moderate economic growth and increasing disparities between countries and regions

Overall, the EU economy seems to have recovered from the economic crisis that followed the financial crisis (which started in 2008). The current growth rate, however, is lower than before the crisis: economic growth was 1.5% in 2014 and 2.5% in 2004. However, there are large differences between EU Member States and regions. Metropolitan and other urban areas are relatively successful; particularly those in the so-called Pentagon, the economic core region of the EU delineated by Paris, London, Hamburg, Munich, and Milan. Some eastern Member States have shown continuous growth rates, even during the economic crisis. Peripheral regions, however, in the east and particularly in the south of the EU are still in the midst of the crisis.

In the years to come, the economy of the EU will grow moderately. The OECD expects that in the years up to 2050 average Gross Domestic Product per capita will grow between 1.5% and 2.5% per year.[98] It is uncertain, however, whether or not a next economic crisis will occur in the coming years and whether or not this crisis will be even more serious than the last one. The structure of the economy will further shift towards a service and knowledge economy and away from the production economy.

Limited growth in demand for built-up areas is expected. Photo: Image Select

Disparities between countries and regions are expected to grow further, particularly in eastern Europe. In the Pentagon, economic growth will remain but will not be high. Urban areas in eastern Europe will show higher growth. Peripheral areas, however, particularly in eastern and southern Europe, will show only very little growth.

[98] OECD 2014.

The moderate economic growth, the further shift towards the knowledge economy and a further increase in people working from home will cause a limited growth in the demand for industrial spaces and office spaces and consequently for built-up areas. These trends will alleviate environmental pollution caused by emissions of carbon dioxide, sulphur dioxide and nitrogen oxides. Furthermore, technological developments and environmental policies, will help to decouple resource use, waste production and environmental pollution more and more from economic production and also from household consumption.

Continuing intensification and extensification of agriculture

Over the past 25 years, the surface of agricultural land has decreased throughout the EU. Presently, agriculture covers about 45% of land in Europe.[99] In recent years, food production has been characterised by two opposing trends: intensification and extensification, amplified by increased competition on the world market. Intensification has caused an increase in food production, despite a decrease in farmland. In the north-western part of the EU, fertiliser use in intensively farmed areas has declined over the last decade, but in the eastern part, there has been an explosive increase since 1990.[100] Extensification has primarily been caused by the abandonment of less productive farmland, particularly in mountainous areas.

Uptake of innovative practices, such as precision farming is expected to increase. Photo: Hollandse Hoogte

The contribution of the agro-food sector to the economy is expected to become smaller in the years to come, but the output of the sector will grow with 10 to 20%.[101] For the period up to 2050, both trends of intensification and extensification are expected to continue.[102] Intensification will most of all take place in eastern

[99] Prins et al. 2017.
[100] EEA 2015a.
[101] Lotze-Campen et al. 2014.
[102] MCRIT 2014.

Europe, and is likely to cause more extensive use of nitrogen and more removal of landscape elements, such as hedgerows and tree lines.[103] Abandonment of farmland is most of all expected amongst small farms in less suitable mountainous areas. In many cases these farmlands will spontaneous renature.

Expectations on the use of farmland range from remaining stable to slightly decreasing towards 2050. The promotion of biofuels by energy policy tends to keep areas under production that would otherwise have been abandoned.[104] The use of pesticide across Europe is expected to decline further in the future. This is caused by environmental policy and agricultural policy and by the diffusion of innovative practices, such as precision farming. Over-fertilisation in western Europe is therefore expected to decline. Water bodies, however will continue to be polluted by groundwater that has been 'loaded' with nitrogen in the past. In eastern Europe application of fertilisers is likely to increase and is expected to lead to a continued pollution of water bodies. Ammonia emissions are expected to remain more or less the same in the years to come.

A breakthrough of the circular economy may offer agriculture a new perspective.[105] The circular economy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy via innovative and efficient technologies, such as robotics. This could lead to higher resource efficiency and to reduced emissions of nutrients and chemicals. Such a breakthrough could happen if negative externalities are included in production costs and if provided subsidies take these externalities into consideration.

Increasing forests and further development of sustainable forestry

Over the last years, in most regions throughout the EU, wood processing and paper production have increased. The volume of wood has grown, since the growth in the numbers of trees within forests have increased more rapidly than in forest area.[106] Forest management has changed towards greater integration of natural aspects. For instance, under sustainable forestry, trees are being felled more selectively.

Pressures to increase the intensity of forest management will continue. Wood and paper consumption in the EU are expected to increase in the immediate future before stabilising after 2030. Wood demand for energy will increase, too, until 2030. Whether the use of wood for energy production will increase after 2030 is highly uncertain and depends on developments in the energy system and future energy policies. Due to fragmented ownership and the multifunctional use of forests, it is uncertain to what extent the increased demand within the EU can be met domestically or by more imports from north and south America or the Russian Federation. In any case, global demand is projected to grow, leading to higher pressures on both the global and domestic markets. Forests areas are projected to increase by more than 5% between 2010 and 2050 due to abandonment of farmland. The improved productivity of forestry will lead to a further increase in felling.

[103] Focus on Nature 2016.
[104] Prins et al. 2011.
[105] Hawken 2010.
[106] UN et al. 2011.

Sustainable forestry by selective cutting. Photo: Image Select

Further mobility growth but less environmental pollution

Over the past decades, mobility has continuously grown throughout Europe — not only due to economic growth, but also because of the expansion of the European Union. Road transport is by far the most preferred transport method for inland freight and passenger transportation; in 2010, 75% of freight and 85% of passengers were transported by road. For inland shipping, the numbers are much lower: in 2010, only 5% of freight was transported over inland waterways.[107] The economic crisis reduced freight and passenger transport, but since the economic recovery, transport is growing again, albeit at a moderate pace.

In the years to come, mobility is expected to grow further at a moderate pace because economic growth is expected to be limited and the EU is assumed not to be further enlarged. This is particularly expected for long-distance freight and passenger transport.[108] In the years up to 2030, all corridors of the Trans-European Transport Network will be completed and after that period the network may be further extended.

Despite the expected further growth in mobility less carbon dioxide will probably be emitted in the years to come. The introduction of new propulsion technologies and the increasing use of biofuels instead of fossil fuels, both stimulated by EU climate policy, will play important roles. Emissions of nitrogen oxides will be reduced because of the expected introduction of low emission vehicles. Introduction of these vehicles will be stimulated by more stringent emission standards. The possible breakthrough of the electric and autonomous car may further reduce emissions of carbon dioxide and nitrogen oxides. The building of roads and railways to complete the Trans-European Transport Network, however, may lead to further fragmentation of natural areas and cultural landscapes. And the creation of some new canals, which is also part of the completion of the transport network, may further disturb hydrological regimes in non-fragmented rivers and related floodplains.

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[107] Eurostat 2012.
[108] MCRIT 2014.

Electric cars will reduce emissions of greenhouse and other gases. Photo: Hollandse Hoogte

Transition towards low carbon energy production

In the first years of the 2000s, energy consumption remained unchanged, but at the end of the decade energy consumption decreased because of the economic crisis. Since the recovery of the economy, energy use is slightly increasing again. Fossil fuels continue to dominate European energy production. Higher environmental standards and new air cleaning techniques are applied throughout the EU though. Moreover, renewable energy (wind, solar, biomass) has increased substantially and energy efficiency has also improved.

In the coming decades, considerable changes are expected. This is driven by the ambition of the EU to realise a low carbon economy and a European energy union by 2050. [109] Although energy consumption is projected to remain at the current level, energy production is expected to undergo a transition.[110] Driven by the aims to provide a strong stimulus to renewable energy and to reduce the energy dependency of the EU, renewable energy is expected to increase up to half of the electricity production. Wind will play an important role in electricity production, whereas biomass and waste will become the most important sources of renewable energy for steam and heat supply. Solar capacity is expected to increase eightfold, but hydropower will only slightly increase.[111] Some neighbouring countries have higher ambitions in this respect. The western Balkan countries have adopted many plans for hydropower. Implementation of these plans, however, is uncertain due to environmental concerns and lack of financing.

[109] European Commission 2011.
[110] MCRIT 2014.
[111] European Commission 2013.


Energy transition will have an influence on historic cultural landscapes. Photos: DPI

Since the use of fossil fuel is expected to be limited, the emissions of carbon dioxides, sulphur oxides and nitrogen oxides by the energy sector will also be significantly reduced. The building of giant wind parks and/or solar fields, however, is expected to have an influence on historic cultural landscapes. Second and third generation biomass is not expected to compete with food production or to lead to deforestation or land conversion at the expense of natural areas.[112] In the next decades many dams for hydropower will have to be replaced, providing opportunities for improving hydrological conditions and fish migration.

At the same time, however, large artificial reservoirs for energy storage and cascades of dams for hydropower are planned in central Europe. Moreover, in many Member States the number of dams in small rivers and streams is expected to grow. These developments may have serious consequences for hydrological systems as well as fish migration. The ambitions of the western Balkan countries to build new dams may also have large hydrological consequences and seriously limit fish migration in some river basins in the EU, for instance in the Danube.

Increasing impacts of climate change

Climate change has become more and more visible in climate statistics and it has also become more widely accepted that climate change is mainly caused by human activities. It is most of all caused by burning of fossil fuel, agriculture and deforestation.[113] In Europe, average temperature has risen and precipitation patterns have changed, with an increase in northern Europe and a decrease in southern Europe. These changed patterns in their turn have led to changed seasonal cycles.

Various climate scenarios have been published, which estimate global temperature rises in the period until 2100 between 1.5 and 6 °C compared to pre-industrial levels. Without substantial reductions in greenhouse gas emissions the climate is expected to change according to the higher ranges of these scenarios.[114] The trend scenario assumes a temperature rise of 2 °C up to 2050 and to 4 °C by 2100. The agreements which have been made during the Conference of Parties in Paris in 2015 are not included in this scenario. These agreements aim at slowing down the temperature rise to 2 °C in 2100.

[112] EEA 2015a.
[113] EEA 2015a.
[114] IPCC 2014.

Climate change is expected to cause higher precipitation levels in winter seasons, particularly in northern Europe. More frequent and longer dry spells are expected in summer seasons, especially in southern Europe. The impacts of climate change are diverse, depending on local circumstances. For instance, climate change is expected to cause higher forest productivity levels in central and northern Europe due to higher temperatures and lower productivity in southern Europe due to increased drought stress.[115] Climate change is also expected to cause changes in the seasonality of river flows. Higher river flows are most of all expected in northern Europe, while lower flows are expected in southern Europe. Furthermore, climate change is expected to lead to more frequent and more extreme natural hazards, such as floods and heatwaves across Europe. It is unknown, however, what will have more impact: the gradual changes or the extreme events.

Natural hazards, such as floods, are expected to happen more often. Photo: Image Select

4.2 Expected impact on challenges

The previous section presents a possible future course for eight socio-economic and physical trends and their expected influence on nature. This section gives an overview of the impact of these trends on the policy challenges, which are identified in Chapter 3. In this report, four challenges are taken into consideration. In the synthesis report the first and the second challenge have been combined. This has been done for pragmatic reasons: in many cases nature policies aim at ensuring both space and good conditions for nature.

Decline in unspoiled nature is expected to continue

As a result of the trends described above, a further decline in unspoiled nature is expected. In urban areas and other economically successful areas growing demand for dwellings, second homes, office spaces, and industrial spaces will cause a growing demand for built-up areas. In these areas, not only transformation of farmland is expected but also further fragmentation of natural areas and historic

[115] Reyer et al. 2014.

cultural landscapes and transformation of natural areas and cultural landscapes into built-up areas. The building of roads and railways to complete the Trans-European Transport network may also lead to further fragmentation of natural areas and loss of historic cultural landscapes. Furthermore, the building of (giant) wind parks and/or solar fields to generate renewable energy on a large scale will affect cultural landscapes.

In northern and southern Europe and in mountainous areas further abandonment of farmland will cause strong increase of forests be it at the expense of grasslands. And in peripheral areas and other economically less successful areas the demand for built-up areas will further shrink, providing opportunities for restructuring and greening urban districts.

The trends are also expected to cause a further decline in biodiversity, although differences are expected, depending on regional and local circumstance.[116] In most parts of Europe there will be a further loss of biological diversity. This loss will be greatest in central parts of France and Spain, central Europe, and the Balkan. Regions that probably experience a biodiversity gain because of changing climatic conditions are the northern parts of the Nordic Countries, parts of central Europe and mountainous areas, such as the Alps, the Pyrenees and the Carpathian Mountains.

Negative impacts of human activities will be reduced but not enough to halt biodiversity loss

Overall, the negative impacts of human activities on nature will be reduced in various ways, but this will not be enough to halt biodiversity loss. The emissions of carbon dioxide, sulphur dioxide and nitrogen oxides by the energy sector will be reduced since the use of fossil fuels by this sector will be limited. The moderate economic growth, the further shift towards the service economy and the further increase in the number of people working from home will also contribute to a reduction in these polluting gases. Furthermore, transport is expected to emit less of these gases due to higher environmental standards, new propulsion technologies and the increasing use of biofuels instead of fossil fuels. Despite these efforts, climate is expected to change up to 2050 because of the delayed effect of several factors with an impact on the climate.

The use of chemical fertilisers and pesticides by agriculture in intensive agricultural areas is expected to decline further due to environmental policy, agricultural policy and the diffusion of innovative practices.[117] In eastern Europe, however, the use of fertilisers will continue to grow due to further intensification of agriculture.

Resource use, waste production and environmental pollution will be further decoupled from economic production and household consumption. This will particularly be caused by environmental policies and technological developments.

It is assumed that current environmental standards for water bodies will be complied with throughout Europe in 2050. Besides, the planned replacement of many dams for hydropower will provide opportunities for improving hydrological conditions and fish migration. However, the planned large artificial reservoirs for energy storage and cascades of dams for hydropower and the expected increase in the number of dams in small rivers and streams may have serious consequences for hydrological systems as well as fish migration. The ambitions of the western

[116] EEA 2015b; Prins et al. 2017.
[117] EEA 2015b.

Balkan countries to build new dams may also have large hydrological consequences and seriously limit fish migration in some river basins in the EU.

Although the negative impacts of human activities on nature will probably diminish towards 2050, biodiversity loss is not expected to halt because of the accumulation of pollutants and delayed effects. Although some species, such as butterflies, will benefit from the combined effects generated by the trends, the majority of the species, particularly plants, are expected to show a moderate to strong decrease.[118]

Integration of utilisation value of nature into business and nature management will hardly change

The utilisation value of nature can be defined in terms of ecosystem services. On the one hand, nature provides many benefits for the economy and society as a whole, such as natural pollination and carbon sequestration. On the other hand, the utilisation of nature may generate more financial resources for nature management. Overall, in Europe, the trends described in the sections above cause few changes in the services provided by nature up to 2050. Besides, in this trend scenario current policies are expected to be continued, not to be intensified. On regional and local levels, however, greater changes may occur. The changes also differ per service.

Throughout Europe, erosion control through natural vegetation will increase due to afforestation. In central and southern Europe and in the Alpine areas, however, less erosion control will be provided by vegetation than in other parts of Europe.[119]

Overall, water retained by vegetation to control flooding is expected to decline, but trends are mixed across Europe. Reforestation and land abandonment, particularly expected in southern Europe, will cause an increase in the amount of water that is retained, while intensification of croplands, especially expected for western Europe, causes a decline in retained water.[120]

Carbon sequestered by vegetation will particularly occur in Scandinavia and the Mediterranean. This will mainly be caused by abandonment of farmland and increased land cover by forests. In parts of western and eastern Europe, however, not much carbon will be sequestered.

Natural pest control and pollination will slightly decrease due to the intensification of agriculture and the decrease in green elements across Europe. In central and eastern Europe, natural pest control and pollination is expected to play a larger role than in western Europe.

Recreation is expected to increase across the continent. This will be caused not only by growing demand but also by growing supply, which is particularly provided by afforestation. Recreational capacity will be highest in northern and southern Europe. This particularly provides opportunities for generating more financial resources for nature management in these parts of Europe.

Whether people will be more connected with nature and related policies will depend on the region they live in

Two trends may strengthen the connections of citizens with nature and nature policy in Europe. The possible further shift in people's values towards post-materialism may cause a greater appreciation of nature and more environmental

[118] Prins et al. 2017.
[119] Prins et al. 2017.
[120] Stürck et al. 2015.

concern among citizens. And the expected recovery of the economy may make it easier to put environmental issues, including nature protection, higher on the societal agenda.

The further diffusion of social media and other forms of ICT is also expected to provide more opportunities to connect citizens virtually as well as physically with nature. For instance, new social media or new computer games focused on nature may help to increase public awareness and by doing that increase participation of citizens in nature policies and other activities related with nature.

The dualisation of demographic and economic trends, however, is expected to cause also a dualisation in this respect: in economically successful and densely populated areas people may be more inclined to post-materialistic values while people living in less successful and less densely populated areas may be more inclined to materialistic values.

The dualisation will make it also more difficult to connect citizens more to nature and nature policy in another respect. In urban areas and other economically successful areas the demand for green areas will grow, but green areas will be become less accessible for people since these areas are expected to become less available and more expensive to realise. At the same time, in peripheral areas and other economically less successful areas the possibilities for creating green areas will increase but the demand for green areas will shrink.

5 Perspectives on the future of nature

This chapter gives an overview of the four perspectives described in the Nature Outlook: 'Strengthening Cultural Identity', 'Allowing Nature to Find its Way', 'Going with the Economic Flow', and 'Working with Nature'. Each perspective tells and visualises an alternative storyline about a desirable future state of nature in the EU and the pathway that may be followed to realise that desired state of nature. The perspectives should not be considered as blueprints.

The perspectives show what nature could be realised when a certain coalition would take the lead, would cooperate in the described way and would take the proposed measures. Existing views of nature are stretched. By doing this, new possibilities may come in sight in terms of coalitions, modes of governance and measures. In this way, the perspectives can help policymakers and stakeholder involved in nature policy and related policies to jointly find new answers to the policy challenges they face. As a set the perspectives explore the normative uncertainty regarding the desirable futures of nature. They differ from the trend scenario which explores (to some extent) the cognitive uncertainty related to future socio-economic and physical trends and their impacts on nature.[121]

Each perspective presents a set of principles (*why*), a desired state of nature that may be realised in 2050 applying the principles (*what*), and a pathway that could be followed to reach that state of nature up to 2050 (*how*). The principles consist of the values guiding the perspective and the major policy challenges the perspective responds to. The description of the desired state of nature includes a narrative of the general state of nature in the EU and also of the states of nature in nature, river, rural and urban areas. Parts of the principles can be translated into spatial effects which can result in land-use changes or changes in the forms and structures of the landscapes. The pathway comprises the circumstances and coalitions that may cause changes of nature policy in the years up to 2050, the mode of governance that may be applied to realise the state of nature in 2050, and the measures that may be taken by nature policy and related policies. These elements of the perspectives are illustrated in text boxes, providing examples and descriptions or explaining principles.

Spatial aspects of the perspectives have been visualised by using various elements: icons, artist impressions, photos, and maps. Visualisation elements have been chosen in accordance to the spatial level: maps are most proper visualisations of the regional level and visuals and photos on the local level. As has been remarked in Section 2.3, the icons represent the main messages of the perspectives in a symbolic way.[122] Computer generated visuals (presented at the beginning of Chapters 6 to 9) show what natural areas, river areas, rural areas and urban areas may look like, according to the perspectives. The photos are used to emphasise important aspects of the perspectives. Finally, the maps indicate what nature, river, rural and urban areas may look like, depending on what type of nature may occur.

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[121] Dammers et al. 2013a.
[122] Tisma et al. 2012.

By way of introducing the perspectives, Table 5.1 provides an overview in key words and Table 5.2 by showing maps. The text below gives brief summaries of the perspectives; Chapters 6 to 9 give elaborate descriptions and visualisations. The perspectives should not be considered as blueprints: each presented state of nature and each pathway provides just an example of what policymakers and stakeholders could realise and how they could do this.

According to *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. Green in cities is well-designed and at people's doorstep. Landscape aesthetics are important and characteristic elements, such as hedgerows and stonewalls, 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 regional nature. The landscape can be experienced, for example, by cycling, sailing, angling and paragliding.

Old cultural landscapes are cherished. Land owners receive support to preserve them. New landscapes are created, for example through redevelopment of abandoned industrial areas and harbours, and by making (former) canals more attractive. Local communities take the initiative, particularly groups of citizens, farmers and entrepreneurs in the leisure sector. Regional authorities facilitate these groups and coordinate the initiatives, as landscape is considered a public good. The EU supports local and regional initiatives by co-financing them and by stimulating the exchange of knowledge and experiences.

In *Allowing Nature to Find its Way* the intrinsic value of species and habitats is highly valued. Nature should have its own space and time to develop. Plants grow where they fit the best, water flows freely and animals have room to migrate. To give room to dynamics, an extended nature network including wildlife corridors and rivers has been developed. 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 sturgeons and people like to experience nature's tranquillity and greatness. From this perspective, natural elements within cities also have a 'wild' and dynamic character, with parks and rivers boasting a wide diversity in plants and animals.

National investment programmes, co-financed by the EU, help to realise the extended nature network. New wild nature is connected to socio-economic agendas, offering new income sources from ecological tourism, and sustainable forestry, hunting, and outdoor sports. Rewilding could be an alternative to farming in remote areas where farm income is low. Public authorities develop the local agenda together with local inhabitants, landowners, farmers, foresters and tourism entrepreneurs. Governments invests in dynamic nature systems. The coordination of initiatives is provided at supra-national level to ensure that all initiatives together lead to a coherent nature network.

Table 5.1 An overview of the perspectives in key words

Perspectives Elements	Strengthening Cultural Identity 	Allowing Nature to Find its Way 	Going with the Economic Flow 	Working With Nature 
Guiding values	Love of places where people live; nature is part of community	Intrinsic value of nature; people are responsible for diversity of species	Individual freedom of choice in how to care for nature	Services of nature are essential for human life and the economy
Policy challenges	Reversing decline of cultural landscapes Boosting connections between nature and communities	Reversing decline of areas of unspoiled nature and decline of biodiversity	Connecting other sectors more with nature Engaging citizens more with nature	Limiting negative impacts on nature Connecting other sectors more with nature
General state of nature	Natural is always nearby and accessible	European nature network is realised and 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
Natural areas	Natural areas have a well-developed recreation infrastructure	Extended European nature network has been realised	Nature outside reserves protected by private initiatives	Natural areas have increased and are in a good condition
River areas	In river areas water recreation and cultural heritage are upgraded	Rivers, lakes and coasts have become more natural	Rivers are optimised for navigation, energy production and irrigation	Rivers have been renatured to better prevent floods
Rural areas	In rural areas landscapes elements have been (re)introduced	Abandoned farmland has deliberately been changed into wild nature	Rural areas are dominated by industrial farming	In rural areas nature and agriculture are highly integrated
Urban areas	In and around cities many attractive and accessible green and blue spaces are found	Nature flows through cities, largely unperturbed by them	In cities well-designed parks, small parks, guerrilla gardens and temporary nature are found	In and around cities many functional green and blue spaces are found
Conditions and coalitions	Homogenisation of landscapes trigger care for regional qualities	Further biodiversity loss stimulates development of extended nature network	Priority of economic growth leads to liberalisation of nature policies	Trends with high impacts on nature trigger a transition towards green society
Modes of governance	Local and region communities have taken the lead	Governments have taken the initiative and are responsive	Governance is dominated by private initiatives	Green pioneers in various value chains have taken the lead
Measures and actions	Regional Quality Teams and Regional Quality Funds help to boost cultural landscapes	National and European investment programmes help to realise extended nature network	Many natural areas and city-parks are privately managed and funded	Ambitious transition programmes stimulate innovation networks on all levels

According to *Going with the Economic Flow,* the focus is on nature that suits people's individual lifestyle. Public authorities are only responsible for a basic network of natural areas (the current Natura 2000 areas), while businesses and citizens take the initiative in nature development outside these areas, for instance, for leisure or health or as an attractive living environment. Upmarket private estates are developed with villas, shady tree lanes, meadows and lakes. Residents can enjoy the tranquillity of these areas, 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 production and wood production, on the best soils.

Nature managers have created ways to generate funds to co-finance nature conservation and development, for instance, in the form of upmarket nature adventures or production of wind energy in natural areas. Initiatives are primarily undertaken by private actors, such as businesses, nature organisations, philanthropists or private landowners. Government's first role is to protect the backbone of natural areas and to guarantee no net loss of biodiversity, for example by compensation for the degradation of nature reserves. Governments also stimulate private initiatives for nature protection and efficient use of natural capital.

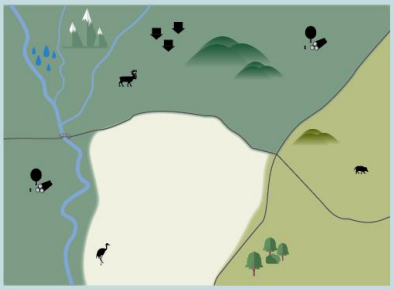
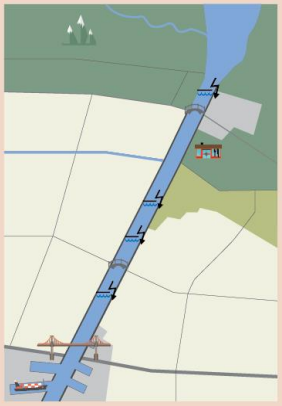
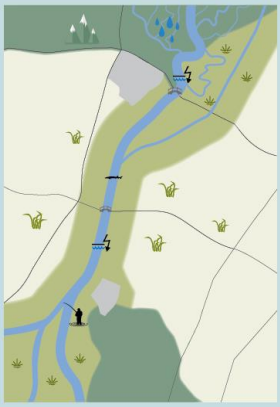
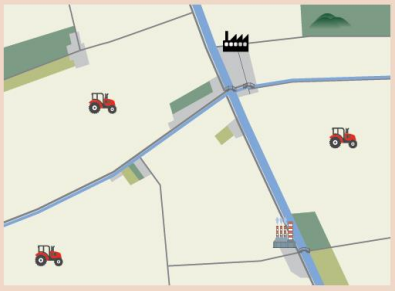
In *Working with Nature*, functions of nature are considered the basis for human life and human beings are seen as part of natural systems. People work with natural cycles and strive for an optimal, long-term delivery of services by natural systems to society and the economy. Agriculture relies on biological processes with respect to soil, pollination and natural pest control. Integrated agricultural and forestry systems are common in dry regions. Cities contain many trees, plants and water streams, providing fresh and cool air for their inhabitants. Upstream forests, bogs and marshes and wide riverbeds decrease the risk of flooding.

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. Citizens behave as conscious consumers, with a healthy diet that contains less meat. Green pioneers from business, finance, health and nature organisations, citizens' organisations and research, all have been cooperating in the transition towards a green society. Governments stimulate innovations and innovation networks by financing research and development, by introducing dynamic environmental norms, and by pricing external effects (costs) and ecosystems services (benefits).

Table 5.2 Maps showing what structure, form, function and land use may look like, under the four perspectives. Source: PBL

	Strengthening Cultural Identity	Allowing Nature to Find its Way
Nature areas		
River areas		
Rural areas		
Urban areas		

Table 5.2 Maps showing what structure, form, function and land use may look like, under the four perspectives. Source: PBL

Going with the Economic Flow	Working with Nature	
		Nature areas
		River areas
		Rural areas
		Urban areas

Natural area, river area, rural area and urban area in the perspective Strengthening Cultural Identity. Images: AENF Visuals

6 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, their 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 to produce regional products. Many investments are made in maintaining and developing urban green-blue infrastructures, accessible nature areas, and rural landscapes.

6.1 Guiding values and policy challenges

In Strengthening Cultural Identity nature is viewed in a broad sense, including greenery and landscapes, and it is considered important for the identity of local communities. Nature expresses the love for beauty of the place where people live. This place is considered 'ours' and the protection of it a shared and collective responsibility.[123] The love for the place where you belong to is rooted in typically European conceptions, such as sense of place, slow food, territorial capital and the believe that cultural diversity is one of the key values of the continent that should be cherished. Nature is not only considered as a precious remnant of the past, but also as something that is shaped in the present and that provides the landscapes of the future.

The identity of communities consists of features, such as physical landscapes, traditional land uses and intriguing stories about the region. There is respect for a centuries old oak tree, curiosity about the remains of an old castle and the pride of the tradition providing local and regional cuisine. In addition to the conservation of traditional landscapes there is also the design or restructuring of places.[124] The conversion of former harbour areas, industrial sites and office areas into green living, working and recreational areas is highly valued in this perspective.[125] Newly developed and well-designed places also contribute to the local and regional identity taking historical developments, physical conditions and aesthetic values into consideration. These places contribute to the cultural history of the future.

The main policy challenges explored in the trend scenario and addressed by Strengthening Cultural Identity are reversing the decline of nature, particularly the decline in 'unspoiled' cultural landscapes and restoring and strengthening the

[123] Scruton 2016.
[124] VOLANTE 2015; RLI 2016.
[125] Perez et al. 2015.

connection between nature and communities in so-called 'living landscapes' and 'lively cities'. It is considered important to reply to the trend of further fragmentation and conversion of cultural landscapes into agrarian production areas in highly productive regions and into built-up areas in densely populated regions. In peripheral regions, the further disappearance of cultural landscapes by farmland which is abandoned and changed into woods must also be dealt with.

The expected increase in urban populations makes it important to upgrade and extend green and blue spaces – called 'green-blue infrastructure' – in urbanised areas.[126] The composition of the population has an impact too: trends, such as migration, gentrification, urbanisation and counter-urbanisation bring new dynamics in the countryside and in cities alike. Since the love of beauty of the places where people live is considered the most important motive for protecting cultural landscapes, it is believed that local communities are best equipped to deal with these challenges.[127]

6.2 State of nature in 2050

Nature is always nearby and is used in various ways
In 2050, nature is always nearby and accessible to people and is used in various ways: experiencing the beauty of landscapes, producing regional products, experiencing the beauty of landscapes, socialising with others, outdoor recreation, and education. By mid-century, landscapes are much greener and diverse and fulfil many more functions than today or in the trend scenario, in particular in agricultural and metropolitan areas. More green and blue spaces have been created to allow people to experience nature and to feel connected with it. Networks and patches of semi-natural habitats, such as meadows, hedges, heathlands and wood pastures are frequent around large cities, towns and villages. Historical vestiges, such as old farm houses, rural estates, industrial heritage and former railways are integrated with nature and they are conserved and redeveloped, for instance, as offices, hotels, wellness centres, cultural hotspots or recreational infrastructure.

Conserved cultural history (left) and newly created cultural history (right). Photos: Thinkstock and Hollandse Hoogte

Conversion of nature into farmland and fragmentation of nature into built-up areas or agricultural areas is not at stake anymore, especially not in large metropolitan areas. In remote areas, land abandonment hardly occurs anymore as many people have rediscovered the countryside to reconnect with nature and to practice a slower way of living. New economic activities have come up that build on traditional and

[126] EEA 2015b.
[127] Scruton 2014.

new products with a high added value: tourist services and regional products, such as meat, cheese, wine, and timber.[128] As part of a slower way of living, many people volunteer in nature and landscape management and also in keeping alive and renewing music traditions and other traditions. Under this perspective, and in the trend scenario, many people live closer to nature than they do today and they have more contact with nature.

Nature reflects the expression of a regionally differentiated culture, of various life styles and traditions. The diversity of species and habitats is greater than today and reflects Europe's cultural diversity. Common species benefit from the increase in parks and other green and blue spaces within cities.[129] Agricultural species and habitats benefit from conserving and enhancing cultural landscapes. Old habits and land-use practices are preserved and new ones are created. Their forms and density vary depending on the local circumstances and the caring spirit of the communities. Examples are traditional land use types, such as peatland hay meadows in north-western Europe, species-rich calcareous grasslands in central Europe or steep, terraced mixed cultures in the Mediterranean. Also, well-kept small-scale plots with hedgerows and *boscages* all over Europe represent habitats for many native plant and animal species.

Natural areas have a well-developed recreational infrastructure

In 2050, natural systems which are influenced by extensive use by people flourish in many regions of the EU: (alpine) pasture, coppice woodland, wood pasture, Mediterranean chestnut groves and heathland. Semi-natural systems previously under threat within nature reserves and high nature value farmland, such as pastures, hedgerows, wood pastures and heathlands are maintained and restored. As a result, habitats that are dependent on extensive agriculture, such as pastures, meadows, heathlands, hedgerows, ponds, single trees and coppice lands, have also been maintained and restored. Species associated with these habitats, such as meadow birds, common amphibian species, butterflies and wild bees, have profited. In remote regions, citizens' involvement and local markets for regional products are less dominant than in metropolitan regions. As a result, in natural areas in remote regions, the share of pastures and heathlands is smaller than in natural areas in metropolitan regions.

Natural areas are accessible by well-developed recreational infrastructure including networks of various paths (e.g. floating paths, treetop paths, and historical paths), well-designed visitor centres, high quality regional food and up-market lodging facilities, such as tree hotels. This infrastructure offers many possibilities for experiencing nature during shorter and longer trips and holidays. This infrastructure incorporates cultural heritage, such as old farm houses and pilgrim roads. The vulnerability of natural systems for recreational activities is respected. On the lakes and rivers in nature reserves, people practise a wide variety of water sports, also those that include the use of electric vehicles.

Nature reserves are used for small-scale harvesting of products, such as game, berries, herbs, mushrooms and timber, and for raising traditional domestic animals, such as Iberian pig. Traditional activities, such as hunting and fishing, are supervised by hunting organisations and local communities. New activities related to ICT, such as Gaming for Nature, makes visiting nature reserves more attractive for young people.[130] The large attention to strengthening cultural identity and using natural areas in various ways provides less opportunities for top predators and

[128] European Commission et al. 2014.
[129] Prins et al. 2017.
[130] Gaming for Nature is a virtual game designed to explore nature reserves in a playful way.

other animal species which require specific natural habitats or which are sensitive to disturbance by people.

Treetop path. Photo: Image Select

Under this perspective, by 2050, many forests have changed compared to 2015 and the trend scenario, particularly those near cities. Conifer forests, for instance, have been converted into broadleaved forests.[131] Because of this, forests have become more attractive for outdoor recreation and tourism. They yield fewer but more precious resources, i.e. fewer resources in the form of paper and biofuel, but more for much appreciated handcrafts.

[131] Haines-Young et al. 2011.

Box 6.1: Eco park

An eco park is a large continuous landscape with high natural values and/or cultural values that also serves as an arena for local nature tourism operators. Conservation and development of nature and/or cultural heritage is combined with facilitation of recreation on the landscape level. Some eco parks include whole villages. The size of the park and presence of iconic species make eco parks highly attractive for tourism. Therefore, they are more intensively visited by tourists than regular natural parks, natural reserves or national parks. Ecological and cultural-historical values, however, take precedence over financial values.[132] In the 2010s, eco parks were only found in some Nordic countries. By 2050, eco parks can be found in many other Member States of the EU with large natural areas due to attractive examples and successful promotion campaigns.

Eco-parks are attractive tourist destinations. Photo: Image Select

In river areas and near the coast, water recreation and cultural heritage are upgraded

In many locations, rivers have been restored and recreational infrastructure has been improved.[133] Local identities have been *strengthened* since cultural heritage, such as old dykes, brick factories, and watermills, have been redeveloped. Local identities have also been *renewed* by development of new dykes and buildings designed under (landscape) architecture. This happened by applying landscape art. Many small dams for hydropower and irrigation and small locks for commercial and recreational navigation have been built. These dams and locks have been carefully integrated into the landscapes, for instance, by using traditional materials or by creating new designs. Major dams still dominate the landscape but they are also well-designed.

Unlike in 2015, and more so than in the trend scenario, surface waters throughout Europe meet the standard quality for swimming and are highly accessible for

[132] Pröbstl et al. 2010.
[133] PBL 2012.

various kinds of recreation and tourism. The improved water quality has led to larger populations of dragonflies and common fish species. Rivers are not only used for traditional outdoor activities, such as angling and canoeing but also for new activities, such as supping and hydro-speeding. And beaches are used not only for sunbathing and swimming but also for kite surfing and paragliding.[134] In order to answer the growing need for quality tourism and to withstand the competition with budget resorts, many coastal resorts derive an attractive local identity from redesigned boulevards, hotels and publicly accessible beaches. In many cases, architects and landscape architects with an international reputation have designed them.

Landscape art contributes to a new identity of a river area. Photo: Mediatheek Rijksoverheid

The building of small dams and locks has seriously limited fish migration in many small rivers and streams. In rivers and streams where salmon, trout and eel are important for angling or regional cuisine, fish passages have been constructed and natural water systems have been restored. Particularly in north-western and northern Europe, many hotspots for anglers can be found. In rivers and streams where fish passages are infeasible, farmed salmon and sea trout are restocked. In these waterbodies stocks of salmon, trout, and eel have increased to some extent; other migratory fish species have not benefited much. Large rivers which are important for navigation or hydropower and in which high locks or dams have been built remain largely inaccessible for migratory fish.[135] Examples of this are many rivers in northern and southern Europe and upstream parts of the Danube. In smaller rivers, improved navigability and nature rehabilitation have been combined (see Box 6.2).

[134] UNEP 2007.
[135] Helcom 2011.

Box 6.2 Restoration of small rivers

In the second half of the 20th century, many small rivers were canalised for navigation. Because of this, the natural values of these rivers strongly decreased and the character of the river landscapes changed, dramatically.[136] By 2050, however, various small rivers have been improved for navigation, nature and landscape values have been boosted and possibilities for recreation have been increased.

Restored and navigable small river. Photo: Image Select

During the 2010s, more and more initiatives were started to restore or renew small rivers that had been canalised, taking their multiple functions as a starting point and integrating economic, ecological and sociocultural interests. These initiatives include improvement of navigability for commercial and pleasure vessels, reconnection of meander cut-offs, restoration of river banks, and upgrading the recreational infrastructure. Inland navigation is considered as an environmentally friendly transport mode. River banks have been restored in an ecological way. And the upgraded recreational infrastructures, such as towing paths, cycling paths, and jetties, have stimulated entrepreneurs from the tourism sector and the catering industry also to take many initiatives.

In rural areas, landscape elements have been (re)introduced

In the last century, agricultural areas tended to become more mono-functional and intensively used, producing uniform landscapes. In Strengthening Cultural Identity this trend is reversed. By 2050, rural areas have become more attractive for local people and visitors, because many landscape elements have been reintroduced. Inspired by the 'villages fleuris', many local communities throughout Europe have embellished 'their villages' by flower beds and flower boxes. Around villages and towns, wooded banks, stone walls, waterways and characteristic buildings, such as old monasteries and rural estates have been conserved and renewed.[137] By doing this, local communities have strengthened the local characteristics and promoted the local identity of 'their areas'.

Agricultural areas around cities are used less intensively, are not so large-scale and much more diverse than in 2015. By mid-century, they will contain many landscape

[136] http://www.seineschelde.be/nl/inhoud/rivierherstel.
[137] PBL 2012.

elements, such as hedgerows and field margins, and provide various services for city dwellers, such as regionally grown food, recreational facilities and health care.[138] Many agricultural areas that were under threat of abandonment in 2015 (remote areas) or already had been abandoned (mountainous areas) have been recolonised by people from elsewhere. Some of them have found new opportunities to work with natural resources, others have gone back to their roots, and still others have bought – historic or newly designed – second homes or cottages.

These areas provide high quality regional food, construction materials, green tourism and wellness. Vineyards, pastures and woodland pastures have expanded at the expense of shrubland and woodland encroaching former farmland. Since droughts occur more often due to climate change, the supply of water has improved, less-water-demanding crops have been introduced and more and more fruit and orchard crops are protected from direct sunlight; in many cases, by trees, particularly in southern Europe.

Rural estate used as health centre. Photo: Image Select

Rural areas near cities provide large potential markets for locally produced and regional branded food and are more varied in use and forms than today. In rural areas under threat of declining population, local energy production provides another revenue model for farmers and the rural population. Wind, solar, hydropower and biogas installations are small-scale and designed to fit with regional characteristics.[139] There are no large wind farms, just single village windmills. The design of these mills differs regionally. They are no longer considered as aesthetic pollution.[140]

[138] Ege et al. 2014.
[139] Sijmons at al. 2014.
[140] Scruton 2016.

Box 6.3: Revitalising remote rural areas

Sheep that can be adopted. Photo: DPI

By 2050 many remote rural areas in Europe which were under threat of an ageing and declining population have been revitalised. Citizens, farmers and other entrepreneurs in these areas have taken various initiatives to turn the tide. People who lived in towns or cities have bought and renovated houses in attractive old villages. Farmers have changed their farming practices and produce high quality local food. And entrepreneurs from the recreational sector started to provide various agro-tourism arrangements including accommodations, restaurants, walking packages, educational activities and so forth. Visitors and other people can adopt goats, sheep and cows, for instance, to maintain the herding of cattle in the mountains. In return they, receive local products or they can use agro-tourism arrangements. These local initiatives have helped to continue traditional farming practices, to preserve livestock breeds, to conserve unique landscapes and to strengthen the socio-economic vitality of remote rural areas.

In and around cities many attractive and accessible green and blue spaces are found

By 2050, cities (and towns) have good living areas with more pronounced and characteristic green and blue spaces than today. The ongoing urbanisation has stopped as people rediscovered the revitalised countryside as a place to reconnect with nature. In and around cities, there are attractive and accessible green and blue spaces, including green schools, public parks, renatured rivers and recreational lakes extending beyond the urban fringe.[141] The green and blue spaces underpin the cultural identity of the cities by their marked design. Vis a vis these spaces, many amenities, such as kiosks, restaurants and hotels are found and many workspaces, museums and hospitals are located in the proximity of them. The identity of such spaces has been boosted by art, architecture and landscape architecture. City centres – considered as showcases of the cities – are decorated

[141] CGDD 2013.

with monumental trees and avenues – considered as entrances of the cities – are lined with robust indigenous trees, giving them vernacular style.

Example of what may be considered a well-designed city park. Photo: Image Select

The intensified relationships with the natural environment in and around cities creates new possibilities for local economies. Throughout the cities there are markets, where regionally sourced produce is celebrated. Former harbours, industrial sites and office districts have been recolonised and renatured (see Box 6.4). In low density neighbourhoods and business areas, green and blue spaces, such as community gardens, urban farms and natural playgrounds, provide attractive nature at the doorstep of urban residents. Woods nearby cities have increased and are well-preserved and rivers and lakes have renatured banks and upgraded recreational facilities.[142] They provide all kinds of possibilities for recreation and other outdoor activities.

The abundance of green and blue spaces also provides ample possibilities for strolling, walking, sporting, green learning and urban gardening. Community sharing of parks and gardens stimulates social cohesion and care for elderly with chronic health problems. Parks, gardens and trees provide comfortable shady lanes in summer and protection against the chilling wind in winter. Species that are typical for built-up areas, such as the house sparrow, the swift, and various bat species, have recovered from decline.

[142] EEA 2016a.

Box 6.4: Reuse and renaturing of areas that have lost their function

By 2050, many former harbour areas, industrial sites and office districts have been recolonised and renatured, following Berlin Tempelhof as an example. At the beginning of the 20th century Tempelhof was a meadow for sheep grazing on the southern edge of Berlin. From the 1920s onwards, it developed into an airport. With the political changes at the end of 20th century, and the modernisation of air traffic, it was decided to expand Tegel airport and Tempelhof lost its function. At the end of the 2000s, the airport was closed and the State of Berlin acquired the property. Initial plans of the Berlin Senate aimed for the development of the airport for building more than 4,500 houses.

Berlin Tempelhof in 2050. Image: Corbis

However, grass root movements mobilised thousands of citizens to vote in a referendum against the government plans. Tempelhof opened to the public in 2010 as a leisure space, quickly becoming popular with kite flyers, cyclists, skaters and skateboarders. The area consists of almost 400 hectares of tarmac runways and green space and have been developed as a public area for recreation and nature. The edges of the former airfield, the existing airport buildings and the emerging park landscape merged to form 'Tempelhof Freedom'.
The airport buildings and hangars as well as the typical open spaces were protected as a national monument. At the edge of the area, property developers created new building quarters. By 2050, the former airport has become a lively hub, where living, culture, nature, leisure and the creative economy go hand in hand. Tempelhof has become an example for recolonising and renaturing many harbour areas, industrial sites and office districts which were no longer used throughout Europe.

6.3 Pathway to 2050

Homogenisation of landscapes triggers care for regional qualities
In Strengthening Cultural Identity some trends have initially caused further homogenisation of landscapes and degradation of local communities. But these trends have triggered various reactions, particularly among citizens, farmers and other entrepreneurs, to turn the tide.[143] In densely populated regions cultural landscapes have been further fragmented and converted into agrarian production areas or in built-up areas. At the same time, ongoing urbanisation has led to an increasing demand of urban inhabitants for green and blue spaces. In regions in which farmland has been abandoned cultural landscapes have continued to disappear. The sense of community has been lost by ongoing globalisation of social life and the economy. At the same time, growing welfare has stimulated the

[143] Schwarz 1996.

environmental and social awareness of people. This has gone along with a higher appraisal of the qualities of the living environment.

These trends have triggered local communities, particularly groups of citizens, farmers and other entrepreneurs, to take the initiative in caring for their surroundings, more than they do today or in the trend scenario.[144] Citizen groups have decided to care more for nature and landscapes and, by doing that, for the identities of 'their places' or 'their regions'. Farmers and other entrepreneurs have increased their business related to economic activities, such as food, tourism, and culture, not only in urbanised regions but also in remote rural areas. Local authorities have become more aware of the importance of green and blue spaces attracting companies, tourists, and residents. And regional authorities have become more interested in making their regions socially and economically vital. They have actively lobbied with the national governments and the EU for regionalising policy implementation, stimulating local initiatives and providing more funding.

Some nature organisations had already a tradition of taking care for cultural landscapes. Other nature organisations were initially hesitant because they feared a further decline in biodiversity, but these organisations became convinced by good examples of communities caring for nature and eventually became highly engaged. Modernised farmers initially feared a limitation of their business, but they gradually were convinced that they can earn an income with investments in landscape elements and that these investments provided them a 'licence to produce'. Traditional as well as social media contributed to this by frequently reporting on iconic examples of improved landscapes and cityscapes.

Local and regional communities have taken the lead

A mode of governance that fits well in Strengthening Cultural Identity is *community governance*: local citizens, business and governments cooperate to conserve and create regional qualities.[145] Farmers, other entrepreneurs, and citizen groups work together in various collectives by sharing resources, such as money, ideas, and expertise. Empowered by local and regional authorities, they start many initiatives, such as arrangements for eco-tourism, agro-tourism and catering in city parks, and building dams for hydropower in small rivers and streams.[146] Producing and selling regional products and electricity have become important economic activities. Many citizens volunteer in groups involved in landscape conservation. Other citizens and local companies create new commons (see Box 6.5). Municipalities invest in upgrading and developing green and blue spaces and protect them from uncontrolled urban development. The hotel and catering industry opens new bars, restaurants and hotels near natural areas, in cultural landscapes, on rivers and in city parks.

Regional authorities facilitate these initiatives, as cultural landscapes and natural areas are considered public goods which the market can only provide to a limited extent.[147] This is done, for instance, by organising regional dialogues and by creating visions ('strong stories') about the future of the regions, taking their histories as sources of inspiration.[148] Regional dialogues are open and informal in character and allow free exchanges of values, beliefs and ambitions. The results of such dialogues are non-binding but this may change when they are used for regional visions, plans, partnerships or contracts. Citizens, farmers and other

[144] Umwelt Bundesamt 2014.
[145] Mommaas et al. 2017.
[146] Dryzek 2013.
[147] Stiglitz 1988.
[148] Blom 2012.

entrepreneurs participate in organised sessions, internet platforms and new social media.

Box 6.5: In a new common the management of the surrounding area is shared by the inhabitants.

Traditionally, a common is a parcel of land owned by one or more persons but over which other people have certain traditional rights, such as the right to collect firewood. This practice goes back to the Middle Ages. In the 2010s initiatives started on local level to create new commons.

Example of a new common. Photo: Bureau Stroming

A new common is a novel approach for regional development, which combines and finances conservation or development of nature or landscapes with living on a limited scale. Local demands for living and green and blue are taken as a starting point. In this way citizens, companies or both create attractive green and blue living and/or working environments for affordable prices.[149] The largest part of a new common consists of nature which is publicly accessible. Groups of citizens, companies or both develop and maintain their own natural areas in which they take up residence and/or work. In Strengthening Cultural Identity, the idea of creating new commons has become very popular, particularly in remote rural areas where land is abundant and land prices are low. By 2050, many local communities in remote areas have created new commons.

The role of national authorities is limited to defining views for the conservation of landscapes of national or international importance. The EU empowers local communities, co-finances initiatives, and removes barriers in regulation for such initiatives.[150]

[149] Innovation Network 2015.
[150] Bouwma et al. 2016.

Regional Quality Teams and Regional Quality Funds help to boost cultural landscapes

Under the perspective of Strengthening Cultural Identity, the EU considers 'Europe's diversity of landscapes' an umbrella theme. Protecting and developing cultural landscapes has been integrated ('mainstreamed') in nature policy, rural development policy, cohesion policy and other policies. Nature policy explicitly addressed the importance of strengthening regional qualities by protecting and improving cultural landscapes and vice versa. Funds related to nature policy, rural development policy and cohesion policy have been increased and pooled in a dedicated European Landscape Fund. This fund does not only aim for boosting natural areas and cultural landscapes but also rural areas and urban areas. It particularly supports rural and urban areas with a potential of becoming vital, for instance, due to neglected cultural heritage that can be conserved and redeveloped and that creates new opportunities for tourism or other economic activities. By doing this social, economic and territorial disparities across the EU has been reduced, industrial areas in decline have been restructured and rural areas in which agriculture was in decline have been diversified.

European energy policy and transport policy have also become more synchronised with nature policy than they are today or in the trend scenario. Regional qualities, including aesthetic qualities, have been included in the financing and the design of energy projects, such as the building of wind and solar parks, or transport projects, such as the building of highways, railways and waterways. Because of this, resistance of citizen groups and environmental organisations has been strongly reduced.[151] The EU has also facilitated the implementation of high speed internet (digital infrastructure) in peripheral areas. Furthermore, the EU has stimulated the exchange of knowledge and experiences between regions, e.g. knowledge related to landscape development and regional branding.

Throughout the EU, Regional Quality Teams stimulate the improvement of landscapes with the potential of boosting regional qualities.[152] They initiate the regional dialogues, stimulate participants to create the visions on the future of the regions and help them to fund the required investments. Conserving and developing regional qualities, such as green and blue spaces, networks of paths and tourist arrangements require lots of investments by farmers, other entrepreneurs, local authorities and citizens. At the same time these spaces, networks and arrangement also generate higher turnovers for the leisure industry and higher property values for home and office owners. Regional Quality Funds guarantee that green and blue investments, similar to those in other regional high quality elements, are financed for the long term and in line with the market (see Box 6.6).[153]

In natural areas, zones which are made (more) accessible for outdoor activities, such as walking, skating, canoeing, and hunting, are designated by local authorities. Harvesting of traditional regional products, such as mushrooms, chestnuts and wood, is regulated by local communities. In many agrarian and river areas investments are made in landscape elements, cultural heritage, landscape art and so forth. In agricultural areas in urbanised regions that are dominated by large-scale farming, farms are integrated into the landscape and large landscape elements are added. Dams for hydropower or irrigation are removed from rivers to improve fish migration, which is interesting for anglers. Other measures taken in river areas to improve water safety are integrated with those that strengthen

[151] EC et al. 2014.
[152] VROM-raad 2006.
[153] PBL 2012.

cultural landscapes. In urban areas municipalities invest in upgrading and developing 'green-blue infrastructures', including public parks, green schools, canals and waterfronts. Green-blue infrastructures are upgraded and extended versions of the 'green infrastructure' aimed at in the 2010s.

Throughout Europe, regional and local authorities attune air and water quality standards to species which are highly valued by their citizens, such as orchids, eagles, and trout. The EU has stimulated this by improving implementation of environmental policy, securing required investments, and improving integration of environmental concerns in other policies. This has resulted from among others increasing supervision of implementation, higher budgets for environmental investments and developing more shared visions with other policies as a starting point. Awareness of landscapes and community building are stimulated by green education programs, which are particularly focused on connecting the youth with nature.

Box 6.6. Regional Quality Fund

Investments required for upgrading and extending green and blue qualities of a region can be financed by a Regional Quality Fund. [154] Such a fund brings different cash flows together in order to pay green and blue qualities for the long term and in line with market prices. The fund is fed with public *and* private money. Public money is generated by local and regional authorities; the national authority and the EU provide co-financing. Public money is not only provided by subsidies, but also by introducing or raising tourist, property or water taxes and by funds for compensating nature, for instance, provided by European transport policy.

Private money can be generated in various ways, for instance, by red-for-green projects, regional bank accounts or green and blue shares. In so-called red-for-green projects, part of the profit that has been made by building homes, offices or amenities is paid to the Regional Quality Fund. Local governments, businesses, civil organisations or citizens who set up a regional bank account are paid a market-based interest rate. In addition, the bank offers a bonus interest which is paid to the Regional Quality Fund. Furthermore, individuals, businesses and civil organisations can invest in a green and blue living or working environment by buying green-blue shares. Regional accounts and green-blue shares are stimulated by local, regional or national tax incentives.

[154] PBL 2012.

Natural area, river area, rural area and urban area under the perspective Allowing Nature to Find its Way. Images: AENF Visuals

7 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.

7.1 Guiding values and policy challenges

In Allowing Nature to Find its Way, nature is considered as an entity greater than people and highly appreciated for its intrinsic value.[155] It takes a global perspective on the diversity of natural habitats and species. People are held responsible for the preservation of biodiversity. The basic idea of Allowing Nature to Find its Way is that nature is best protected by creating a large, coherent and connected network, spread across the continent. This network of large natural areas and corridors provides enough space for the dynamics of natural processes, such as flooding, erosion and animal migration to be self-sustaining.[156] Moreover, the network strengthens the resilience of species and habitats.

This is not only a matter of restoring or developing nature, but also about letting nature run its course.[157] Society only needs to create and maintain the necessary conditions; when these conditions have been achieved, nature no longer needs a large degree of management. Allowing Nature to Find its Way is concerned with developing complete natural systems over large areas that provide space for all levels of functioning of natural systems and with particular attention to top predators. It is less concerned with conserving single species or with preserving specific succession stages.

Allowing Nature to Find its Way first of all answers the policy challenge of reversing the decline in areas of unspoiled nature in Europe as has been explored in the trend scenario. The creation of a network of large and well-protected natural areas and corridors – an expansion of the existing network – is a response to this challenge, increasing the resilience of nature to impacts of human activities. This is not only an ecological challenge – realising nature restoration by creating large undisturbed natural areas. It is also a socio-economic challenge, since natural areas in Europe

[155] CGDD 2013.
[156] European Commission et al. 2014.
[157] Sloterdijk 1989.

are often located in relatively densely populated areas, where boosting people's engagement is important.

Various types of nature have been restored or have been allowed to rehabilitate.[158] In some situations, species, such as the European bison and the wild horse, have been reintroduced. In case of top predators, such as bears and wolves, risks for husbandry animals and dangerous encounters with people have been accommodated.[159]

On a continent where nature is everywhere influenced by people, it does not always make sense to restore historical analogues. Therefore, new types of natural systems could also be developed, not only to enhance dynamic natural balances, but also to answer the demand for experiencing wild nature and to help realise local socio-economic agendas, for instance, by creating new possibilities for nature-based tourism.[160]

7.2 State of nature in 2050

Conditions of species and habitats have improved considerably
By 2050, the state of nature has improved considerably, compared to 2015 and under the trend scenario. The European nature network mitigates most external impacts and provides space for many habitats and species including top predators. Particularly, in marshland, moors, heathland and natural grasslands habitats and species have increased. Although the surface of forests has become less to provide room for other natural systems, forest habitats and species are in a good condition. In river areas, biodiversity benefits from rivers which have been restored and are part now of the nature network. This is a significant improvement, compared to 2015 and under the trend scenario. In urban areas, much more diversity of species and habitats can be found since environmental conditions have improved and many more green spaces can be found. In rural areas, however, further intensification of agriculture situated further away from nature reserves and corridors has caused more decline in habitats and species in these areas. This has happened particularly in north-western and eastern Europe.

Extended European nature network has been realised
By 2050, the European nature network partly contains former farmland, which has been transformed into nature reserves or natural corridors. This has happened, for instance, in the mountain ranges of Scandinavia, the Carpathian ranges and the Pyrenees, in the river flood plains of the Rhine, the Danube, and the Oder, and in some areas previously threatened by desertification, such as parts of the Iberian Peninsula and the Pannonian Plain.

Nature reserves consist of interconnected and self-regulating natural systems, offering habitat for sustainable populations of herbivores and top predators. In larger and smaller nature reserves, natural gradients in soil and water systems have developed and natural processes, such as flooding and animal migration have been restored. Small reserves in the nature network and natural areas outside the network play important roles as stepping stones for migratory animals and local diversity of species alike.

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[158] Jørgensen 2014.
[159] Seddon et al. 2014.
[160] Hobbs et al. 2013.

Sublime view in a large nature area. Photo: DPI

Although many nature reserves are largely restored along lines of historical analogy, new natural systems have also been developed. This has particularly happened where conditions for undisturbed nature are promising but irreversible landscape change has occurred. Examples are peat extraction and reclamation landscapes across the centre of northern Europe and polder landscapes in north-western Europe. Such new natural systems play a crucial role as stepping stones.

In Allowing Nature to Find its Way, the amount of wild nature – where the human impact is limited – has increased substantially, compared to 2015. Regulated accessibility of nature reserves allows people to experience sublime views of nature and creates income and jobs which is vital for local communities. In most nature reserves activities, such as nature-based tourism and sustainable large game hunting are allowed.[161] The same is true for traditional and organic farming and for sustainable forest management. Nearby nature reserves and on the edges of the reserves tourism facilities can be found, mostly upmarket facilities. Box 7.1 gives an example.

[161] UNEP 2007; FACE 2015.

Box 7.1: European 'Kruger' Park

By 2050, many European 'Kruger' Parks can be found near large nature reserves, particularly in eastern and southern Europe.[162] This idea was launched around 2015 and has been realised on many locations throughout Europe in the following decades. A European 'Kruger' Park is a protected area which can consist of an upmarket hotel or lodges or luxury tents and which is usually managed by the tourist industry in cooperation with nature organisations. From here tourists can watch the natural landscape and on safari they can spot mammals (wisents, bears, beavers), birds (geese, cranes, owls), and fish (trout, salmon, sturgeon). Part of the generated income is spent on the management and further development of the nature reserve. In this way, a European 'Kruger' Park combines nature development with the creation of jobs and incomes, which is not only beneficial for nature but also for the local community.

European 'Kruger' Park. Source: Terra Incognita

Forest management in nature reserves mimics natural processes. The number of old-growth forest stands has increased. Near-natural forest management ensures more diversity in species and age structures of forest stands. In areas in which clearcutting still occurs, natural regeneration is ensured by leaving seed trees standing and by reducing the size of clearings.

Because of this, forest species and habitats are doing well in 2050, better than under the trend scenario. In heathlands and shrub lands which are included in the European nature network and which are managed by extensive livestock grazing the conservation status has increased, also for birds. The same is true for sparsely vegetated land.

Rivers and coasts have become more natural

By 2050, rivers and coasts in Europe are much more natural than in 2015 or in the trend scenario. The connectivity of the rivers has been improved as well as the water quality and quantity in these water bodies. In north-western and central Europe, in areas with intensive agriculture and high population densities the ecological status of water bodies has also been restored. In many of the rivers that are not used for navigation, natural dynamics have been reintroduced by allowing them to meander. These rivers flow now under natural conditions. Floodplains of

[162] Innovation Network 2015.

rivers, such as the Loire, the Elbe, the Rhine and the Ebro have been restored and are parts of the nature network now. In other rivers, distributaries have been realised (see Box 7.2). The rivers and floodplains have become important as corridors for water and land species. Wetlands which were reclaimed and cultivated in the past have also been restored and provide important habitats for various bird and fish species now. Banks of rivers and lakes are without protection and greened, providing natural gradients and reducing barriers for species.

River flowing under natural conditions. Photo: DPI

Relocated dykes, restored floodplains, and reconnected old distributaries contribute to more nature-based flood control and to more diversity in habitats and species. Forests and peatlands upstream retain water and reduce peak flows during high river discharges and prevent water shortages during droughts. In addition, terraces and riparian zones – woodland areas alongside rivers and streams – reduce the risk of water shortages during droughts.

Many rivers are accessible now for migratory fish, such as eel, salmon, and sturgeon. Many small dams that are no longer essential have been removed. Near locks that are necessary for navigation and many dams that are essential for hydropower or irrigation, fish passages have been created, allowing migration in both directions. In many cases, these bypasses allow an ecological flow of 30% and are open all year round. Moreover, they provide spawning grounds for fish. Fish passages near the two dams in the Iron Gates and the Gabčikovo Dam in the Danube now enable migration of salmon, shads and sturgeons. Estuaries which were blocked by dams in 2015, such as the Haringvliet and the IJsselmeer in the Netherlands have been partially or completely opened up again.

Box 7.2: Renatured rivers and wetlands

By 2050, along many river stretches, natural dynamics have been maintained or reintroduced by creating new distributaries. Former floodplains and wetlands which were once embanked, drained and cultivated for farming but appeared to be unsuitable have been restored and reconnected. These renatured rivers and wetlands not only help to store water and thus avoid flooding, but also increase the diversity in bird, mammal and fish species. In the 1990s and 2000s, this happened along stretches of the Rhine and the Emscher. Later, these examples were followed along many other rivers, such as along stretches of the Danube and the Po.

Renatured river. Photo: DPI

Abandoned farmland has deliberately been converted back into wild nature

By 2050, farmland is being used more efficiently than under the trend scenario.[163] In suitable locations outside the nature network, agricultural production has further intensified. On less suitable soils, for instance, in areas threatened by desertification, farmland has been abandoned, and in Allowing Nature to Find its Way, these areas were converted back into nature; for instance, by rewilding them (see Box 7.3). As a result, in areas where agricultural intensification takes place, the species that depend on extensive farming have disappeared, while, in areas where farmland has been abandoned, species pioneering shrub and forest habitats have established themselves.

Nature reserves and corridors which are part of the network are buffered by farmland which causes only limited environmental impacts, such as traditional farming, ecological farming or industrialised farming with few environmental impacts.[164] This prevents any negative influences caused by neighbouring agricultural areas.

[163] Garnett et al. 2013.
[164] Focus on Nature 2016.

The development of the nature network has led to a decrease in farmland with high nature values.[165] This farmland did not substantially contribute to the restoration of complete natural systems, while it required substantial resources for management. In intensively used areas, corridors have been created with natural habitats from large natural areas with 'untouched nature', through areas with intensive agriculture into 'wild nature' in urban areas.

In many areas, the nature network contributes to the revitalisation of the countryside. Natural areas and corridors provide jobs and income, for instance for recreational entrepreneurs, farmers providing nature values, and companies providing services for nature management.

Green corridor in rural area. Photo: Ed Dammers

[165] Prins et al. 2017.

Box 7.3: Rewilding Europe

By 2050, a multiple of several millions of hectares of land has been rewilded on marginal areas of less importance to agriculture throughout Europe. Via large-scale conservation programmes, core wild areas have been restored and protected, connections between these areas have been realised and top predators and keystone species have been protected or reintroduced. In many cases, this required ecological restoration or wild nature engineering; particularly, to restore connections between protected fragmented areas, and to reintroduce large herbivores or top predators.

Around 2010, the Rewilding Europe initiative was established with the aim of rewilding 1 million hectares of land by 2020 in 10 areas, including the Danube Delta, the Carpathians, the Velebit mountains and western Iberia. By the middle of the century, areas in the Nordic countries, the Baltic States, the Alps, the Pyrenees, the Balkans and many other parts of Europe have also been rewilded.[166]

Top predators, such as the brown bear, play an important role in rewilding Europe. Photo: DPI

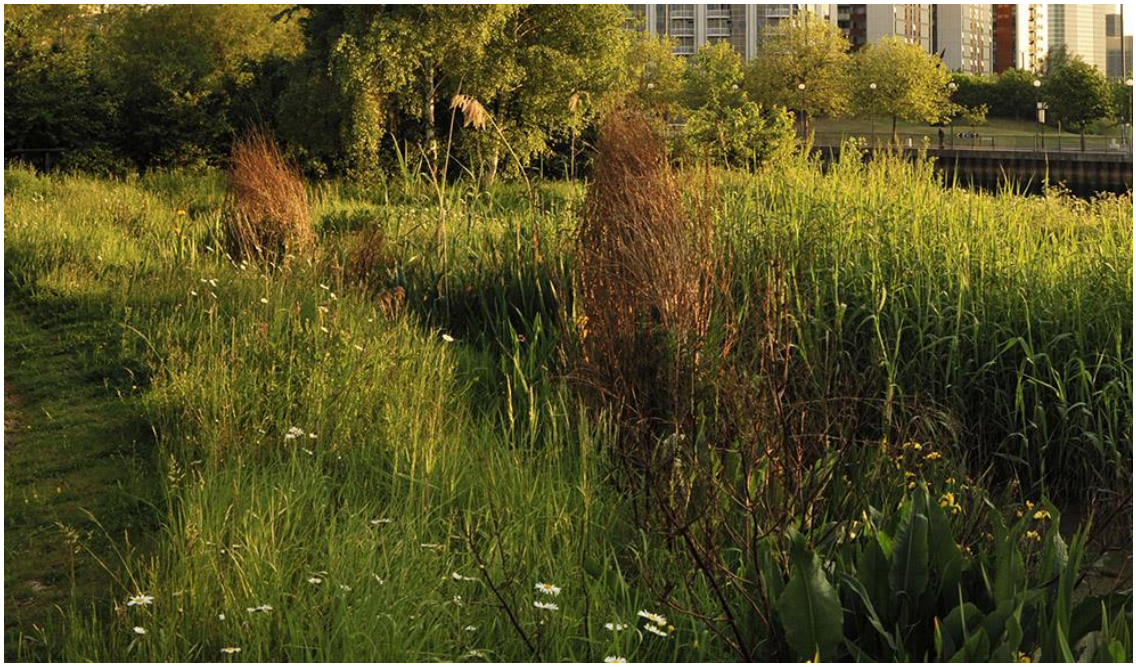
Nature flows through cities, largely unaffected by them

By 2050, nature is allowed to flow through cities, mostly without being affected by them. Large parks are connected with reserves or corridors in nearby rural areas and renatured streams and rivers run through the cities.[167] In some cases there is even enough room for a river to meander. This wild urban nature gives space to natural processes and is managed in an ecological way. Besides, environmental conditions have been improved. As more natural habitats have occurred within cities, many species associated with these habitats and well adapted to the presence of people have migrated to the cities. Examples are falcons, beavers and sturgeons. Occasionally, also larger herbivores, such as roe deer, wild boar and deer can be sighted.

[166] ARK et al. 2012.
[167] EEA 2016a.

Parks provide cooling during hot summer days and ensure that water can infiltrate into the ground during extreme rainy days.[168] Walking paths, cycling paths, canoeing routs and so forth have been created in such ways that species are not disturbed much. The parks are not always easily accessible for elderly people and sometimes they create health risks, for instance, Lyme Disease caused by ticks.

Since many cities have developed in a lobed way and since surrounding nature is protected from (uncontrolled) urban sprawl, residents, workers and tourists are stimulated to experience wild nature close to their living and working environments. Since the space required for nature has limited that for built-up areas, land prices have risen, and this in turn has been a reason to provide more high-rise buildings. Cities thus have wild nature within short distance.



Wild urban nature managed in an ecological way. Photo: Image Select

By 2050, a far larger number of cities have a high percentage of green areas than in the current situation or under the trend scenario. This is not only the case in northern and central Europe but also on other parts of the continent, and in both urban districts with high socio-economic status and districts with lower status. The variety of species and habitats in urban areas has significantly increased; most species and habitats in these areas are no longer under threat (see Box 7.4).

[168] EEA 2016c.

Box 7.4: Urban wildlife

By 2050, the number of wildlife species living in large cities has been significantly increased. In the 2000s, there were already animals which were named after the cities in which they live, such as London foxes, Riga beavers, and Berlin wild boars. These wild animals easily adapt to city life; they soon learn where food can be found and that people do not pose a threat. Wild animals are popular with city dwellers and tourists, but they can also cause serious damage. Wild boars, for instance, frequently destroy the grass in city parks and private gardens and occasionally attack people.

After a learning period in which the behaviour of wild animals in cities has been studied and experiences have been exchanged with other green cities, local authorities have developed adequate wildlife management. In some parks, wild animals are allowed, other parks have become fenced, on some occasions the animals are being hunted. The public has become actively involved and well-informed. By 2050, animals are no longer named after the cities where they live, but cities are named after animals that have been (re)introduced, such as 'Helsinki, City of Eagles', 'Manchester, City of Hawks', and 'Vienna, City of Sturgeons'.

Wild boars in a city. Photo: Alamy

7.3 Pathway to 2050

Further biodiversity loss stimulates development of extended nature network

In Allowing Nature to Find its Way, it is assumed that several of the trends explored in the trend scenario and several unexpected events have stimulated an adaptation of nature policy and related policies in the years up to 2050. By doing this, the trends and events enabled the mode of governance, measures and relationships with other policies described below.

The loss of some very iconic species, such as the Iberian lynx, has put nature rehabilitation high up on social and political agendas.[169] This was stimulated further by international conferences that resulted in agreements on measures to reverse the loss of biodiversity. The possible further shift towards post-materialistic values has led to greater appreciation of nature and traditional and new media were helpful to raise attention for nature development. The increasing globalisation and liberalisation of agricultural markets have caused further abandonment of farmland, which has made land available for nature development. The decline in the socio-economic vitality of peripheral areas has stimulated the idea that nature development can help revitalise these areas.

In reply to these trends and events, the EU has strongly promoted the development of the European nature network. By doing this it aimed to definitely reverse the further loss of biodiversity and implement the international agreements. The EU has been actively supported by Member States, which are progressive in nature conservation and development, and by nature conservation organisations and citizen groups, who are worried about a further decline in the diversity in species and habitats.

Landholders and hunters have also supported the initiative, since the nature network provides new opportunities for sustainable hunting.[170] Farmers who own farmland on less suitable soils were positive, since the initiative allows them to relocate to other areas where they can produce food in a more economical way. For the tourism and catering industries, the development of the nature network has provided new business opportunities, such as nature-based tourism in natural hotspots.

Farmers practicing intensive agriculture in or nearby nature reserves have been compensated for relocating their farms. People who feared unexpected encounters with top predators became more reassured after information campaigns organised by hunters and actions to scare the animals away from the villages.

Governments have taken the initiative and are responsive

A mode of governance that could be helpful in achieving the state of nature presented above is that of *incentivising governance*. Just like traditional forms of government, this mode of governance is characterised by public authorities taking the lead in nature development. Unlike traditional governance, however, this does not imply top-down planning, solely based on scientific knowledge.[171] incentivising governance implies joint vision building, making larger investments and creating the necessary environmental conditions for nature development. Joint vision building is based on intensive communication with various actors, various sectors and on various levels (see Box 7.5).

The European Union takes the initiative, since it has an obligation to implement international agreements and the nature network transcends the borders of the Member States. The EU and the Member States continue to apply the subsidiarity principle, albeit in a less stringent way. This gives the EU the authority to more actively coordinate and monitor the implementation and the management of the nature network by national and regional authorities.[172] Informal networks to discuss the feasibility of proposals continue to play important roles.

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[169] CGDD 2013.
[170] FACE 2015.
[171] Dryzek 2013.
[172] PBL 2012.

The EU actively seeks cooperation with other public authorities, business organisations, nature conservation organisations and citizen groups, from European to local levels. Regional development is crucial for integrating European and national ambitions with regional ambitions and ambitions in terms of nature development with ambitions in terms of agricultural production, water management, urban development, etc.[173] On national level it is decided which types of natural systems should be aimed for: historical analogies or 'new' types of nature. These initiatives are supported by traditional and new media, such as advanced nature documentaries and techniques to observe iconic species live and communicate about them.

Box 7.5: Building a joint vision

A joint vision makes the core qualities of the European nature network explicit, both for nature as for various sectors of society.[174] Such a vision represents the contours of the nature network, including the core areas and the core corridors. Further elaboration of the vision is done at national, regional and local levels. This in turn can lead to regular adaptation of the European vision. In this way, shared storylines are developed that mobilise actors and that indicate directions for the countless decisions they take.[175]
During the building of a joint vision the actors involved exchange knowledge and experiences and they discuss their ambitions with one another. While doing this, they explore to what extent ambitions can be integrated into the vision and to what extent ambitions can be combined. Involvement of actors from various sectors and from different levels is important for the implementation of the vision, for its legitimacy and for mutual learning.

National and European investment programmes help to realise the extended nature network

In Allowing Nature to Find its Way, the moderate economic growth combined with increased political priority for nature allows larger investments of the EU and national and regional authorities for nature. The EU has developed an ambitious programme for the further implementation of nature policy after 2020. National and regional governments have initiated larger investment programmes, which are co-financed by the EU. At EU and national levels, budgets for nature policy and rural development have significantly been increased and shifted towards nature development. Private actors, including Landholders, hunters and the tourism industry, pay (higher) taxes since they benefit from nature management.

Connecting nature development with the local socio-economic agenda provides common ground for developing consensus for zoning and regulation and also for the establishment of funds for acquisition of land and for nature management. Collation and communication of best practices related to this agenda helps to identify potential benefits. Regional authorities, together with Landholders, are responsible to establish local management organisations to enhance the functioning of natural systems.

To create new nature reserves, land has been acquired and long-term contracts have been signed with private owners to financially compensate them for restrictions in the use of their land that are required to ensure conservation. Moreover, stimulation programmes to convert farmlands of marginal value into natural areas with extensive agricultural management have been created. These

[173] PBL 2012.
[174] Meyer et al. 2015.
[175] Hajer et al. 2010.

initiatives are stimulated by generating funds, launching programmes for the promotion of wild nature and combining generalised scientific knowledge about species and habitats with specific local knowledge.

With nature being concentrated in large, connected areas, efforts to preserve small natural areas have been reduced. The development of a nature network which extends throughout the continent implies a greater role for the EU in spatial planning. The same is true for the dynamic management of protected areas and for creating and maintaining the conditions in which their habitats can be sustained.

Many nature reserves have achieved the status of 'European parks', including an ambitious implementation of nature legislation and ambitious investments in nature conservation and restoration by the Member States and the EU. Legislation is focused on reducing impacts of people in these parks, activities with few impacts on the diversity in species are allowed. Enabling tourists to visit these parks enhances public support for them. Visitors are charged for accessing them by car; investments have been made in public transport. Tourists visiting these parks are guided and zoning is applied. Visitor centres inform tourists and offer package deals for activities, such as camping, canoeing and safaris. A special trademark of nature-based tourism has been developed for visiting 'hotspots' of the European nature network.

Environmental standards have become more stringent than they are today or under the trend scenario and much emphasis has been put on improving the implementation of European environmental policies. Next to environmental regulation, environmental taxes have been introduced and voluntary agreements have been more extensively employed. European air policy protects natural systems throughout the continent from excessive concentrations of nutrients and forests from acidification. By improving the implementation of European water policy almost all water bodies in the EU have reached a 'good ecological status'.

Long distance fish migration routes have been created by making clear choices for rivers which are intended for fish migration and rivers which are not. From the former, dams have been removed; in the latter, mechanisms have been created for fish to overcome certain barriers. Near-new locks that are necessary for navigation or dams that are essential for hydropower or irrigation, fish passages have been created. Regulation ensures that these fish passes contain an ecological flow of 30% and that they are open all year round. This regulation has been supported by research on fish migration, both downstream and upstream. In cases of relicensing of old dams for hydropower or irrigation, new standards have led to a reduced height for some of them.[176]

In Allowing Nature to Find its Way, much effort is put on integrated programmes combining the funding of investments in nature development with investments in other sectors (see Box 7.6).[177] Therefore many synergies have been created. Budgets for nature policy and rural development policy have significantly increased and have been shifted towards nature development. Rural development policy stimulates conservation and creation of large natural elements on farmland. Moreover, rural development policy stimulates managed transformation of abandoned farmland into rewilded nature. Sustainable forestry has contributed to near-nature forest management, which in turn has a positive impact on forest species and habitats; the objective for 2020 has been realised and subsequently tightened.

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[176] O'Connor 2015.
[177] PBL 2012.

Box 7.6: Integrated national investment programme

An integrated national investment programme combines the funding of investments in nature development with investments in climate adaptation, infrastructure and other sectors.[178] The objective of the investment programme is to synchronise investments in the physical realm and thus to create more efficiency and more synergy. In order to achieve this objective, the involved departments seek cooperation with each other as well as with regional and local authorities, business companies and civil society.

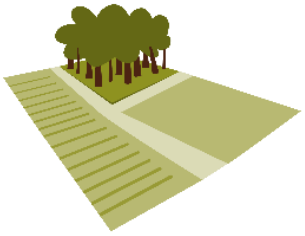
The investments are made on the basis of a shared vision of the central government and the regions on promising areas. Justice is done to European policies, to national goals and to regional conditions. Demands from other sectors, such as agriculture, tourism, and energy, are also taken into account. The investment programme is funded by the national government and co-financed by the EU. Additional investments are funded by increasing existing taxes, for instance, on environmental pollution, or by introducing new taxes, such as on the use of open spaces. This also limits the negative impact on nature caused by environmental pollution and particular forms of land use. In Member States with a decentralised system, the integrated investment programme is applied on a regional level.

Cohesion policy co-finances the development of natural areas and corridors and the greening of cities since this contributes to the socio-economic vitality of rural and urban areas. New infrastructures, such as roads, rail roads or canals, to make peripheral areas more accessible, are no longer built through nature reserves or corridors. Where this is considered unavoidable, adequate measures are taken, such as compensation for losses and damage to habitats, and the construction of ecoducts and wildlife crossings to limit barriers to migratory routes of animals. On a local level, spatial planning contributes to the development of cities in a lobe shape, and prevents uncontrolled urban sprawl.

[178] PBL 2012.

Natural area, river area, rural area and urban area from the perspective of Going with the Economic Flow. Images: AENF Visuals

8 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.**

8.1 Guiding values and policy challenges

The perspective of Going with the Economic Flow reflects freedom of choice regarding people's individual lifestyle, without interfering with lifestyles of others.[179] This includes the freedom of individuals to value and use nature in the way they would like. In this perspective, nature reserves – the current Natura 2000 areas – are considered as public goods which should be protected and managed and should be funded by governments. International agreements regarding nature conservation and development are complied with. Nature conservation and development is considered most cost-effective in so-called biodiversity hotspots, particularly when taking the lower financial costs of conserving nature in remote areas into account.

In 2015, almost one fifth of EU territory consisted of protected natural areas.[180] This meant that, according to the perspective of Going with the Economic Flow, the necessary level of nature conservation has been reached. Where there is more demand for nature, for instance for leisure, living or health, this can be dealt with by private initiatives. Nature outside reserves is considered as a private good which should be managed by private companies, nature organisations, private landowners and citizens and which can be used to provide all kinds of services to land owners and/or consumers.[181]

Going with the Economic Flow responds to the policy challenges presented by the use of nature by other sectors and those of connecting people with nature and with policies related to nature, as explored in the trend scenario. This is done by integrating the utilisation value of nature into other sectors, such as tourism, the construction industry, and the health sector, without undermining the utilisation value by over-exploitation. Moreover, private companies, private nature

[179] Mill 1859.
[180] EEA 2015a.
[181] CGDD 2013.

organisations and citizens are made responsible for nature outside the reserves. By doing this, people and organisations feel more connected with nature and more money for nature conservation is generated.

8.2 State of nature in 2050

Outside nature reserves, nature is a cherished 'accessory' to other land uses

By 2050 a basic network of protected natural areas exists, comparable to the surface of Natura 2000 areas today. The protected areas safeguard a basic level of diversity of species and habitats across Europe. Outside the protected areas, nature represents a cherished 'accessory' to other land-uses, based on economic motives and individual commitment. In Going with the Economic Flow, lands are used where economic value is highest.[182] Highly productive farmlands are located in areas with suitable soils and with optimal transport connections. Activities, such as farming, forestry, and mining are highly industrialised but comply to environmental norms.

Outside nature reserves, nature is used intensively. Photo: Thinkstock

Where other land uses are less profitable, nature is being appreciated since it contributes to scenic beauty and as a valued expression of private ownership. In urbanised regions, many natural areas are used for leisure activities, such as golf, amusement parks, and motorised recreation. Nearby cities and along coasts, houses, offices, and other real estate have been built in and around woods, around lakes and along rivers.[183] In mountain areas and in peripheral parts of flood prone lowlands large natural areas can be found.

[182] VOLANTE 2015.
[183] PBL 2012.

Nature outside nature reserves is protected by private initiatives
By 2050, throughout Europe nature reserves are relatively well protected. Locally, measures, such as the removal of biomass from nature areas, have been taken to mitigate impacts from human activities that take place outside the reserves, such as ammonia emitting animal husbandry. Animal husbandry is not limited. The negative impacts could not be avoided at all locations. Therefore, nature reserves represent a lower diversity in species and habitats than in the trend scenario. Large windmills in reserves with good wind conditions help to finance the management of these reserves. In more densely populated regions, houses, offices, restaurants and hotels are situated at the edge or even within the boundaries of nature reserves.

Outside the reserves, particularly in regions with low intensity of land-use and high landscape value, other natural areas can be found. Examples of such natural areas are bird sanctuaries, wild life refuges and wild reserves (see Box 8.1). These natural areas are managed by private companies or nature organisations and are accessible for visitors who pay entrance fees or who are a member of the management organisation. Large natural areas are found in remote areas, especially in mountain areas, and along flood prone lowlands. These natural areas are used for a variety of leisure activities, in addition to hiking and hunting, and also include motorised activities, such as jet skiing and delta flying.[184] In more densely populated and more easily accessible areas, nature consists of highly preferred landscapes or parks in which people like to stay. Other natural areas consist of green enclosures, privately owned and managed, and are used for activities, such as playing golf, organising festivals, and quad driving.

Natural area used for leisure activities. Photo: Thinkstock

Many forests which are no nature reserves have a homogeneous composition of trees and are intensively used for timber, paper production and bioenergy. Forests near more densely populated areas have a more heterogeneous composition and are less intensively used by the forestry sector. This reflects the demand of people for all kinds of outdoor leisure activities. Many catering facilities can be found in these forests.

[184] FACE 2015.

Box 8.1: Private wild reserve

A 'private wild reserve' is a privately owned estate on which nature is being conserved or developed and which is privately funded. Creating a wild reserve may include restoring peatlands, planting native forests, and reintroducing animals, such as European bison, elk and bear. Besides, accommodations, restaurants and other amenities are developed to create upmarket facilities for visitors. Furthermore, wild reserves provide possibilities for sporting and hunting. The development and the management of the reserves are funded by charging entrance fees, money earned by the facilities, prices paid for hunting and selling wild game to supermarkets and restaurants.[185] Multi-day packages are marketed to visitors from all over the world. In this way, private wild reserves contribute to local employment and economic growth.

In the 2010s, private wild reserves could only be found in several remote areas of Europe. However, the economic potential of the reserves and the willingness to mean something for nature motived many entrepreneurs and wealthy citizens to follow these examples. As a result, by 2050 many private wild reserves can be found throughout Europe, particularly in eastern and southern Europe where large surfaces of nature are available, land prices are low and private wild reserves contribute most to employment and growth.

Private wild reserves provide upmarket facilities. Photo: Image Select

Rivers are optimised for navigation, energy production and irrigation

In Going with the Economic Flow, many rivers have been further canalised, creating optimal conditions for navigation, energy production (cooling water, hydropower), drinking water provision and irrigation. Rivers have become more fragmented and catchment areas have become more disturbed since many new dams have been built for hydropower to realise the ambitions for renewable energy and for increased need for irrigation in order to adapt to climate change.

Moreover, the use of hydropower reservoirs has been intensified in order to optimise power generation with pumped storage and cascade reservoirs. Almost all on-grid electricity storage is provided by pumped storage. Cascade systems of reservoirs are able to adapt quickly to changing electricity demands. Therefore, in various rivers in mountainous regions, rivers have been transformed into chains of

[185] Wightman et al. 2002; Otiman 2008.

reservoirs with artificially fluctuating water levels. In southern Europe, water storage has become more important due to climate change. Rivers, such as the Guadiana and the Guadalquivir are more and more intensively used for irrigation. Discharges from these rivers have decreased further, as more water is used for agriculture, hotels and golf courses, due to the growing demand for tourism and the climate becoming both hotter and drier.


Rivers optimised for navigation (left) and hydropower (right). Photos: Hollandse Hoogte and DPI

Due to these developments, in most European catchment areas, biological diversity has further declined, compared to today's situation and the trend scenario.[186] In many catchment areas, migratory fish species, such as eels, shads and lampreys have become extinct due to intensively used rivers with locks and dams. In rivers where dams for hydropower and irrigation are equipped with fish elevators fish migration remains possible to some extent (see Box 8.2).

In Going with the Economic Flow, risks of landslides, flooding, mud floods, and droughts are mostly addressed by technical solutions, such as dams and dykes, or, when calamities cannot be avoided, through financial compensation by insurers. In locations where risks are high and solutions are too expensive, people have moved away to safer areas.

Along the coast, many resorts, restaurants and hotels have been built. A great diversity in facilities has been created, ranging from low market to upmarket facilities. Many coastal areas and beaches are privately owned and therefore not publicly accessible for recreation.

[186] Prins et al. 2017.

Box 8.2: Fish elevator

By 2050, various dams for hydropower and irrigation in European rivers are fitted with fish elevators. The elevators help migratory fish to overcome the barrier which has been created by the dam and to reach upstream waters. The fish swim into a hopper located at the dam and are lifted to an exit channel where they continue their upstream journey.[187]

Fish elevator. Image source: Unknown.

Fish elevators are relatively inexpensive ways of overcoming barriers for migratory fish; particularly when dams are high and fish passages would be very expensive. Initially, fish elevators attracted fish to the hopper by currents created by strategic releases of water. Many migratory fish, however, had trouble finding the hopper and therefore could not reach the upstream waters. Besides, elevators only enabled migration in one direction. Better located fish entrances and more sufficient water currents helped to enhance the effectiveness of the elevators. New generations of elevators enable fish migration in two directions, instead of only in one direction.

Rural areas are dominated by industrial farming

By 2050, most rural areas in Europe are dominated by industrialised farming. Agriculture is mainly driven by economic motives: wherever investments are profitable, land has been improved and mechanisation has taken place.[188] Land has been improved by enlarging and by applying more effective drainage and irrigation systems. Mechanisation consists of applying precision farming, new kinds of ICT, robotics and gene technology.

Due to these developments, agricultural yields have increased, production costs are reduced and environmental standards are better complied with, compared to the situation in 2015 and under the trend scenario. Arable farming is based on detailed

[187] https://www.princeton.edu/~ota/disk1/1995/9519/951905.PDF.
[188] Haines-Young et al. 2011.

knowledge of soil characteristics, pest abundance and weather predictions. The introduction of genetically modified crops helps to minimise chemical inputs for fertilisation and pest control.[189] Regarding animal farming, most cattle is stabled all the time to control feed intake as well as nitrogen and ammonium emissions. In eastern Europe, further modernisation of agriculture has led to an increased use of fertilisers and pesticides and related emissions of nitrates, phosphates and pesticide residues.

Rural area dominated by industrial farming. Photo: Hollandse Hoogte

Throughout Europe, water use has been limited to an economic level. For instance, water is only transported by pipelines when farmers cover the costs. In arid regions, this has resulted in the expansion of irrigated areas in which highly efficient irrigation techniques are applied and where genetically modified crops that need only a little water to grow are being cultivated. These new techniques have made it possible to maintain agriculture in a hotter and drier climate.

In mountain areas and other areas where agriculture is marginal, farmlands have been abandoned or converted into lands providing products for niche markets. In eastern and southern Europe, subsistence farming, i.e. farmers growing enough food to feed themselves and their families, has increased. Particularly in economically less successful regions this type of farming has become more important. In some of these regions small villages have been redeveloped for tourism (see Box 8.3). In southern Europe, large agricultural areas have spontaneously changed into dryland wilderness areas. In urbanised regions, organic farming and traditional farming, provide high quality food.[190]

In regions dominated by industrialised farming, particularly in north-western and central Europe, species and habitats associated with small-scale cultural landscapes have largely disappeared. Agriculture in arid regions has put pressure on the

[189] De Wilde 2015.
[190] Giraud 2015.

biological diversity within water bodies. Plots and field margins which are less productive still harbour a basic level of biodiversity. In regions where organic farming or traditional farming have found niche markets a far greater variety of species can be found. In some regions, the abandonment of farmland has resulted in increased biodiversity. In southern Europe, dryland wilderness provides habitats for several migratory bird species.

Box 8.3: Rebirth of small villages

In the 2010s in various peripheral areas, particularly in eastern and southern Europe small villages which have been abandoned could be found. Land degradation, feudal conditions, traditional farming or other factors had led to increased poverty and a declining and ageing population. Particularly young people migrated to more successful areas in Europe or other continents.

Traditional houses used as tourist accommodations. Photo: Hollandse Hoogte

By 2050, various small villages that were abandoned have been redeveloped by tourist entrepreneurs or property developers. In most cases, characteristic buildings, such as traditional houses, bakeries, mills and farmhouses, have been bought and refurbished. In some cases, entire villages have been put for sale. Many of these villages now accommodate tourists, provide restaurants and are used as a basis for recreational activities in the region. Small villages which have been entirely redeveloped have become gated communities: they are accessible for people who have booked accommodation.

Cities host well-designed parks, small parks, guerrilla gardens and temporary nature

By 2050, most cities in Europe have expanded compared to 2015, since economic growth and population increase have increased the demand for offices, industrial buildings and houses (see Section 4.2). Particularly in Member States without a strong planning tradition, urbanisation has taken the form of uncontrolled urban sprawl.

City park in business district (left) and guerrilla gardening in urban district with little green space (right). Photos: Thinkstock and Marcin Butryn

In most cities, the number of green spaces has decreased. In and nearby upmarket business districts and residential districts, however, well-designed and well-managed parks which are not always large are located. Some parks are fenced and are only accessible for people who pay for it. In various high-rise buildings, vertical agriculture is being practiced, producing food for city dwellers. This happens under completely controlled conditions reducing the ecological footprint.[191] Scattered across the cities small parks with low management requirements can be found. In many urban districts with few green spaces citizens practice guerrilla gardening. They garden on lands that are abandoned and that are not being cared for without having the legal right to do so. On the city fringes, vacant plots provide space for uncultivated, temporary nature (see Box 8.4). Most of these green spaces are freely accessible.

Healthy people living in neighbourhoods with lots of green spaces are divided from less healthy people living in less privileged neighbourhoods. Since there are not many freely accessible green spaces available in direct living environments many people own a family home or rent a cottage in rural areas or on the edges of natural areas. As a result, scattered around the cities satellite settlements have developed dedicated to leisure culture.

In all cities, the quality of the urban environment, particularly air quality, has improved compared to 2015 and meets the basic environmental standards of the trend scenario. This has been caused by the further shift towards the knowledge economy, the introduction of cleaner cars and other trends which result in lower emissions of polluting gases (see Section 4.1). Besides, green spaces help dealing with heat stress, which is appreciated as a by-product of green spaces.

[191] De Wilde 2015.

Box 8.4: Temporary nature

In many urban areas, particularly on the urban fringes, plots are available for which plans for new homes, offices or roads have been developed but whose implementation has been delayed.[192] By 2050 many of these vacant plots are 'temporarily lent to nature'. These plots contribute to urban biodiversity, since pioneer species, such as mosses, butterflies, and lizards, settle on them. In most cities landowners are encouraged to let nature temporarily grow on these plots. This has been made possible since national governments, stimulated by the EU, have deregulated nature legislation. By waiving the legal protection of natural species and habitats on vacant plots, for instance, temporary nature does not impede planned building activities.

Temporary nature on construction land. Photo: Innovation Agro & Nature

8.3 Pathway to 2050

The priority of economic growth leads to liberalisation of nature policies
Under the perspective of Going with the Economic Flow, it is assumed that some trends and events – most of them explored in the trend scenario – have stimulated decentralisation and liberalisation of nature policy and related policies. Discourses on small government, a stricter interpretation of the subsidiarity principle and active business and citizenship have stimulated decentralisation and privatisation.[193] These discourses were fuelled by increasingly complicated decision-making on the EU level, continued low economic growth and high unemployment rates, keeping subsidiarity, employment and economic growth on top of EU and national agendas. The continuing moderate growth in tax incomes has been a reason to reduce budgets for nature management organisations and to promote

[192] Innovation Network 2015.
[193] Dryzek 2013.

their privatisation.[194] In peripheral regions, economic decline and population shrinkage have caused a further reduction in public investments in nature conservation, creating space for private initiatives.

The EU has been influenced by business organisations and political groups, striving to reduce subsidies and to make agriculture and other businesses more competitive on the globalising markets.[195] Business and farmers organisations have actively lobbied with the EU and the Member States for using nature to stimulate employment and economic growth and for managing nature in a more cost-effective way. Tourist companies, other companies and wealthy citizens saw potential markets for natural areas which are not protected, for instance as hunting reserves and amusement parks. A growing majority of the Member States has endorsed decentralisation and liberalisation of nature policies in order to enhance international competitiveness and to provide more opportunities for local and regional initiatives.

Nature organisation and citizen groups initially opposed the liberalisation of nature policy but were not influential enough to turn the tide. Eventually, they have adapted to the changed circumstances and decided to generate funds and form partnerships with tourist companies, other companies and wealthy citizens to conserve and develop nature.

Governance is dominated by private initiatives

In Going with the Economic Flow, the mode of governance can be characterised as *market governance*, stimulating private initiatives.[196] By 2050, at the EU level, nature policy has been limited to conserving nature reserves that already existed in 2015. Outside these reserves forestry, agriculture and other land uses can be practiced in industrialised ways within the limits of environmental standards. The EU is most of all concerned with nature as a means to stimulate employment and economic growth and providing a basic quality of the living environment for all.

Most national governments have simplified nature legislation but ensure compliance with European nature policy. Strong emphasis on subsidiarity at the EU level increased national, regional and local differences between implementation of European nature policy. On all levels, nature policy and other environmental policies focus on health and risk management, securing public health and safety from natural risks. Local authorities are responsible for the protection of nature in the reserves; regional authorities coordinate the conservation of nature reserves which exceed the local level. The conservation of nature reserves remains publicly funded but has been transferred to privatised nature management organisations. These so-called trusts closely collaborate with private companies and commit citizens to secure financing for nature conservation. Conservation and development of other natural areas is the responsibility of the private sector in this perspective (see Box 8.5).[197]

Business models that incorporate nature have proliferated. Leisure companies have formed partnerships with nature organisations to create luxury leisure areas in which consumers can experience nature in various ways. Property developers have formed partnerships with them to develop attractive green residential areas and office areas.[198] Nature organisations became interested to join these partnerships,

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[194] IGEAT et al. 2006; CGDD 2013.
[195] Fink and Rammig 2014.
[196] Bouwma et al. 2015.
[197] PBL 2012.
[198] Ibidem.

because the partnerships enabled them to use the marketing knowledge of private companies and to secure funding for nature conservation. Private companies became interested since they wanted to increase their brand value, attract employees and improve relationships with consumers.

Box 8.5: Private initiatives for nature

In the 2010s, public authorities in the EU did not succeed in halting the decline in biological diversity. In addition, the involvement and appreciation of society for nature policy was decreasing. But at the same time private companies and citizens started initiatives to conserve and develop nature.
In the 2020s, governments, private companies, civil society and citizens concerned with nature have made a paradigm shift which helped them to escape from this downward spiral.[199] Nature was no longer considered as something to *protect from* society but as something to *flourish with* society. As a result, private companies and wealthy citizens started various nature projects. This sometimes happened in collaboration with nature conservation organisations. The principle 'private action for the public good' played an important role.
This principle has been put into practice by various motives and in a variety of ways, such as buying natural areas to better conserve them or to create more possibilities for hunting, creating green spaces to increase market prices of office buildings or to strengthen the green image of companies and building luxury leisure areas to earn money and to increase the quality of the living environment. Since private companies and citizens, themselves, invest in nature and are themselves responsible for it, they experience nature as theirs ('my nature').

Many natural areas and city parks are privately managed and funded
In Going with the Economic Flow, market-based measures and private initiatives are preferred. Public nature reserves are managed by private trusts. Other natural areas are privately funded: tourist companies, other companies and wealthy citizens fund these areas by charging entrance fees, by organising hiking tours, hunting and other activities for which people pay and by organising sponsoring, lotteries and crowd funding.[200] Well-designed and well-managed parks in urban areas are financed by property developers demanding higher prices for houses and offices located near the parks, by owners of restaurants located in the parks or by charging entrance fees from visitors.

Local governments form public private partnerships with property developers, the health sector and other sectors to combine the design of parks with the construction of houses, offices, hospitals and other buildings. House owners and office owners are organised for this purpose, for instance, by neighbourhood improvement districts or business improvement districts.[201] These privately funded parks are managed by the owners or the tenants of the surrounding houses, offices and amenities.

At EU level regulations for nature conservation are maintained but budgets for nature policy have been limited to co-financing the management of existing nature reserves. The EU has increased efforts to benchmark the management of the reserves and to reward best practices by providing higher co-financing.

Nature policy and related policies are synchronised in focused and efficient ways to minimise transition costs that come with time-consuming and therefore costly

[199] Innovation Network 2015.
[200] Ibidem.
[201] PBL 2012.

coordination.[202] Environmental policy has been deregulated, more than in the trend scenario. This is also true for European water policy and waste policy. Environmental taxes have not been introduced.

Agricultural policy is kept at a basic level in order to guarantee an integrated agricultural market.[203] Agricultural subsidies have been significantly reduced. Forestry in all nature reserves takes ecological considerations as a starting point. In other forests, economic considerations continue to have priority and the sector has become more industrialised. Rural development policies are managed at national and regional levels or left to the market. Nature reserves and other natural areas generate more employment and economic growth than under the trend scenario, since these areas are more used for leisure activities. In nature reserves, ecological considerations dominate; in other natural areas, other considerations may have priority.

Energy policies have become less ambitious regarding renewable energy than in the trend scenario and climate policies have become more focused on climate engineering and storing carbon dioxide.[204] As has been mentioned above, large wind parks have been built in nature reserves with good wind conditions creating additional funding for the management of these reserves. Degradation of nature reserves, caused by the construction of new roads, railroads or canals occurs, but is compensated. Technological solutions for fish migration, however could not compensate the loss of biodiversity caused by the building of new hydropower systems.

Box 8.6: Funding of green spaces in built-up areas by the private sector

Usually, municipalities finance the development and management of green spaces in built-up areas to a large extent, but private companies can also contribute a lot. As far as parks and greeneries lead to higher real estate prices, the owners or the users of homes, offices and other buildings could pay part of the costs.
This could happen, for instance, by recovering the cost in land prices, by raising property taxes or by including financial arrangements in public–private partnerships. When property taxes are raised, it is important that national governments do not reduce the funding of municipalities.
When a property developer or a consortium develops an area as a whole, the municipality can even refrain from investing in green spaces. In these cases, the role of the municipality could be limited to imposing and communicating quantitative and qualitative standards that should be fulfilled by the area in advance. This could, for instance, be done by describing the standards in an urban plan or a zoning plan.

[202] Meyer et al. 2015.
[203] Haines-Young 2011.
[204] De Wilde 2015.

Natural area, river area, rural area and urban area, under the perspective of Working with Nature. Images: AENF Visuals

9 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 towards a holistic approach was followed in 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.

9.1 Guiding values and policy challenges

In Working with Nature, nature is considered essential to the prosperity of societies. The earth is seen as the home that people share with every other living creatures and society is considered as a part of nature.[205] Nature and people are inseparably intertwined from the local to the global level. The natural goods and services provided by nature ensure sustainable business operations as well as societal wellbeing. Protecting nature ensures that services are sustainably used and not become depleted.[206]

The stock of natural systems that yields goods and services into the future forms our 'natural capital'. This natural capital together with other forms of capital, such as 'technical capital' and 'social capital' is considered a key input for a wide range of 'value chains' in society. The way in which economic performance is defined has changed.[207] Growth counted in terms of Gross Domestic Product, has been redefined in terms of well-being and includes an assessment of the natural resources of a country or another territorial unit and the services it provides to business and society as a whole. Understanding the dependence of economic activities and society on nature and the opportunities to minimise the impacts of these activities on nature is therefore considered as crucial.[208]

The main challenges addressed by this perspective are the use of nature by other sectors and limiting negative impacts of human activities on nature.[209] This requires a transition towards a green economy, in which new ways of producing and consuming make the best use of the services delivered by nature while minimising negative impacts on nature.[210] In Working with Nature, people behave as conscious consumers who follow healthy diets that contain less meat than they do today or under the trend scenario.

Economic production therefore becomes nature inclusive and guided by the principle 'Working with Nature'. Different ways of Working with Nature are developed ranging from better using existing natural or near-natural systems to

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[205] Schmid 2016.
[206] Millennium Ecosystem Assessment 2005.
[207] GNF 2014.
[208] Bishop 2013.
[209] European Commission et al. 2014.
[210] UNEP 2013.

increasing the delivery of services by cultural landscapes or production landscapes. Nature-based solutions are applied to stabilise production systems by limiting the frequencies of pests, erosion and flooding.[211] In some cases, ecosystem engineering could even lead to new ecosystems.

9.2 State of nature in 2050

Natural systems provide a variety of services
By 2050, nature consists of areas ranging from agro-food, feed and fibre landscapes to landscapes providing supporting or regulating services, for example, wetlands or coastal dunes. Natural systems delivering multiple services have significantly increased. Examples are forests, peatlands, and marshes. Natural systems that provide only limited regulating services or production services, such as semi-natural grasslands and heathlands, have decreased. Forests have become more diverse to prevent damages from storms. They are also used for biomass production or erosion prevention. This has a moderately positive effect on the diversity of forest species.

Natural pollination (left) and rooftop gardening (right). Photos: Novum Photo and Hollandse Hoogte

Throughout the EU water quality of rivers meet standards of 'good ecological quality' and in many rivers the biological diversity has increased and fish migration has been made possible. In rural areas, the increase in natural elements acting as sources for pest control and pollination has a positive impact on species that depend on semi-natural habitats. In urban areas, nature ranges from trees and shrubs to reduce the impacts of extreme climate events to green rooftops for farming. Due to improved environmental conditions, urban biodiversity has further increased.

Natural areas are in good condition and have expanded
Overall in Europe, natural areas are better protected for their contribution to water regulation, peat soil conservation and so forth.[212] In some cases, natural areas are expanded. In areas with less suitable conditions for agriculture, such as mountain areas, commercially exploited coppice lands and forests have developed to provide alternative sources for biomass production. Woody and other biomass is used for renewable energy and as natural resource for the chemical industry.[213] The overall condition of grazed grasslands and heathlands has improved as the number of grazing animals is in line with the carrying capacity of these ecosystems. Semi-

[211] Maes and Jacobs 2015.
[212] Prins et al. 2017.
[213] Coppicing is a traditional method of woodland management which takes advantage of the fact that many trees make new growth from the stump or roots if cut down.

natural grasslands dependent on mowing regimes are in a good condition as the increased demand for biomass stimulates farmers to mow the grass instead of doing nothing. Degraded peat lands have been restored and their management has been changed to ensure that maximum carbon sequestration is achieved and peat oxidation – and as a consequence greenhouse gas emissions – are avoided. In these areas, this only allows extensive agriculture and requires farmers to fully make us of nature's services and to develop new business models. The surface of wet areas, marshlands and dunes along the coast has increased as new areas have been redeveloped in order to regulate flooding.

Rewetted peatland avoids peat oxidation and emissions of greenhouse gases. *Photo: Image Select*

Forests are managed in sustainable ways (see Box 9.1). As a consequence, forest age and species composition have become more diverse than in 2015, either by diversity within forest stands or between stands. This helps to avoid the outbreak of pest and to minimise the susceptibility to storms which are expected to increase all over Europe because of climate change (see Section 4.1). [214] Moreover, the effects of forest practices on carbon sequestration are mitigated, for instance, by allowing an increase in dead wood in the forest. Forest management is not only focused on wood and paper production, but also on erosion prevention (on steep slopes) and water retention (in upstream areas). On these slopes and in these areas, the production of wood and paper is not the first priority. This does not create many problems since more and more wood and paper are expected to be reused in the years up to 2050.

[214] Jactel et al. 2009.

Box 9.1: Sustainable forestry

Europe has a long tradition of sustainable forestry. In this tradition forests are considered as working environments, providing paper and wood for furniture, construction, energy production and so forth. A sustainably managed forest contains trees of all ages and often different tree species. As the trees mature they are felled and the natural wood is processed at saw mills. Felled trees are replaced with seedlings through natural regeneration. In this way, the forest is constantly renewed. Great care is taken to ensure the safety of wildlife and to preserve the natural environment. Forests which are managed in a sustainable way add greatly to the look of the natural environment and consequently attract tourism. Because of this, they provide local employment related to forestry and tourism. Under the perspective of Working with Nature by 2050, all forests in Europe are managed in an ecologically responsible way.

Sustainable wood harvesting. Photo: Image Select

Rivers have been renatured to improve flood prevention

In this perspective, rivers throughout Europe are managed in an integrated way, including flood prevention. In upland areas, forests retain excess rainwater and help to moderate water run-off. Because of this, they diminish extreme run-offs. This in turn reduces the damage from flooding and also helps to mitigate the impacts of droughts.[215] Along rivers floodplains have been reactivated or have been developed to serve as retention reservoirs, which are normally wet, or detention reservoirs, which are normally dry and are only used during peak flows. These floodplains consist of extensively used grasslands and include secondary rivers and river bypasses (see Box 9.2). In the floodplains buildings are absent, except innovative constructions, such as stilt houses, floating offices and restaurants built on mounds. Because of this, floodplains not only reduce flood risks but also provide societal benefits and economic advantages.

Dams for hydropower or irrigation have been built in an ecologically responsible way with low dams, small reservoirs, fish passages for upstream and downstream

[215] EEA 2016a.

migration and sediment transport. Large fish passages near dams make fish migration possible in both directions and for all migratory species, including endangered species, such as eel, salmon and sturgeon. Special turbines reduce mortality rates of fish migrating in downstream direction. The improved connectivity of rivers provides possibilities for various kinds of water recreation, such as angling, canoeing, and hydro speeding. Environmental flows save natural wetlands as the normal seasonal and daily fluctuations are maintained.

Fish passage near hydropower dam. Photo: DPI

Water quality has been improved, compared to the situation in 2015 and under the trend scenario as buffer zones containing wetlands have been established around rivers and lakes. In rural areas, helophyte filters are put in place to clean waste water. In urban areas, new techniques based on microbes are applied for water treatment.

Box 9.2: Room for the river

Depoldered land to decrease flood risk. Photo: Hollandse Hoogte

As rivers flood each year the water deposits sediments on the floodplain which in turn reduce the storage capacity for annual flooding. The principle 'room for the river' addresses flood protection, nature development and improvement of the environment in the areas surrounding rivers. This is for instance done by lowering the level of floodplains, 'depoldering' land or constructing flood bypasses. Depoldering means that by moving a dyke inland, part of the land which was located behind the dyke becomes part of the floodplain. A flood bypass is a parcel of land that is designed to convey excess flood waters from a river in order to reduce the risk of flooding on the remaining land in urbanised regions.
In the 2000s and 2010s, the 'room for the river' principle was applied in regions with large rivers in north-western Europe, after several incidences with a high risk of flooding in this part of the continent. The principle addresses the storage and discharge of water but not the upstream aspect of retaining water. By 2050, room for the river has also been applied in various other areas with large rivers in urbanised regions in Europe which are vulnerable for flood risks. Applying the principle became increasingly urgent due to more extreme water discharges which were caused by climate change. Because of this, the principle is combined now with water retention by tributaries, wetlands and changing land use, for instance, by transform farmlands into natural areas.

In rural areas, agricultural landscapes deliver nature-based solutions

In many rural areas nature and agricultural are highly integrated. Nature is particularly enhanced to provide regulating services and supporting services, enhancing agrarian production or mitigating natural hazards. Soil management is adapted to increase soil biodiversity and to enhance nutrient cycling, soil formation, carbon storage and primary production. By applying soil management techniques, such as fallow techniques, diversified crop rotations, combined cropping or livestock and crop integration, soil fertility is enhanced and the use of fertilisers and pesticides is reduced.[216] Pests are controlled by the abundance of predators living in

[216] European Communities 2010.

the margins of the fields or near the fields. These margins consist of various semi-natural systems, such as riparian zones, flower strips and other small landscape elements. They cover up to one tenth of the farmlands.

Flowery field margin stimulating pollination and pest control. *Photo: Image Select*

Riparian zones along waterways and around small marshes act as water retention reservoirs in upstream areas. These reservoirs also play an important role in improving water quality. Drought-tolerant crops are used in areas with very low levels of precipitation, to avoid large amounts of water needing to be abstracted for irrigation. In many cases, these crops are combined with bushes and trees (see Box 9.3). In agricultural areas that are susceptible to erosion and drought, such as the mountainous regions in southern and eastern Europe, small landscapes are maintained and restored to avoid water runoff, improve water uptake and decrease evaporation. Nevertheless, part of the farmland in southern Europe has been abandoned due to increasing droughts, which have been caused by climate change.

A consequence of this way of managing farmland is that overall yields in 2050 are slightly lower than in the trend scenario. But on the other hand, less chemical inputs are being used, reducing production costs. Food supply is primarily reduced due to the fact that part of the farmland is used for landscape elements, which means that less area is available for production. But this does not have serious consequences for fulfilling food demand since European citizens have chosen to eat less meat in this perspective. The area of land with crops that bind nutrients to the soil has risen profoundly, limiting the need to import soy for livestock feed and meat substitutes from other continents. Also, chemical and pharmaceutical products are extracted from certain crops, but without leading to very intensive farming or threatening food security.

As has been indicated by the trend scenario, rural areas are highly characterised by renewable energy in 2050.[217] According to Working with Nature, renewable energy is provided by large wind parks and large solar fields and by algae cultivation,

[217] UNEP 2007.

providing third generation biofuels.[218] Many animal farmers produce algae using the manure to provide the nitrogen and phosphorus that algae need and providing useful resources for biofuels.

Box 9.3: Restoration agriculture

Restauration agriculture combining cattle grazing with fruit cultivation. Photo: Image Select

In the 2010s, restoration agriculture was only practiced in the United States and in several areas of southern Europe. In the following decades, however, this type of agriculture resulted in many advantages for agriculture as well as nature and was more and more applied. By mid-century, restoration agriculture is practiced in various regions throughout Europe.
Restoration agriculture cultivates an assemblage of plant species that aims to mimic a natural system to sustainably produce agricultural yields while restoring ecosystem services.[219] The aim is to recreate the richness of a natural system by using various plants and animals and by applying a multi-layered design for cropping from ground to canopy level. For instance, an oak savanna mimic can be based on chestnuts, apples, plums and cherries, gooseberries, grapes, fungi and grass for livestock. Such an assemblage has for instance the advantage that different crops have different nutrient demands and that some crops produce nutrients for other crops. Additional advantages are higher biodiversity, integrated pest control, and improved soil conditions. The system requires careful management, in particular with regard to mechanisation. Besides, tree crops require a long-term investment.

In and around cities, many functional green and blue areas are found
By 2050, there are many cities with a far larger percentage of green areas throughout Europe, than under the trend scenario. Green areas are not only found in urban districts with high economic status but also in districts with a low status.[220]

[218] Van Calmthout 2013.
[219] Shepard 2013.
[220] EEA 2009.

Scattered throughout the cities, there are many individual trees, tree rows, green roofs, public allotments, parks, etc. These green elements provide important services, such as improving air quality, decreasing flood risks, and reducing urban heath islands. As a result, they contribute to the health and safety of people living or working in cities or visiting them. Moreover, the variety of species has considerably increased in most cities.

Water retention in a city park to reduce flood risks. *Photo: Hollandse Hoogte*

Streets are lined with a broad variety of trees – not necessarily indigenous tree species – which are adapted to the local climate and which are best suited for the required services. Parks vary from small areas with grass, bushes and trees which are used as playgrounds for children, to large areas with marshes, lakes and woods which clean water, reduce flood risks and sequester carbon dioxide. Large parks and woods also provide many possibilities for all kinds of outdoor sports. Public allotments host a wide range of fruit and vegetables and also flowering plants to attract insects, particularly bees.

All apartment buildings, office buildings and shop buildings have green roofs containing mosses and herbs or lawns and shrubs or enable rooftop farming. The roofs of houses and other buildings provide energy by solar tiles. New buildings are made of recycled materials and are also recyclable themselves. Hospitals are surrounded by healing gardens or other green areas to stimulate the healing of patients (see Box 9.4). Urban expansions are located in areas where risks of natural hazards, such as landsides, floods and avalanches, are minimal.

Box 9.4: Healing garden

In 2015, healing gardens were primarily found in some American and Asian cities. By 2050, however, they have become common, not only in American and Asian cities but also in European cities, since they have various advantages. Patients heal faster from surgery if they are overlooking trees instead of walls in their hospital room and the presence of plants and animals in parks increases the well-being of people and reduces stress.

Healing garden near a hospital. Photo: Hollandse Hoogte

It became more and more clear that by organising part of the prevention and the cure of diseases in green areas, health care saves a lot of costs. This was done, for instance, by creating gardens or parks around hospitals in which patients can sit, walk, meet psychologists or work with their hands. Investing small parts of the saved costs in gardens, parks and natural areas has contributed substantially to the greening of cities and to nature development around the cities. At the same time, the gardens provide ample possibilities for walking and the parks for sports.

9.3 Pathway to 2050

Trends with high impacts on nature trigger the transition towards a green society

Under the perspective of Working with Nature, it is assumed that up to 2050 some trends and impacts – several of them presented in the trend scenario – have stimulated farmers, other entrepreneurs, researchers, policymakers and citizens to pursue a transition of society towards a 'green society'. The following trends have triggered a paradigm shift in society which has led to a growing recognition that the earth is a home that people share with other living creatures. Increasing frequencies and intensities of natural hazards caused by climate change has created

a sense of urgency for finding ecologically responsible solutions.[221] Growing scarcity of oil, nitrate and other natural resources has caused higher prices and has led to an increasing demand for bio-based resources. The limited economic growth has created a sense of urgency to optimise chain processes, such as production, processing and logistics, and to develop new value chains for goods and services. New outbreaks of animal diseases have led to a growing awareness among farmers of the importance of ecologically responsible agriculture.

These trends have enabled 'green pioneers' to realise a transition (fundamental system change) towards a green society, which is more encompassing than a green economy.[222] Growing attention of traditional and new media for the trends lead to more pressure from environmental organisations and various companies for better cooperation of the economy with ecology and also lead to changing attitudes among citizens. People who have taken the lead in the transition came from business (agriculture, industry), finance (insurance, pensions), health (hospitals, nursing homes), civic society (nature organisations, citizen organisations), and knowledge institutes (R&D institutes, universities). These people and the organisations they represent became more and more aware that by actively contributing to the transition they could gain competitive advantages in the green economy. Laggards from various value chains followed at a (much) slower pace and were confronted with (serious) competitive disadvantages. Many of them did not survive.

The transition was a tour the force and its realisation required a period of several decades. Three subsequent periods can be distinguished.[223] In the first period, solutions that were already available, such as natural pollination, were applied. In the second period, innovations that already existed as models but needed further testing and marketing, such as the cultivation of algae for energy production, were put into practice. And in the final period more radical innovations which contribute more to the green society but for which major barriers had to be overcome, such as recyclable buildings, were introduced and became common.

Green pioneers in various value chains have taken the lead

The transition towards a green society and the innovations needed to maintain society green is stimulated by *transition governance*. This mode of governance is based on stakeholders across various production chains, such as food, feed, fibre, chemicals and energy, and various types of stakeholders, including business, government, non-governmental organisations, aiming for a transition towards a green economy. This is done by focusing on innovations and by enabling their development, breakthrough and dissemination. Various actors take the lead. What matters most is the engagement to innovation processes and the responsiveness to change existing practices and policies when needed.[224] For instance, focusing public investments in research and innovation on the greening of society has created fertile grounds for innovations.[225]

Innovations most of all take place in innovation networks in which green pioneers from various value chains meet, discuss new ways of producing and consuming, share knowledge and agree which activities are needed to test and implement the innovations (see Box 9.5).[226] Innovation networks are organised around various issues, such as restoration agriculture, renewable energy, recycling of buildings and new ways of financing the greening of cities. Activities that are undertaken include

[221] CGDD 2013.
[222] Rotmans 2012.
[223] Newton and Bai 2008.
[224] Voß et al. 2009.
[225] Mazzucato 2013.
[226] Dammers and Hajer 2011.

doing research, designing, prototyping, marketing, testing and applying new solutions. The innovation networks are constituted more by informal engagement of individuals than by formal representatives of organisations. Eventually, however, cooperation also takes formal forms, for instance, by creating innovation platforms, by forming green economic boards and by signing covenants or contracts.[227]

Box 9.5: Innovation network

In an innovation network participants, such as farmers, other entrepreneurs, scientists, civil servants and others search innovative solutions in order to realise shared ambitions. An example of this is the cultivation of algae to meet the growing demand for biofuels and natural resources for the chemical industry.[228] Participants from a variety of value chains cooperate on an equal basis, applying principles, such as transparency, self-organisation and knowledge sharing. These networks use open innovation approaches based on agreements, complementary interests and shared ambitions.

Cultivation of algae stimulated by innovation networks. *Photo: Hollandse Hoogte*

Frequent, face to face meetings are alternated by virtual meetings and knowledge sharing through the internet. An innovation network operates in an experimental way: various projects shape one innovation at a time, adapting the innovation along the way as problems present themselves and solutions are found. This step-by-step way of working is expected to contribute more to developing ecologically responsible solutions than traditional approaches.

Most innovations happen on the boundaries between different value chains, providing fertile grounds for exchanging knowledge and finding new solutions. And many innovations happen on different scales, not only on a local and regional scale but also on the national, European and global scale. Some actors actively participate in pilots, while other actors back new solutions in other ways, for instance by crowd funding.

[227] Etzkowitz 2000.
[228] http://www.innovatienetwerk.org/en.

Ambitious transition programmes stimulate innovation networks on all levels

The transition towards the green society implies a fundamental change of how the economy and society use natural resources and other services provide by nature. Private, civic and public organisations have learned how to integrate the ecologically responsible use of resources in their daily practices. Nature has provided inspiration in various ways to find new solutions; for instance, for preventing pests in agriculture, for reducing flood risks in cities and for designing and redesigning industrial products (biomimicry).

The EU and the national governments have stimulated the transition towards a green society by enabling all kinds of innovations. This happened by taking measures that were identified in response to the needs of innovation networks and green pioneers to develop and disseminate green innovations. Public investments in basic and applied research focusing on the greening of various production chains have been significantly increased. Active involvement of companies and environmental organisations proved to be an important condition and active involvement of citizens in defining research agendas has been strongly encouraged. The EU and the national governments have taken (part of) the risks away from innovators in order to increase their willingness to participate.[229]

The EU and the Member States have also take other measures to stimulate the transformation. These measures not only rewarded ecologically responsible behaviour but also put a price on ecologically irresponsible behaviour.[230] The Gross *Natural* Product has been introduced as an indicator for sustainability to complement the Gross *Domestic* Product as an indicator for material wealth. Public debate on greening society have been organised and 'champions of green innovation' have been publicly rewarded. The pricing of external costs of production and consumption have gradually increased, among other things, due to higher green taxes, polluter-pays schemes and emission trading permits.[231] Examples are loss of biodiversity caused by farmers using chemical fertilisers, climate change caused by energy companies emitting greenhouse gases, and increased litter caused by consumers using non-biodegradable plastics bags.[232] Allowances for emitting carbon dioxide have been significantly reduced and prices have become much higher. Artificially low prices or tax reductions for the use of fossil fuels have been gradually abolished. Environmental standards for air, water and soil have gradually become more stringent. Certifications have been replaced by environmental impact tables, which are more transparent. And regulations that hinder innovations, such as intellectual property rights have been adapted.

In cooperation with the innovation networks the EU and the Member States have developed an ambitious transition program, stimulating innovation networks from the local to the global level. This required a new approach to education and learning: people from the private and the public sector have learned how to educate themselves and how to learn from one another. Businesses have marketed their products and services by referring to their green character, i.e. the use of natural resources and the provision of natural services. New arrangements, such as public–private trade organisations have been created to stimulate the provision of ecosystem services and other innovative solutions (see Box 9.6).

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[229] Fink and Rammig 2014.
[230] Focus on Nature 2016.
[231] Dryzek 2013; EEA 2016b.
[232] Mazzucato 2013; Bouwma et al. 2016.

Under the perspective of Working with Nature, the distinction between nature policy and other policies related to nature has disappeared to a large extent. Ecosystem services provide many opportunities for integrating ('mainstreaming') nature in other policies. Environmental standards which have become more strict and external effects which have become more internalised have stimulated the supply of ecosystem services. This is also true for environmental standards related to agricultural policy, rural development policy, cohesion policy, and waste policy. Because of this, the use of chemical fertilisers and pesticides and the emissions of ammonia related to agriculture have been reduced considerably, compared to under the trend scenario. At the same time, ecosystem services, such as helophyte filters, contribute to water treatment.

Box 9.6: Public–private trade organisation

A public–private trading company creates markets for services provided by nature. This happens by bringing supply and demand in a given area together and by trading these services. Various kinds of ecosystem services are combined and various sources are tapped that until then were hardly used. A trading company actively searches for related ecosystem services, such as a reed water park for water treatment and biomass production, in combination with canoe routes, floating walking trails, and restaurants for recreation and tourism.
The public–private trading company creates a market by actively searching for demanders seeking for ecosystem services, for entrepreneurial providers and for smart arrangements to match supply and demand.[233] The public sector pays the costs and the losses of income by providing subsidies. The private sector rewards the entrepreneurial risks. This is for instance done by power companies paying for the provision of biomass. In this way, EU regulations are complied with. Since the producers of the ecosystem services obtain market prices, delivering the services becomes a profitable activity. By doing this, the public value of ecosystem services is made visible and rewarded. The trading company actively promotes ecosystem services by using knowledge networks, launching information campaigns and communicating exemplary projects.

Subsidies for rural development and regional development provided by the EU and by national or regional authorities have been used to stimulate the development, marketing and application of ecosystem services. Water retention in natural areas was paid by national, regional or local authorities responsible for water management, for instance, by cities that are located downstream and that benefit from water retention upstream.

[233] Londo et al. 2005.

10 Deriving messages

The policy messages of the synthesis report have been derived by the scenario team; this chapter describes how readers can derive their own messages. To do this successfully, it is important to take the basic assumption of multi-naturalism as a starting point. A first step in deriving policy messages is organising a series of informal dialogues preceding or parallel to formal decision-making. When organising such dialogues, arranging unexpected encounters between policymakers and stakeholders, creating shared understanding and building joint visions are important activities. Building a joint vision can be considered as bricolage, which can be practiced in different ways. Policymakers and stakeholders are invited to further elaborate the components of the Nature Outlook and to make them applicable to their own national, regional or local setting.

10.1 Multi-naturalism as basic assumption

This final chapter is focused on deriving policy messages from the Nature Outlook. Policy messages provide strategic arguments to organisations and groups involved in nature policy and related policies. The synthesis report describes the messages that have been derived by the scenario team.[234] These messages are focused on finding common ground for the policy agenda beyond 2020. Some messages have been derived from the trend scenario, other messages from individual perspectives and still others by combining elements from the perspectives.

This chapter describes how readers can derive their own policy messages, applicable to their own national, regional or local setting. Deriving messages from the trend scenario is rather straightforward, since these messages are directly related to future policy challenges. Therefore, this chapter instead focuses on deriving messages from individual perspectives and especially from combinations of perspectives. This is illustrated by describing four different ways in which elements from the perspectives can be combined when building a joint vision.

As remarked in Section 1.1, Europe has a variety of natural systems even though the continent is relatively small, densely populated and highly urbanised. People living on the continent or visiting it experience and value nature in various ways: as tourists, farmers, restaurant holders, scientists, inhabitants, and so forth. People are involved in various social practices, providing them with a variety of different interactions with and experiences of nature. In fact, there are different versions of 'nature', which do not simply imply different views on a shared 'thing'. Different 'things' are involved and they are embedded in different practices.[235]

Therefore, we should move from thinking in terms of a unified nature as a background for all human activities (*naturalism*) to thinking in terms of multiple ways in which people and other beings are linked with one another (*multi-*

[234] Van Zeijts et al. 2017.
[235] Mol 2017.

naturalism).[236] As a consequence, 'nature' should not be considered as a universally agreed upon concept and an appeal to save nature should no longer be considered as sufficient to obtain agreement.

10.2 Organising informal dialogues

A first step in deriving policy messages from the Nature Outlook is creating stimulating conditions by organising a series of informal dialogues. The stakeholder dialogues which were organised to create the perspectives and to derive messages from them can be considered as examples of such dialogues. Informal dialogues can be organised during the development of scenario studies but they can also be organised to facilitate the use of scenarios.

Three activities are important when organising informal dialogues: arranging unexpected encounters, creating shared understanding and building joint visions.[237] By organising meetings between a broad range of involved policymakers and stakeholders, such as employees of public organisations, business organisations, non-governmental organisations and citizen groups from a variety of sectors, various views of nature, agriculture, urbanisation and the like can be brought together and can be discussed and challenged with the aid of the perspectives.

Through the exchange of and reflection on various insights about the future and discussing the trend scenario and the perspectives, participants in such dialogues can develop a shared understanding. This may help them, for instance, to identify the most important challenges for a region and the regional ambitions that could be realised.

During the meetings, the perspectives can also be helpful to build joint visions on the future of a region. While doing that, the participants can explore to what extend 1) their ambitions can be accommodated in such visions, 2) their ambitions can be combined, 3) the ambitions conflict with one another, and 4) conflicts can be overcome by finding new solutions. Face to face meetings may be alternated with communication via the internet, for instance, by creating digital platforms or organising webinars, and also via traditional and new media.

A series of informal dialogues may be organised preceding or parallel to formal decision-making. Informal dialogues are not primarily contexts for taking formal decisions, but they might serve as preparation for formal decision making. Participants who hold strategic positions in their organisations (managers, advisors) can be considered as ambassadors between the informal dialogues and formal decision making.[238] They are especially able to communicate the results of the dialogues in their organisations and to inform other participants about decisions (to be) made in their organisations. For the effective implementation of a joint vision which is being developed in the informal dialogues, it is important that attention is paid to matters, such as establishing alliances, defining projects to realise the visions, funding projects and organising implementation. In the informal dialogues these matters are discussed only in general terms and no binding decisions are made; in formal decision making this happens in more concrete ways and binding decisions are actually made.

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[236] Latour 2017.
[237] Dammers and Hajer 2011.
[238] Latour 2013.

A series of informal dialogues can be organised at all levels, from the EU to the local level. The steps to be made and the principles to be applied are comparable on all levels. The text below is focused on the regional level since this is more concrete than focusing on the EU or the national level.

For a series of informal dialogues to be successful, it is important that the meetings are organised on a frequent basis and over a longer period of time.[239] This can be done, for example, by organising a meeting every few months in a period of a year or two years. In this context, the following principle applies: 'by taking time you win time'.[240] Other conditions to be met to make informal dialogues successful are: inviting people who are used to think on a strategic level, encouraging people to speak without being bound by mandates or instructions from their organisations, and creating a safe environment in which people can discuss unconventional ideas.

After each meeting, it is important that policymakers and stakeholders who have taken the initiative to hold the informal dialogues, analyse and elaborate the results. In subsequent meetings, they may present the analysed and elaborated results and discuss them with the other participants. By proceeding in this way, mutual learning among the participants may be stimulated.

When the Nature Outlook, focusing on the EU level, is applied to the national, the regional or the local level its components must be adapted to this level in order to derive the right policy messages from them. For certain regions, main policy challenges may differ from the challenges which the EU faces as a whole; for example, population decrease instead of moderate growth. Parts of the perspectives may not be relevant, e.g. insights about natural areas may not be relevant for an urban area, while other parts may be in need for further elaboration, such as insights into city parks providing ecosystem services. The components of the Nature Outlook can be adapted in different ways and in varying degrees (see Section 2.3). This can be done by conducting a literature review, by making maps and visualisations and/or by making model calculations if models and data are available.

10.3 Practicing bricolage

Building a joint vision can be considered as a design activity that, to a large extent, is characterised by *bricolage* (improvisation). In the practical arts and the fine arts, *bricolage* is understood as the creation of a work from a diverse range of objects or materials that happen to be available. Bricolage, not only has a playful but also a serious character. The descriptions and visualisations of the perspectives provided by the Nature Outlook can be used as material to create a joint vision. Inspired by the arts, four different methods of bricolage can be distinguished when using the Nature Outlook: making a pastiche, constructing a palette, fashioning a collage and creating an assemblage.[241] Each successive method embodies a higher level of integration. In the context of using the perspectives, we defined these four methods of bricolage in a stricter sense, in order to distinguish them more clearly from one another. Besides, in our context the various elements of the perspectives

[239] Van der Steen and Van Twist 2012.
[240] Evers and Susskind 2006.
[241] Bricolage consists of organising things that are available. This can be done by combining them, i.e. by creating a pastiche, a collage or an assemblage (Latour 2004). But in the context of using perspectives it is also possible to organise things without combining them, i.e. by creating a palette, as will be clarified in the text.

are considered as different land uses. The four ways of bricolage can be summarised as follows:

- Making a *pastiche* refers to the choosing *one* perspective as a source of inspiration for building a joint vision
- Constructing a *palette* refers to combining elements from different perspectives in a joint vision by allocating different land uses to *distinct sub-areas* which have no interrelations
- Fashioning a *collage* refers to combining elements from different perspectives in a joint vision by allocating different land uses to *adjacent sub-areas*
- Creating an *assemblage* refers to combining elements from different perspectives in a joint vision by allocating the different land uses to the *same sub-area*

Each of these methods of bricolage is elaborated below and examples are provided and visualised.

When practicing bricolage, it is important to keep in mind that the perspectives are to a large extend not mutually exclusive. Users of the perspectives may pick and mix from several or all of them to form a joint vision on the future of nature and related sectors in a region. In the context of informal dialogues, bricolage is not an individual but a joint endeavour and not only a matter of rational, verbal reasoning, but also of creative, visual articulating.[242] Drawings, sketches and symbolic maps may be used as conversation tools, reflecting the transformations between what participants consider as challenges and as solutions and helping them to integrate challenges and solutions.

Making a pastiche

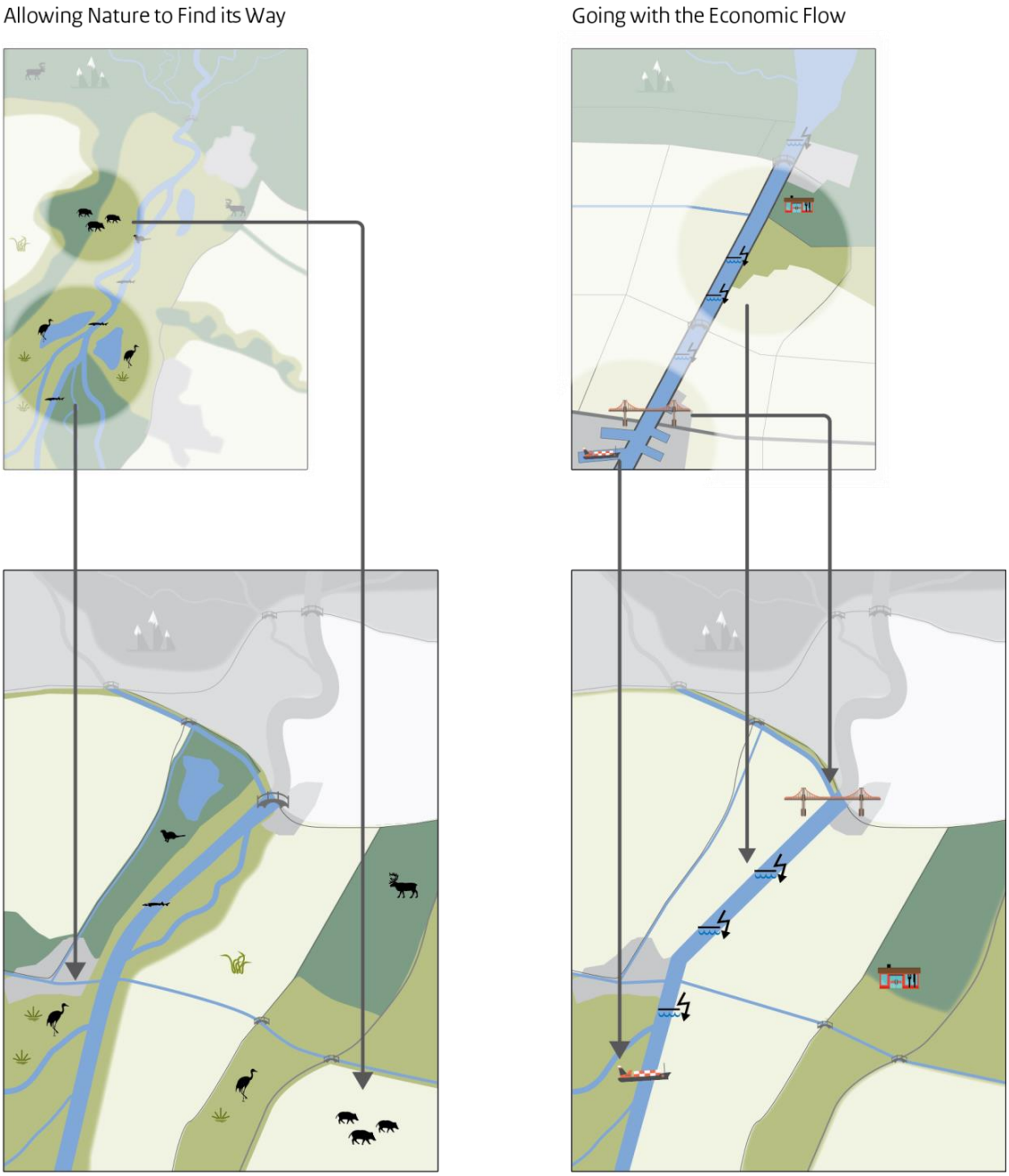
A pastiche is a work of art, literature, theatre or music that imitates the character or style of the work of one or more other artists.[243] In the context of using the Nature Outlook, making as pastiche refers to choosing *one* perspective as a source of inspiration for building a joint vision. In this case, various elements of the Perspective can be included in the vision, in modified forms or not.

Suppose that policymakers and stakeholders want to develop a joint vision on the future of a river area. Some of them want to stop the decline in unspoiled nature while others want to maximise the utilisation value of the river. The river, however, only allows the realisation one of these perspectives, and no elements from the other perspective. A meandering river with natural banks, for instance, may contain a high potential of increasing biodiversity and fish migration and angling but because of this may not allow the building of dams for hydropower or irrigation. In this case, the policymakers and stakeholders may use the perspective of Allowing Nature to Find its Way, to develop a joint vision that is aimed at further increasing the biological diversity within rivers (see Figure 10.1, left). Under this perspective, among other things, more space could be created for meandering, allowing river banks to be flooded, and distributaries to form that may provide additional spawning areas for fish and more natural areas for other species. By creating these conditions, species, such as sturgeons, otters and cranes may be reintroduced into the area.
In an alternative vision, which is inspired by Going with the Economic Flow, the river may be optimised for the generation of navigation and hydropower (see Figure 10.1, right). This may happen, for instance, by canalising the river and by creating a cascade (series) of dams (with locks and fish elevators) and water reservoirs. The cascade would, however, cause so many barriers that fish migration would no

[242] De Jonge 2009.
[243] Online Etymology Dictionary.

longer be possible and the quality of aquatic ecosystems would significantly decline. Even with fish elevators, only a small amount of fish will reach the end of the cascade of dams. Not all of the migrating fish will find the elevator entrance and many will be caught by birds of prey and predator fish.

Figure 10.1: Two distinct visions on a river area (bottom images), which can be characterised as a pastiche inspired by Allowing Nature to Find its Way (top image, left) and by Going with the Economic Flow (top image, right).



Source: PBL

In this example of a joint vision for a river area, the hydrological, geological, and biological characteristics make the combination of (elements of) two perspectives in one vision impossible. This means that policymakers and stakeholders must make a choice for the implementation of one or the other vision in formal decision-making.

Policymakers and stakeholders can also be inspired by the pathway of one of the perspectives. They may, for instance, be inspired by the idea of turning an area into a 'European park' or applying incentivising governance and increasing public investment in nature development, as is included in the first vision. Alternatively, they can be inspired by the idea of applying market governance, establishing public–private partnerships and private funding of fish elevators, in the second vision. In many cases, however, it will be possible to combine elements from more perspectives in one joint vision and in many cases this will also be necessary in order to adequately answer the challenges for nature policy and related policies.

Constructing a palette

In the art world, a palette is a rigid flat surface, usually made of wood, on which a painter arranges and mixes paints.[244] In our context, constructing a palette refers to combining elements from various perspectives to a joint vision, by allocating land-use elements to distinct sub-areas located at some *distance* from each other. This may be done because one sub-area is most suitable for a particular land use and another sub-area for another land use but also to avoid negative impacts of a particular land use on other land uses.

Take as an example a rural area and participants of a series of informal dialogues who have agreed that the decline in unspoiled nature should be halted, the negative impacts of human activities should be reduced, and at the same time the utilisation value of nature should be more integrated into business. When constructing a palette, these challenges would be dealt with by allocating different forms of land use to different sub-areas and avoiding interactions as far as possible (see Figure 10.2).

The perspective of Strengthening Cultural Identity could involve investment in new landscape elements, such as tree rows and hedgerows in a certain sub-area. In such a sub-area, there would also be possibilities for small-scale agriculture producing regional produce and for various outdoor recreational activities. From Going with the Economic Flow, space could be allocated for intensive farming in another sub-area, and to remove landscape elements to give room for large-scale production. From the perspective Allowing Nature to Find its Way, a nature reserve may be created in a third sub-area by managed rewilding of abandoned farmland, by connecting it with other nature reserves in the region or by allowing an upmarket facility for ecotourism. In this last sub-area, only ecological farming and sustainable recreation on a limited scale would be permitted. By allocating different land-use functions to different sub-areas that are located at a certain distance from each other they do not conflict, but neither do they generate considerable synergy.

The various perspectives could also inspire policymakers and stakeholders to develop and implement different policies for each sub-area. For instance, applying community governance and creating a regional fund for investments in landscape elements for the first sub-area, market governance and simplifying environmental legislation for the second sub-area, and incentivising governance and connecting nature development with the local socio-economic agenda for the third sub-area.

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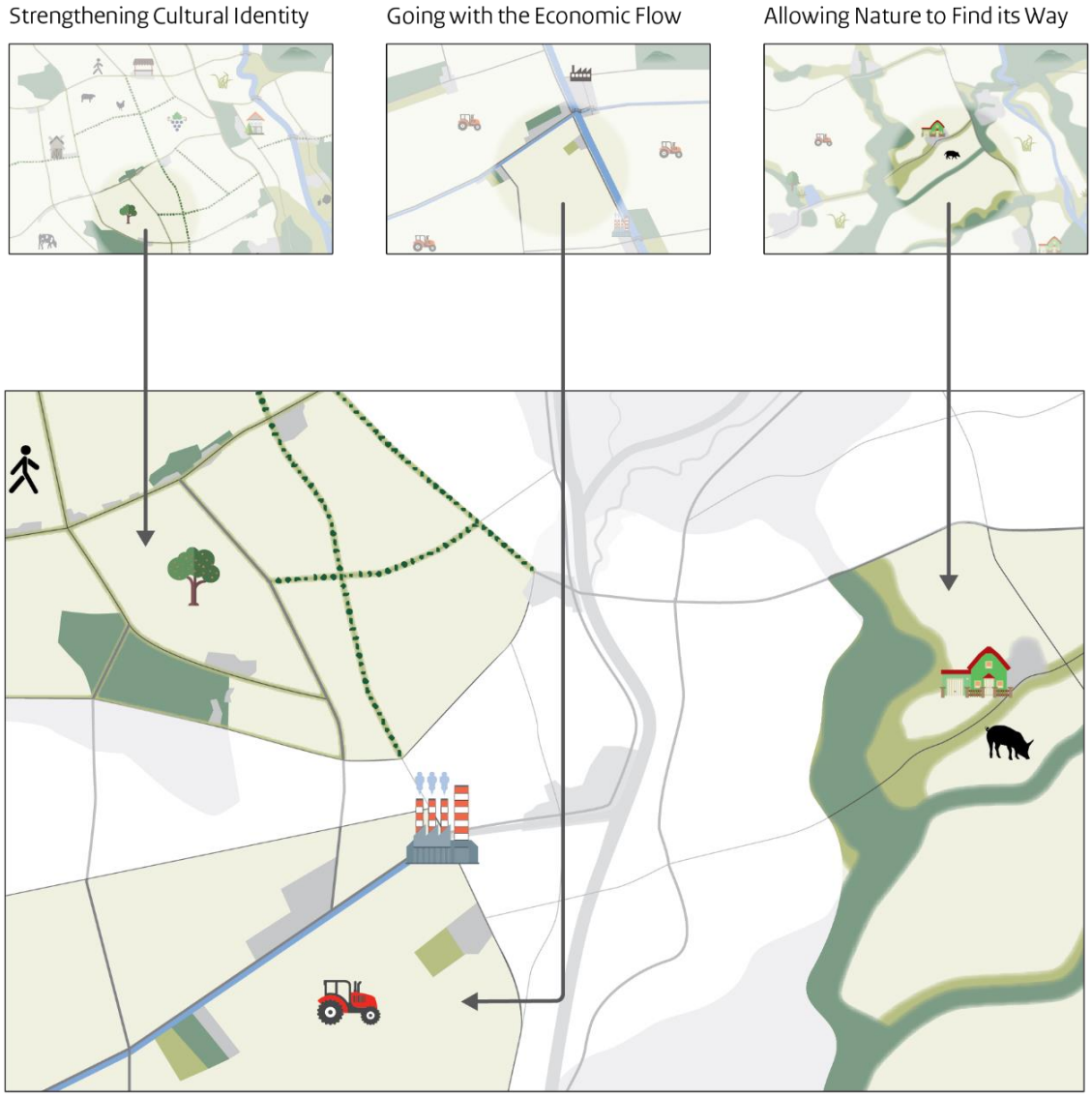
[244] Online Etymology Dictionary.

Figure 10.2: Joint vision on a rural area which can be considered as a palette and which is inspired by Strengthening Cultural Identity, Going with the Economic Flow and Allowing Nature to Find its Way.



Source: PBL

Fashioning a collage

Collages are made with a technique that is primarily used in the visual arts, where works of art are made from a collection of different items and materials, thus creating an *eclectic* whole.[245] In the context of the Nature Outlook, fashioning a collage refers to combining elements from different perspectives in a joint vision by considering the elements of the perspectives as land uses and allocating them to *adjacent* sub-areas (see Figure 10.3).

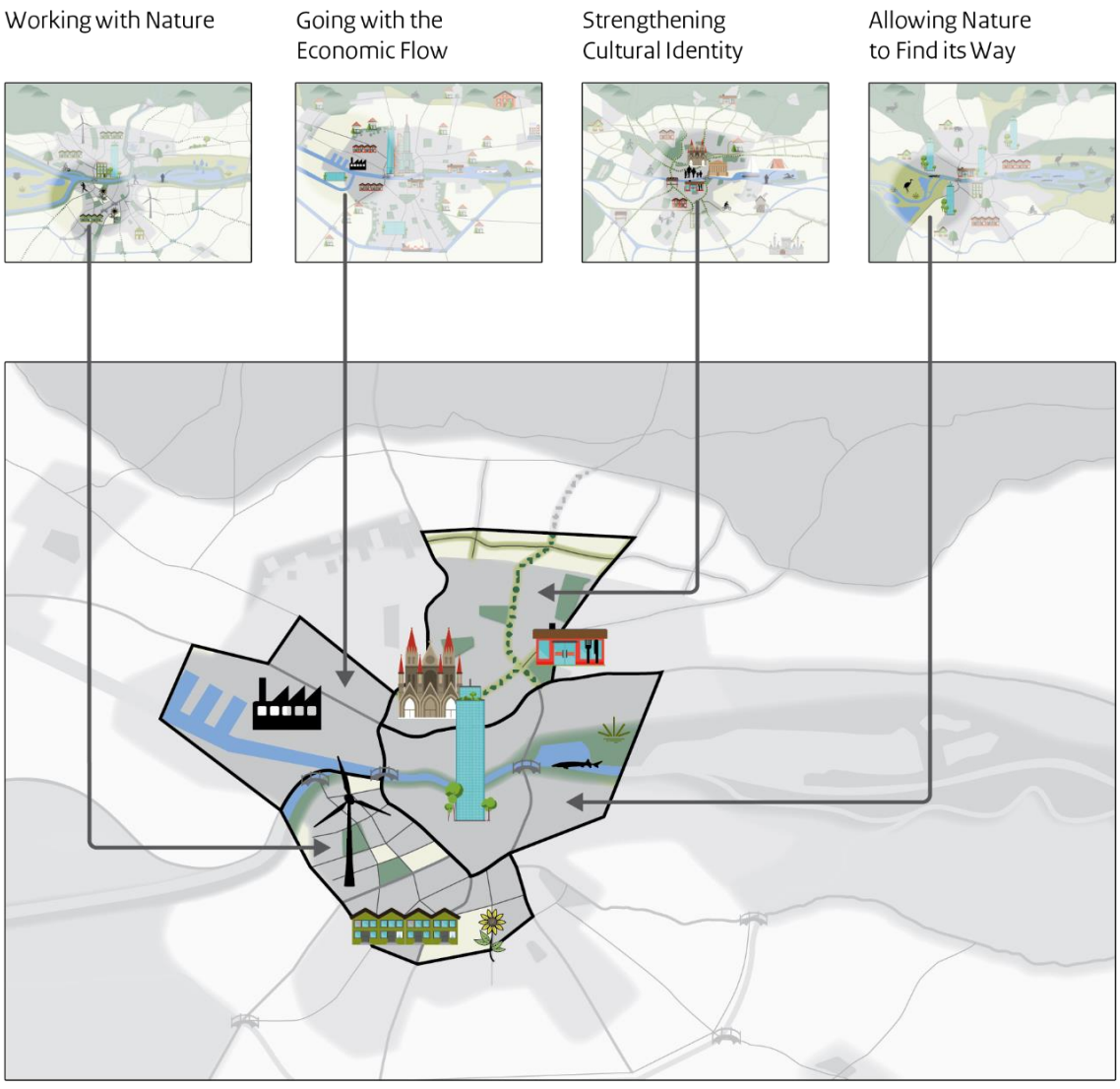
Take for example an urban area and participants of a series of informal dialogues who have agreed that the utilisation value of nature in business should be increased and the connection of people with nature should be enhanced. This could be done by creating new office areas and living areas, hospitals, restaurants and other

[245] Online Etymology Dictionary.

amenities, city parks, green spaces for urban gardening, and blue spaces for water retention. When fashioning a collage, these forms of land use would be allocated to adjacent sub-areas, while keeping the land uses separate from one another and by designing the sub-areas in mono-functional ways. In this way, the sub-areas form a collage (patchwork).

From the perspective of Allowing Nature to Find its Way, large city parks could be created along the edges of cities, creating the required space by constructing high-rise office buildings and apartment buildings in nearby areas. Working with Nature may encourage the creation of green spaces for urban gardening and stimulate renewable energy in neighbouring urban districts. From the perspective of Going with the Economic Flow, possibilities may be created for luxurious green living in another, adjacent district. Strengthening Cultural Identity may underpin the cultural identity of yet another neighbouring district, through marked designs of offices, residential housing and parks, and by renovating and repurposing cultural heritage in this district.

Figure 10.3: Joint vision on an urban area which can be regarded as a collage and which is inspired by Working with Nature, Going with the Economic Flow, Strengthening Cultural Identity and Allowing Nature to Find its Way.



Source: PBL

By allocating different land-use functions to adjacent sub-areas and by keeping them separate they do not conflict with one another. Some synergy could be achieved, since the functions of the adjacent sub-areas may reinforce each other to some extent. For instance, more people may visit a park when a restaurant is located nearby and vice versa.

In this case, the perspectives may also help policymakers and stakeholders to develop and implement different policies for each city district. For instance, making larger public funds available for investments in nature in the first city district, stimulating green innovation in new generations of wind, solar and other renewable energy technology in the second district, giving space to a variety of private initiatives related to housing construction and leisure facilities in the third district, and introducing a quality team to stimulate marked design of new buildings, parks and renovated cultural heritage, in the fourth district.

Creating an assemblage

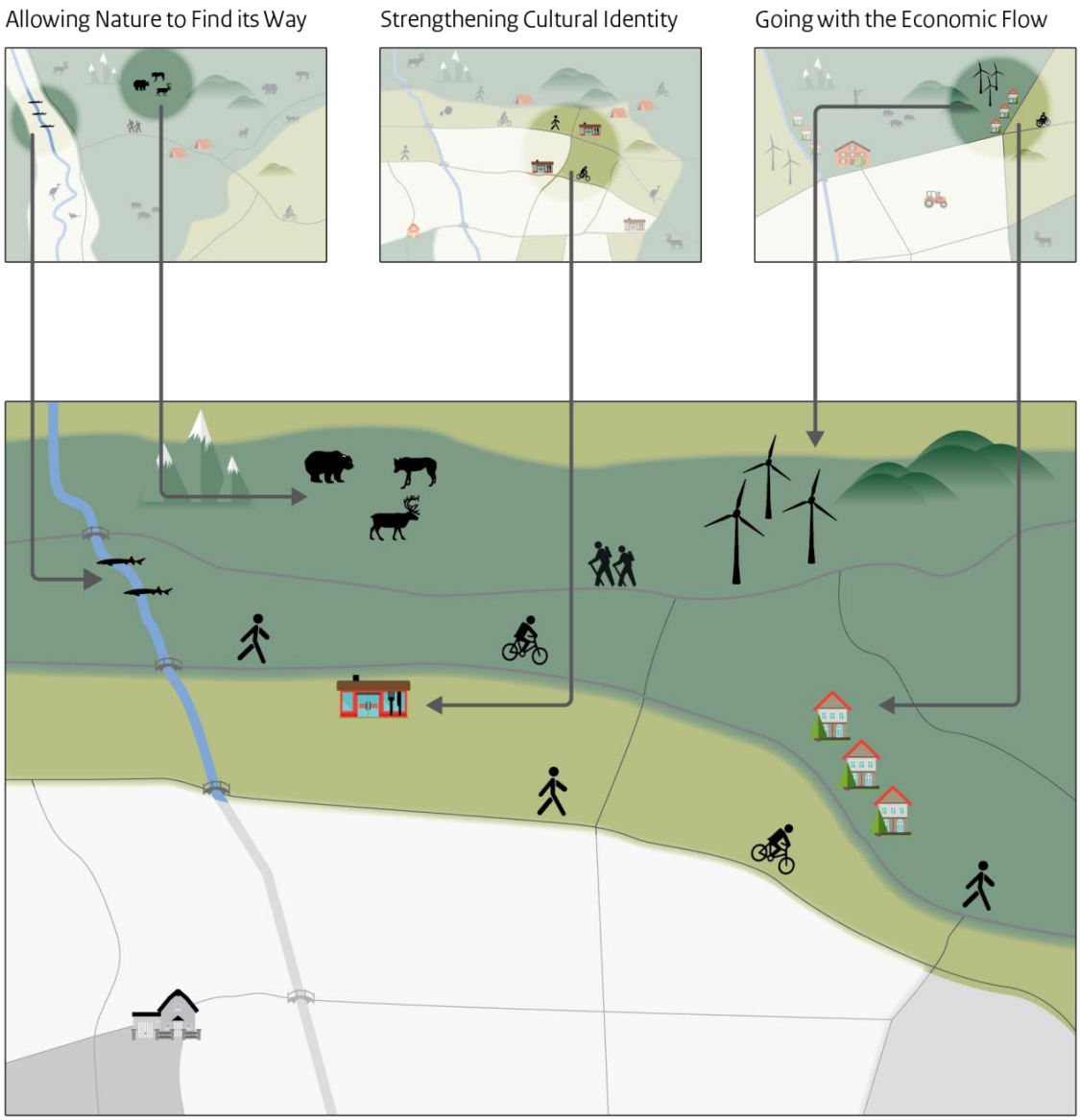
The assemblage approach is created by bringing different parts together and merge them into one *integrated* whole. The concept may refer to works of art, but also to industrial products. In the context of industrial design an assemblage is understood as an integrated and not an eclectic whole. In our context, creating an assemblage refers to combining elements from different perspectives in a joint vision by considering the elements as land uses that are allocated to the same sub-area (see Figure 10.4).

Take for example a nature reserve and policymakers and stakeholders participating in a series of informal dialogues who agree that the decline in unspoiled nature should be reduced, the integration of the utilisation value of nature into business should be enhanced and people should be more connected with nature. When creating an assemblage, different forms of land use would be allocated to the same sub-area in order to meet the challenges, they would be synchronised with one another and they would give the sub-area a multi-functional character.

From the perspective of Allowing Nature to Find its Way, nature reserves could be expanded and interconnected by corridors, in order to create habitats for sustainable populations of migratory fish, herbivores and top predators. From the perspective of Strengthening Cultural Identity, nature reserves could be made more easily accessible by creating a limited number of well-developed networks of trails and treetop walkways, floating walkways and other paths. These networks, together with the construction of several upmarket lodges along the edges of nature reserves may help to generate more financial resources for management of those reserves. In line with Going with the Economic Flow, at specific locations, a limited number of houses and windmills could be built within these reserves without disturbing wildlife. This could help to create more jobs and growth in the region.

By conceiving the elements from different perspectives as different land-use functions and by allocating them to the same sub-area they may conflict with each other. Therefore, much attention is being paid to integrate the different functions. By doing this, possible conflicts can be avoided and many synergies can be achieved. For instance, allowing substantial building activities in the nature reserve would make the creation of habitats for sustainable populations of migratory fish, herbivores and top predators impossible, but allowing building activities on a limited scale and on specific locations may help to finance nature management and may contribute to the socio-economic vitality of the region, thereby increasing commitment of people and business with nature development.

Figure 10.4: Joint vision on a natural area which can be understood as an assemblage and which is inspired by Allowing Nature to Find its Way, Strengthening Cultural Identity and Going with the Economic Flow.



Source: PBL

The perspectives may also help policymakers and stakeholders to develop and implement nature policy and related policies that are highly integrated. For instance, public authorities may take the initiative to create a nature reserve that achieves the status of a 'European park'. Together with nature conservation organisations, companies in the tourism industry and groups of citizens – supported by the national government and the EU – may create a regional quality fund to generate the financial resources for various investments in and around the nature reserve. This fund may be further enlarged by charging an entrance fee and by organising hiking tours, sustainable hunting and other activities and by organising sponsoring, lotteries and crowdfunding.

10.4 Final remarks on using perspectives

The participants of a series of informal dialogues may build joint visions, practicing bricolage in the ways which just have been described. In the cases of a palette, a collage or an assemblage it might be helpful also to take a procedure into consideration. In these cases, a joint vision may be built by taking the following steps:

1 take the perspective that promises to provide the most adequate insights for better dealing with one or more policy challenges and discuss which insights are most useful;
2 take a second perspective that also seems to provide relevant insights and discuss which insights from this perspective can be combined with those from the first perspective;
3 take a third perspective and proceed in the same way;
4 possibly also take the last perspective and complete the procedure.

An alternative procedure may provide more inspiration, but may also be more difficult to apply. In this procedure, the second and third steps are replaced by:

2 take the perspective that differs most from the first and discuss which insights from this perspective can be combined with the insights from the first perspective;
3 take the perspective that differs most from the first two and proceed in the same way.

Since perspectives are no blueprints, they do not contain all elements that may be relevant for a joint vision. Therefore, the participants of informal dialogues are invited to add their own ideas and to jointly generate more ideas than those which are provided by the Nature Outlook. This scenario study is not conclusive and should be considered as a starting point for inspiring dialogues between people with various ties to nature and who are willing to contribute to nature conservation and development in various ways.

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Appendix 1 Participants in stakeholder dialogues

Ms Agnes Zolyomi , European Habitats Forum
Ms Alexandra Tisma, PBL Netherlands Environmental Assessment Agency*
Mr Alwin Gerritsen, Wageningen Environmental Research (Alterra)*
Ms Amanda Gregory, Joint Nature Conservation Committee (United Kingdom)
Ms Anik Schneiders, Research Institute for Nature and Forest (Flanders)
Ms Anita Prosser, EUROPARC Atlantic Isles
Ms Anne Gerdien Prins, PBL Netherlands Environmental Assessment Agency*
Ms Anne Teller, European Commission, DG Environment (observer)
Mr Arjen van Hinsberg, PBL Netherlands Environmental Assessment Agency*
Mr Axel Buschmann, Federal Agency for Nature Conservation (Germany)
Ms Aysegul Cil, European Centre for Nature Conservation*
Mr Bas Pedroli, Wageningen Environmental Research (Alterra) / Wageningen UR*
Mr Carlos Pina, Lisbon Regional Coordination and Development Commission
Ms Caroline Costongs, Euro-Health-Net
Ms Cátia Rosas Santos, CONFRAGI – COGECA
Ms Chantal van Ham, International Union for the Conservation of Nature (IUCN) – European Regional Office
Ms Charlotte Simon, *Federation of Associations for Hunting and Conservation of the European Union*
Ms Christina Fatourou, European Centre for Nature Conservation*
Mr Claus Mayr, NABU, BirdLife partner in Germany
Mr Clive Needle, Euro-Health-Net
Mr Cy Griffin, Federation of Associations for Hunting and Conservation of the European Union
Ms Ece Aksoy, European Topic Centre, University of Málaga
Mr Ed Dammers, PBL Netherlands Environmental Assessment Agency*
Mr Florian Wolf-Ott, Austrian Umweltbundesamt
Mr Guy Duke, The EU Business @ Biodiversity Platform
Mr Hans Farjon, PBL Netherlands Environmental Assessment Agency*
Mr Hans van den Heuvel, Dutch Ministry of Economic Affairs
Mr Henk van Zeijts, PBL Netherlands Environmental Assessment Agency*
Ms Inge Gotzmann, Network of NGOs for the European Landscape Convention
Ms Irene Bouwma, Wageningen Environmental Research (Alterra)*
Ms Ivone Pereira-Martins, European Environment Agency
Mr Jaap Wiertz, PBL Netherlands Environmental Assessment Agency*
Ms Janneke Vader, Wageningen Economic Research (LEI)*
Mr Jean-Michel Scheuren, Biomimicry Europa
Mr João Teixeira, Lisbon and Tagus Valley Regional Development Commission
Mr Joerg Priess, Helmholtz Centre for Environmental Research
Mr Johannes Drielsma, Euromines
Mr Juan Urbano López de Meneses, Spanish Ministry of Agriculture, Food and Environment
Ms Kadri Tillemann, Keila Municipality, Estonia
Ms Karoline Noworyta, EuroHealthNet
Ms Kathrin Ludwig, PBL Netherlands Environmental Assessment Agency*

Mr Keimpe Wieringa, PBL Netherlands Environmental Assessment Agency*
Mr Koert Verkerk, Dutch Federation of Agriculture and Horticulture
Mr Kristjian Civic, European Centre for Nature Conservation
Ms Laure Ledoux, European Commission, DG Environment (observer)
Mr Lawrence Jones-Walters, Wageningen Environmental Research (Alterra)
Mr Luc Bas, International Union for the Conservation of Nature (IUCN)– European Regional Office
Ms Marie Assmann, Euro Health Net
Ms Marijke Vonk, PBL Netherlands Environmental Assessment Agency*
Mr Mark Snethlage, European Centre for Nature Conservation*
Mr Matthias Jurek, UNEP Vienna - Secretariat of the Carpathian Convention
Ms Mélanie Yammine, International Union for the Conservation of Nature (IUCN)
Mr Michael O'Brian, European Commission, DG Environment (observer)
Mr Miklós Kertész, Centre for Ecological Research, Hungarian Academy of Sciences
Mr Miklós Marton, Hungarian Ministry of Agriculture
Ms Monique Brok, European Centre for Nature Conservation*
Ms Natalie Pauwels, European Commission, DG Environment (observer)
Mr Neil McIntosh, European Centre for Nature Conservation
Mr Pauwel Bogaert, CIVILSCAPE
Mr Peter van Tilburg, Dutch Ministry of Economic Affairs
Ms Petra Péntek, Hungarian Ministry of Agriculture
Mr Pierre Crahay, European Landowners Organisation
Mr Radoslav Považan, Slovak Environment Agency
Mr Robert Franssen, Stichting Wandelnet (the Netherlands)
Ms Sharon Parr, Burren Farming for Conservation Programme
Ms Soscha de La Fuente, Dutch National Youth Council
Mr Tamas Marghescu, International Council for Game and Wildlife Conservation
Ms Tania Runge, COPA – COGECA
Mr Ties Mouwen, Dutch National Youth Council
Mr Toby Aykroyd, Wild Europe
Ms Valerie Carter, European Council for Village and Small Town - Ecovast
Ms Wenke Frederking, Federal Agency for Nature Conservation (Germany)

* Participants with role in organisation of one or more dialogues

Appendix 2 Interviewees

Mr Angeluta Vadineanu, University of Bucharest
Mr Fernando Santos Martin, Universidad Autónoma de Madrid
Mr Frank Neumann, Institute for Infrastructure, Environment and Innovation
Ms Geanne van Arkel, Interface
Mr Henrique Miguel Pereira, German Centre for Integrative Biodiversity Research
Mr Joop van Hezik, Nature Assisted Health Foundation
Ms Manuela Raposo Magelhaes – University of Lisbon
Mr Matthew Arndt, European Investment Bank
Ms Mirilia Bonnes, Sapienza University of Rome
Mr Nico Beun, Innovatienetwerk Agrocluster en Groene Ruimte
Ms Niki Frantzeskaki, Erasmus University DRIFT
Mr Rob Jongman, Jongman Ecology
Ms Sandrine Devos, European Aggregates Association
Ms Sneška Quaedvlieg-Mihailovic, Europa Nostra
Ms Tania Runge, COPA-COGECA
Mr Thorsten Arndt, PEFC International
Mr Tim Fairhurst, European Tourism Association
Mr Ulrich Leberle, Confederation of European Paper Industries
Mr Jano Topocer, Comenius University Bratislava

Legend

Land use

- Agriculture area
- Nature area
- Forest, park
- Water
- Urban area

Infrastructure

- Main road
- Secundary road
- Green road
- Dyke
- Bridge
- Bridge
- Bridge
- Shipping industry
- Fish passage

Nature

- Tree row
- Trees along green road
- Forest tree
- Urban tree
- Shrub
- Group of shrubs
- Meadow flowers
- Swamp
- Crane
- Otter
- Wild boar
- Red deer
- Sturgeon
- Jackal
- Wolf
- Beer
- Fox

Agriculture

- Extensive agriculture
- Industrial agriculture
- Urban agriculture
- Glasshouses
- Wineyard
- Orchard
- Chicken
- Cow
- Sheep
- Pig

Buildings

 Row houses

 Villa

 Appartment building

 Highrise

 Rowhouses green facade

 House with green wall

 Townhouses with green facade

 Farm

 Industry

 Agricultural industry

 Local market

 Hotel

 Catering

 Windmill

 Castle

 Church

 Museum

 Aquaduct

Recreation

 Walking

 Running

 Hicking

 Relaxing

 Biking

 Motorised recreation

 Hunting

 Swimming

 Canoing

 Fishing

 Sailing

 Motorised water recreation

 Playground

 Camping

 Silent area

Energy production

 Windmill

 Solar panals

 Hydro powerplant

 Energy crops

Other ecosystem services

 Water retention

 Carbon sequestration

 Woodcutting (sustainable)