

Flanders
State of the Art

Nature Outlook 2050

Inspiration for the nature of the future

RESEARCH INSTITUTE
NATURE AND FOREST

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CONTENTS

Overview	4	4. How do we tackle the challenges of the future?	66
Foreword: Nature Outlook 2050	5	4.1 Six major challenges: causes and solution strategies	68
Different perspectives for the future	6	4.1.1 Challenge 1: Halting the loss of biodiversity	71
1. About the Nature Outlook 2050	8	4.1.2 Challenge 2 & 3: Guaranteeing a healthy living and working environment & coexisting and living consciously	75
2. Green infrastructure as an asset for the future	18	4.1.3 Challenge 4: Using natural resources sustainably	78
2.1 Green infrastructure as negotiated concept	20	4.1.4 Challenge 5: Dealing with a changing climate	81
2.2 Biodiversity from different angles	22	4.1.5 Challenge 6: Ensuring food security	85
2.3 Defining green infrastructure	26	4.2 Strengths and weaknesses of the different perspectives	87
2.4 Analysing the boundary object of 'green infrastructure'	28	4.2.1 Letting nature find its way	88
3. A glimpse of 2050: four different perspectives on nature and society	30	4.2.2 Using the economic flow	88
3.1 Why work with different perspectives?	32	4.2.3 Strengthening cultural identity	89
3.2 Four different perspectives in stories and images	33	4.2.4 Working with nature	89
3.2.1 Strengthening cultural identity	34	5. Working with different perspectives	92
3.2.2 Letting nature find its way	42	5.1 What can the Nature Outlook 2050 be used for?	94
3.2.3 Using the economic flow	50	5.1.1 Formulating an area-specific vision for green infrastructure	94
3.2.4 Working with nature	58	5.1.2 Guiding a vision-forming process in a positive way	96
		5.2 Which measures can we combine?	97
		5.3 Multifunctional strategies	98
		5.4 Lessons from the Nature Outlook 2050	100
		6. Key messages	102

OVERVIEW

We don't have a crystal ball that can show us what Flanders will look in 2050. However, that shouldn't prevent us from looking ahead and envisioning solutions for the distant future. Visions of the future reflect our wishes and expectations. This is no different when we are considering the nature of tomorrow (and beyond). Everybody does so from their own vision of what nature should and could be.

The Nature Outlook 2050 is based on four different visions of the future regarding nature, which were previously developed for Europe. Working with a broad group of stakeholders, we adapted them to the Flemish context. The visions of the future aim to list a number of important choices that policy is facing and to demonstrate their possible outcomes. None of these visions, however, is "the" vision for Flanders. They already exist side by side and can reinforce or oppose each other. With this report, we hope to make the corresponding choices and their consequences tangible in stories, images and numbers.

We are not providing a blueprint with ready-made solutions for policies, but rather we want to offer inspiration. To create a picture of the future, we have expanded our scientific toolbox with devices that you don't usually find in a nature report. In addition to traditional figures and indicators, this report presents impressions of landscapes in 2050. It also includes fictional testimonies about life in 2050. They are intended to lend the reader's imagination a helping hand.



This synthesis report is intended for a wide audience. It summarises the main findings of a more extensive and in-depth Technical Report. The Technical Report consists of five chapters and provides the knowledge base of the Nature Outlook 2050. Each chapter has been developed as a separate publication and is available on the nature report website (www.natuurrapport.be).

- **Chapter 1** What, why and how?
- **Chapter 2** Defining green infrastructure
- **Chapter 3** Challenges and driving forces
- **Chapter 4** Four perspectives in stories and images
- **Chapter 5** The perspectives examined

We refer to the Technical Report at various points in this synthesis report. When we do, you will see the symbol above, with the number of the relevant chapter of the Technical Report.

Inspiration for the nature of the future

Nature Outlook 2050

FOREWORD

Flanders is facing major challenges. Despite local successes, biodiversity continues to decline. Urbanisation and land conversion continue to increase, as does our ecological footprint. Food production and the average agricultural income are increasingly under pressure. The climate is going haywire and environmental trends that improved over the past decades now seem to be stagnating ... All these phenomena interact with each other and create an uncertain future. This should not prevent us from looking ahead and offering solutions in ambitious long-term visions.

One of the solution strategies that the European Commission is proposing is the roll-out of a green infrastructure strategy. Green infrastructure not only supports biodiversity but also provides many other services that benefit people and society as a whole. With this broad approach, the Commission wants to colour outside the lines of conventional nature conservation, and wishes to address a wide range of policy areas, citizens and forms of land use.

With the Nature Outlook 2050, the Research Institute for Nature and Forest (INBO) wants to contribute to the social and political debate on future green infrastructure in Flanders. The Nature Outlook 2050 builds on the diverse values and purposes that people assign to nature. These are translated into four different perspectives, which you can read about in detail in this publication. The Nature Outlook 2050 not only wants to provide insights into the challenges that arise and the possible answers to them, it also wants to broaden horizons, provide inspiration and, above all, get people excited about engaging with the topic themselves. For these reasons, we primarily focus on policymakers and those involved in strategic policymaking, planning

and the creation of green infrastructure in Flanders. It may also be useful for citizens, allowing them to gain more insight into this matter.

The Nature Outlook 2050 is the third and final part of the Flanders Regional Ecosystem Assessment. With this assessment, we wish to lay the foundation for a policy that takes due account of the conservation and restoration of biodiversity and of the ecosystem services that nature offers us. The assessment makes clear that nature and ecosystem services form the basis for the use of our environment, as is clearly illustrated in the United Nations' Sustainable Development Goals (SDGs). This nature report is not just the work of the INBO. We worked closely with researchers, policymakers and relevant parties from diverse backgrounds. We invited them to share knowledge and insights and to enter into dialogue with us and with each other.

I warmly invite you to join us in considering green solutions for the challenges of 2050, so that we can start to adjust our policy accordingly, today.

We hope you enjoy reading this report.

Dr. Maurice Hoffmann

INBO Administrator General, a.i.



Different perspectives for the future

In what directions can nature evolve in Flanders?
And what consequences will this have for the
way we live, work, protect nature and produce
food? In the Nature Outlook 2050, we give voice
to our imagination and outline some important
possibilities and visions of the future.



People feel totally connected to the landscape around them. Everyone lives within walking distance of a (city) forest or nature area. People young and old buy vegetables from a local farmer. During the winter months, everyone helps prune the hedges. The children, too, because you're never too young to get involved.



The whole of Flanders is a green region where rivers meander freely. In the vast forests, wolves and lynxes roam undisturbed. There is a pleasant bustle in the villages and cities. Children come home to their little apartment after school and then head straight to the woodland playground. Vertical agricultural systems deliver a large amount of food on a small surface area.



A sustainable business park is situated in green surroundings. Pure river water is used in production processes, while employees enjoy the view of the landscape. A farmer demonstrates a high-tech gadget to improve his harvest. Members of the golf club can take a swing in a beautiful landscape in their free time.



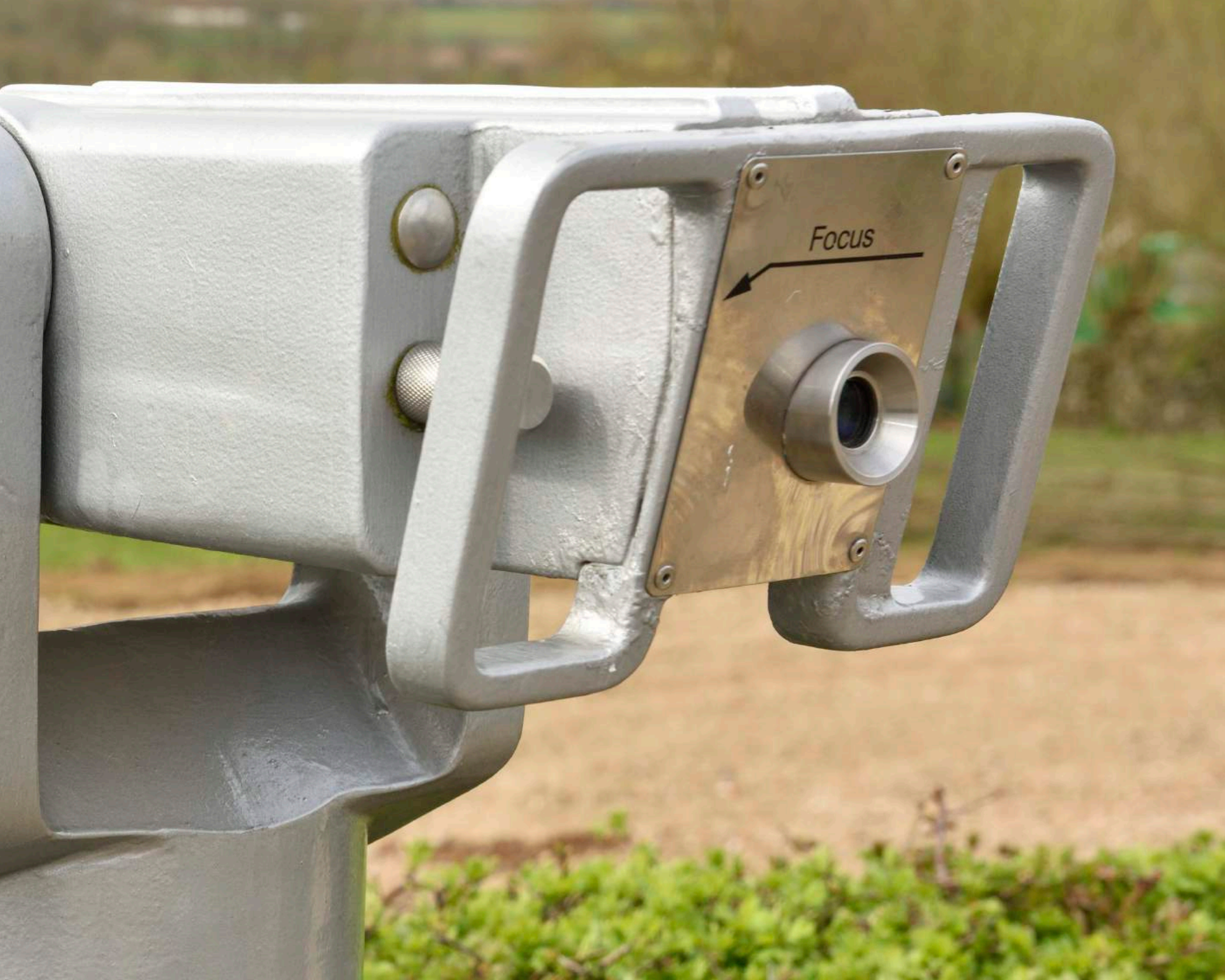
Flanders is a patchwork of forests, river valleys, grasslands and fields. The green environment provides clean air and offers a cooling effect during the summer. Parks and urban forests create space in villages and cities. People enjoy walking and unwinding in them. Agriculture and nature go hand in hand: water is collected and reused, leftovers from the harvest go to the compost heap and help to restore the soil.



1

The Nature Outlook 2050 explores paths for the development of a green infrastructure in Flanders. What could this kind of green infrastructure look like? And how can it help to reduce various societal challenges? From these reflections we wish to offer inspiration for the nature policy of the future.

ABOUT THE NATURE **OUTLOOK 2050**



Focus

1. About the Nature Outlook 2050

Nature policy faces major challenges. At the global, European and also the Flemish level, the decline in biodiversity and the ecosystem services that it provides is difficult to stop. This has far-reaching consequences for humans, because our well-being and our prosperity depend on healthy ecosystems. Nature in Flanders can help solve a number of important societal challenges. But what should that nature then look like? To answer that question, we address a number of fundamental issues. What do people understand by the term 'nature' and how do they experience it? What challenges do our ecosystems face? Which challenges can nature policy offer an answer to? And from which strategies and policy measures can nature policy benefit? This nature report aims to provide inspiration for strategic policy discussions about the future of our nature in the broadest meaning of the word.

Addressing the loss of biodiversity

In order to halt the loss of biodiversity and ecosystem services, it is important that we recognise the complexity of that challenge. The decline is a result of various developments that extend beyond the boundaries of nature reserves, countries and sectors. Their interplay is complicated and difficult to predict. As a result, it is not sufficient to only intervene in (the management of) our nature and our landscapes. We also need to look at other subsystems in our society: the technologies we develop, the way we acquire knowledge, the organisation of our society and economy, the value patterns and cultural habits that underlie our choices ... All these aspects are interlinked, meaning that changes in one subsystem often only experience a breakthrough if the other subsystems evolve as well. The consequence of this interconnectedness is

clear: if we want to tackle the loss of biodiversity, it is not enough simply to adjust the policy that directly affects nature and landscape. We must also address other subsystems. This requires closer cooperation between different policy domains and policy levels, and greater involvement from various sectors and citizens. The fact that this is not a simple task is evident from the fierce resistance that nature-oriented policy measures sometimes evoke in areas with a spatial designation other than nature conservation.

Bringing visions together

Bringing visions together The resistance that people can feel towards nature- oriented policies is partly due to the fact that we all view nature through a different lens. For hikers or mountain bikers its recreational function takes precedence. Timber companies see nature as a production

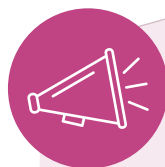
area. Designers use it as a source of inspiration for their products. Local residents have a sense of attachment to the region where they grew up. And children explore it to discover places where they can play undisturbed.

If we want to do something about loss of biodiversity, we have to take those different perspectives into account. A good nature policy is not limited to a single vision of nature, but uses different visions in a targeted way to tackle societal challenges. This increases the connection between nature policy and the way in which different actors experience and appreciate nature. The more involvement and cooperation there is between the policy, citizens and various economic sectors, the more chance there is that said policy will succeed.

Green infrastructure as part of the solution

The European Commission already wants to offer part of the answer with its Biodiversity Strategy. One of the aims of this strategy is to halt biodiversity loss and the decline of ecosystem services in the EU by 2020. One of the accompanying targets focuses on the restoration of ecosystems and the services they provide, through the establishment of a 'green infrastructure'. The term 'green infrastructure' can be interpreted in a wide variety of ways. The European Commission itself describes green infrastructure as: 'a strategically planned network of natural and semi-natural areas with other environmental features, designed and managed to deliver a wide range of ecosystem services'. From that perspective, green infrastructure is much more than a network of protected natural areas. It supports biodiversity and provides a significant number of social services. The benefits that nature can provide for humans are given a more central position. With this broad approach, the Commission wants to colour outside the lines of conventional nature conservation, and wishes to appeal to a wide range of sectors, policy areas and citizens. It encourages member states to develop their own strategy.

The Nature Outlook 2050 aims to contribute to the social and political discussions about the future of green infrastructure in Flanders. The starting point of the report is therefore the diverse values that people attribute to nature and the answers they expect from nature.



For a clear understanding ...

In this report, we use many terms that are common in daily life: nature, green, sustainable, nature policy, quality ... People can interpret these terms differently according to the social context in which they live, the economic sector in which they work or their own personal beliefs. This multitude of interpretations means the terms can be used in various situations and is a characteristic of a pluralistic society. But this can also lead to ambiguity, vagueness, confusion and misunderstandings. Texts that intend to make scientific research accessible to a broad public, such as this synthesis report, often struggle with this.

Experience and policy science literature teach that it is often not desirable to stipulate these multi-interpretable concepts in hard, rigid definitions that should then be universally applicable. The use of value-laden concepts, such as nature and green infrastructure, requires room for a debate about how broadly or narrowly they can be interpreted, a debate that is never entirely 'over'.

Readers who wish to work with insights from this report will also have to conduct these

debates. The definitions that emerge from this are negotiated solutions, not facts that we can substantiate or refute on a scientific or academic basis. In scientific literature, we call them 'boundary objects'. When these definitions are to form part of formal policy, such as in government regulations or subsidies, it is necessary to legally enshrine them so that they are generally enforceable. We hope that the insights and recommendations from this report can enrich those debates and policy practice.

With these considerations in mind, we give the term 'nature policy' a very broad interpretation in this report. We see it as any policy that has the intention to directly or indirectly support our nature and biodiversity. It therefore also includes parts of e.g. environmental policy, spatial policy, agricultural policy, industrial policy and urban policy.



Six major challenges for 2050

For this Nature Outlook, we worked with a large group of relevant parties and experts to select six major challenges for the future, for which green infrastructure could offer an answer. These challenges are not separate from each other, but can reinforce or weaken each other.

Challenge 1: Halting the loss of biodiversity.

The loss of biodiversity in Flanders is not only a serious blow to nature, it also has a real impact on our prosperity and well-being. In order to reverse the decline, three strategies are essential: creating more space for biodiversity, connecting habitats both inside and outside protected nature areas, and reducing external environmental pressures such as eutrophication, pollution and invasive species.

Challenge 2: Guaranteeing a healthy living and working environment.

A healthy living environment is high on the social and political agenda. Three important subchallenges play a key role in this: improving air quality, preventing heat islands and providing sufficient green space in and around living and working environments.

Challenge 3: Coexisting and living consciously.

The quality of our living together has a major influence on our well-being. We can increase this quality by creating an attractive living and working environment, by improving social cohesion in our society and by striving for safe and high- quality mobility.

Challenge 4: Using resources sustainably.

For the fulfilment of basic needs such as food, (drinking) water and materials, we are dependent on natural resources and well-functioning ecosystems. We identify three important focal areas: improving water quantity and quality, using soil sustainably, and producing sufficient biomass, as a source of renewable energy and raw material for the bio-economy.

Challenge 5: Dealing with a changing climate.

It is now firmly established that our climate is changing. Also in Flanders we are experiencing the consequences. Green infrastructure can help solve four sub-challenges: limiting the damage caused by flooding, mitigating the risk of drought, making our ecosystems more resilient, and reducing the concentration of greenhouse gases in the atmosphere.

Challenge 6: Ensuring food security.

The demand for food will increase significantly in the years to come. Sufficient space for food production, sufficiently high productivity and sustainable land use are basic requirements to continue to guarantee food supply, as well as sustainable production and consumption choices. Green infrastructure can support a healthy soil and water management as well as processes such as pollination and pest control. It also affects the space that remains available for food production.



Goal of the Nature Outlook 2050

First and foremost, the Nature Outlook 2050 wishes to explore paths for the development of green infrastructure. What could this green infrastructure look like in 2050? And how can it help us to reduce societal challenges? From these reflections, we want to offer inspiration for a new nature policy for the future. We have to outline this now, because nature requires time to develop. Moreover, new strategies and measures often generate controversy and this can increase the time required to implement them.

Exploring the future always presents a dilemma for scientists. On the one hand, we want to make concrete statements, so that policymakers can tackle bottlenecks in a timely way and optimally exploit the available opportunities. On the other hand, the future is unknown and uncertain and there is no empirical basis for such statements. If we study the future, then we cannot really generate certain knowledge about that future, but only tentative insights into it. Foresight studies can help us to deal with and give structure to the uncertainties surrounding the future. In this way, they can give direction to policymaking in the long term.

The Nature Outlook 2050 does not offer simple prognoses or creative speculations, but examines future scenarios. Future scenarios link knowledge about the past with statements about a possible or desirable future. They look further ahead than prognoses (usually ten to fifty years into the future) and can therefore explore new pathways. They allow us to break free from existing restrictions and to take into account possible drastic changes in our environment. Future scenarios also provide a deeper insight into the way in which these potential futures can be realised. This makes them ideally suited as an inspiration for vision-building and strategic policymaking.

With this Nature Outlook, we investigate four very different scenarios, referred to later on as perspectives, to create a green infrastructure with a focus on 2050: 'strengthening cultural identity', 'letting nature find its way', 'using the economic flow' and 'working with nature'. None of those different perspectives represents an 'expected' vision of the future. What they do show is a possible future if we want to realise a vision of nature from a certain value pattern.

The opportunities that a green infrastructure offers in tackling six major challenges for the future, constitute the focus of this scenario research.

The perspectives do not offer a ready-made blueprint for policy. We want to provide stakeholders with tools to develop their own vision and strategy for green infrastructure, thereby shaping nature policy now and in the future. The actual development of a green infrastructure strategy that integrates to a greater or lesser extent elements from different perspectives, is not the focus of this research.



Characteristics of our scenarios

The scenarios outlined in this study are:

- **normative:** they are based on perspectives that use different value frameworks. This allows us to list the different ways in which people define and evaluate the question of green infrastructure and to highlight the possible effects of these differences in the longer term.
- **exploratory:** they explore the limits of what is possible. In this way we want to investigate the widest possible range of solutions.
- **qualitative and quantitative:** qualitative storylines and images are combined with modelling and estimations by experts. At the same time we want to stimulate the imagination and scientifically underpin the consequences of choices.
- **integral (with a focus on nature and landscape):** green infrastructure is viewed in relation to other social aspects like housing, food production and energy supply. A vision for green infrastructure needs to transcend sector boundaries.
- **supplementary to other future outlooks:** the scenarios build on earlier studies but explicitly focus on changes in nature and landscape.

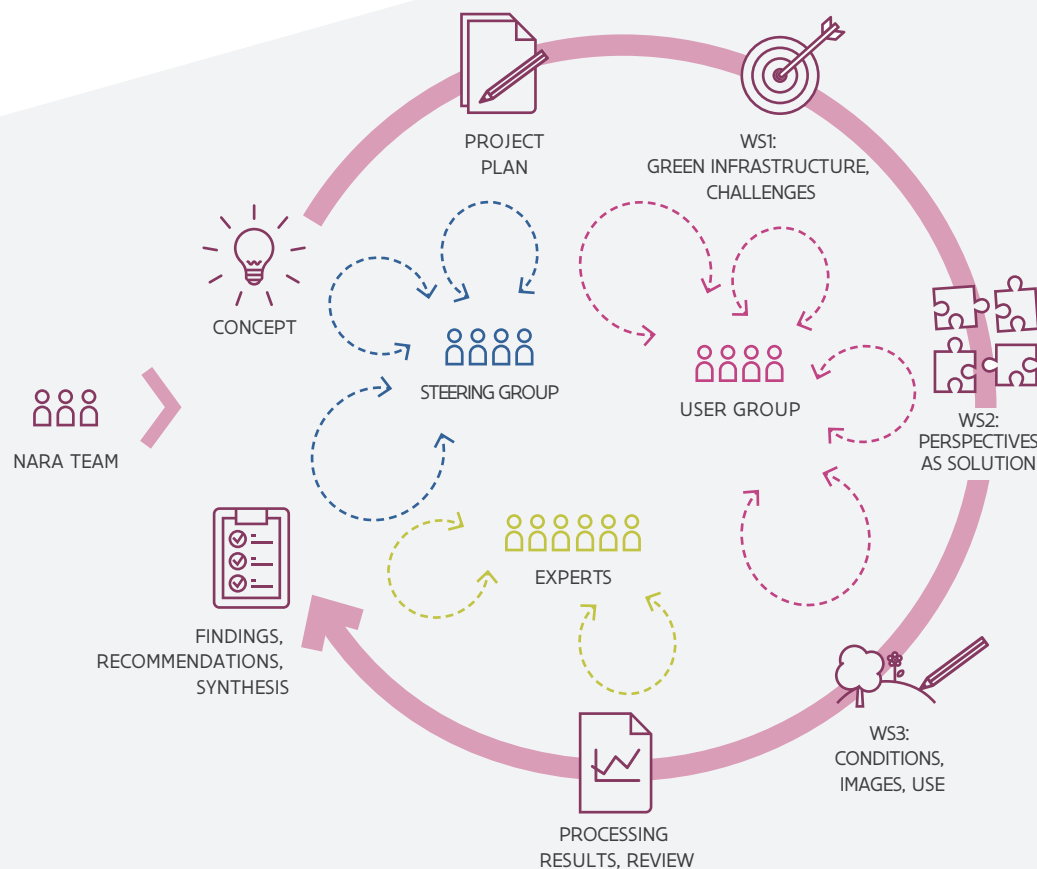


FIGURE 1

The inclusive process of the Nature Outlook 2020, from concept to end result. WS = workshop.



How did we go about this process?

A scenario study is not an endeavour by scientists alone, especially not when it concerns a subject that is as complex and values-laden as green infrastructure. For this reason we collaborated with a wide range of stakeholders and experts. We opted for a broad participatory process with participants from different sectors, policy levels and knowledge systems. Our intention in doing this was to capture a broad spectrum of values, to align the visions of the future with the lived experience of the target group, to create broad support and to strengthen confidence in the results. With these participants we created a dialogue and a learning process that can help us deal with the uncertainties of the future.

Three groups of actors contributed to the research:

- The **steering group** guided the research team (NARA team) through the entire process and gave advice on, among other things, the content, scientific quality and policy relevance of the Nature Outlook. It contributed to the concept, plan of action, workshops and the formulation of the conclusions. The steering group met five times in the course of the research process.
- The **user group** helped shape the perspectives and the associated images and stories. It consisted of experts, policymakers and members of civil society organisations from various societal sectors, such as agriculture, nature, health, spatial planning, finance, tourism and youth. The different types of knowledge that were considered in this regard had to provide more in-depth and nuanced reflections on possible social and ecological changes in the future. After a personal intake interview, the users took part in three workshops. During these workshops, we determined the concept of green infrastructure and defined the challenges for which every perspective would need to provide an answer. We further developed the perspectives, scrutinised possible preconditions and risks, and went deeper into the use of the different perspectives in practical examples. Participants and researchers were given ample opportunity to exchange knowledge, acquire new insights, and work together on their competences in areas such as cross-sectoral cooperation, thinking in the long term and dealing with uncertainties. The workshops were fed with data from the intake interviews, interim consultations with experts from the user group or outside, images, spatial analysis and literature study. After each meeting, the research team set to work with the results. We selected ideas, analysed them and developed them further into a consistent whole. Conclusions were presented to the participants for review before or during the next workshop.
- Some **experts** provided the investigation with specialised knowledge. For example, experts in system analysis checked the consistency of the detailed perspectives. Ecosystem experts contributed to the translation of storylines into possible changes in ecosystems such as forests, grasslands, marshes, heathland and dunes. For each challenge we engaged several experts to evaluate the different perspectives in broad strokes.

The knowledge and expertise of all parties involved added important value to this research.

Building blocks of the report

The Nature Outlook 2050 was constructed in consecutive steps. These are discussed in this synthesis report.

The first step was the **analysis of the theme and the associated policy issue**: what is green infrastructure and which questions are we going to consider? We defined the concept of 'green infrastructure', identified the challenges for which this green infrastructure could offer solutions and identified the driving forces behind these challenges.

Next, we worked out **four perspectives on nature and society**, each of which builds on a different set of motivations to take action. For each perspective we described the status of green infrastructure in 2050, the values and principles behind this vision of the future, the governance types and strategies with which we can achieve this status and the technological and knowledge systems on which it would be based. We partly built on scenarios from previous studies, but updated our perspectives based on discussions with the user group and steering group. In this way we were able to more closely align the perspectives with the questions from the user group and with the Flemish policy context.

In a third step, we analysed the **effects** of the perspectives on the various challenges. For this, we first translated the main features of the perspectives into spatial objectives and land use principles. With the resulting maps we calculated the consequences of changes in land use and land management for each challenge. In order to include aspects that are difficult to quantify, we supplemented these results with qualitative estimates and arguments from a range of experts. We also investigated how future-proof the perspectives are, what their strengths and weaknesses are, whether we could combine measures from different perspectives and whether they are multifunctional.

Finally, we wrote down our **conclusions and recommendations** in an extensive technical report and a synthesis report that cover both the methodological insights and the substantive insights as well as the possibilities for use.

Final part of three-part series

Every two years, the INBO draws up a nature report ("natuurrapport" or NARA) on the status of nature in Flanders and the progress of the policy. NARA 2018, or the Nature Outlook 2050, is the final part of a three-part assessment of ecosystems in Flanders.

In NARA 2014, we reported on the status and trends of the ecosystems and the ecosystem services they offer us. NARA 2016 showed how government bodies and stakeholders can pay more attention to ecosystem services in policy and governance. The Nature Outlook 2050 explores the distant future of ecosystems and their services in Flanders from four scenarios or 'perspectives' for the development of green infrastructure.

Early 2019, the Nature Outlook 2050 was presented to the Flemish Minister for Environment, Nature and Agriculture in the Flemish Parliament and to a broad target group of decision makers, experts, and relevant and interested parties.



Want to find out more about this topic?
You can read all about it in chapter 1
of the Technical Report.



NATUUR HEB WEG LATEN VINDEN

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Europe regards green infrastructure as a smart way to reconcile multiple functions in one domain: biodiversity, agriculture, housing, mobility ... To get started with a concrete project in the area of green infrastructure, it is vital that all parties involved have a shared notion of the concept.

GREEN INFRASTRUCTURE AS AN ASSET FOR THE FUTURE



20

2.1 Green infrastructure as
negotiated concept

22

2.2 Biodiversity from different
angles

26

2.3 Defining green infrastructure

28

2.4 Analysing the boundary object
of 'green infrastructure'

Green infrastructure as an asset for the future

Green infrastructure can slow down the loss of biodiversity in our society and provide new opportunities for nature. It can take different forms to achieve this: from protected nature reserves to landscape elements in an intensively used space. Every application of green infrastructure requires a debate about the goals, quality criteria and the land use that can be reconciled with it. In this chapter we search for a widely supported description of green infrastructure that can facilitate the dialogue surrounding biodiversity and other societal challenges.



2.1 Green infrastructure as space for problem solving concept

We can describe our environment and all natural and human-influenced elements therein as a social-ecological system. It consists of subsystems – the ecosystems, but also our knowledge system, our technology and our social organisation – that are closely interwoven. The interactions between such subsystems are complex and difficult to predict. Changes in one subsystem often only experience a breakthrough if the other subsystems evolve as well. This dynamism and interconnectedness makes many contemporary societal challenges difficult to solve. They can be categorised as 'wicked problems'.

The decline of biodiversity is a highly persistent, wicked policy problem that is interwoven with our culture, our technology and other subsystems. Restoring ecosystems is easier in a context in which the other subsystems also evolve. In designated protected areas, nature policy often has sufficient scope to locally influence other subsystems. For example, we locally manage the 'technology' subsystem when we exclude buildings, paved roads and motorised traffic from our nature reserves. This is more difficult in non-protected areas and on a larger scale, because other subsystems

evolve in a different direction in those contexts. They seal the soil, erect buildings or replace the natural vegetation with cultivated plants. In these kinds of complex areas, where nature policy has less influence, the development of green infrastructure is particularly important. Given the dynamism and the interconnectedness of our social-ecological systems, this is a substantial challenge.



Boundary object

We cannot easily solve wicked problems via a traditional top-down approach in which the government imposes measures from above. These problems demand *adaptive governance*: a participative approach that allows room for learning processes and adjustments, focusing on awareness and on behavioural and cultural change. Adaptive governance does not strive for immovable rigid definitions, but creates boundary objects that primarily aim to provide a space for negotiating definitions and solutions.

Green infrastructure is one such boundary object: on the one hand it leaves sufficient room for interpretation by different target groups, and on the other hand it is clear and concrete enough for clear communication to occur. The concept of 'green infrastructure' can play a role in the dialogue between actors who want to work together to set up a project or action around biodiversity. The concept must be able to transcend the boundaries between sectors, scale levels and organisations and to evolve flexibly,

based on dialogue, interaction in situ, reflection and learning processes. To fulfil this role, the boundary object of 'green infrastructure' requires an appropriate description that combines clarity and flexibility. In our open and participatory search for an optimal definition, we allowed for a wide spectrum of divergent and sometimes contradictory visions and opinions. With this open approach, we wanted to give different actors the chance to learn from each other and to build up trust with fellow stakeholders.

2.2 Biodiversity from different angles

Biodiversity is declining not only in Flanders but also worldwide. Biodiversity policy aims to halt that loss and, where possible, restore the biodiversity and the services it provides us with. Biodiversity is a very broad concept and includes the diversity of genes, species, ecosystems and landscapes as well as all relationships between them. We can study the possibilities for restoration from various angles. The frame of reference and the value pattern of those involved will shape the strategy and the final restoration plan. There's no such thing as restoring 'the' biodiversity. Although biodiversity – unlike nature or green space – has an objective, neutral definition, the same does not apply to biodiversity restoration. That is where values-laden choices are made.

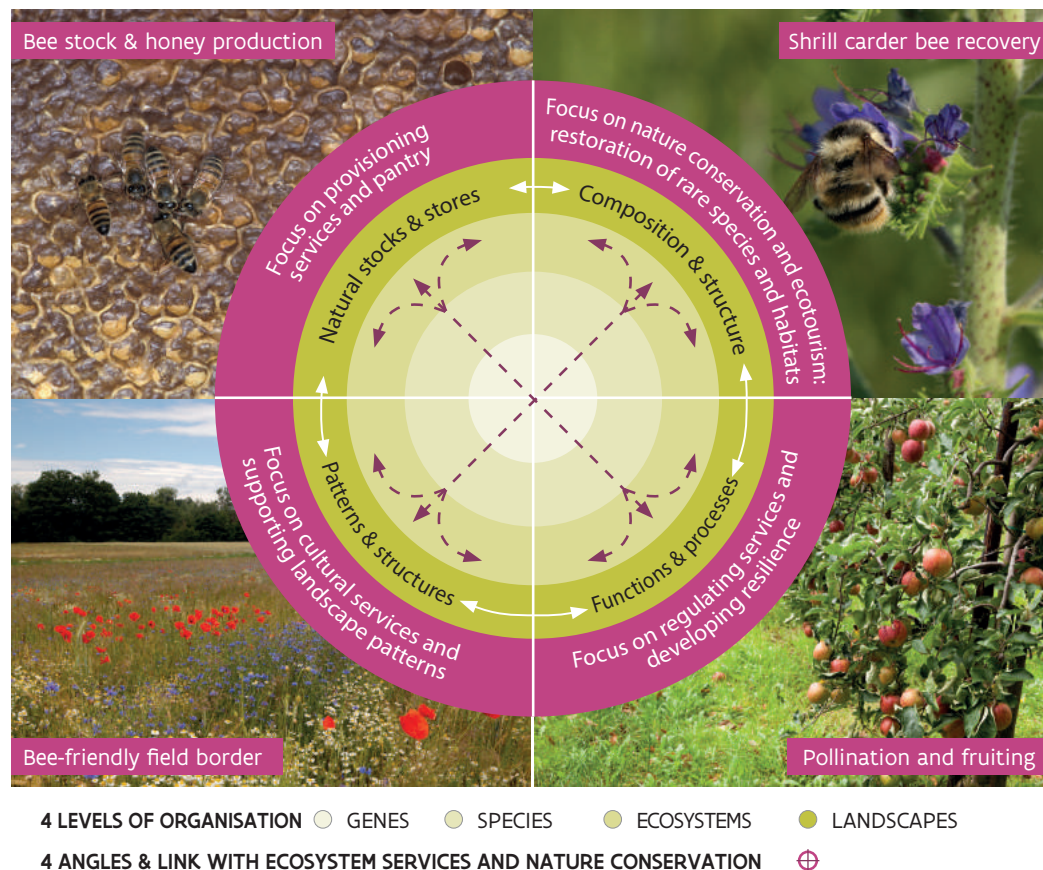


FIGURE 2

The four organisational levels and four angles of biodiversity. From every angle, we use different values and propose different solutions for green infrastructure, linked to ecosystem services and nature restoration. This is illustrated with the example of honeybees and bumblebees.

For instance, which choices do you make when you want to restore the biodiversity of honeybees and bumblebees in Flanders?

- We can focus on the **conservation of a specific species**, such as the shrill carder bee, and create forest borders with more flowers, to give this rare species every possible chance. We then assume that the measures we take for a specific species are also beneficial to many other species.
- Another motive is the **restoration of natural processes**. We appreciate bumblebees and honeybees because of their role in the pollination and fruit setting of fruits and vegetables. In that case, our starting point is a function that provides benefits for humans. At the same time, we assume that this will also improve other functions such as protection against erosion or natural pest control and that the pollination of native plant species will be better guaranteed.
- A strategy concerning pollination can be combined with a **redesign of the landscape structure**. Green infrastructure around fields and orchards, with hedges and wide floral borders, increases the habitat of both honeybees and bumblebees. The varied structure also makes the landscape more attractive for recreational users and can create migration routes for other species.

- Finally, biodiversity also involves the entire **'stock' of species or genes**. If, at a particular time, we need a large number of honeybees and bumblebees to optimise pollination, we can try to expand a suitable habitat. But we can also call upon technical aids such as beehives. Depending on the method, this can go hand in hand with honey production and sustaining the practice of beekeeping. As a remedy for bee mortality, we can focus on increasing genetic diversity. A larger gene bank is a strategy to increase the disease resistance and resilience of bee populations.

The perspectives described above can be applied to every aspect of biodiversity. Depending on the lens that an individual looks through, he or she will make different choices, take different measures in different locations and consequently promote a different part of biodiversity.



The value of nature

Many discussions about nature and biodiversity can be traced back to a social debate about the value of nature. Nature, greenery and biodiversity can be considered valuable in various ways. We distinguish four motive clusters to underpin nature policy:



3. Many of us consider nature to be a necessary condition for a good and happy life. It is in this case not so much about survival, but about quality of life. For example, a landscape may be part of the cultural personality and regional identity of an area. We speak of the **relational value** of nature. For many people, that value is irreplaceable.



1. We can find nature valuable because of the right to exist that we assign to all living beings. That **intrinsic value** of nature is separate from the importance it holds for people. This value lies at the basis of the policy choice to protect rare, highly threatened species and ecosystems.



2. We can also find natural ecosystems important because they form a foundation for life on earth and the survival of human beings. This then concerns all ecosystem structures and processes that make human activities possible and that we need to survive, such as photosynthesis, soil formation and the nutrient cycle. This is the **fundamental value** of nature.



4. Nature can also be valuable as a means to achieve a goal or a function. For example, a meandering river can purify more water than a canal. We call these kinds of values **instrumental values**. They can often also be presented as economic values. For example, the natural purification capacity may be compared with the cost of a conventional water purification station. If these functions can also be fulfilled by technical aids or other systems, they are replaceable.



Green infrastructure in policy

The term 'green infrastructure' was first discussed in the European climate and biodiversity policy in around 2008. The concept was intended to help achieve the nature objectives and help restore ecosystems. In 2011, the European Commission launched a new EU biodiversity strategy for 2020. This strategy determined six objectives. Among other things, member states had to define areas for a European nature network, establish a broader cooperation with agricultural, forestry and water policy and develop a strategically planned network for green infrastructure.

Protecting biodiversity in Europe

Within the European biodiversity strategy, the purpose of green infrastructure is to connect the defined nature areas with each other. In addition, it can help address major societal challenges such as climate change, migration and population growth by creating a resilient network of green and blue space. Biodiversity and the associated ecosystem services in the European Union must be protected, valued and restored by 2050. The benefits for human beings are given a central position, and smaller green elements, such as green roofs, parks and avenue trees, are more at the forefront.

A historical framework for Flanders

Implementation of the European green infrastructure policy in Flanders builds on existing Flemish policy plans. In the 1950s, the Belgian government drew up a national green plan for the first time, in response to the expansion of urbanisation and the traffic infrastructure. In 1991, the Flemish administration launched the Green Ecological Network (Groene Hoofdstructuur): a set of natural core areas, nature development areas, wildlife corridors and buffer areas. In the second half of the 1990s, new legal regulations were laid out to secure the open space. The Flemish Ecological Network (Vlaams Ecologisch Netwerk) was launched and again formulated allocation targets for large units of nature and nature in development. In addition, there was a need for an Integral Interfacing and Supporting Network (Integraal Verwevend en Ondersteunend Netwerk) to complete the ecological network and make it multifunctional.

While Flanders worked on the demarcation and spatial accounting of an ecological network, Europe got the Natura 2000 network up and running. Natura 2000 is a continuation of two previous European directives: the

Habitats Directive and the Birds Directive. The network is a cornerstone of European biodiversity policy, which contributes to the protection of endangered habitats and species. In Flanders, the Natura 2000 network was enshrined in the Nature Decree, the Conservation Decree and the Natura 2000 programme. These guidelines stipulate that Flanders must define special protection areas (SPAs) for the European nature network.

Resilient open space

The Flemish policy on (open) space and all functions that need to be given a place therein is outlined in the Flanders Spatial Policy Plan, a follow-up to the Flanders Spatial Structure Plan. The Spatial Policy Plan White Paper, which the Flemish Government approved in 2016, outlines the strategic key aspects for spatial development in the coming years. Extra attention is paid to a robust, resilient open space, a green-blue network, the multifunctional character of open space and the promotion of ecosystem services. In July 2018, the Flemish Government approved a strategic vision on this topic.

2.3 Defining green infrastructure

In order to get started with a concrete project in green infrastructure, it is vital that all parties involved have a shared notion of the concept. Our process to define the concept didn't happen overnight. We interviewed scientists, policymakers and stakeholders from various sectors about their vision for green infrastructure, organised a survey and held workshops where we debated with an extensive user group. This group consisted of a wide range of stakeholders with different backgrounds and functions: experts, policy workers and members of civil society organisations from various societal sectors, such as agriculture, nature, environment, health, spatial planning, agriculture, tourism and youth. In a qualitative analysis of all input, we investigated what people mean by the term green infrastructure. How do they define the concept? With which arguments and criteria do they construct their definition? Is that understanding consistent with the definitions proposed in policy documents and scientific literature? Can we cluster different concepts and criteria into a definition upon which a consensus can be built?

Respondents regularly disagreed about which landscape elements, vegetation or use of space do or do not (or can or cannot) form part of green infrastructure. Moreover, they typified green infrastructure not only on the basis of its physical appearance (what does it look like?) but also on the basis of its function (what purpose should it serve?), its quality (which requirements should it meet?) and the social and spatial context (in which environment is it located?). We briefly explain those four dimensions below.

1. Physical appearance

Green infrastructure comprises certain forms of vegetation and ground cover in the landscape. Opinions differ as to which forms these are. Respondents' answers varied from 'nature reserves' and 'green roofs' to 'anything that's green'.

2. Goals or functions

Most respondents only recognise a green area as green infrastructure if it or contributes to certain goals or functions. These goals can be very diverse: connecting nature areas, buffering water, increasing social interaction ...

3. Quality criteria

For something to be called green infrastructure, it must meet a set of quality requirements or criteria. These quality requirements are often aligned with the goals or functions. For example, an agricultural landscape can be green infrastructure, but only if it is managed in a sustainable way and contributes to biodiversity.

4. Context

Whether a green element is or is not labelled green infrastructure also depends on the context. Is it in an urban or rural area? What spatial scale are we talking about: (a street, a city, a valley? What is the historical context, how was the space used in the past? For example, private gardens can be green infrastructure. In the countryside, the quality requirements are generally higher than in an urban environment.

Green infrastructure

PHYSICAL APPEARANCE

What does green infrastructure consist of?

- Natural and semi-natural areas
- Network of ecosystems
- Landscape elements (row of knotted willows, green roof ...)

GOALS OR FUNCTIONS

What purposes does green infrastructure need to serve

- Protect biodiversity
 - Concrete nature targets
 - Fundamental quality of nature
- Also achieve other societal goals
 - Increase quality of living environment
 - Offer a basis for social and cultural interaction
 - Provide economic value
 - ...

QUALITY REQUIREMENTS

What requirements should green infrastructure meet?

- Promotes biodiversity
- Creates a network
- Is sustainable and fair
- Guarantees fundamental quality in terms of:
 - scope
 - species diversity
 - impact on the surrounding area
 - accessibility
 - ...

CONTEXT

What does green infrastructure mean within its spatial and social-cultural context?

- Green infrastructure can look different in a rural or urbanised
- Context helps determine the design and management of new and existing green infrastructure
- Context requires insight into the interactions between scale levels (knowledge & insights, practical experiences, policy processes ...)

2.4 Analysing 'green infrastructure' as a boundary object

Based on the analysis of policy documents, scientific literature and interviews with experts and the user group, we can describe the boundary object of 'green infrastructure' as follows

Green infrastructure is a network of high-quality natural and semi-natural areas and other landscape elements that accommodate natural processes. Its management and use aims to protect biodiversity and achieve other social objectives in both a rural and a more urbanised environment.

This description also lends itself to a further specification of the term 'green-blue networks'. It includes several concepts that require some explanation:

- **Network**

A network ensures better connectivity within and between natural and semi-natural areas. It ensures that areas and landscape elements function as a whole, so that certain nature objectives and social goals can be achieved.

- **Natural and semi-natural areas**

These are areas that are relatively undisturbed by people and where natural processes (within certain limits) still have free rein. They also contain historical cultural landscapes and more intensively used areas, such as urban environments or areas of organic farming, where we play a more active role in steering the natural processes. In this way, we can protect, strengthen or steer certain ecological functions and nature values in relation to social needs and preferences, for example food production, water collection or quiet recreation.

- **Other landscape elements**

Point and linear features in the landscape such as street trees, hedgerows, roadsides and green roofs.

- **Protecting biodiversity**

The protection and restoration of biodiversity in the broad sense of the word, namely the diversity of genes, species, ecological processes, ecosystems and landscapes.

- **Achieving social goals**

This includes various aspects of social welfare and economic prosperity, such as health, quality of the living environment, fair income and social

cohesion. Many of these aspects depend on the availability of ecosystem services.

- **Management and use**

Through various forms of management and use, like pruning or flooding, we can adjust the boundaries of and processes within (semi-)natural ecosystems and landscape elements. This allows us to achieve certain quality criteria, such as environmental quality, species diversity, accessibility and restoration of ecological processes.

- **Accommodating high-quality natural processes**

For a network of green infrastructure we can set quality requirements such as size, species diversity, environmental quality, accessibility and so on. The quality criteria that green infrastructure must meet in a specific situation depend on the goals that it must work towards and the local or broader context. For instance, the quality requirements in an urbanised environment will differ from those in a valley or agricultural area.



Want to find out more about this topic?
You can read all about it in chapter 2 of the technical report.



HEDGEROW



EXTENSIVE GRASSLAND



INTENSIVE MAIZE FIELD

What is green infrastructure, and what is not?

Whether we consider a green element to be green infrastructure depends among other things on the context, concrete goals, physical appearance and quality requirements. Some examples:

- A **hedgerow** is green infrastructure. It can form both a migratory route and a habitat and it provides a range of ecosystem services in rural or more urbanised areas. Management may vary depending on the importance we attach, from a local, regional or broader context, to certain aspects of biodiversity and/or ecosystem services, such as pest control for a nearby orchard, or connecting forests to each other.
- A **permanent grassland with limited fertilisation, extensive mowing and grazing management** and meat or milk production for a local market is green infrastructure. Extensive land use allows grassland to increase biodiversity, for example as a habitat for plants and birds. The pasture can provide various ecosystem services and support societal goals, including food production and biomass for renewable energy. One precondition, however, is that the environmental impact does not exceed the ecological capacity of the soil and groundwater.
- An **intensively cultivated maize field** is not green infrastructure. Ploughing the soil, in combination with the use of slurry and pesticides, has a negative impact on, among other things, soil fertility and the biodiversity of the groundwater and surface water. A maize field increases the supply of a limited number of ecosystem services and societal goals, such as food production, but comes at the expense of other ecosystem services, such as water quality, climate and erosion prevention.

3

Developing more and better green infrastructure is only possible when different sectors work together. For this reason, we had various users enter into dialogue about the future of our green infrastructure, based on four "perspectives" on nature and society.

A GLIMPSE OF 2050: **FOUR PERSPECTIVES** ON NATURE AND SOCIETY



32

3.1 Why work with
different perspectives?

33

3.2 Four different perspectives
in stories and images

3. A glimpse of 2050: **four perspectives** on nature and society

More and better green infrastructure is an effective means of improving the status of biodiversity and the ecosystem services it provides. The changes in land use and management that this requires call for cooperation that crosses the borders of various sectors and policy levels. For this study we brought policymakers and stakeholders from different backgrounds together to enter into a dialogue on the future of our nature policy. Together we developed four different perspectives on Flemish nature and society.

3.1 Why work with different perspectives?

Effective nature policy must take into account a number of major and hard-to-predict changes that the future has in store for us. How will the climate evolve? Will people soon be eating healthier, more sustainable food? Scientific foresight studies can bridge the gap between imagination and reality and provide a compass for policymaking in the long term.

The Nature Outlook 2050 explores four scenarios or 'perspectives' that describe the development of green infrastructure in Flanders. Each perspective is based on a certain vision of nature and society,

and from this basis provides green infrastructure solutions for important challenges that are coming our way, like climate change, loss of biodiversity or keeping our living environment healthy. We found a concrete basis for our perspectives in the European Nature Outlook (PBL 2017). We translated it for a Flemish context and presented it to the user group and the steering committee of this study. After several intense rounds of discussion, we came up with four revised Flemish perspectives on nature and society, which each have a different emphasis:

1. **Strengthening cultural identity**
2. **Letting nature find its way**
3. **Using the economic flow**
4. **Working with nature**

The perspectives outline four divergent visions of the future regarding nature and society in Flanders. None of these visions represents the 'expected' evolution: rather, they explore a possible evolution if we pursue a corresponding view of nature from a certain value pattern. For

each perspective we also show a few existing initiatives that are already being implemented and that could contain the seed of a future transition. In chapter 4 we analyse the strengths, weaknesses, opportunities for synergies and irreconcilable points of the different visions of the future. By doing this, we want to inspire policymakers and stakeholders to shape nature policy both now and in the future.

A systems approach

We can describe our environment and all natural and human-influenced elements therein as a social-ecological system. It consists of closely intertwined subsystems that constantly interact and evolve together. This co-evolution makes it difficult to make policy changes in one subsystem if the others do not also evolve. For this reason, perspectives on nature and landscape also presume perspectives on other facets of life in society, such as how we organise our policy or what role technology and knowledge play. In order to draw up the perspectives, we analysed five subsystems:

- **Nature and landscape:** how does the perspective vary in terms of the four angles of biodiversity (stocks, composition, patterns & structures, and functions)?
- **Values:** what value does the perspective assign to nature (intrinsic, fundamental, relational or instrumental value)?
- **Organisation of society:** what is the balance between group interest and individual interest? Who should take the lead in creating and managing green infrastructure, and what role do the other actors play?
- **Knowledge:** what is the dominant knowledge type (from skills and practical knowledge to scientific theories) and what role do knowledge institutions play in society?
- **Technology:** upon which type of technology do we primarily rely?

Reference is made to the various subsystems in the description of each perspective. For each perspective, we also outline how the concept of green infrastructure is implemented in a certain spatial context, such as cities, nature reserves, river valleys and agricultural areas.

3.2 Four different perspectives in stories and images

In the following sections we describe the broad strokes of each perspective. They are the result of extensive consultation with the user group and experts. The previously described systems approach helped us to bring together and supplement that information in a structured way. We summarise the basic principles that shape each perspective and describe how they translate into the management, design and installation of green infrastructure. Other relevant societal themes, like health, mobility and employment, are only dealt with if they share an interface with green infrastructure. In chapter 4 we will delve deeper into the effects that these assumptions have on the challenges for the future.



Strengthening cultural identity





3.2.1 Strengthening cultural identity

Nature and living environment determine our identity

In the 'Strengthening cultural identity' perspective, people identify with the place where they live. They feel connected with the local landscape and its past. An important site, a brook or even a specific tree can be part of that sense of home. Landscape and nature constitute an important part of the local and regional community. Characteristic elements like hay meadows and streams are restored and well maintained. Nature is also seen as an **essential part of a good and meaningful existence**. Life is about more than survival: people visit nature to relax, to enjoy a beautiful landscape and to meet neighbours, residents and other townspeople or villagers.

The design and management of public green spaces takes into account the **needs and preferences of different groups in a superdiverse society**. Urban greenery, preferably within walking distance, gives people the opportunity to meet each other and can improve social cohesion. In this perspective, the **landscape is considered a collective good or a common**. People come together to produce local food and to be active in nature.

Easy access to traditional landscapes

The value that people assign to landscapes in this perspective is tied to the history of those landscapes. People like to dwell in a **semi-natural environment** that is part of an old agricultural system like a hay meadow or heath. Traditional landscape systems such as water meadows, historic polder grasslands, streams with water mills, hedgerows and meadows with knotted willows are all highly favoured. To be able to preserve and strengthen cultural and regional landscape elements, their **former function is given a new, contemporary interpretation**. A typical example is a seventeenth-century water mill that gets transformed into a visitor centre or a meeting place.

Local nature plays a major role in the quality of life. From this angle, nature is **as easy to reach and safely accessible as possible**. Urban greenery is well thought-out and within walking distance. Neighbourhood parks, community gardens and school vegetable gardens bring people together in green settings. A rich assortment of slow roads, hiking and cycling paths invites you to explore the landscape. These are surrounded by hedges, avenue trees, sunken lanes or other elements that increase the attractiveness and appeal of the landscape.

Charismatic species like badgers, hamsters and farmland and meadow birds are part of those local landscapes. The green space is aimed at underlining a shared sense of identity and increasing social cohesion.

Food from our own region is valued once more. Local varieties of apples, grains, forgotten vegetables and dual-purpose varieties are restored and produce extra added value in the food market. Sustainable production goes hand in hand with the restoration of beneficial ecosystem services such as pollination or soil fertility. The production of food and raw materials serves a dual purpose: it must fulfil local needs while maintaining the traditional landscape from which people derive part of their identity.

Local communities take the lead

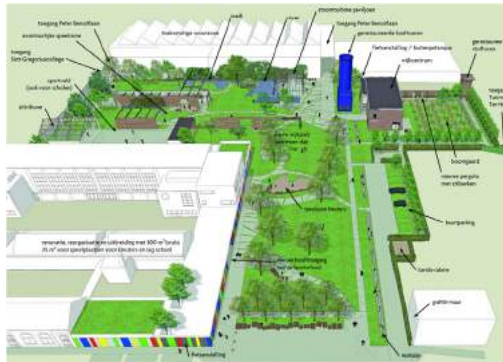
Local communities, civic associations, farmers and entrepreneurs play a leading role in the design and management of green infrastructure. **Local and regional authorities** support them and coordinate the initiatives. The Flemish government also provides financial support for local or regional initiatives. **Bridge organisations** such as regional landscapes, forest groups and river catchment committees.

committees play a key role because they connect various actors, scale levels and knowledge types.

The community is responsible for the management of green infrastructure, either through financial support or through a contribution in kind. Various working tools can support this kind of commons management.

For instance, a landscape fund levies taxes on products and services that benefit from green infrastructure, like a stay in a hotel. In coommunity-supported agriculture (CSA) the pay their share at the start of the growing season, assist in field work and maintenance and come and harvest or collect their own fruit and vegetables. Local currencies are also a good way of facilitating joint management of green infrastructure. This system already exists on a small scale today. For example, volunteers in Ghent can earn 'torekes' with which they can rent vegetable garden space or buy fruit and vegetables from the community grocery store.

Habits, local customs and practices are studied, adjusted and passed on from generation to generation. Technological developments focus on specific techniques to maintain the cultural-historical landscape and to adapt it to a dynamic environment.



De Porre neighbourhood park

At the former industrial site De Porre in Gentbrugge, the city of Ghent made space available for a neighbourhood park, a community centre and the extension of a school. The development respected the industrial history by preserving valuable walls and buildings. The neighbourhood park and community centre contain spaces where people can meet, thereby increasing the social cohesion of the neighbourhood. The park contains an orchard and adventure zones for children.

Hedge laying

From the Celtic period until the end of the nineteenth century, laid hedges were frequently used as livestock fences around fields or meadows. The emergence of barbed wire put an end to that. Hedges formed a habitat for typical species in agricultural areas, such as the yellowhammer. Today, various forms of hedge management are being reintroduced into rural regions in Western Europe. The laid hedges strengthen regional identity and contribute to restoration. In regional landscapes in French Flanders and West Flanders, the initiative is also part of a species action plan for the yellowhammer.



What do nature and our living environment look like?

The 'Strengthening cultural identity' perspective restores traditional landscapes, but also gives them a contemporary function and meaning so that people feel more connected to their environment.



Many attractive, small-scale green and blue spaces are available in and around **urban areas**. Almost everyone has greenery within walking distance and rivers once again have a prominent place in the landscape. Derelict sites and other (temporarily) unused areas are repurposed as green space, but also monastery gardens, large private gardens ... Garden streets, green roofs and wall gardens form an alternative in densely built city districts. Private residences have a large collective garden, possibly in combination with a small private garden. Community picking gardens, urban agriculture and other short-chain initiatives are prominent.



In **rural areas**, small landscape elements from the past are strengthened or reinstated. They are given a (new) interpretation as a source of biomass, raw material for crafts, scenery for recreation or space for water storage. The most fertile soils near the village centres are responsible for the production of fruits and vegetables. This increases the diversity of agricultural crops.



Farming in flood-prone areas in **river valleys** has adapted to more suitable agricultural land uses like hay fields or grazing pastures. Landscape heritage, like an old windmill or water mill, is revalued. Valleys and rivers provide safe routes that connect local communities.



Natura2000 areas are retained as **nature reserves**. Specific habitats have to fit within the cultural-historical framework of the region. Forests are only extended to create ecological connections, restore historic forest cores, form visual buffers and function as recreational green areas around cities.



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Glimpse of 2050

"I am Madge an 85-year-old widow. I have five children, seven grandchildren and two great-grandchildren. I have lived in the same village since my childhood. But thirty years ago, when the children had left the house, I thought about moving. My village had changed so much that I didn't feel at home there anymore. The farmers in the area vanished and industrial estates and shopping boulevards appeared. The main road through the village was getting busier, the river was getting dirtier and the forest had to make way for a sports hall. My charming village had become a chaotic, characterless place."

"In the year 2050 the village has luckily changed for the better. The river is clean again and my neighbours Jos and Alif often go there to fish. The sports hall has moved to the centre of the village and the businesses are now in a regional business park. As a result there is once again room for woodland, meadows and rows of trees at the edge of the village. A small farm with cows, grain and some vegetables sells its harvest here in the local area. That means I don't always have to go to the supermarket. A hydrogen-powered shuttle bus takes employees to the business park and picks them up again. As a result there are far fewer cars and trucks in the village. The forest is largely restored, that's where I go to cool down if it's very hot in the summer. My great-grandchildren can play safely in the nearby community garden. I feel completely at home here again!"



STRENGTHENING CULTURAL IDENTITY



Where we live is part of our identity. Nature and landscape are an important component of the local and regional community.”

WHO

**LOCAL INITIATIVES
PLAY A
LEADING ROLE**

(citizens, farmers, entrepreneurs)

**REGIONAL
AUTHORITIES
COORDINATE**

**BRIDGE ORGANISATIONS
BRING ACTORS TOGETHER**
(regional landscapes, forest groups, catchment committees)

HOW

Green infrastructure = common good

(communal gardens, self-harvest farms, citizens who co-manage)

WHAT



Green areas for meeting and recreation within walking distance ensure close-knit cities.



Semi-natural and cultural-historical landscape managed by and accessible to the community.



Rivers and valleys form safe connecting axes between local communities.



Local production and consumption take the characteristics of the landscape into account.



Preservation and updating of landscape heritage (e.g. old water mills) and small landscape elements (e.g. hedges).

EFFECT



**HALTING THE LOSS OF
BIODIVERSITY**

Small-scale nature is vulnerable to disturbance.



**GUARANTEEING
A HEALTHY LIVING
ENVIRONMENT**

Collective landscaping brings more greenery into the living environment.



**COEXISTING AND
LIVING CONSCIOUSLY**

Strong local involvement offers more opportunities to socially vulnerable groups.



**USING NATURAL
RESOURCES
SUSTAINABLY**

Small landscape elements protect against erosion and provide biomass.



**DEALING WITH A
CHANGING
CLIMATE**

Small-scale nature is less resistant to the effects of climate change.



**ENSURING FOOD
SECURITY**

Short-chain agriculture requires space and has to compete with the global market.

Potential radical developments in areas like consumption, technology or climate can influence the assessment



Letting nature find its way





3.2.2 Letting nature find its way

Robust and wild

In the 'Letting nature find its way' perspective, people attach great importance to the **intrinsic value of nature**. They recognise that natural processes and species have a right to exist and they accept that nature can support or thwart human goals. The target is '**zero management**' or **minimal intervention** by humans. The result is an extensive network of untamed, 'wild' nature, as we already see today on a smaller scale in a few forest reserves.

Wild nature is **strong and resilient**, provided that it is given enough space and time. For this reason, a network of nature reserves is developed that is large enough to be self-regulating. Robust nature in turn provides effective **life insurance for people**: floods cause less damage, water treatment capacity improves ...

Limited access to wild nature

A robust nature network requires **large, contiguous areas of nature**. In those large natural areas, stable climatic vegetation with extensive forests will eventually develop, provided that people do not intervene. To create a stable **network with spacious wildlife corridors**, rivers are once again given more space. Watercourses

can freely meander and (eco)hydrological processes such as floods, erosion and sedimentation determine which type of nature occurs where. River valleys function as corridors that wildlife can move along.

The **large scale of nature** ensures that all functional species groups (such as composters, grazers and predators) are present and that the populations regulate themselves. This creates a dynamic food web: the dams built by beavers affect the fish populations, large grazers like deer provide open space in the forest, top predators like wolves keep the large grazer herds in balance ... Maintaining the natural processes in an area has priority over the protection of individual species.

In this perspective, **less space remains for food production and for living and working**. Man becomes an observer, an ecotourist in his own region. To safeguard food security, as much food as possible is produced in as small a space as possible in the agricultural area. Space can be saved by arranging agriculture in layers (e.g. vertical farming) or through further intensification (for example with precision farming, where technology is used to give plants

or animals the exact management that they need). In residential and working environments, **high-quality high-rise buildings** reign supreme. To maintain a healthy living environment, the large-scale nature network is supplemented by the deployment of more **small-scale green infrastructure** like vertical gardens, green roofs, parks, (collective) gardens and green business parks. Working in from the outskirts of the city, green offshoots of wild nature penetrate the densely built-up area. The denser the habitation, the more facilities there are to unlock the green space.

Government coordinates the network

The Flemish **government owns** the large nature reserves and finances the development of dynamic natural systems. Coordination of these actions takes place at the supranational level, so that all initiatives on a European and even global scale form a **coherent network**. Within that framework, regions can further hone the green infrastructure. Business parks, gardens, horse pastures and other sites must also comply with ecological conditions.

Robust, wild nature implies that people once again **have to learn to live together with wild animals**. Preventive measures, such as partitions

to keep wild boars out of gardens, can facilitate that coexistence. Yet, this also requires some tolerance from people in terms of unwanted plants, insects ... Awareness plays an important role in this: those who know the underlying processes and functions of the self-regulating natural world can also be more sympathetic to its needs. This new, wild nature can also offer new sources of income from ecotourism, sustainable forestry, hunting and fishing.



Vertical farming

A vertical agricultural system saves space and can thus create more room for green infrastructure. The description 'vertical' does not always have to be literal - it also applies to agricultural forms that combine or 'stack' multiple purposes. A good example is Ghent Urban Farm, where they use containers in several tiers to cultivate herbs, vegetables, fish and shellfish right in the city. By cultivating in layers, the production per surface area is higher. The system is also closed: the fish and shellfish provide the necessary nutrients for plant growth and the plant roots clean the water for the fish.

Wild nature in the Drowned Land of Saeftinghe

The Drowned Land of Saeftinghe (Verdrunken Land van Saeftinghe) is a nature reserve on the border between the Netherlands and Belgium. At 3,580 hectares, it is the largest brackish marsh in Europe. The Drowned Land is jointly managed by the Zeeuws Landschap (Netherlands) and the Agency for Nature and Forests (Flanders). This management remains limited to grazing because there are no natural grazers. Apart from that, natural processes are given free rein. The mud flats and salt marshes that are created in this way are a paradise for birds. The majority of the nature reserve is accessible only with a guide, in the context of sustainable ecotourism. There is however a freely accessible walking path around the reserve which overlooks the marshes.



What do nature and our living environment look like?

The 'Letting nature find its way' perspective provides extra space for wild nature. There is less room left over for other land uses.



Large town centres are further compacted, small centres make way for nature. Green fingers pass through **urbanised areas**. Existing parks become more characteristic of wild nature. They form stepping stones between the larger natural areas and bring nature closer to home. **Gardens** are laid out more naturally and allow species to migrate as much as possible.



Existing **open nature** (marsh, heathland, sand dunes, semi-natural grassland) largely disappears due to afforestation.



Rivers and valleys are part of the nature network and are given more space again given more space. Where safety permits, dikes are demolished or moved so that parts of the valley can flood again. Natural processes such as erosion and sedimentation are also given free rein. The panorama of the coast changes: more dunes and fewer polders provide a stronger natural coastal defence.



Nature and agriculture are separated in **rural areas**. As much food as possible is produced on the remaining surface area that is not required for nature, living, working, mobility, industry ...



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to view these images in detail



Glimpse of 2050

"My name is Charles, I am 40 and the proud father of two daughters. Nevertheless, I used to have doubts about whether I wanted children or not. I looked around my local area, saw a sea of urban development and land parcelling, and wondered if I could make them happy. Now, when I go walking along the river Nete, I still have a hard time imagining that thirty years ago, people couldn't walk ten minutes without seeing houses. The old tram line in the Vossestraat has become a beautiful nature reserve. On Sundays we often walk in the Zenne valley. It is now 80 metres wide, with a thriving marsh forest. Our housing is smaller than when I was a child - in an apartment on the ninth floor - but when our children leave the building, the woods are right on their doorstep."

"The countryside nearby isn't just wild nature: potatoes, grain and sugar beets are cultivated there. With the help of technology, farmers try to produce as much as possible with as little impact on nature as possible. There is a new, integrated business park just outside the village. You can walk through wet grasslands underneath the buildings."

"Our electric cars don't enter the residential areas, but rather stop in a car park on the perimeter. Then we walk the rest of the way. Just outside the village, we can take the tram to Brussels. As a student I was always bothered by all the cars there, but now it's nice and quiet in the city. My daughters are looking forward to a bright future!"



LETTING NATURE FIND ITS WAY



Resilient nature needs peace and space to develop. Humans also reap the benefits of those large, continuous nature areas.”

WHO

**FLEMISH GOVERNMENT
CONTROLS PURCHASES &
MANAGEMENT**



**EUROPE
COORDINATES**
(to establish a coherent
nature network)

WHAT


Dense residential areas with
blue-green connections between
nature reserves.


Large, continuous and
unmanaged nature areas
(especially forest).


Rivers are given all the
space they need.



HOW

Green infrastructure =
largely owned by the
controlling government.
Zero management
is the ambition


Intensive,
high-tech agriculture,
separated from
nature.


Wild nature, both in
cities and in nature
areas.

EFFECT



HALTING THE LOSS OF BIODIVERSITY

Large, contiguous forests
are less sensitive to
disturbance.



GUARANTEEING A HEALTHY LIVING ENVIRONMENT

Green fingers cool the cities
and ensure a pleasant living
environment.



COEXISTING AND LIVING CONSCIOUSLY

Wild nature is
less accessible.



USING NATURAL RESOURCES SUSTAINABLY

Intensification of agriculture
increases the pressure
on the environment.



DEALING WITH A CHANGING CLIMATE

Large nature areas
help to cope with the
effects of climate
change.



ENSURING FOOD SECURITY

Less space for intensive,
but less resilient
agriculture.

Potential radical developments in areas like
consumption, technology or climate can
influence the assessment.



Using the economic flow





3.2.3 Using the economic flow

Nature generates economic benefits

In the 'Using the economic flow' perspective, **nature is a valuable means of generating an income.** For instance, this could be via food or wood production, by providing a place for relaxation or by making industrial areas more attractive to employees. The design of nature is mostly left to professionals. The emphasis is on forms of nature that suit consumers' individual lifestyle and preference or investors' business style.

A great deal of attention is paid to the efficient use of natural resources and raw materials. The perspective assumes that we **can largely attain green infrastructure through market transactions:** private investments, economic developments ... Agriculture focuses on maximum crop profitability, for example through precision farming and specialisation, and is also export-oriented.

Nature as pantry

In this perspective, nature is an **essential pantry.** It is appreciated for its **production possibilities** for the economy, forms a **backdrop** for recreational activities and offers **inspiration** in the search for nature-based solutions to various problems. For example, we can tackle flooding by focusing simultaneously on controlled flood areas and on building techniques that make housing possible in water-sensitive areas.

Varied landscapes form a backdrop in which people like to **relax and enjoy themselves.** Those who like to live in a green environment happily pay a bit more to do so. Where biodiversity forms the basis for **renewable raw materials,** for example for biorefining, energy production or the wood industry, preference is given to efficient strains or varieties that provide large volume and good quality. In this vision of biodiversity, many common plants and ornamental species are worth as much as rare specimens. Rare species are primarily a reserve stock for new applications in a rapidly changing environment. Only invasive species that affect the yield of other species are controlled.



Cut your own Christmas tree People come to the Dutch Hoge Veluwe National Park every year to extract hundreds of pine trees from the forest. Visitors can pick a Christmas tree, cut it down and take it home for free. Not only does this benefit the visitors, it is also beneficial for the nature in the Park. After all, the pine trees grow in the Park's unique open sand drifts and need to be removed from there. The open sand drifts are retained due to their recreational appeal. Children learn from an early age that nature can also be economically profitable. This initiative is part of a broader arrangement of economic valorisation of the park through, among other things, entrance fees, donations and sponsor contributions.

Nature management guided by new revenue models

Businesses and individuals take the lead in the creation of green infrastructure. They also partially determine how that nature is **managed and arranged**. Banks, insurance companies and retailers impose conditions on their customers and suppliers for sustainable agriculture and forestry, housing and so on. In this vision, individuals are responsible for their choices: those who live in a flood-prone area also have to pay for the damage caused by flooding.

The government has to safeguard first and foremost the preconditions for sustainable market operation. In addition, it creates new markets, such as carbon credits, and promotes the management and development of green infrastructure through grants, auctions and fiscal measures. Such systems protect food production and reduce the pressure on agricultural land from non-farmers, like horse owners or investors. Permanent and temporary green infrastructure are given separate legal status, so that the installation of temporary nature does not involve any risk of ground loss.

In this perspective governments, nature associations and other landowners actively **look for ways to co-finance the management of their land**. This can be achieved by, for instance, charging for recreation in nature reserves, building exclusive holiday homes in attractive landscapes, collecting entrance fees or by having people pay for ecosystem services like carbon storage or recreational space. Donations from private individuals and companies contribute significantly to the financing of nature reserves. Because a lot of nature is privately owned, accessibility can vary greatly. For example, some areas may be completely private or only accessible to members. Knowledge about the installation and management of green infrastructure is valuable and can be marketed. The knowledge system is highly specialised. This means that there are specialists in environmental law and biological pest control, landscape architects, green contractors ... each with their own data, concepts and jargon. Companies develop high-quality technological solutions to reduce societal challenges, for example through precision farming, smart cities or the transition to a circular economy.

What do nature and our living environment look like?

The 'Using the economic flow' perspective focuses primarily on the instrumental, economic value of nature and strives for an efficient use of open spaces.



Well-designed private gardens and parks feature prominently in **village centres and towns**. These are only accessible to the owners. Houses with a view of a park are more expensive. Gardens are intended for comfort and relaxation. Because aesthetics and shape are decisive when it comes to choosing plants, specially bred cultivars are preferred. **Companies** that create green infrastructure on their sites can make that nature temporary in character, so that the sites can be developed later.



The paths of **rivers and valleys** are planned in an integrated way, with attention paid to safety, recreation, navigability and agriculture. Intermediaries act as liaison between the various economic actors. Off the coast, islands are constructed for the temporary storage of renewable energy and as a cost-effective means of coastal protection.



To maintain or develop **nature reserves**, an underlying economic revenue model is needed. Existing nature reserves can only be sustained if new income is found, for example from tourism, hunting or sponsoring. New nature reserves are developed by companies and private individuals. The individual, market-based preferences of the owner or investor shape the natural experience that the area offers.



In **rural areas** the emphasis is on industrial agriculture. Technological solutions limit the environmental impact. The government protects agricultural land against other uses. In this perspective a strict separation between agriculture and nature is considered to be the best option for biodiversity.



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Glimpse of 2050

"My name is Marc and I am the manager of PROCUPA. Thirty years ago, a lot of companies were only concerned about their own activities and much less about the social cost of what they were doing. Today I set different priorities for my company: my most important building blocks are sustainable, preferably locally produced, raw materials and employees who feel good about themselves."

"My company is based along the river Dender. Over the past few years, the government has invested heavily in the area, improving the water quality, adding valuable natural elements and reducing the flood risk. Initially there were plans to remove my company, but in the end it was possible for me to stay. This has several advantages: the clean river water can be used in my production process and my employees enjoy a healthy, green working environment. Furthermore, they are all shareholders of my company and they want to work with me to contribut

e to promoting ecosystem services. This is all underpinned by a just and balanced fiscal system."

"Our business park is part of a green network of grasslands, woods and an open water management system. That network is managed jointly. It is attached to the new natural area around the nearby village and connects it with the nature reserve along the river. People who want to visit the nature reserve pay one euro for entry. The green network allows us to install shared renewable energy facilities, with solar panels and green roofs. The recently constructed bicycle connections are already proving really popular. Working with the municipality and the local transport company, we have also arranged a shuttle service for our employees. Anyone who still travels by car has to pay a parking fee. As a result, a lot of cars have disappeared from our site. And everyone feels good about that."



USING THE ECONOMIC FLOW

“

Nature is a valuable mean of generating an income. The questions and expectations of landowners and investors determine what green infrastructure looks like.”

WHO

GOVERNMENT
CONTROLS THE
CONDITIONS FOR
GOOD
MARKET
OPERATIONS

BUSINESSES AND
INDIVIDUALS
INVEST IN
NATURE AREAS
AND CONTROL
THEIR DESIGN

WHAT



Green spaces in cities
with varied
accessibility.



Designed with consideration
of safety, nature,
recreation, navigability
and agriculture.



Varied landscapes
where people can
relax and unwind.



Green production factor
for the economy, a
backdrop for activities
and a source of
inspiration for design.



Intensive,
high-tech
agriculture.



Green infrastructure =
owned by businesses and
individuals. They determine
the design of a green area.
Accessibility of nature depends
on financing (from freely
accessible to paid entry
to private ownership).

EFFECT



HALTING THE LOSS OF BIODIVERSITY

Small-scale, fragmented
nature is vulnerable to
disturbance.



GUARANTEEING A HEALTHY LIVING ENVIRONMENT

The expansion of green
infrastructure must be large
enough to have an impact on the
quality of life.



COEXISTING AND LIVING CONSCIOUSLY

Private nature increases
the risk of social
exclusion.



USING NATURAL RESOURCES SUSTAINABLY

Internalisation of
environmental costs can
lead to sustainable use.



DEALING WITH A CHANGING CLIMATE

Few decisive green
infrastructure measures for
mitigation or adaptation.



ENSURING FOOD SECURITY

Strong dependence
on technology and
fluctuations on the
world market.

Potential radical developments in areas like
consumption, technology or climate can
influence the assessment.



Working with nature





3.2.4 Working with nature

Mutual dependence and sustainable use

The 'Working with nature' perspective **emphasises the mutual dependence of people and nature**. Natural processes are essential for our quality of life, our prosperity and, in the long term, our chances of survival. Humans must use natural resources sustainably so that they remain available for future generations. The depletion of such resources can result in high costs or irreparable damage.

In this perspective, people are adamant about the importance of **nature for preventive health care**: walking in nature brings peace of mind, forests provide cool respite during hot summers ... A green environment also contributes to **quicker recovery after illness** and ensures that **children develop well**.

Purposefully implementing green infrastructure

Ecosystem services are indispensable for the economy and for life on earth. This perspective focuses on **optimising natural processes** that provide benefits for humans, such as pollination, soil fertility, water treatment and air purification. **Green infrastructure is implemented purposefully** to be able to provide ecosystem services in a sustainable way, so that future generations can also benefit from it.

Functional biodiversity prevails: species policy is responsible for the conservation and restoration of species that contribute to the desired ecosystem functions in society. An extensive genetic variation of plants and animals addresses all possible growth conditions and survival strategies. A resilient nature constitutes the basis of our prosperity and well-being.

An extensive range of green and blue spaces has to meet the demands of nature experiences, recreation, education and preventive health care. In this perspective, **cities are marbled green and blue**. This enables them to support the water cycle and provide cooling spaces for their residents. Nature and city are intertwined, but so are nature and agriculture. Sustainable land use equates to natural support for various benefits, from the inner city to the rural areas.

Kruikeke Bazel Rupelmonde flood area

The Kruikeke Bazel Rupelmonde controlled flood area (CFA) serves as a water buffer in extreme weather conditions. When water levels are high, river water can flow into an overflow dike in the flood area. A much higher ring dike protects the downstream residential areas from flooding. The CFA is underwater only a few times a year at most. The rest of the time, an agro-management group actively manages the grasslands for the benefit of meadow birds and the local Barbier guides lead walkers through the polder.



Everyone contributes

Green pioneers from the business community, the financial sector, education and the health sector and from environmental and nature associations, civic associations and the research community are working together on the transition to a green society. The **government coordinates** all actions and encourages sustainable choices in investment, production and consumption. It also ensures that environmental costs are included in the prices of products and services. This means that the price of ecological damage is not passed on to distant regions or future generations. In addition, the government works out a system of financial compensation for nature benefits that serve the collective interest.

Creating green infrastructure is costly and maintenance also requires money and working hours. Because this investment provides benefits for all local residents, and sometimes for society as a whole, **every beneficiary must contribute to it**. As an example, during the weekend and in holiday periods, a school's green playground can become a public park space for local residents.

Agriculture resolutely opts for an **agroecological approach** with nature-based techniques.

The approach takes into account the capacity of nature and uses local knowledge to apply an agricultural land use that suits the environment. **Smart design** has an important role in land use: for example, agriculture can be cleverly combined with erosion protection or water availability. Experiential learning enables further honing and refining of agricultural techniques. Technology plays more of a supporting role in the search for nature-based solutions.

In this perspective, **nature as medicine** is widely accepted in the health sector. Interaction with a green environment is used to enable patients to heal faster and to stimulate children's development. General practitioners prescribe walking or working in nature as a remedy, and hospitals bring their patients in contact with nature, both passively (having a view of nature) and actively (exercising in nature).

Agroecological farming

An agroecological approach to agriculture is based on cooperation with and imitation of nature. The basic principles are recycling of nutrients (for example, as manure or compost), maintaining soil fertility, the least possible loss of resources (sunlight, water ...) and the stimulation of genetic diversity. The approach takes the capacity of nature into account and uses local resources and farmers' knowledge to achieve resilient agriculture.

Health initiative 30-30-30

During Forest Week (Week van het Bos), thirty people walked in the forest for thirty minutes daily for thirty days. The results of this small-scale experiment showed that the majority of the participants slept better and felt happier, fitter and more energetic. The initiative was carried out by the environmental organisation BOS+, commissioned by the Agency for Nature and Forests and the health insurance company CM Midden-Vlaanderen. The cooperation between government and civil society and the focus on preventive health care make the 30-30-30 initiative an example of the 'Working with nature' perspective.

What do nature and our living environment look like?

The 'Working with nature' perspective creates space for nature-based solutions to sustainably tackle challenges like increasing flood risk and drought stress.



Green-blue networks traverse the **urban area**. They are designed to serve specific purposes: collecting water, mitigating the heat island effect, contributing to preventive healthcare ... Everyone has access to green space in their environment. (Temporarily) unused spaces such as derelict sites or old parking garages are made green and opened up, as are semi-public spaces like monastery gardens and school playgrounds. Highly compact districts receive additional green space thanks to the demolition of vacant buildings and through incentives for green roofs and facades. Larger urban forests on the outskirts of cities meet the recreational requirements.



In **rural areas**, nature and agriculture are strongly intertwined. Biodiversity supports food production. Farmers try to close ecological cycles as much as possible by collecting water and re-using it, composting residues ... Biodiversity that negatively affects agriculture, like pests or wild boars, is inhibited.



The natural processes of the **rivers and coastlines** are utilised in a controlled way. Two examples of this are the development of dunes to protect the coastline and water treatment via reed beds.



The aim of managing **nature reserves** is a sustainable supply of the desired ecosystem services. Physical conditions like soil texture and the groundwater level determine where different types of nature are developed. The European nature targets are optimally adapted to the natural potential of an area. Outside the current nature reserves, too, land use can change considerably depending on the desired ecosystem services, for example by transforming highly erosion-sensitive arable land into multifunctional forest.



Please visit www.natuurrapport.be to view these images in detail

Want to find out more about this topic? You can read all about it in chapter 4 of the technical report.

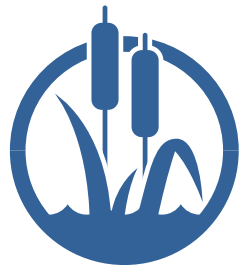


Glimpse of 2050

"I am Karim, Aalst's local care farmer. Twenty years ago I was recruited by the city to run the local children's farm along with two colleagues. That meant we were farmers and public servants at the same time! Over time, the city needed to save money and management of the children's farm was no longer considered a core task. That was a shock initially, but in the end we decided to start our own organic nature and care farm."

"The site of the former children's farm, which had a few buildings, meadows, fields and a garden, wasn't big enough for our new project. That's why we came to an agreement with the municipality to lease some extra grounds from them: the Arme Klarenbos forest (17 ha), the banks of the Molenbeek stream, the vacant Tinka water mill and a meadow of 2.7 ha with a rundown fish pond. In our new, larger domain, we wanted to collaborate with nature to create a flourishing and integrated business. Working with the municipality and the environmental organisation Natuurpunt, we set up a nonprofit organisation."

"At our new farm we maximize our self-sustainability: we produce our own fruit, vegetables, grain, legumes, meat, fish and fertilisers, but also energy, water and raw materials. All our produce is sold locally. In addition, we give nature as much space as possible. All of our fields, grasslands and banks have broad herb borders and untamed edges. We have left the dam that a beaver built last year. The meadows that flood in the summer provide excellent hay, and the alders and willows are thriving. We use the grain we harvest to bake our own bread in our wood oven. We gather the wood in the Arme Klarenbos. A fox now lives there as well, so we keep our chickens and rabbits in sturdy cages. We rent the renovated water mill to youth groups during holiday periods. On top of that, we're also a care farm: people with psychological problems, young people from youth care, disabled people, the elderly and other vulnerable groups come to visit regularly. When I see them totally flourishing, I know we made the right choice!"



WORKING WITH NATURE

“

People and nature depend on each other. Respect for ecosystems not only benefits nature, but also our economy and society.”


WHO

**GOVERNMENT
COORDINATES AND
STIMULATES**

**BROAD
COOPERATION**

*by companies,
civic associations,
farmers, nature and
environmental
associations,
scientists, the health sector
and the financial sector.*


Green-blue
networks through
cities.


Natural processes
are used in a
controlled way.



Targeted management
for sustainable delivery
of ecosystem services.


Agroecological
farming.


Green
healthcare.

WHAT

HOW


Green infrastructure =
resilient green-blue network
that supports many goals:
biodiversity, economy, agriculture,
(public) health, protection
against flooding,
heat stress, ...

EFFECT



HALTING THE LOSS OF BIODIVERSITY

Lower environmental pressure
and increased connectivity offer
opportunities.



GUARANTEEING A HEALTHY LIVING ENVIRONMENT

Extensive green facilities are
oriented towards health.



COEXISTING AND LIVING CONSCIOUSLY

The green-blue network
brings nature into every
neighbourhood.



USING NATURAL RESOURCES SUSTAINABLY

Agroecological farming
ensures a lower environmental
impact and increases
soil fertility.



DEALING WITH A CHANGING CLIMATE

Targeted use of nature to
prevent flooding and increase
the soil carbon content



ENSURING FOOD SECURITY

Resilient agriculture,
but uncertainty about
the productivity of
agroecological farming.

Potential radical developments in areas
like consumption, technology or climate can
influence the assessment.

4

Each of the four perspectives shows a different vision for tackling the challenges of the future with the help of green infrastructure. Do they manage to provide an answer? And will they stand the test of time if the future develops in a different direction than we currently expect?

HOW DO WE TACKLE THE **CHALLENGES** OF THE FUTURE?



68

4.1 Six major challenges:
causes and solution strategies

87

4.2 Strengths and weaknesses of
the four perspectives

4. How do we tackle the **challenges of the future** ?

In this chapter, we look at six major challenges for the future. Each of the four perspectives shows a different vision for tackling these challenges with the help of green infrastructure. Do they manage to provide an answer? And are the solution strategies future-proof? We assess the effects of the green infrastructure measures put forward by each perspective based on a mix of quantitative and qualitative analyses.

4.1 Six major challenges: causes and solution strategies

With the user group we selected six major challenges for the future that we can (partially) solve with green infrastructure. In the following sections we discuss the main causes of each challenge (see the box "Driving forces behind the challenges") and the possible solutions that the perspectives offer. Figure 3 shows whether the green infrastructure measures in a certain perspective reduce, increase or have little influence on the challenges.

The assessment of the perspectives is based on a quantitative and a qualitative evaluation.

- In order to assess the effect that the perspectives would have on the various challenges, we used the Flanders spatial modelling tool 'RuimteModel Vlaanderen'. This allowed us to identify, for each of the four perspectives, where and to what extent land use changes. The spatial model allowed us to integrate different aspects in our approach: the spatial effects of demographic and economic developments, the consequences of green infrastructure measures ...

In concrete terms, we translated the storylines from each perspective into spatial principles. To do so, we had to quantify many choices: exactly how many hectares of forest have to be added, which agricultural plots are transformed ... The spatial principles of each perspective are described in detail in the technical report. Based on that input, the spatial model calculated a new map of land use for each perspective. We could then use the land use maps to calculate a set of spatial indicators that clarify the different aspects of a challenge. We were thus able to assess to what extent the measures from a

particular perspective affect the challenges (the **quantitative assessment**). The quantitative analyses are based on simulations of land use and do not represent an 'expected' future. The indicators mainly serve to illustrate the differences between the perspectives and to clarify cause-and-effect relationships.

- Spatial indicators usually only highlight one aspect of a challenge. A quantitative analysis is therefore not sufficient for a complete assessment of a perspective's effects. For this reason we asked a group of experts to consider the different perspectives in their entirety and to indicate what consequences can be expected. For this **qualitative assessment** we contacted three or more experts per challenge. Ultimately, 22 experts wrote down their verdicts. It was not so much their final assessment that was important here, but rather the argumentation that supported their assessment

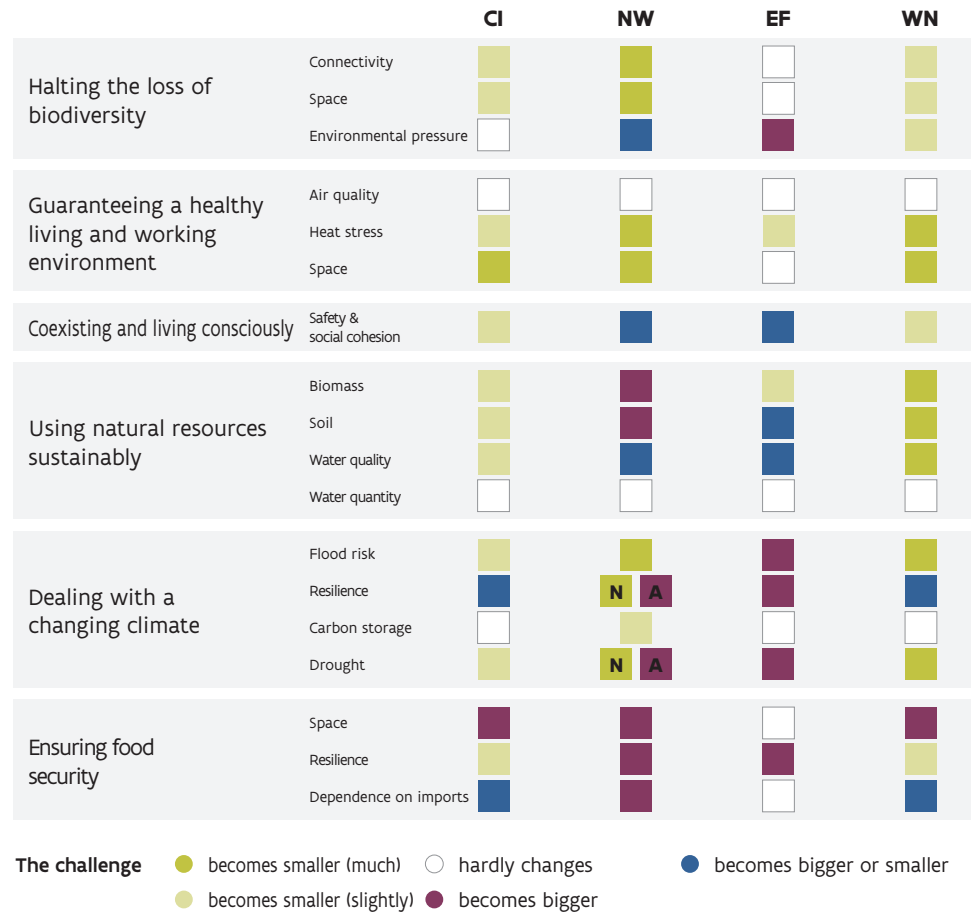


FIGURE 3

Summary of the effects of the perspectives' green infrastructure measures on the components of each challenge. The figure integrates the results of the quantitative analysis and the expert assessment.
 CI = Strengthening cultural identity, NW = Letting nature find its way, EF = Using the economic flow,
 WN = Working with nature, A = Agriculture, N = Nature.

Both the statistics and the expert assessments have their advantages and limitations. A quantitative approach is often more informative, but can only tell part of the story. Moreover, it is not equally helpful for all challenges. The combination of the two paints a more complete picture and makes it possible to summarise the often complex relationship between green infrastructure and challenges.

In a number of cases, there is very little certainty as to the direction in which the challenge will evolve: either because the quantitative and qualitative analysis each indicate a different direction, because the experts disagree or because the outcome depends on unpredictable future developments that are not covered in the storylines, such as our consumption pattern or technological developments. The effectiveness of certain measures also depends on the size of the challenge. Sometimes a perspective does reduce a challenge, but the effect remains very limited. In that case, green infrastructure is not sufficient to tackle the challenge comprehensively and other measures are needed.



Driving forces behind the challenges

The challenges that lie ahead of us in the coming decades are caused by a series of mechanisms or driving forces. They are not independent of each other, but can strengthen or weaken each other. We distinguish two types of driving forces: direct and indirect.

Direct driving forces are usually the result of human activities. They have a direct impact on ecosystems and biodiversity. The most important direct driving forces are:

- **Changes in land use**
- **Pollutants and nutrients**
- **Overexploitation**
- **Climate change**
- **Invasive non-native species**

Indirect driving forces are social processes and systems that shape human choices and activities. They have no immediate effect on ecosystems, but they do respond to the way in which people use and manage ecosystems and their services. The main indirect driving forces are:

- **Demography:** the size and composition of the population
- **Economy:** economic growth, disposable income, the consumption and production patterns of families and governments, the degree of globalisation ...
- **Technology:** the development of new products, techniques, methods ...
- **Sociopolitical forces:** the mechanisms by which social attitudes are translated into policy
- **Cultural forces:** the knowledge, values, norms and customs that we apply as a society and that help determine our choices

4.1.1 Challenge 1: Halting the loss of biodiversity

Biodiversity continues to decline worldwide. This has significant consequences for our prosperity and our well-being. The United Nations recognises the loss of biodiversity as one of the greatest threats to humanity. To reverse the decline in Flanders, the user group of this study saw three important challenges: **creating more room for biodiversity, connecting species' habitat areas** and **reducing the impact of external environmental pressures**. Green infrastructure can increase the total surface area assigned to nature and can better connect nature hubs. Large, contiguous natural areas are more resistant to external environmental pressures (such as eutrophication, acidification, pollution, climate change and invasive species) and can accommodate a greater variety of species.

Which driving forces influence the challenge?

Flanders is highly **urbanised**. A dense road network, ribbon development and suburbanisation lead to fragmentation and a loss of open space. If policy remains unchanged, there will be less and less room left for nature. Moreover, due to the **intensification of agriculture**, the landscapes evolved from park-like mosaic landscapes with a typical biodiversity of field weeds, woodland birds and farmland birds to large-scale monotonous

agricultural areas that lack wildlife species and small landscape elements.

The growing population and the increasing production and consumption have an influence on the **emission of pollutants**. Our current pattern of production and consumption puts heavy pressure on nature and the environment, both here and in other countries. Thanks to targeted technological and policy measures, emissions have declined sharply over the last few decades. But this favourable trend has weakened in recent years for a number of environmental indicators, such as emissions into air and water. The fact that people are gradually becoming more aware of the problems with regard to the environment, our health and animal welfare, can have a positive impact on the ecological footprint of our consumption.

The overexploitation of natural resources (for instance pumping up too much groundwater) has a major impact on biodiversity, as do **climate change** and **invasive non-native species**.

Assessment of the perspectives

Some of the ways in which we assess the effect that the different perspectives have on the challenge are the extent of natural ecosystems that they create, the degree of fragmentation and connectivity of the landscape, the diversity of plant species and the extent to which a perspective helps to achieve the conservation targets for nature of European interest.

- **In most of the perspectives, the extent of natural ecosystems (forest, semi-natural grassland, heath, dune, marsh, mud flat and salt marsh) increases.** Today, less than a fifth of Flanders' surface area is comprised of nature. The measures in the perspectives can influence this surface area in different ways.
 - In the 'Letting nature find its way' perspective, the proportion of natural space in Flanders rises to almost a quarter. The perspective strives for large, contiguous forests: the total forest surface area is almost 20 percent. This afforestation is at the expense of culture-specific, open types of nature such as heath and grasslands, making the European nature targets less feasible.
 - Nature also expands in the 'Working with nature' perspective, to 22 percent of the

total surface area. But the expansion is more spread out and targeted to meet local needs like erosion protection or protective forests. In this perspective we also see a strong increase in marshlands, partially for water purification. The focus on ecosystem services offers opportunities for the more culture-related types of nature that Europe is striving for.

- In the 'Strengthening cultural identity' perspective, the proportion of nature extends slightly to cover almost a fifth of Flanders. The expansion consists not only of forests, but also of grassland, heathland and dunes: forms of nature that align well with the regional identity of the area. The iconic landscape elements also offer opportunities here for more culture-specific types of nature.
- In the 'Using the economic flow' perspective, the surface area of nature hardly increases. This is partly due to the fact that a lot of extensively managed grasslands once again have an economic function. The expansion of nature is not aimed at increasing biodiversity, but rather focuses on tourism, recreation and production. For a number of European protected habitats, such as heath and dunes, we can achieve the surface area objectives as long as they are compatible with economic or tourist/recreational motives.

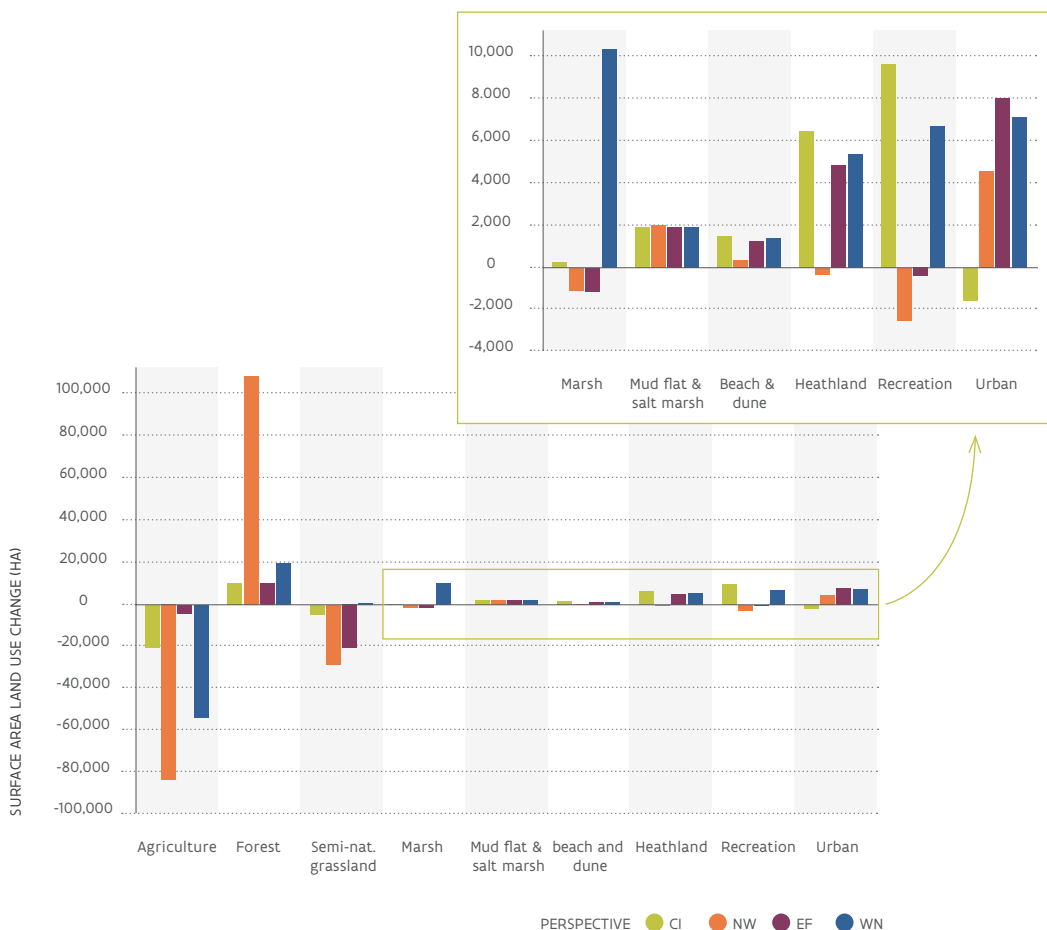


FIGURE 4

Simulated changes in land use in 2050 compared to the status in 2013. According to the simulations, the expansion of the forest in each perspective is mainly at the expense of the agricultural and semi-natural grassland surface areas. The decline in farmland is the smallest in EF due to agriculture-protecting measures.

- Due to the increase in green infrastructure in three of the four perspectives, **the fragmentation of the green space (the nature categories from the previous indicator, recreational areas and parks) decreases.**
 - This decrease in fragmentation is greatest in the 'Letting nature find its way' and 'Working with nature' perspectives.
 - The changes are minimal in the 'Strengthening cultural identity' perspective and the nature hubs remain relatively small.
 - In 'Using the economic flow', fragmentation increases. Semi-natural grasslands are converted into agricultural areas, which further fragment the remaining nature hubs.

Despite the reduction in fragmentation, nature continues to consist of relatively small, scattered hubs in the different perspectives. We find the biggest exception in the 'Letting nature find its way' perspective, in which forests occupy relatively large, contiguous surfaces.

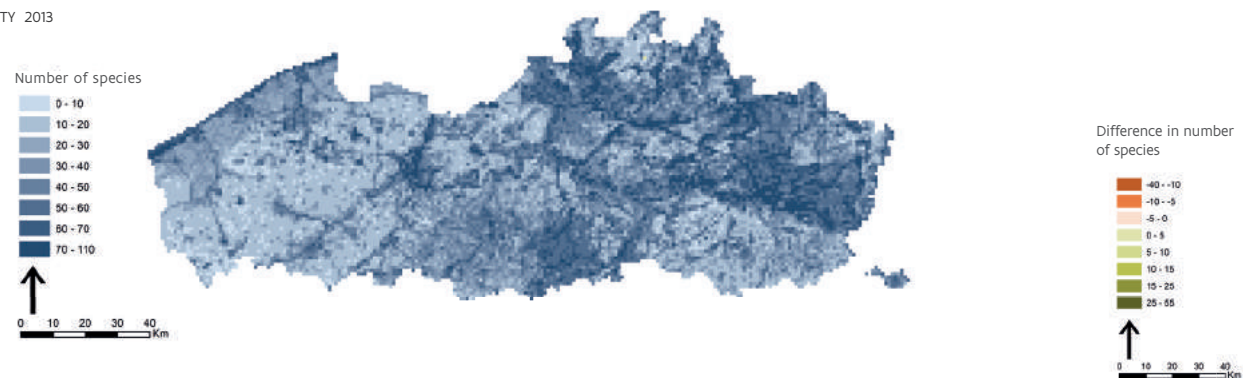


FIGURE 5

Change of the simulated degree of fragmentation of the green space in the perspectives (compared to 2013). Altering land use changes the green space within which a species can move freely. The bar graph shows for each km² in Flanders by how many hectares that unfragmented area increases (defragmentation) or decreases (fragmentation) according to the simulated land use changes. The defragmentation of the green space is greatest in the NW and WN perspectives.

- Due to the presence of small landscape elements in the 'Strengthening cultural identity' and 'Working with nature' perspectives, **species can move through the landscape more easily.** In the other perspectives the landscape matrix is less suitable, especially due to more intensive land use, so species cannot easily migrate between nature areas.
- Because the nature areas in most perspectives are rather small and surrounded by other areas, they are likely to be **vulnerable to environmental pressures and climate change.** The 'Letting nature find its way' perspective is best equipped to deal with this. The large, contiguous forests provide a more stable climate and are less susceptible to disturbance. Natural valleys can also form corridors for south-north migration. However, sensitive species will also disappear in this perspective. We will evolve towards a more homogeneous or less diverse natural world if the external environmental pressures, such as eutrophication, do not diminish.

(A) SPECIES DIVERSITY 2013



(B)

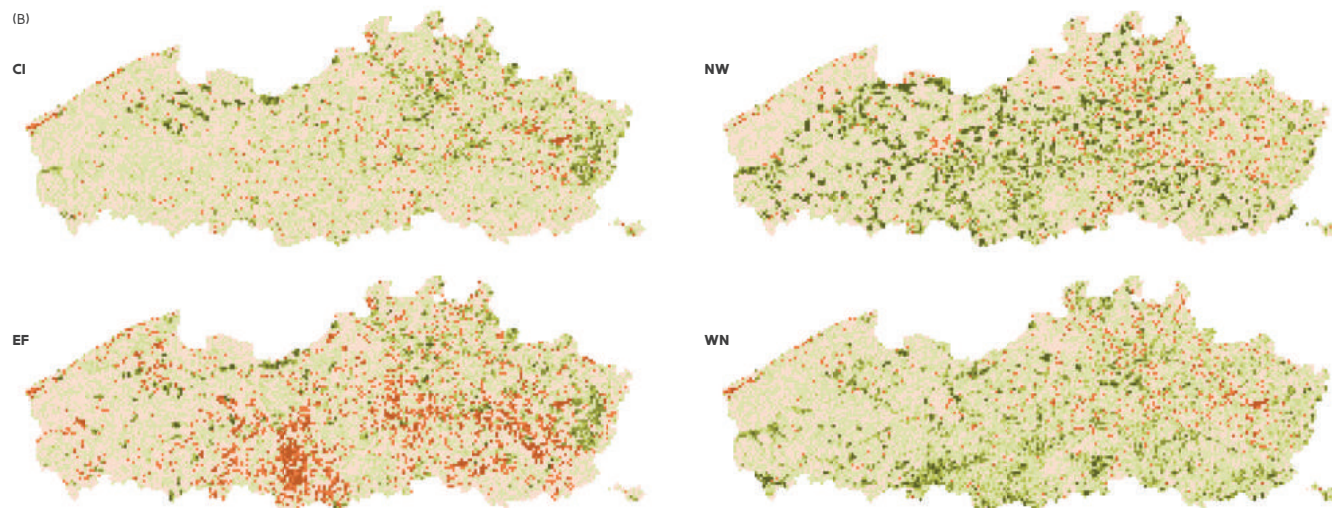


FIGURE 6

The modelled species diversity of plants in the initial situation (2013) is highest in valley areas and in De Kempen and lowest in the intensive farming region in West Flanders. Compared to the initial situation, species diversity improves in the perspectives CI, NW and WN. We see the strongest increase in the valleys due to the expansion of forest and marsh and in the south of Flanders due to the application of erosion measures. The limited decrease in species diversity in EF is mainly the result of the conversion of grasslands into fields and semi-natural grasslands into production grasslands.

4.1.2 Challenge 2 & 3: Guaranteeing a healthy living and working environment & coexisting and living consciously

For many Flemish people, being healthy is the most important component of their quality of life. A healthy living and working environment is high on the social and political agenda. But despite numerous measures to reduce emissions of air pollutants, air quality in Flanders remains poor. This has a huge impact on public health. The heat stress in cities is also a growing problem, especially for the elderly, young children and people with health problems. In addition, people are worried about a lack of nature and green space in their environment. One in five Flemish people does not have green space within walking distance. A green environment is nevertheless positive for mental health and offers opportunities for physical activities and social interaction. This study's user group splits the health challenge into three major subchallenges: **improving air quality**, **combating heat islands in urban areas** and **providing sufficient green space in and around residential areas**. Green infrastructure can help to alleviate heat stress, and particulate matter and other pollutants can be mitigated by the vegetation.

The quality of our living together also has a major influence on our well-being. The area in which we live and work has an influence on how we feel. A **pleasant, green living and working environment** increases our quality of life and neighbourhood satisfaction. People feel more

settled and at home in attractive surroundings. Moreover, a pleasant living environment can **improve social cohesion** in the neighbourhood and in society. An attractive green neighbourhood ensures that people spend more time outdoors and meet each other. Neighbourhood parks in particular stimulate social interaction and contribute to the development of a close community.

Which driving forces influence the challenges?

The intense **urbanisation** in Flanders limits the supply of attractive green spaces for relaxation and outdoor activities. The dense road network and sprawling buildings take up a lot of space. At the same time, there is increasing **demand for green living environments** and **green space for walking and playing**. People need green space not only to move and relax but also to meet each other. Due to increasing migration, ageing and individualisation, our **society is becoming more heterogeneous** and social cohesion is under pressure. For this reason, the creation of sufficiently accessible and high-quality green areas is high on the Flemish policy agenda.

The air pollutants in our environment mainly come from industry, households, the energy sector and the transportation sector. Source-oriented technological purification techniques can have a major impact on the **emission of air pollutants**. More and more people are becoming aware of the impact of poor air quality and demanding measures to reduce emissions of pollutant substances.

Because of its high degree of urbanisation, Flanders is already experiencing a heat island effect in a number of places. Ongoing **urbanisation**, in combination with **climate change**, can further reinforce that evolution in the future.

Assessment of the perspectives

Our assessment of the extent to which the perspectives can bring about a healthy (shared) living and working environment is based among other things on the capture of particulate matter by vegetation, the cooling effect of vegetation, the proximity of green areas for sport and relaxation and income-related access to green space in the neighbourhood or district.

- Currently one fifth of the Flemish population does not live near an urban forest. More than a third has no access to green space in their neighbourhood or district. The **presence of greenery in the living environment improves in all of the perspectives**. Urban forests do particularly well in 'Letting nature find its way' and 'Working with nature'. The greening of approach roads to cities in 'Letting nature find its way' yields the largest surface area of neighbourhood and district green space. However, accessibility can be limited because the unmanaged nature is too 'wild' or cannot be disturbed. The small-scale green spaces in 'Working with nature' and the collective gardens in 'Strengthening cultural identity' also increase the availability of green space in the living environment. The 'Using the economic flow' perspective scores lower on this challenge because part of the green space created is private property and therefore not accessible to the wider public. On a local scale, temporary green spaces can bring a strong improvement.

- The expansion of green infrastructure in the perspectives 'Letting nature find its way', 'Working with nature' and 'Strengthening cultural identity' results in a **more equal distribution of district and neighbourhood greenery** across income classes. Each perspective implements this principle in a different way:

- The strong **local involvement** that we find in 'Strengthening cultural identity' increases the chance that the spaces will serve socially vulnerable groups.
- The 'Working with nature' perspective offers plenty of **functional nature** and a strong green-blue network in cities. Extra attention is needed for accessibility and for the needs of socially vulnerable groups.
- In the 'Letting nature find its way' perspective, extra nature is created, but it is **not always accessible** or well attuned to the needs of socially vulnerable groups. The focus is on unmanaged nature and achieving nature targets. The absence of management, which for instance means that more nettles and thistles may appear in the streets, can also bring a sense of degradation.
- In the 'Using the economic flow' perspective, market forces offer **more opportunities for investments** in high-quality green space. Areas with temporary greenery fill up spaces that would otherwise remain unused. Market forces do, however, increase the risk that vulnerable groups have less access to green space. Greening of a neighbourhood or district can also cause property prices

to rise significantly and crowd out more socially more vulnerable groups. The risk of 'green gentrification' by the way applies to all perspectives.

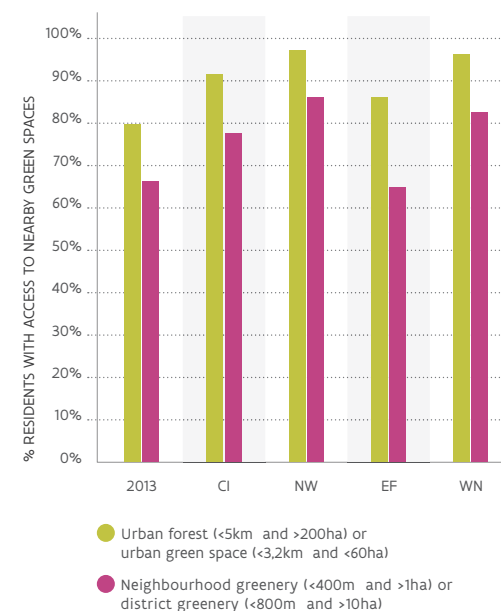


FIGURE 7
Simulated percentage of residents with access to city or neighbourhood greenery. Each perspective gives more inhabitants access to an urban forest or to green space in their neighbourhood. Only the EF perspective lags behind in terms of neighbourhood greenery.

- The 'Letting nature find its way' perspective scores best on the capture of particulate matter thanks to the substantial forest expansion. In general, however, the **effect of green infrastructure on the capture of particulate matter remains limited**, especially in cities. Source-oriented measures, like less motorised traffic and less wood burning, are much more effective for this challenge. The internalisation of environmental costs can stimulate the use of source-oriented measures in the perspectives 'Using the economic flow' and 'Working with nature'. The added value of vegetation does not lie in one specific subchallenge (capturing particulate matter), but rather in its multifunctionality: more green infrastructure purifies the air, provides cooling when it is hot, offers space for relaxation ...

- The additional **green infrastructure reduces the heat stress** in cities in every perspective. The effect that vegetation has on the temperature is mainly felt locally. Creating a small park here and there is not enough: for the temperature to drop measurably. In order to achieve this effect, an **extensive urban green-blue network is needed**, with parks, green roofs and other natural elements. If climate change continues unabatedly, green infrastructure will not be sufficient to keep the temperature in cities tolerable.

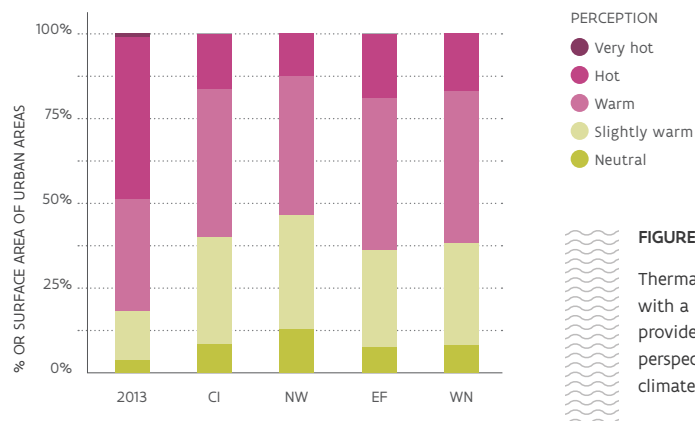


FIGURE 8

Thermal sensation within the simulated urban areas with a possible heat island. The green infrastructure provides an improvement in thermal comfort in every perspective. However, temperature increases due to climate change may negate that effect.

4.1.3 Challenge 4: Using natural resources sustainably

We depend on well-functioning ecosystems for the fulfilment of basic needs like food, (drinking) water and materials. The Nature Report 2014 showed that for seventeen of the eighteen examined ecosystem services in Flanders, demand exceeds supply. The natural resources that form the basis of these ecosystem services are decreasing in size or in quality. If we want to give future generations sufficient opportunities, we have to use our resources more sustainably.

The user group identified three important natural resources for Flanders that are closely related to the development of green infrastructure: soil, water and space for renewable energy and biomass. Due to the high population density, only a small amount of water is available per inhabitant in Flanders. Using it prudently and efficiently is therefore essential, as is a concern for water quality. Too many demands are made on our soil, which leads to a loss of functions and ecosystem services. Moreover, we need to preserve sufficient space within Flanders for biomass and other sustainable sources of energy or materials. In the following sections we explore whether the perspectives improve **water quantity and quality in Flanders**, whether they **use the soil sustainably** and whether they **can supply**

sufficient biomass as a source of renewable energy and raw material for the bio-economy.

Which driving forces influence the challenge?

Groundwater is used in Flanders for all kinds of purposes: to produce drinking water, but also for industry and agriculture. However, with less rainfall in the summer, **climate change** can compromise groundwater replenishment. Recent policy focuses on reducing **groundwater consumption** and improving water quality and infiltration of rainwater into the soil. Fourteen percent of the Flemish soil is already sealed: a consequence of **urbanisation**.

Avoiding further soil sealing is crucial not only to allow more water to permeate, but also to protect our soil. The Flanders Spatial Policy Plan wants to **halt the consumption of open space**, for instance by building houses closer together. In addition to soil sealing, we also need to avoid soil loss (due to water or wind erosion, soil tillage or harvesting). Soil fertility has declined due to **intensive agriculture and forestry**. Targeted agricultural techniques that bring more carbon into the soil can improve fertility.

The **transition to a bio-economy** and sustainable energy production is initiated by the need to **reduce greenhouse gas emissions** and to tackle climate change. Moreover, countries want to be **able to meet their own energy demands**. The Flemish government encourages the production of renewable energy with green energy certificates and premiums.

Assessment of the perspectives

Our assessment of the extent to which the perspectives succeed in using resources in a sustainable way is based among other things on further soil sealing, the replenishment of deep groundwater (water quantity), nitrogen removal from the water (water quality), soil loss due to erosion and biomass production for energy and materials.

- In each perspective there is only a **limited increase in built-up surface area**. In 'Strengthening cultural identity' we even see a decrease. All perspectives assume that the annual increase in land conversion will drop and will be halted completely by 2040 (the objective of the Flanders Spatial Policy Plan). The expected population growth – about a million additional inhabitants by 2050 – can

be accommodated within the available space in each perspective, all the while with a population density that hardly changes in most locations. In the urban centres, population densities will largely be comparable to the current limits.

- The green infrastructure measures in the perspectives have a **very limited effect on the replenishment of the deep groundwater**. Reducing the soil sealing in 'Strengthening cultural identity' creates (a bit) more infiltration. Forests support our ecosystems by making more water available in the upper layers of soil and in the watercourses, but they have hardly any effect on the replenishment of deep groundwater. Measures that limit the use of that water, for example by using surface water instead of pumping up groundwater, are much more effective.
- **Nitrates are removed** in ecosystems with a high groundwater level, such as marshes, rivers and riparian zones. The extent to which the perspectives succeed in improving water quality largely depends on the amount of fertilisation that they allow and the surface area of 'suitable' ecosystems that they provide.

- In 'Letting nature find its way' the agricultural area decreases considerably, reducing total fertilisation. The large natural areas in this perspective are partly self-cleaning and are more resistant to pollution than small, fragmented areas.
- The 'Working with nature' perspective assumes less fertilisation per hectare. Small landscape elements ensure less runoff of nutrients, pollutants and sediment into watercourses.
- Small landscape elements also play a positive role in 'Strengthening cultural identity', but the level of fertilisation remains high.
- The agricultural area is most protected in 'Using the economic flow'. If the use of fertilisers in intensive agriculture does not decrease, for instance through the adoption of precision agriculture, the nitrogen load may remain high.

The impact of green infrastructure measures on this challenge is limited. Source-oriented measures, like a decreased use of fertilisers, are much more effective in this regard.

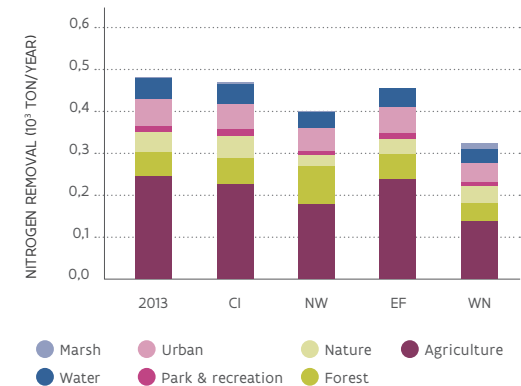
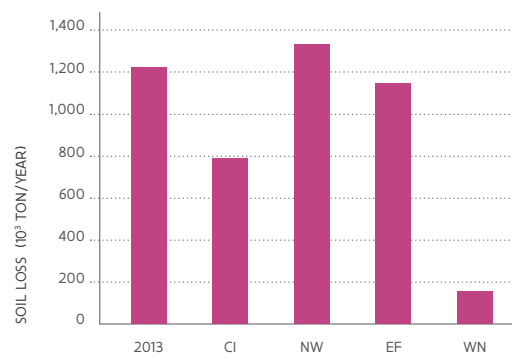


FIGURE 9
Total simulated nitrogen removal (denitrification) by ecosystems. The denitrification decreases mainly because of the decrease in total fertilisation in the perspectives.

- **Combating erosion** is most successful in the 'Working with nature' perspective. On erosion-sensitive plots, grass is sown or forest is planted and small landscape elements like hedges are laid out in order to reduce soil runoff. We also see small landscape elements in the 'Strengthening cultural identity' perspective, but they are less effective against erosion because their location is determined to a greater extent by cultural-historical aspects. The erosion measures in 'Using the economic flow' are limited, so the impact also remains limited. In 'Letting nature find its way' erosion is increased on some plots due to the further intensification of agriculture. Adjustments to soil management can positively influence the results.



- In every perspective, **biomass from wood and grass cuttings** is available for the production of materials and energy. The availability of woody biomass in particular increases in every perspective. Only part of it is actually harvested. The increase in the wood harvest is highest in 'Working with nature', especially due to the incorporation of wooded borders and hedges. This perspective is also the only one in which the total grassland area (and therefore also the amount of grass clippings) is retained. The large forest expansion in 'Letting nature find its way' does not translate into a large wood harvest: on the one hand because very little is allowed to be harvested in nature reserves and on the other hand because the growth remains limited (coniferous trees are replaced by deciduous trees that are not intended for production and have slightly slower growth). More wood is harvested in the 'Using the economic flow' perspective in spite of the limited additional growth because of more intense forestry in this perspective.

FIGURE 10
Simulated soil loss due to erosion. Due to the transformation to forest or grassland and the planting of small landscape elements on erosion-sensitive plots, the WN perspective shows the strongest decrease in soil loss compared to the current situation.

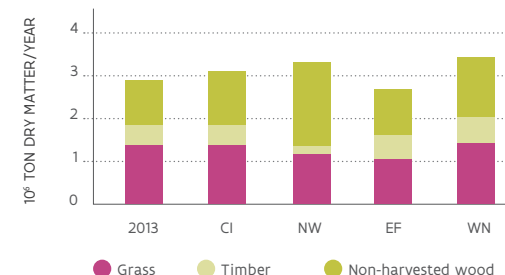


FIGURE 11
Simulated production of biomass from woody vegetation and grass cuttings. Partly due to the forest expansion in every perspective, wood as a biomass becomes relatively more important than grass clippings. The increase in harvestable woody biomass is highest in WN, especially due to the planting of woody shrubs and hedges.

- The 'Using resources sustainably' challenge in particular offers **opportunities for source-oriented measures** in particular. Support for this is greatest in 'Strengthening cultural identity' (because people feel connected to nature and the landscape) and in 'Working with nature' (where the focus is on the sustainable use of natural resources). The internalisation of environmental costs in 'Using the economic flow' and 'Working with nature' can be an incentive to work in a less polluting way. The intensification of agriculture in 'Using the economic flow' and 'Letting nature find its way' can increase the risk of extra environmental pressure if the expected technological developments cannot deliver on their promises. The 'Using the economic flow' perspective also increases the risk of short-term thinking because private economic benefits have to cover the incurred costs and generate an income.

4.1.4 Challenge 5: Dealing with a changing climate

Intense thunderstorms, long periods of droughts, more frequent heat waves, more rain in the winter ... The effects of climate change are already visible in Flanders. Due to the rising sea level, wetter winters and the sharp increase in short but extreme rain showers in the summer, the risk of flooding will continue to increase in the years to come. At the same time our soil is drying out. Finding a solution is not easy, because the changes are driven by forces within and outside Flanders.

Green infrastructure can make a significant difference in four subchallenges. For example, it can **store flood water**. Additionally, green infrastructure can ensure that **rainwater is drained to rivers more slowly** and better penetrates the soil better. **Robust, resilient ecosystems** can better cope with the effects of climate change, like extreme weather conditions, temperature rises and new diseases, and can adapt more quickly without losing ecological functions. Finally, green infrastructure can **reduce the concentration** of greenhouse gases like CO₂ and methane in the atmosphere. Marshes and peat bogs, for instance, are important storage sites for carbon.

Which driving forces influence the challenge?

Climate change is determined by the emission of greenhouse gases, which in turn is a result of population size, global consumption patterns and economic developments. The consequences are countless. **Heavier rain showers** combined with **increasing soil sealing** increase the risk of flooding. And because flood-prone areas are being **used more and more intensively**, floods are increasingly accompanied by high damage claims.

In contrast with the heavy rain showers, climate change also results in **less rainfall and more evaporation** in the summer. This increases the risk of drought stress. **Excessive pumping of groundwater** can intensify the drought stress, as can a reduced replenishment of groundwater due to too much soil sealing.

The resilience of an ecosystem is closely related to the **space** it is given, the **habitat diversity** and the associated **biodiversity**.

Assessment of the perspectives

We assess the extent to which the perspectives can cope with climate change on the basis of their ability to temporarily retain rainwater (avoid peak flows in rivers), store water in valley areas (reduce flood risk) and store carbon in soil and biomass (climate mitigation).

• Reducing flood risk

- The forest expansion and the restoration of small landscape elements in the 'Working with nature' and 'Strengthening cultural identity' perspectives ensure that **rainwater is retained for longer**. This reduces the risk of peak discharges and therefore also of flooding. The benefits from the forest expansion in 'Letting nature find its way' are largely offset by the removal of small landscape elements in agricultural areas. In urban areas in particular, where the soil is mostly sealed, water retention measures are needed. Green roofs and open soils help to retain rainwater and drain it gradually, provided that this is implemented on a large scale.

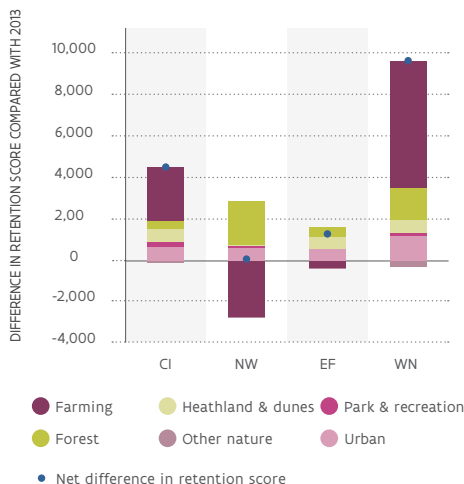


FIGURE 12

Difference in the simulated capacity of the landscape to retain rainwater (water retention) between 2013 and 2050. The total retention score is calculated as the sum of the differences in retention capacity per plot of land. The forest expansion and the creation of small landscape elements in the WN and CI perspectives ensure that rainwater is retained longer. The increase in heathland and dunes also increases retention. In urban areas, the common construction of green roofs and green areas ensures that rainwater is retained longer.

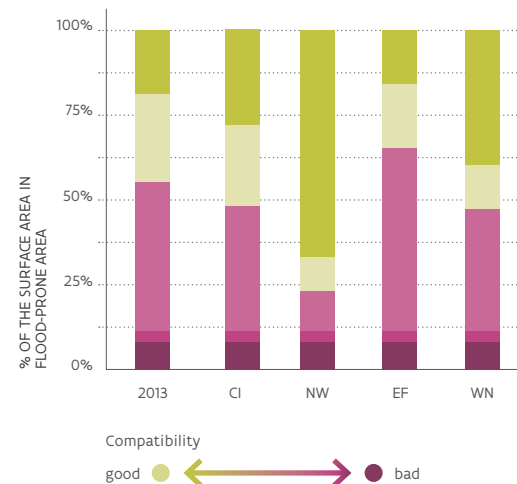


FIGURE 13

Simulated capacity of the landscape to store floodwater. The bar graph shows the compatibility of land use with floods that can occur once every hundred years. The land use in the valleys is best adapted to floods in the NW perspective.

- The 'Letting nature find its way' perspective offers the most opportunities for **storing floodwater in valleys**. 'Strengthening cultural identity' and 'Working with nature' also offer this option (to a lesser extent), but it is not certain whether the vegetation of pastures and meadows can be successfully combined with frequent flooding. In the 'Using the economic flow' perspective, river valleys are used for arable farming, which means a decrease in the water storage capacity. Structural solutions such as stilt houses can help to reduce the impact.
- Whether the perspectives can limit the **flood risk from the sea** is uncertain. We did not perform a quantitative analysis for this component. In their qualitative assessment the experts argue that the Flemish coast offers hardly any room for natural coastal protection. The coastline is built-up and the hinterland is used intensively. The 'Working with nature' perspective offers the best opportunities because more public support is created for a controlled use of nature, for instance via an expansion of the dune belt or the construction of sand engines in front of the coastline. In 'Using the economic flow', the market can help to develop

artificial, recreation-oriented islands off the coast, but there is a risk that this will simply shift the problem elsewhere.

• Climate mitigation through carbon storage

- The effect of the land use changes in the four perspectives, like forest expansion or the conversion of arable land into permanent grassland, on **carbon storage is limited** compared to measures that reduce CO₂ emissions. The perspectives achieve carbon storage mainly in forests and less so in soils. Storage is highest in 'Letting nature find its way' thanks to the large expansion of the forest area and the low harvest rate. The harvesting of wood can have both a positive and a negative effect (use as an energy source vs. use in products with a long lifespan). The 'Using the economic flow' perspective is the only one that provides less carbon storage, primarily because of the high utilisation rate of the forests and the conversion of grassland into arable land, reducing the carbon content in the soil. The storage of carbon in agricultural soils will depend to a large extent on financial incentives that farmers receive to apply techniques that increase soil organic carbon.

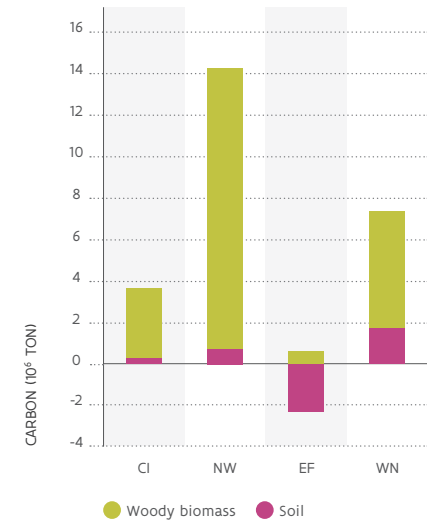


FIGURE 14

Simulated change of the carbon stock in the soil and in woody biomass compared to 2013. Carbon storage is highest in the NW perspective due to the substantial forest expansion and low harvest rate. The carbon storage in the soil is only a fraction of the storage in new forests.



- **Resilience of ecosystems**

We had the resilience of ecosystems analysed by the experts. This resulted in the following conclusions:

- Due to the low availability of water in our region, Flanders is particularly vulnerable to drought stress. A **high soil carbon content increases the** water availability for vegetation and thus helps to reduce the impact of drought.
- The intensive agriculture in the 'Letting nature find its way' and 'Using the economic flow' perspectives ensures high water consumption and brings less organic carbon into the soil. The perspectives 'Strengthening cultural identity' (concerned with the characteristics of the landscape) and in particular 'Working with nature' (agroecological farming) have a focus on **fertile soils and crops that are adapted** to local physical conditions. This makes them more resistant to extreme weather conditions.
- Because of their size, the **large forest areas** in 'Letting nature find its way' are **more resistant to climate change**. The impact of weather extremes is also limited in the 'Strengthening cultural identity' and 'Working with nature' perspectives because land use is better attuned to the physical suitability of the landscape.
- The presence of many **small landscape elements supports a functional agrobiodiversity that** helps with pollination and pest control. We especially see this in 'Strengthening cultural identity' and 'Working with nature'. But those landscape elements are not stable, self-regulating ecosystems. The large forests in 'Letting nature find its way', however, are self-regulating and can better absorb outbreaks of diseases and pests. Nevertheless, it is uncertain whether they are also resistant to new types of diseases and pests that may arise due to climate change. The intensive agriculture in 'Letting nature find its way' and 'Using the economic flow' pays little attention to measures that increase the resilience of the system and is therefore vulnerable to the effects of climate change.

4.1.5 Challenge 6: Ensuring food security

In order to ensure food security in a rapidly changing world (think of the trade conflicts and geopolitical tensions), regions are best as self-sufficient as possible. The user group of this study considered green infrastructure to play an important role in providing sufficient space for **food production** with a **sufficiently high productivity**. We had also better opt for **sustainable land use** that focuses on maintaining fertile soils with a sufficiently high carbon content. We should avoid soil loss as much as possible. This enables us to guarantee productivity in the long term. Finally, **sustainable production and consumption choices** (for example, combating food waste and producing and consuming less meat and dairy products) are also necessary to guarantee food security in the long run.

Which driving forces influence the challenge?

The available surface area of fertile agricultural soil in Flanders is **becoming more** scarce due to the increasing **urbanisation** and the **growing demand** for land for non-professional agricultural activities (for instance, as a grazing meadow for horses) and non-agricultural economic activities (for instance, carpentry). In addition to land scarcity, **soil degradation and soil loss** in particular pose a threat to food

production. **Climate change also** has far-reaching consequences: higher temperatures and carbon dioxide concentrations lead to higher crop yields in Flanders, but the increasing drought, flooding, salinisation, extreme weather conditions and new diseases may easily offset that effect.

Urbanisation, increasing prosperity and relatively low food prices play an important role in the consumption choices that people make. The average Fleming today not only consumes more food than just after WWII, but also eats more meat and dairy products. Although the interest in sustainability and health is increasing, that attitude is not always reflected in our buying behaviour. Low prices, convenience and promotions have an influence on our choices. The government can **stimulate more sustainable consumption and production with awareness campaigns and adjusted price and subsidy policies**.

Assessment of the perspectives

Our assessment of the extent to which the perspectives can ensure food security is based on the available agricultural surface area and the experts' estimations.

- Fertile agricultural land **is lost in every** perspective due to conversion to forest and other forms of nature. The loss is smallest in the 'Using the economic flow' perspective due to farmland-saving measures and the conversion of semi-natural grasslands into production grassland and arable land. The restoration of small landscape elements leads to additional loss of production space in the 'Strengthening cultural identity' and 'Working with nature' perspectives. These landscape elements can however drive up biomass production and deliver important ecosystem services like pollination or erosion control.

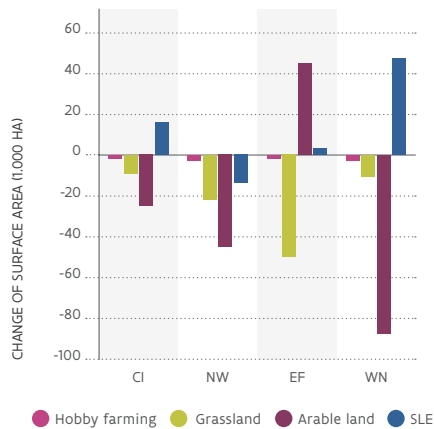


FIGURE 15

Simulated change of the pasture and cropland and of the surface area occupied by small landscape elements (SLE). The changes in pasture take into account the losses or gains due to the increase or decrease in SLE. Agriculture loses fertile land because of conversion to forest and other forms of nature. The construction of SLE causes extra loss of productive area, but those SLE in turn produce biomass and also provide other ecosystem services.

- The 'Strengthening cultural identity' perspective strives for short food chains with a focus on **local production and consumption**. As a result of this choice, more space is needed within Flanders for growing fruit, vegetables and cereals, and less space remains for livestock farming. Government support should ensure that local producers can compete with the global market. The 'Letting nature find its way' and 'Using the economic flow' perspectives resolutely opt for **intensive agriculture that is oriented towards** and achieved on a limited surface area. Vertical farming and precision agriculture can partly offset the loss of productive space. In these perspectives, the market drives the practical choices that a farmer makes. If the production of biomass for energy or materials generates a higher farm income, this can result in a smaller share of fertile land being used for food production.

- In the 'Working with nature' perspective, agriculture relies on **natural processes to reduce its dependence on foreign resources** such as fertiliser or animal feed. This kind of agroecological farming system should be more resistant to climate change and the associated agricultural losses. Whether this approach actually works is not entirely clear: agroecological farming is not yet standard practice and there is still uncertainty about its productivity.
- The perspectives may not succeed **in being self-sufficient in food supply**, certainly not within the environmental limits of Flanders. Our high meat production and consumption in particular result in a large ecological footprint, which we partly shift to foreign countries. Without fundamental adjustments to our food culture, including lower meat consumption, it will be difficult to satisfy our consumer preferences in a sustainable way.



4.2 Strengths and weaknesses of the perspectives

In this section we summarise the strengths and weaknesses of the green infrastructure measures in the different perspectives. They are considered to be strengths if the measures can reduce a major challenge for our society, or a weakness if they can't. No single perspective, however, succeeds in addressing all challenges. Each perspective does have a solution strategy for each challenge, but it also allocates different priorities and levels of emphasis. Sometimes green infrastructure is simply not enough and we have to look for a different approach, like a different method of producing and consuming.

It is important to keep in mind that the future is difficult to predict. Also, driving forces that are not covered here, like climate change and our consumption pattern, can evolve in different directions. This increases the uncertainty of statements about the strengths and weaknesses of the perspectives. Therefore we also investigated the possible influence of some very unpredictable driving forces on our outcomes. We investigated the extent to which the four perspectives are robust enough to offer a solution to the challenges of the future even in the event of major changes (see box 'Future-proofing the perspectives'). In this way we can find out which circumstances benefit or simply hinder policy measures in the perspectives.

4.2.1 Letting nature find its way: strong nature, less resilient agriculture

In this perspective the emphasis is on **robust nature**, whereby a large area of farmland can develop into forest. The remaining **agricultural area is used more intensively** to safeguard food security. This intensification can affect the ecological resilience of the agricultural system, for instance due to environmental pollution, more soil erosion and lower soil quality.

The large natural areas are better buffered against environmental disturbances. But unless the emissions of pollutants and nutrients fall drastically, the **pressure on the water system and biodiversity will remain high**. In order to reduce environmental pressure, this perspective is dependent on factors that it has little control over, such as future technological developments (e.g. to limit the impact of agriculture and industry) and a change in production and consumption preferences.

Generally speaking, this perspective provides **more space for nature**. This makes ecosystems more resilient to environmental pressures and contributes to a healthy living and working environment. By giving more space to rivers, the risk of flooding decreases. At the same time,

the perspective also imposes restrictions on the use of all that nature. The focus on natural processes may result in certain areas being **less accessible**, for example because there are no paths, or **access may even be prohibited**. The type of nature can also be less attuned to the wishes of some users.

4.2.2 Using the economic flow: focus on economy leaves less room for nature

In this perspective, the emphasis is on the **use of natural capital**. Profitability and financial income are an important driver for investments in green infrastructure. This perspective can therefore more easily offer solutions for market-related challenges such as food and biomass production. The fact that **food security nevertheless does not increase** is mainly due to the limited social-ecological resilience of the agricultural system. The perspective depends on the import of resources, making it more vulnerable to fluctuations on the international markets. Also, the fact that nature decisions are mainly driven by profitability and therefore potentially use less nature-based techniques, can reduce the resilience of the system.

Just like the perspective 'Letting nature find its way', the 'Using the economic flow' perspective also supports **intensive agriculture**. This brings risks for the resilience of the system and the impact on the environment. Moreover, the ecosystems in this perspective are smaller and less resistant to external disturbances. This increases the biodiversity challenge. To reduce environmental pressure, the perspective relies on **uncertain factors** such as technological developments and a change in behaviour among producers and consumers.

The 'Using the economic flow' perspective (just like 'Letting nature find its way') starts from a **land sparing rationale**. Nature and economy are spatially only interwoven if that yields economic benefits. As a result, investments in green infrastructure depend on the preferences of consumers and producers, for example their individual lifestyle or the managers' business style. The **expansion of green infrastructure is rather limited** in size, which means it is less able to solve challenges like heat stress and loss of biodiversity. Furthermore, privatisation can exclude some population groups from access to green spaces. In this area, the government can intervene with regulation.

4.2.3 Strengthening cultural identity: local production is part of landscape identity

While the two perspectives discussed above adhere to a land sparing rationale, the perspectives 'Strengthening cultural identity' and 'Working with nature' focus more on **land sharing**. Inserting green infrastructure here is geared to the opportunities and limitations of the landscape and the needs of society.

In the 'Strengthening cultural identity' perspective, green infrastructure measures are mainly linked to local solidarity and landscape identity. Green infrastructure is not deliberately used to reduce the challenges of the future, but is rather a **by-product of landscape-related choices**. As a result, its impact is limited. Biodiversity progresses to some extent because there are more high-quality habitats and better connections between them. However, due to their limited size, **habitats remain vulnerable to external pressures** such as climate change or intensive use by a growing population.

In this perspective, agriculture is mainly focused on **local production** and a local food market. This makes the agricultural system less vulnerable to fluctuations on the international markets. However, the question here is whether and how

such a locally oriented system can maintain itself in an open, **globalised economy**. Due to the expansion of forest and nature and the creation of small landscape elements, the area allocated to farming also decreases. This can partly be compensated by urban agriculture and community-supported agriculture.

4.2.4 Working with nature: mutual dependence

The 'Working with nature' perspective also aims for **interconnectedness of green infrastructure in the landscape**. The emphasis is on optimisation of natural processes and a targeted implementation of measures according to social demand. This targeted approach leads to greater effectiveness of the measures taken.

The 'Working with nature' perspective **scores "good" to "very good" on most challenges**. In particular, challenges that depend on regulatory ecosystem services, such as heat stress, water treatment, flood protection and sustainable land use, are reduced. The perspective heavily relies on nature-based solutions: nature is used to simultaneously tackle several societal challenges as efficiently as possible. The general application of agroecological techniques has a major impact

on the ecological resilience of the agricultural system and on the environmental impact of agriculture on biodiversity and the water system.

In this perspective, agriculture is more focused on **local production**. This reduces the agricultural system's dependence on international markets. Just as in the 'Strengthening cultural identity' perspective, agricultural space decreases due to the expansion of forest and nature and the construction of small landscape elements. The application of agroecological techniques can help to limit production losses due to extreme weather conditions. Because nature-based techniques are knowledge-intensive, a **great deal of research** on their optimal practical application is still needed. Moreover, there is still uncertainty about the effectiveness of functional agrobiodiversity, especially in rapidly changing climate conditions. The speed and scope of climate change has a decisive impact on the effect of green infrastructure measures in all perspectives.

Future-proofing the perspectives

A great number of driving forces are highly uncertain and can influence the results of the perspectives in different ways. We will briefly examine four examples.

1. CONSUMPTION AND LIFESTYLE

The current Western consumption pattern is accompanied by unsustainable environmental pressure. However, we are seeing that more and more people are living more environmentally consciously. Consuming less and differently increases the chance that every perspective will find a solution to the challenges.

2. TECHNOLOGICAL DEVELOPMENT

More than ever before, our society is turning to technology to face major societal challenges. Technological developments can reduce the environmental impact of our consumption and production and make us less dependent on resources. However, increased efficiency can also lead to a growth in economic activity, whereby production and consumption increase and the environmental benefit is lost. In addition,

some new applications require a lot of energy or other resources. If technology can deliver on its promises, the chances of finding solutions to the various challenges increases in every perspective.

3. SPATIAL SCALE OF GOVERNANCE

The term 'governance' encompasses the formal and informal processes and power structures with which we coordinate the behaviour and interactions within and between groups of people and attempt to guide them in the right direction. It therefore includes more than just 'government policy'. The current trend of globalisation goes hand in hand with the counter trend of going back to local needs (localisation). Each perspective benefits from a hybrid of the two (glocalisation). A number of challenges (like climate change) require a regional or supranational

approach, while other challenges (like erosion) benefit from a more local approach. Local involvement can also increase the support for regional plans.

4. CLIMATE CHANGE

It is still not certain how large the impact of climate change will be. For this study we looked at three possible Flemish climate scenarios. Current trends indicate that the climate is evolving towards the most extreme scenario. If this trend continues, the other challenges will also become indomitable or 'wicked' problems for which no green infrastructure strategy has an adequate answer.



5

The four perspectives are not intended as ready-made blueprints for policy. But they can help us to conduct an open discussion about the future of green infrastructure in Flanders. They can also help to open and broaden the debate in other processes of strategic policymaking.

WORKING WITH DIFFERENT **PERSPECTIVES**



94

5.1 What can the
Nature Outlook 2050
be used for?

97

5.2 Which measures
can we combine?

98

5.3 Multifunctional strategies

100

5.4 Lessons from the
Nature Outlook 2050

5. Working with different perspectives

The four perspectives are not intended as ready-made blueprints for policy. They present various options, each of which provides a different answer to important challenges for the future. It is up to policymakers and society to draw inspiration from the perspectives. They need to consider with each project which challenges are paramount and which perspective (or combination of perspectives) is preferable.

5.1 What can the Nature Outlook 2050 be used for?

Perspectives can help us to conduct an open discussion about the future of green infrastructure in Flanders. They can also help to open and broaden the debate in other processes of strategic policymaking with regard to green infrastructure. In the following sections we indicate how policymakers and other stakeholders can work with the different perspectives.

5.1.1 Formulating an area-specific vision for green infrastructure

The intention of vision development is to **exchange visions** about sectors and processes that influence green infrastructure, such as nature, agriculture and urbanisation. The stakeholders collectively select the **goals** that green infrastructure must achieve in a certain area and they try to formulate a **common vision for the future**. In doing so, they examine which goals they can combine and which conflicts may arise.

A concrete vision of the future for a certain area rarely contains all measures from one specific perspective. In practice, stakeholders will often combine measures and strategies from different perspectives to arrive at the desired vision for the future. A combination of this kind can arise in different ways.

- **Choosing one perspective as a source of inspiration.**

This is especially the case in domains with a limited surface area, where different objectives are difficult to reconcile. In that case the task is to compare the possible visions and choose one. The specific policy measures and governance strategies put forward by a specific perspective may provide additional ideas.

For example: in a local forest, the focus is on optimal wood production. Wild nature development is not considered here.

- **Applying elements from different perspectives in non-adjacent subareas.** This approach is particularly suitable for larger areas like a province or a regional landscape, which can be divided into smaller, non-adjacent subareas. Some locations lend themselves better to a specific land use. Certain land uses are also difficult to combine in one place and are best realised in separate locations.

For example: a province can focus on recreational green space in one area, while in another one it focuses on local food production or preventing drought stress. It can build a network of neighbourhood parks around a city, and then a protected nature reserve a bit further out of the urban area.

- **Applying elements from different perspectives in adjacent subareas.**

In Flanders, different land uses are often interwoven on a very small scale. Measures and strategies must then be deployed in adjacent subareas. For this to be successful, a good evaluation of win-wins and potential conflicts is essential. The application of different measures in separate subareas reduces the chance of tensions. Synergies and conflicts are particularly important on the borders of these areas, where zones merge into each other.

For example: the stakeholders of a certain city want more green space for recreation and less heat stress in the summer. Different neighbourhoods can achieve these goals in different ways. On the outskirts of the city, for example, tall apartment buildings can be found next to a large nature park. In a nearby district, old monastery gardens can be remodelled so that neighbours can relax and garden together.

- **Applying elements from different perspectives in the same area.** Measures from different perspectives can also be used to develop an integrated, area-specific vision with a focus on multifunctionality. For this to work, the measures must be compatible (see 5.2). In addition, sufficient attention must be paid to encouraging win-wins and avoiding tensions between different forms of land use or land management.

For example: in a rural area, the stakeholders want to protect an old valley forest, while at the same time preserving agriculture and creating an attractive landscape for recreation. This is possible when measures from different perspectives are combined. The forest can be expanded along the river and thus connected to another forest (Letting nature find its way). Luxury homes can be built further up in the valley. The construction and sale of these homes can finance the purchase of land for the expansion of the forest (Using the economic flow). In the surrounding area, legal restrictions and financial incentives can direct agriculture towards agroecological activities with a low environmental impact (Working with nature).

5.1.2 Supervising a vision formation process in a positive way

The way in which vision formation is organised has a major influence on its rate of success. Perspectives can contribute to stimulating conditions and methodologies. It is important that the **context and goals** of the exercise are clear. The perspectives are most suitable for supporting informal discussions, not for immediately reaching policy decisions. A **thorough stakeholder analysis** must ensure that a sufficiently broad group of people is involved, who together represent various points of view. Encouraging unexpected encounters is the task here. Organising multiple dialogues, spread over a longer period, can help build **mutual trust**.

In order to develop an effective area-specific vision for green infrastructure, it is important to properly identify and agree on the challenges facing an area. Once the main challenges are clear, the stakeholders can look for solutions. In doing so, they can try to answer the following questions:

- **In which perspective(s) do the different visions and measures** that the people around the table are proposing belong? The perspectives provide a framework for structuring the proposals.
- **Which perspective(s) offer other interesting measures?** First, one perspective (for example, the one that is dominating the conversation) is thoroughly discussed. Then, the other perspectives and their measures are discussed.
- Which **perspectives and measures can produce the most desirable results** for the selected challenges? Are these measures at the expense of other challenges, and if so, are additional measures available to limit this negative impact?
- Which **measures seem to have potential from every perspective** and can therefore be implemented in any case?
- **Will the chosen measures hold under changing circumstances?** If not, which additional measures can mitigate the deviations and make the perspective more robust?



Want to find out more about this topic? You can read all about it in chapter 1 of the technical report.



5.2 Which measures can we combine?

Each perspective represents a different alternative of our social-ecological system. Because value preferences, governance styles, technology preferences, etc., differ widely and often co-evolve, the majority of measures from different perspectives cannot simply be combined at the same place and time. The greater the system differences, the more difficult the combination. For each perspective, we examined the extent to which its strategies and measures can also be applied in different perspectives and where this creates potential synergies or conflicts. In the following sections we will discuss a number of examples.

Some measures and strategies from different perspectives lead to similar land use changes or can **reinforce** each other's positive outcomes. Such interventions are important for policymakers, because they bring people with different points of view together and encourage their commitment to nature. From the viewpoint of 'Strengthening cultural identity', for instance, small landscape elements underline landscape aesthetics and the cultural-historical ties that people have with it. For the advocates of 'Working with nature', those elements support processes like pollination or erosion control. And from the 'Using the economic flow' point of view, they represent a source of biomass.

Some interventions can produce synergies between perspectives, provided that certain **preconditions** are met. One example is the large, unmanaged forests that characterise the 'Letting nature find its way' perspective. These forests can go hand in hand with the goal of profitable, low-maintenance nature in 'Using the economic flow', provided that recreation and nature experience are central and that production objectives are left out.

Finally, some measures are **not compatible** at all and can cause conflicts between stakeholders. For example, it will be difficult for the private parks that are created in 'Using the economic flow' to please the proponents of accessible nature.

For each perspective, we examined the extent to which its strategies and measures can also be transferred to other perspectives and where this yields potential synergies or conflicts. The technical report provides an extensive overview of the most important measures from the different perspectives and the degree to which they can be transferred to other perspectives..



Want to find out more about this topic? You can read all about it in chapter 4 of the technical report.

5.3 Multifunctional strategies

One important advantage of working with green infrastructure is its multifunctionality. Many measures and strategies contribute to the reduction of multiple challenges simultaneously. By applying the right measures in the right place, we can optimise the societal benefits. In this section, we will look at some examples of this. Which strategies provide the most win-wins across all perspectives?

Valley restoration

All perspectives contain measures to limit the flood risk in valleys. The 'Using the economic flow' perspective limits itself to keeping buildings out of the most flood-prone areas. In the other perspectives, large parts of river valleys are redesigned. The regeneration of these valleys reduces several challenges at the same time:

- Due to the redesign of river valleys, land use is better attuned to the purpose of tidal water storage. This **reduces the risk of flooding**.
- Naturally structured valleys can **support biodiversity**, among other things by functioning as migration corridors for species that are moving northward because of climate change.

- The higher water levels and afforestation of valleys ensures higher carbon storage in trees and in the soil of wet grasslands. As a result, **more CO₂ is removed from the atmosphere**.
- A reduced fertilisation pressure and a greater self-purification capacity of the water system lead to better **water quality**.
- Concentrating the measures in valley areas that are of less interest from an agricultural and economic point of view limits the **impact on the viability of agriculture**.

Green-blue network in cities

Densely populated, urbanised areas have relatively little open space available to tackle issues like climate change or food supply. Possible solution strategies, such as the creation of urban forests or flood areas, are often passed on to the surrounding open space. Nevertheless, cities can reduce a number of challenges by adopting a green-blue approach.

- The creation of (temporary or permanent) green infrastructure offers room for sports, relaxation and social interaction. This creates an **attractive, high-quality living and working environment**.

- More green infrastructure also implies that cities **are better equipped to cope with the challenges of climate change**, like urban heat stress, drought and increased flood risk.
- The construction of ecologically managed road verges and green-blue ribbons that connect to an ecological network outside the city support **biodiversity**.
- More urban agriculture makes cities **more self-sufficient in food provision** and can restore the between food consumer and producer.

Nature-based solutions for agriculture

By 2050 our earth will have to feed nearly ten billion people. Flanders also raises the question of how we can create an economically viable partly self-sufficient agriculture without exceeding the carrying capacity of our ecosystem. No single perspective from this study succeeds in fully resolving the food security issue. The perspectives that deploy intensive agriculture risk a continued high impact on the environment and society if we fail to drastically reduce the environmental pressure by means of technology. They also expose themselves to fluctuations in international markets. The perspectives that are more focused on local production and consumption, or that rely on natural processes, are less dependent

on international market fluctuations and have a lower environmental impact. Working with natural processes also enhances the resilience of agriculture and increases the social return. The productivity of the agricultural system must then be high enough and a stable market must be created for producers who focus on local food demand.

The advantages of nature-based solutions for agriculture include:

- A higher carbon content in agricultural soils increases **erosion control**.
- Due to the higher carbon storage in agricultural soils, **more CO₂** is removed from the atmosphere.
- A higher carbon content also **improves soil fertility**.
- Natural pest control and healthier soils require farmers to use **fewer fertilisers and pesticides**.
- The creation of natural field margins and wooded **borders increases biodiversity**.
- These same small landscape elements also generate a **more attractive landscape**.

- The management of wooded borders produces **more biomass**, which can be used for energy production or as a raw material for the bio-economy.

An important precondition for all strategies is the availability of sufficient space to implement green infrastructure. Each perspective is based on a scenario in which no open space is lost after 2040 and in which we will compact our living areas and build more densely. This is also a key target in the Flanders Spatial Policy Plan.



Want to find out more about this topic? You can read all about it in chapter 5 of the technical report.

5.4 Lessons from the Nature Outlook 2050

There is always room for improvement. Just as we have taken into account lessons from earlier scenario research for this study, we do not want to hide our own areas of improvement. After all, in complex processes with many stakeholders, experience is an important factor in achieving the desired results. For this study we started with research questions that previous studies had put forward and we tried to formulate answers to them. Some methods and approaches proved less successful during the process or did not achieve the intended goal. However, others did yield interesting results. In this paragraph we list the most important practical lessons that we can draw from this future study.

1 Perspectives can stimulate an open discussion about a cross-sector and value-laden subject like green infrastructure and help to avoid polarisation.

Perspectives encourage stakeholders to think outside their own frame of reference and to empathise with a different vision. They offer a language and a forum to reflect within a positive atmosphere on the uncertainties that the future brings.

The majority of the participants in our workshops pointed out afterwards that the challenge and solution-oriented approach gave them a deeper insight into the diversity of challenges that arise, the different visions that exist and the way in which green infrastructure can contribute to solutions. In particular, thinking about the consequences of certain strategies brought a great deal of clarity. It underscored that choosing a particular type of nature also requires choices in other sectors of society, such as agriculture or housing, and vice versa.

2 Longer and more in-depth research is needed to get a better picture of the effects of scenario studies on the individual and societal learning process and policy.

A more thorough investigation of this kind should also question participants and their direct work environment after the study has ended, and should check whether or not they include ideas and conclusions from the study in policy documents or organisational processes. Hardly any studies (including ours) opt for such an extensive follow-up process. As a result, we cannot make any statements for now about

the effects of our study in the long term. Future studies that do embark on an extensive follow-up process can therefore develop much-needed expertise. Some examples of questions that remain unresolved are: can the participants actually use the insights gained in their work context? Do they make connections with other sectors and challenges faster? Do they take more account of the uncertainties of the future? Can other stakeholders also use the results of the study? And do the findings also flow through to policy practice?

3 Going through a collective process of scenario development demands a lot of time and commitment from the participants. It is by no means evident to guarantee a constant and balanced representation of all values and knowledge types during such a lengthy process.

Because previous scenario studies already pointed out this problem, we took our precautions. For example, we based the study design on stakeholder questions and started with an extensive stakeholder analysis. We made targeted telephone calls and conducted personal intake

interviews with interested parties. In addition, where possible, we adapted our questions and methods to their wishes and we regularly gave feedback on our results.

Despite our efforts, the number of participants had halved by the third workshop. Lack of time proved to be a major reason for participants to drop out. Attending workshops for three days (unpaid) was not easy for many participants. In addition, questions quickly emerged about the relevance of the project and the precise status of the nature report in Flemish policy. Scenario development is a complex process and the throughput of results to policy is not guaranteed. On top of that, the participants had different expectations, which could not all be fulfilled.

The participants themselves considered the question of whether the diversity of the group of participants was sufficient. The group predominantly consisted of highly educated persons with Flemish roots. A sufficiently broad and extensive selection of stakeholders, which takes participants' dropping out during the process into account, remains a point of attention for future exercises, as does limiting the requested time investment.

4 Different goals require different scenario types. A study that intends to provide inspiration for the strategic formation of policy and visions cannot at the same time provide concrete recommendations at an operational policy level.

Many participants expected to get concrete insights for daily (policy) practice in addition to inspiration for the distant future. Initially we tried to reconcile these two angles: we would link the visions of the future to the current policy and give concrete suggestions for their adaptation. We could not fully achieve that goal, partly due to lack of time. An additional (time-consuming) step of integration and consultation is needed to translate the long-term views and recommendations from this study into short-term actions.

5 An interaction between qualitative storylines and quantitative modelling helps to make the perspectives more consistent and explicit and allows for better visualization of their consequences.

Qualitative and quantitative approaches each have their own advantages as well as their limitations. The combination of both offers an excellent opportunity to highlight the benefits and overcome the drawbacks. The storylines and images can inspire and promote communication between stakeholders with different backgrounds, but sometimes lack depth and substantiation. The quantitative models illustrate the orders of magnitude and the relative differences between perspectives, which are important for estimating the impact of certain choices. They can clarify the relationships between measures and effects and sometimes offer surprising vantage points. Vague and/or unclear descriptions can create misunderstandings. In this study it was helpful to make certain assumptions more explicit in order to complete the storylines, to strengthen the contrast between them and to put the logic of the reasoning in order. Visualising the land use principles on a map also gave us a better idea of the scope of some measures and their consequences. However, the quantitative approach can only tell part of the story: not all system relationships and changes lend themselves to quantitative analysis. Moreover, the available scientific knowledge sometimes proved inadequate to express the effects of the perspectives in orders of magnitude or relative differences.

6

KEY MESSAGES

If we want to be ready for the challenges of tomorrow, we need to start thinking and acting in a future-oriented way today. What role can green infrastructure play in Flanders, and what conditions need to be met for this? We will now list some important insights.




LEIDEN

7

1. Als u zich wilt oriënteren langs de Maatkeboek, waar gaat u één naartoe?
2. Welke plek langs de Maatkeboekvallen vindt u de mooiste?
3. Welke plek langs de Maatkeboekvallen vindt u de minst mooi?
4. Welke plekken langs de boek vernijdt u liever en waarom?
5. Op welke plek langs de Maatkeboek komt u graag en waarom?
6. Op welke plekken langs de boek...

47

De Maatkeboekvallen
Wat is de mooiste plek?



6. Key messages

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In recent years, the nature report (NARA) has examined the state and trend of ecosystems in Flanders and the services they offer us (NARA-T 2014). We also showed how policy can work with those ecosystem services, for decision-making that is more geared towards sustainability (NARA-B 2016). Today with NARA-S 2018, the Nature Outlook 2050, we are focusing on the future. The evolutions in our society in the field of technology, economy and culture are happening faster and faster. Nature needs time to develop and the change processes are slow. If we want to be ready for the big and often uncertain challenges of tomorrow, we need to start thinking and acting in a forward-looking way today. How can we maintain or provide green infrastructure in Flanders that helps us to respond to some major challenges of the 21st century? We investigated this in this Nature Outlook 2050.

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Green infrastructure (GI) helps to reduce the loss of biodiversity and address challenges like climate change, sustainable use of natural resources, social cohesion, food security and health. The strength of the nature-based solutions that GI provides lies in their multifunctionality. A vision and strategy that indicates which functions we want to realise where and in what way, requires social awareness and a political debate. The perspectives presented here can contribute to this.

The Nature Outlook 2050 examines the possibilities for better green infrastructure in Flanders from four different perspectives. These perspectives not only represent a different view of nature and landscape in 2050, they also differ in the underlying value patterns, in who should take the lead in implementing concrete measures, and in terms of the technology and knowledge systems that should be used.

Each perspective offers its own set of solutions for some major challenges of the future. Each perspective has its strengths but also its weaknesses: the ideal perspective that offers the

perfect solution for all challenges does not exist. Moreover, the developments that form the basis of the challenges examined here are dynamic and difficult to predict. How will our climate change? Which technological breakthroughs does the future have in store for us? Which economic or political power relations can we expect?

In such a rapidly changing environment, it is good to have a wide variety of solutions from the different perspectives available. However, it is not straightforward to combine various solutions on a limited surface area. Multifunctionality is the key word: we want to carefully and collaboratively

select measures and strategies that aim for win-wins between perspectives and that minimise the potential conflicts.

The solutions that green infrastructure can offer us are only fully realised if they are also accompanied by drastic changes in our consumption and production patterns, for instance in terms of food, energy, mobility and land use.

Green infrastructure can indeed be an effective solution for a number of ecological and societal challenges, such as halting the loss of biodiversity, restoring soil fertility, increasing quality of life and limiting the risk of flooding. But for challenges like improving air and water quality and mitigating climate change, source-oriented measures are much more effective. Green infrastructure plays a more complementary role here.

Particularly challenges that are strongly related to our consumption pattern, such as food security, water availability, renewable energy supply or climate change require far-reaching measures that exceed the possibilities of a green infrastructure strategy. Because a large part of our consumption and production is embedded

in an open economic system, these challenges also transcend the boundaries of Flanders. In order to tackle these challenges at their roots, we must be prepared to change our consumption and production habits and to use open space more economically.

A policy that seeks to effectively halt the loss of biodiversity has to look beyond the protected natural areas. To achieve sustainable land use, we need to embed reflexes – in all sectors and at all policy levels – to reflect on the importance of biodiversity and the benefits it can bring. Broad policy programmes and plans like the Common Agricultural Policy (Gemeenschappelijk Landbouwbeleid) and the Flanders Spatial Policy Plan (Beleidsplan Ruimte Vlaanderen) can be a catalyst for the mainstreaming of biodiversity.

Opportunities for multifunctionality are at the same time also challenges in breaking or transcending sector boundaries within the government, the private sector and civil society organisations. Restoring biodiversity is only feasible if biodiversity becomes mainstream in other policy areas such as land use, housing,

agriculture, energy, mobility and – last but not least – economic policy. But mainstreaming goes beyond government alone. In addition to cooperation between the various policy areas and layers of government, cooperation between the government, civil society organisations, the private sector, citizen forums and individual citizens is also of increasing importance. Achieving a coherent network is not only of strategic importance for biodiversity. At the same time, it increases the chances of forging coalitions between the various actors and finding solutions to challenges within other policy areas.

Moreover, it is essential that those sectors and partners become aware and convinced of the benefits that biodiversity offers them. Biodiversity shouldn't simply be a cost item: it should form the basis for a sustainable future. For example, greening a business park can help with water and heat management, while it is at the same time good for the corporate image and the well-being of the employees. Investing in biodiversity generates profits in the short and long term and makes society less dependent on uncertain developments..

A legitimate nature policy uses the different visions of nature that exist in society as its starting point. Only by taking into account the opportunities and solutions that all these visions offer can we achieve the necessary mainstreaming of biodiversity.

People assign a wide range of meanings to the term 'nature'. They experience nature in different ways and expect different things from it. A green infrastructure strategy based on the opportunities and solutions of each of these visions of nature can appeal to various sectors and citizens. It allows us to formulate a broad set of cross-sectoral objectives and actions and thus forms the basis for a broadly supported nature policy.

Perspectives can support processes of vision formation and strategic policymaking with regard to green infrastructure. They can stimulate an open discussion about a complex and value-laden subject like green infrastructure. They encourage participants to think outside their own frames of reference and to empathise with a different vision. They offer a language and a forum to reflect together in a constructive atmosphere about the uncertainties as well as the opportunities that the future entails.

The perspectives of this nature outlook reflect divergent trends in society and are not intended as ready-made blueprints for policy. They describe various options and action perspectives, each of which provides a different answer to a number of important challenges for the future. It is up to policymakers and society to consider which challenges take precedence and which combinations of perspectives and measures are preferable where and when.

Stakeholders can use the descriptions, images, stories, examples, infographics and analyses from this nature outlook to facilitate discussions, clarify points of view, define goals and underpin a shared vision and strategy for the future.

Living labs are an interesting tool for testing the knowledge and insights from this ecosystem assessment. Various sectors are given the space to experience what nature and ecosystem services can mean to them, to identify best practices and to initiate new partnerships.

The Nature Outlook 2050 is the final piece of a three-part ecosystem assessment in which the importance of nature to people takes centre stage. The assessment is an extensive reference work that can inspire policy and other stakeholders to use land sustainably. However, many of the concepts and ideas from this assessment are relatively new to policy. Also typical of an ecosystem services approach is that it cannot be restricted to one policy domain. This complicates its implementation in concrete activities and policy instruments.

The knowledge and insights from the Nature Outlook 2050 and from other scientific studies can be tested in practice by means of living labs. In these living labs, innovative projects are set up with several partners and at different scales (a residential area, a valley area, an intensive agricultural landscape, a business park ...). The development of green infrastructure is always central. In this way, the partners have ample opportunity to gain experience and discover what works and what doesn't. The resulting lessons can serve as the basis for the broader rollout of initiatives by companies, policy and other stakeholders. In addition the co-productive approach can also initiate sustainable partnerships between stakeholders who at present experience difficulties in cooperating. In addition to policy actors and traditional civil society organisations like regional landscapes and forest groups, less obvious partners, from citizens' organisations to architectural firms, can also invest in innovative solutions for green infrastructure.





Colophon

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NARA steering group: Koen Carels, Sylvie Danckaert, Geert De Blust, Glenn Deliège, Carl De Schepper, Maurice Hoffmann, Olivier Honnay, Bea Kayaerts, Hans Leinfelder, Patrick Meire, Erik Paredis, Johan Peymen, Paul Quataert, Stijn Vanacker, Hans Van Dyck, Petra van Egmond, Dirk Van Gijsegghem, Peter Van Humbeeck, Marleen Van Steertegem, Jan Verheeke, Anna Verhoeve and Liesbet Vranken

NARA user group: Wouter Bervoets, Bart Bollen, Esmeralda Borgo, Griet Celen, Pierre Crahay, Thomas De Bie, Sven Defrijn, Kurt Degrieck, Patrick Dictus, Glenn Deliège, Jannie D'hondt, An Digneffe, Guy Engelen, Leen Franchois, Anke Geeraerts, Marleen Goethals, Iris Gommers, Mia Lammens, Els Martens, Jeroen Panis, Joost Salomez, Jan Seynaeve, Kaat Smets, Inge Smolders, Monika Sormann, Krist Tack, Barbara Tempels, Piet Thys, Karen Van Campenhout, Sylvie Van Damme, Kris Vandekerkhove, Danny Van den Bossche, Dirk Vandenbussche, Stijn Vanderheiden, Wim Van Gils, Liesbet Van Laer, An Van Lancker, Luk Vanmaele, Katia Van Tichelen, Laura Verlaeckt, Wim Verheyden, Inge Vermeulen and Oda Walpot

Other experts: Kris Decler, Pieter De Frenne, Luc De Keersmaecker, Matthias Demuzere, Jeroen De Reu, Steven Desager, Koen Devroey, Jeroen De Waegemaeker, Annick Gommers, Rik Hendrix, Bob Peeters, Lien Poelmans, Sam Provoost, Kristof Rubens, Greet Ruyschaert, Hendrik Schoukens, Igor Struyf, Inge Uljee, Line Vancraeynest, Toon Van Daele, Frank Van de Meutter, Floor Vandevenne, Dirk Van Gijsegghem, Ann Van Herzele, Arjen van Hinsberg, Els Verachtert, Francoise Vermeersch, Els Willems and Carine Wils

Research Institute for
Nature and Forest
Herman Teirlinckgebouw
Havenlaan 88 box 73
B-1000 Brussels
www.inbo.be