PBL Netherlands Environmental
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NATURAL CAPITAL IN THE NETHERLANDS:
Recognising its true value

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Summary

‘We use nature because it is valuable, but we lose it because it is free.’ This quote by TEEB project leader Pavan Sukhdev has contributed to the attention for natural capital (the value of nature) and its sustainable use. This natural capital delivers a variety of ecosystem services, such as clean water and air, food, energy and recreation. On a global level, 60% of ecosystem services is being degraded. Although, currently, there are no urgent problems in the Netherlands in the short term, the demand for certain ecosystem services is increasing while their supply is dwindling.

Governments, non-governmental organisations and businesses, therefore, are looking for ways to enjoy all that nature has to offer without depleting the earth’s riches. PBL Netherlands Environmental Assessment Agency studied this in a two-year research programme involving a number of Dutch projects. PBL collaborated in seven projects, to explore the possible role of natural capital, and also analysed this role for a number of past projects.

The sustainable utilisation of natural capital was found to offer benefits for all parties involved. The projects were divided into three subject areas; these are the arenas where parties meet, enter into debate and, often, engage in political combat. These subjects are: sustainable entrepreneurship, entrepreneurial nature management and area development.

Sustainable entrepreneurship to secure resources

Sustainable entrepreneurship means that companies search for possibilities for the sustainable utilisation of natural capital. Motivations and ambitions vary; companies not only seek to secure the necessary natural resources, they also feel responsible for a proper work environment and environmentally friendly production methods.
For example, those within the cacao production chain were found to strongly focus on product certification when both quality and production levels nearly failed to meet demand. In addition, there is also a growing market for sustainably and locally produced food and bio-based materials. Collaboration is a characteristic element of many projects, between parties within the same chain as well as those in the same area. This requires certain types of collaboration and agreements, such as regarding finances.

Entrepreneurial nature management to increase income and support and enhance biodiversity

Dutch nature and landscape organisations are looking for new sources of income and for ways to broaden their support base. National park Weerribben-Wieden, for example, is searching for ways to become more entrepreneurial by offering new recreational activities while also producing energy from biomass, using waste from pruning, thinning and trimming. Such new activities should not be at the expense of biodiversity, and require a particular type of collaboration with government authorities and businesses as well as new financing methods.

Joint, sustainable use of nature within a certain area

Space is scarce in the Netherlands; spatial planning for a given area has to take into account the interests and wishes of many different parties. Collaboration enables these parties to make more sustainable use of the natural capital within that area. In the Ems-Dollart, for example, province, water management authority, agriculture and nature organisations collaborate on a double-dyke zone for flood protection, while creating opportunities for aquaculture, recreation, nature development and resource production. This also calls for financial collaboration, with parties searching for new financing methods and ways for a fair distribution of costs and benefits.

Still a long way to go in the sustainable utilisation of natural capital

Our case studies show how innovations are promoted and energy is generated through initiatives where nature and economy enhance each other. Thus, smart utilisation of natural capital contributes to a broad spectrum of societal objectives. However, there is still a long way to go. Frontrunners among companies, nature organisations and government authorities often have to pioneer to find their way. There is a lack of knowledge, and existing regulation may form a barrier as many rules and regulations are focused on prevention – how to protect nature against over-exploitation. Much less is known about how natural capital could be protected while it delivers economic profits and societal benefits; for example, through sustainable harvesting of resources and sustainable drinking water extraction methods.

In order to strengthen the connection between financial and natural capital, it is important that opportunities are created to conduct experiments, to develop knowledge networks, and to provide procedures and frameworks that would induce the sustainable utilisation of natural capital. This would also involve policy agendas in which natural capital could play a role; for example in areas such as the greening of the economy, public health, food supply, planning policy, and specific elements such as flood protection, environmental water quality and climate adaptation in cities. With the future in mind, the barriers identified must be addressed – only then will companies, nature organisations and citizens be able to expand on the opportunities for both conservation and utilisation.

Natural Capital in the Netherlands

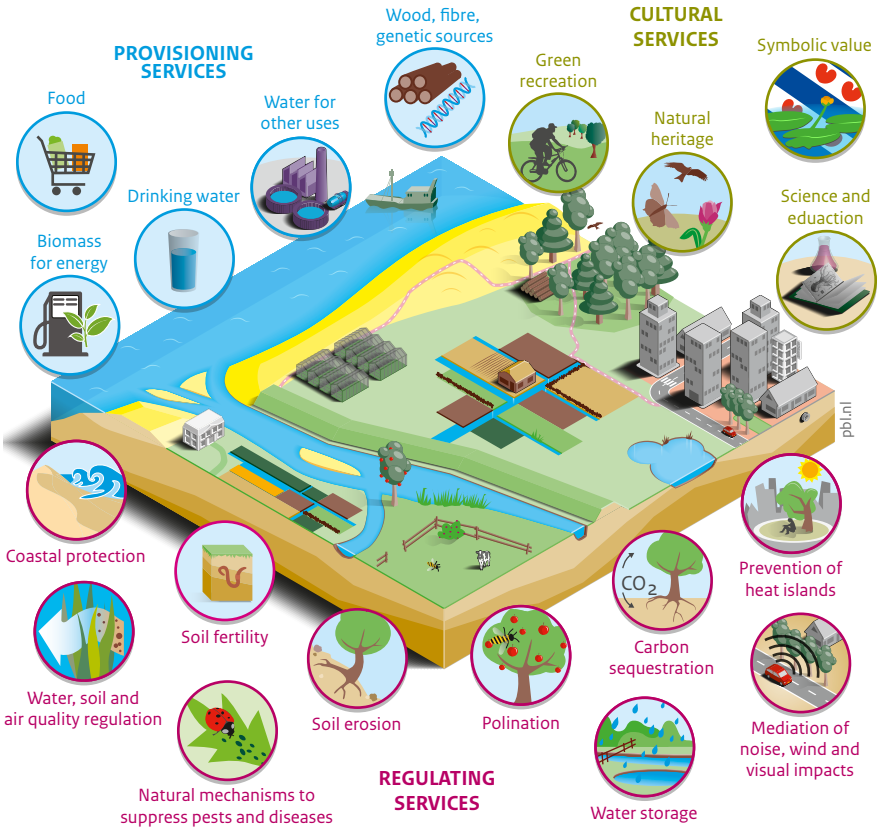
1.1 The significance of natural capital

Over the last years, the attention paid to the value of nature – natural capital – has been growing. Natural capital consists of all the natural resources available on earth. The increase in attention for natural capital is not surprising; society after all depends on it. One of the typical, everyday products supplied by nature is clean drinking water. It is stored in layers below the earth's surface that purify the water, from where it is pumped up by drinking water companies and prepared for consumption. Much of the drinking water in the Netherlands is extracted from nature areas that also have a recreational function. Other drinking water sources are located in or near agricultural areas, where the use of fertilisers and plant protection products affect groundwater and surface water quality. At the same time, farmers also make grateful use of natural capital, such as that of soil fertility (Figure 1.1).

For these reasons, natural capital is of great value, but, because it is free, it is often used carelessly. This paradox was put forward by The Economics of Ecosystems and Biodiversity (TEEB 2009, 2010). TEEB researchers have pointed out the broad spectrum of benefits of natural capital and the ecosystem services it provides to humans. They have also demonstrated the economic importance of natural capital, alongside that of financial, cultural and social capital. However, all around the world, natural capital is under strain. Already in 2005, the Millennium Ecosystem Assessment showed a 60% decrease in ecosystem services, globally.

In the Netherlands, too, there is growing interest among government authorities, NGOs and companies in natural capital as well as in the possibilities of its sustainable utilisation and conservation. This interest is in line with developments in the policy fields of nature, environment, spatial planning and sustainability, as well as in corporate social responsibility. For example, in its vision for nature 'Natuurlijk verder' (2014), the national government argues in favour of a type of policy that places nature at the centre of society, rather than only in designated nature conservation areas.

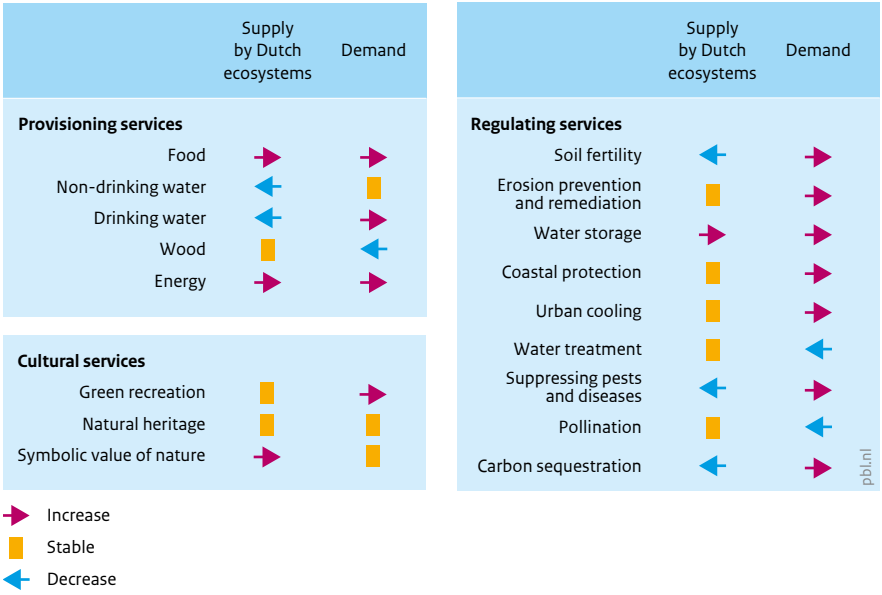
Figure 1.1
Examples of ecosystem services



Source: PBL, WUR, CICES 2014

Declining natural capital in the Netherlands is not expected to lead to urgent problems in the short term, although soil fertility and natural mechanisms to suppress pests and diseases will continue to go down, under a growing demand for these two ecosystem services (Figure 1.2). This larger demand will not pose a problem when alternatives are available, such as artificial fertilisers, or when certain resources, such as timber and food, can be imported. Often, however, such alternatives have a negative impact; for example, when they pollute groundwater and surface waters, and, in the case of imported resources, when they lead to natural capital loss in the country of origin.

Figure 1.2
Changes in the supply of goods and services, 1990 – 2013



Source: PBL; Alterra, Wageningen UR 2014

1.2 Natural capital in practice

Government authorities, companies and non-governmental organisations often do not or only partly include the value of natural capital in their decision-making. However, many countries are becoming aware of this fact, and the significance of natural capital is increasingly being recognised. The preservation of natural capital calls for resilient ecosystems, which in turn require biodiversity conservation. Currently, many parties are trying to give natural capital a more prominent position in their decision-making processes (see text box 'TEEB experience in other countries').

TEEB experience in other countries

An inventory of around 60 studies, tools, pilot projects and policies in 15 countries shows the large impact of TEEB and of the increased focus on ecosystem services. Government authorities, nature conservation organisations and the business community, over the last decade, have become more aware of the significance of ecosystem services and the consequences of biodiversity degradation. Government authorities have become more interested in public-private collaborations, new revenue models and policy instruments to stimulate and/or enable nature-inclusive solutions. Companies are becoming more aware of the importance of ecosystem services for their business activities. Currently, they mostly focus on the impact they have on biodiversity and ecosystems, and actual changes in how they use ecosystem services are still rare.

On an international level, awareness-related knowledge development is receiving a large amount of attention
Many foreign initiatives are aimed at knowledge development, such as through ecosystem assessments. These are particularly intended to increase awareness of the significance of ecosystem services and of the consequences of a further decline, particularly in regulating services and biodiversity, for agriculture, companies and citizens. In addition, there are many pilot projects investigating the options for an alternative utilisation of ecosystem services, in order to arrive at nature-inclusive solutions. These projects apply certain elements of natural capital to address issues such as flood protection, increased sustainability in agricultural practices, and in greening the economy.

New revenue models and new forms of collaboration are still rare
Nature-inclusive solutions typically involve multiple parties collaborating to improve the utilisation of ecosystem services. These collaborations use new revenue models according to which the costs and benefits of using and preserving ecosystem services are shared. For our study, we found relatively few initiatives outside the Netherlands that were either testing such new revenue models or were encouraging collaborations that would involve more nature-inclusive methods. However, particularly in neighbouring countries, we found a number of nature-inclusive development projects, in which multiple parties collaborated in the pursuit of various societal objectives through the sustainable utilisation of ecosystem services. Nature development and flood protection were often found to be the main objectives of these projects. Hardly any such projects were found in developing countries, where the focus is rather on generic government regulations through which landowners are compensated for the services their land provides.

Embedding in institutions and policy increases, but often is limited to financial incentives
The significance of ecosystem services is hardly embedded in government regulation. In only a small number of countries, considerations around ecosystem services are part of nature and biodiversity policies or conservation management plans. A growing number of countries is applying economic tools to exert influence on the utilisation of ecosystem services. The means by which they do so can be grouped into three categories: 1) tax revenues to create funds for nature conservation or public goods management; 2) measures that compensate landowners for costs incurred or income lost due to the supply of ecosystem services; and 3) market instruments that connect supply and demand, such as habitat banking.

The Netherlands could learn from particularly German and British experiences
Experiences in the United Kingdom and Germany are relevant for the Netherlands. For example, the UK guidance for nature valuation in CBAs, and a best-practices guide for projects that pay for ecosystem services. The United Kingdom also has experience in habitat banking and in securing nature and landscape management in local decision-making processes through local nature partnerships. Inspiration can also be found in Germany, in their habitat banking programme and the research and development plan 'Erprobungs- und Entwicklungsvorhaben' that encourages projects that combine nature conservation and ecosystem services. Other inspiring examples include a US system of local inhabitants paying for the conservation of characteristic local habitats (cultural services), for protection against flooding (regulating services) or US experiences with habitat banking. Other ecosystem services may also benefit from these types of initiatives.

See: http://themasites.pbl.nl/natuurlijk-kapitaal-nederland/natural-capital-netherlands/results and Oosterhuis and Ruijs (2015)

In the Netherlands, small-scale projects are trying to combine utilisation and conservation of natural capital. This report presents a study of seven of these projects (see text box 'Projects in practice – Natural Capital Netherlands' and the website http://themasites.pbl.nl/natuurlijk-kapitaal-nederland/natural-capital-netherlands). The study's main question was that of how government authorities, businesses and non-governmental organisations are taking the value of natural capital into account in their strategic decision-making. The report shows the significance of natural capital for the various parties, how they have created new ways of utilising this capital in a sustainable manner, the problems they encountered along the way, as well as the solutions they found. In addition to these projects, we also looked at a number of projects of the recent past in other countries and from neighbouring policy fields with

comparable issues, as well as a number of existing policy measures. The lessons learned from the individual projects may contribute to the sustainable utilisation of natural capital on a much larger scale.

For all of these projects, three elements were investigated, inspired by the TEEB studies: which are the ecosystem services involved, how could these be valued, and what are the possibilities for capturing this value. In contrast to many earlier studies on this subject, we focused our attention explicitly on how these elements help in weighing the importance of natural capital in actual decision-making processes. The TEEB studies are also known for expressing the value of nature in monetary terms. For the projects in our study, we found monetary valuation to only play a limited role; the valuation of nature appeared to be a process of awareness of the significance of specific ecosystem services for society, rather than a method for estimating the monetary value of those services.

Projects in practice – Natural Capital Netherlands

Overview of projects

Flood protection: Dyke reinforcements in Ems-Dollart and the construction of a secondary channel at Varik-Heesselt: When choosing flood protection options, early determination of the economic and ecological benefits of nature-inclusive solutions may lead to different choices. This particular project, which also involves a number of parties in the area, studies the possibilities of nature-inclusive decisions on flood protection issues for two areas, taking the value of natural capital into account. Here, lessons can be learned to benefit the many projects currently planned in the Delta Programme, the programme through which the Netherlands is investing in the prevention of flooding due to climate change.

Greening agriculture: For a further greening of the Common Agricultural Policy (CAP) after 2020, the NCN conceptual framework could provide some guidance. In this project, together with area collectives in Salland and the Peat Colonies (Veenkoloniën), we explored the applicability of the NCN approach in expanding and intensifying the greening targets of the CAP as well as the related financing.

Brabant Water: Drinking water company Brabant Water, the Province of North Brabant, farmers and NGOs work together in various projects on limiting the negative impact of plant protection products on groundwater. The generic policy limiting the use of such products is not effective enough to protect drinking water sources in the long term. Sustainable utilisation of natural capital is possible, but farmers are not expected to automatically continue to apply the related measures themselves. Together with Brabant Water, participants and other parties in the area, we explored a number of options for structurally enshrining these voluntary additional measures in farm management, in particular.

Making international trade chains more sustainable: Dutch businesses that rely on imported resources are dependent on nature elsewhere in the world. We investigated the use of ecosystem services in production areas outside the Netherlands, exploring the impact of various management methods for soya, cacao, palm oil and timber on ecosystem services and biodiversity. In addition, we looked at companies within the trade chains and their possibilities for inducing more sustainable production methods.
National Park Weerribben-Wieden: Nature conservation organisations increasingly have to finance their activities themselves, due to decreasing government subsidies. Together with nature organisations, we explored whether ecosystem services could generate revenues from existing nature. For National Park Weerribben-Wieden, we explored the options for protecting, experiencing and utilising nature. We also studied the opportunities for nature policy to develop new revenue models and to optimise the existing ones.
Natural innovation in the food sector: Local products, organic products and 'forgotten' vegetables and livestock breeds are on the rise in the Dutch food market. In this project, together with 15 innovative entrepreneurs in the food sector, we explored the options for them to develop a viable business model based on the sustainable use of natural capital. We analysed their opportunities and challenges, how their businesses could be organised appropriately, and where win–win situations could be achieved for economy and ecology.
Natural capital in the bio-based seaweed chain: Seaweed cultivation has great potential for the bio-based economy, but in the Netherlands this industry is still in its infancy. In this project, we investigated how a natural-capital perspective could contribute to an ecologically and economically sound circular seaweed chain. We provided insight into which ecosystem services seaweed fields could provide (wave absorbtion at offshore wind farms), what their value would be, and whether or not and how that could be capitalised.

Overview of other projects
Climate buffers: An evaluation of 10 completed projects of the 'coalition of natural climate buffers' (Coalitie Natuurlijke Klimaatbuffers) showed that nature could play a role in adapting certain areas to the consequences of climate change; for example, through ecosystem services such as water collection and storage. We analysed the situations in which such nature-inclusive solutions would be the most promising.
Subsidies for companies and biodiversity: On the basis of 70 subsidy applications, we analysed the activities proposed by companies in order to realise zero net loss of biodiversity. Industrial companies were found to often opt for technical solutions to lower their impact, while the services sector focuses more frequently on natural and governance solutions.

Revenue models for nature: learning from culture, education and health care. Our analysis of 21 revenue models showed there are possibilities for new revenue models in the nature conservation sector. Based on experience, nature conservation organisations may learn whether new revenue models would also suit them.

Ecosystem services abroad: The analysis of 60 foreign projects and initiatives showed that TEEB has increased awareness of the significance of ecosystem services and biodiversity. However, despite a number of inspirational examples, pilot projects related to sustainable use of natural capital are still relatively scarce.

Applicability of the TEEB-city tool: In order for the benefits of 'green' to be placed higher up on the urban agenda, next to the costs that are involved in the maintenance of public greenery, a tool was developed to demonstrate the benefits of green. An analysis of the TEEB-city tool showed that it helps municipalities, developers and companies to gain insight into the positive impact of urban green. Explaining the function of the tool in decision-making processes may provide direction for its further development.

Lessons learned from two decades of policy on the European hamster: The European hamster is a strongly protected species under European nature policy. An analysis of 20 years of European hamster policy showed that the relationship between the protection of the European hamster and agriculture has changed from first being associated with over-the-top and too strict nature policy, to the hamster having become a positive symbol of the Limburg landscape.

Estates: The barriers to creating links between nature and the economy on estates were identified on the basis of a SWOT analysis. In addition, a number of possible actions were presented to develop a vision for estates and to organise entrepreneurship and the involvement of leaseholders and government authorities.

Consumers' willingness to pay for nature-friendly agriculture: A choice experiment showed that citizens would be willing to contribute financially to the purchase of land for the purpose of nature-friendly agriculture in the buffer zones of protected areas; specifically with respect to the 'farmers for nature' initiative (Boeren voor Natuur), a Dutch association that compensates farmers located adjacent to protected areas for adopting nature-friendly production methods proven to have positive biodiversity effects.

Green funds scheme: Projects that meet certain sustainability criteria are eligible for reduced interest rates on loans. A SWOT analysis of the 'green funds scheme' (Regeling Groenprojecten) showed that this regulation is seldom applied for nature projects. Many of the parties involved in spatial development, particularly nature organisations and government authorities, are able to borrow money from elsewhere at low interest rates, and the yield levels required by banks are usually too strict for nature projects.

Habitat banking: If investments by companies and government authorities are expected to have a negative impact on nature - for example in the case of expansion of road networks and real estate - the negative impact must be compensated for by the development of comparable nature in close vicinity of the affected area (nature compensation). Habitat banking, where landowners receive habitat credits for new habitats that they can sell to parties willing to compensate for the resulting negative impact, is a promising alternative to nature compensation. In order to test its potential, experiments could be carried out with a system of habitat banking as an alternative to that of voluntary compensation.

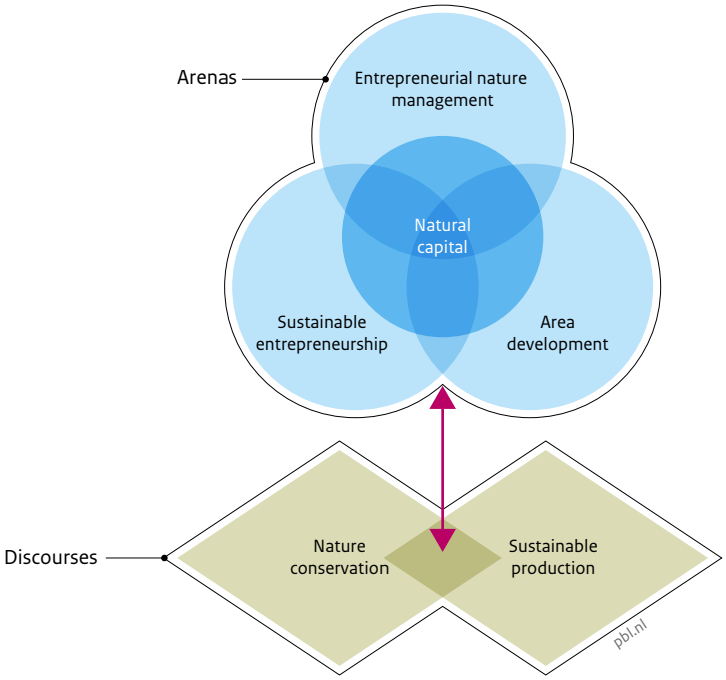
For more information, see http://themasites.pbl.nl/natuurlijk-kapitaal-nederland/natural-capital-netherlands/results

1.3 Natural capital in the 'arena'

The planning and decision-making processes of the projects studied can be clustered into three domains. We call these domains 'arenas' as they relate to situations where parties enter into debate and, often, engage in political combat. How these parties use natural capital depends on both their role and the particular situation. The three domains are Sustainable entrepreneurship, Entrepreneurial nature management and Area development (see Figure 1.3).

Sustainable entrepreneurship means that companies look for ways to utilise natural capital in a sustainable manner. Entrepreneurial nature management is conducted by nature and landscape organisations when they look for new and sustainable ways to utilise natural capital within their protected areas, with biodiversity conservation as a non-negotiable pre-condition. In area development (rural or urban), local stakeholders look for possible synergies between the various spatial functions, such as agriculture, nature, water, land and commercial activities. Experience has shown that urgency often originates from one particular function; the chosen solution may lead to a more integrated and regional utilisation of natural capital. Underlying the three domains are two subjects of ongoing discourse about the role of nature. One centres around how nature conservation is organised, the other is about making economic activity more sustainable.

Figure 1.3
Promising arenas for operationalising the natural capital concept



Source: PBL

The following sections describe the three domains, look at why parties are interested in natural capital and which sense of urgency or opportunity drives them to choose certain alternative ways to utilise it. In addition, the barriers they encounter are described as well as the options available to the various parties for overcoming those barriers. The final section unites the domains and presents a number of overarching lessons learned.

Sustainable entrepreneurship

The market is often awarded only a limited role in conserving natural capital, because it is difficult to include the value of natural capital in market prices. The projects we studied show that the sustainable use of natural capital nevertheless provides opportunities for certain businesses. Dutch innovative food enterprises are an example of companies that use new revenue models for the sustainable utilisation of natural capital. They aim to create not only economic, but also ecological and social value; for instance, the cultivation and consumption of legumes illustrate how multiple values can be generated simultaneously. Legumes not only supply useful proteins to the human diet, their cultivation also aids soil fertility and soil resistance against pathogens.

2.1 Natural capital and the business community

A growing number of Dutch companies are focusing on the sustainable use of natural capital. Their specific approach depends largely on their relationship with that natural capital.

In the first place, security of supply and quality of resources are both important to companies. In order to guarantee these elements, certain companies need to take natural capital into account. The declining quality of cacao, for example, has been the reason for importers to induce more sustainable production methods among cacao producers. And drinking water company Brabant Water is able to supply better quality and cheaper drinking water if the soil has an adequate purifying and water-retaining capacity. This can only be achieved if agriculture, in turn, uses fewer plant protection products and fertilisers and invests in improving the soil's natural fertility and pathogen resistance.

Second, companies benefit from a good image (giving them a 'social licence to operate'), and they are increasingly aware of their own corporate responsibility. Operating methods that have a negative impact on natural capital do not fit in with that image. Companies in palm oil, timber and soya trade chains are all working towards increasing sustainability because of their severely negative impact on natural capital, such as due to deforestation and soil degradation. The new seaweed market, offering

Sustainable entrepreneurship

Leading parties
- Entrepreneurs dependent on natural capital, or those who have a large impact on it
- Sustainable entrepreneurs

Urgency / opportunities
- Security of supply and quality of resources
- Preventing or reducing negative impact on natural capital
- Image improvement and Corporate social responsibility
- Opportunities for corporate shared value creation and access to niche markets

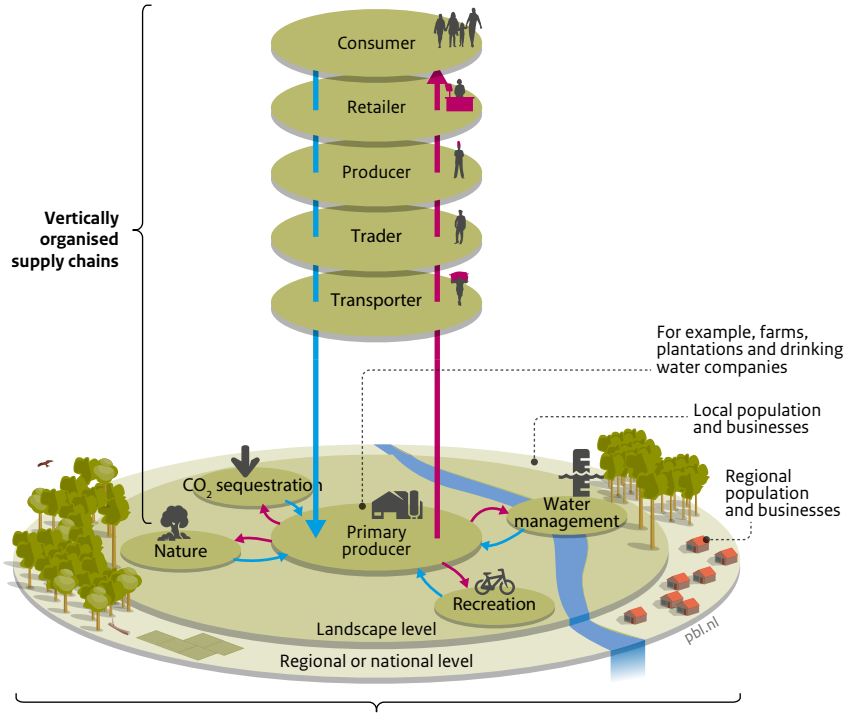
Barriers
- Many companies operate in niche markets, and their products and services are in the initial phases of the innovation process
- Limited knowledge on impacts, natural processes, risks, procedures, sustainable business models, legislation, and niche markets
- Lack of collaboration with partners in the same chain, the financial sector and local parties

Possible strategies
- Helping entrepreneurs to recognise opportunities via platforms and transparency tools
- Supporting experiments in promising sectors with a large impact and large dependence on natural capital
- Making sustainable entrepreneurship more appealing; first by facilitating sustainable enterpreneurs, later by raising standards and implementing new rules

alternatives to petroleum-based resources, is emerging because of the negative impact of petroleum products. The most ambitious companies not only focus on *profits*, but also on *people* and the *planet*.

Companies are all part of a production chain (see Figure 2.1). Increased sustainability at the beginning of the chain, in resource extraction or primary production, has the most positive impact on natural capital. This impact goes beyond the production location, as for example the preservation of a forest in cacao production has a positive, regional impact on downstream water availability as well as a global effect because of the carbon sequestration capacity of that forest. Sustainability-increasing options available to individual parties in a production chain depend on the length of the particular chain. Small-scale innovative food enterprises, such as seaweed companies, often are in direct contact with primary producers, whereas companies in international timber and soya chains have fewer possibilities to interact with their primary producers. Therefore, both groups also make different strategic choices, but they can learn from each other. It is important for both groups, for example in the seaweed chain and in international palm oil and soya chains, to explore the options for benefiting from other ecosystem services (CO_2 sequestration, wave absorption) to fill their revenue model. Innovators also show that sustainable entrepreneurship using natural capital is possible, and international companies have experience in mainstreaming and scale-ups within their sector.

Figure 2.1
Sustainable production and natural capital



Source: PBL

2.2 From barriers to options in sustainable entrepreneurship

The companies studied were mostly frontrunners that apply new, innovative methods, financing mechanisms and organisational models, to enable the sustainable utilisation of natural capital. They do, however, face certain barriers. For example, often, they lack sufficient knowledge, both on sustainable production methods and on revenue models and business strategies. Drinking water company Brabant Water, for example, found that farmers no longer know how to maintain soil fertility by using natural methods. Small-scale, sustainable food enterprises mostly face organisational issues. And new

seaweed cultivation companies face questions about the possibilities of applying seaweed as an alternative biofuel or in water purification, or about the best way to set up a production chain. Platforms have been started on awareness and knowledge development and knowledge sharing among companies. This is also supported by the government, with Green Deals, collaborations between companies, government authorities and research institutes, to create sufficient room for experimentation, remove barriers, create new markets and provide sound information. The government could further support and expand such initiatives.

Companies and other parties involved could take action themselves and collaborate in order to spread risks. Brabant Water, together with farmers and the province, is obtaining such good results in reducing the use of chemical plant protection products that it provides the possibility of collective insurance which pays out in the event that such reduced use leads to lower yields for famers. Farmers can also enter into mutual collaborations which enables them to seek out new markets for sustainably produced food, or enter into more effective agreements with contract workers about the use of plant protection products.

The government could also increase the appeal of sustainable entrepreneurship. It could hold large and international companies accountable for their corporate behaviour and responsibility to make chains more sustainable. Regional authorities could do so for companies that play a major role in the region or at a certain business park. The government could create a certain demand through sustainable public procurement, such as of sustainably produced food and certified timber. In addition, it could support the further improvement of certification programmes, by explicit inclusion of criteria for sustainable use of ecosystem services. Over time, after enough experience has been gained, the government may set certain standards that make sustainable production the norm, for example through regulation. Another important reason for government involvement is to close the finance gap for innovations (the 'valley of death'). Current subsidies and innovation funds are often inadequate, in this respect.

Entrepreneurial nature management

Many Dutch nature and landscape organisations are developing new visions and revenue models that include better utilisation of natural capital and more effective nature conservation. Staatsbosbeheer (Dutch institute for nature reserve management), for example, has changed the way it operates. With the key words of 'conservation, experience and utilisation' it aims to involve the public more closely in its nature areas, and it is funding nature management to a larger degree from revenues that result from its own activities.

3.1 Nature conservation organisations and natural capital

Many Dutch nature conservation organisations are faced with spending cuts, because their government funding has been reduced. They also face a decline in public support for nature management. They need to change their course in order to continue their conservation work and to justify their activities, towards both the government, citizens and the business community. Therefore, most nature conservation organisations have developed new visions or organisational plans. The nature visions of provinces have also shifted more towards sustainable nature utilisation. The Province of North Brabant, for example, has communicated its ambition of treating nature and the economy as equal elements in its new nature policy. Estate owners also have fewer means to maintain their estate and are looking for alternatives to utilise natural capital in ways that will keep their estate financially viable without a negative impact on its value.

Biodiversity conservation is one of the main objectives of nature and landscape organisations. This also remains their major objective in their new newly formulated strategies. New activities to fund nature conservation should contribute rather than interfere with that. For example, for National Park Weerribben-Wieden, there are ideas for a different spatial planning so that biomass harvests can become more profitable without having an adverse effect on nature value or biodiversity.

Various ecosystem services provide opportunities for new revenue models. The most promising of those concern provisioning services (e.g. supply of meat and biomass), regulating services (e.g. water supply, safety and quality), and cultural services

Entrepreneurial nature management

Leading parties
- Organisations that manage nature areas and estates, who are looking for ways to expand their revenue options

Urgency / opportunities
- Financial deficits in nature management and development
- Nature quality deterioration within and outside the nature network
- Legitimise nature policy

Barriers
- Competences are lacking or there is resistance against entrepreneurial nature management
- Co-financing capacity is often limited
- The degree of urgency and the opportunities vary strongly, per area

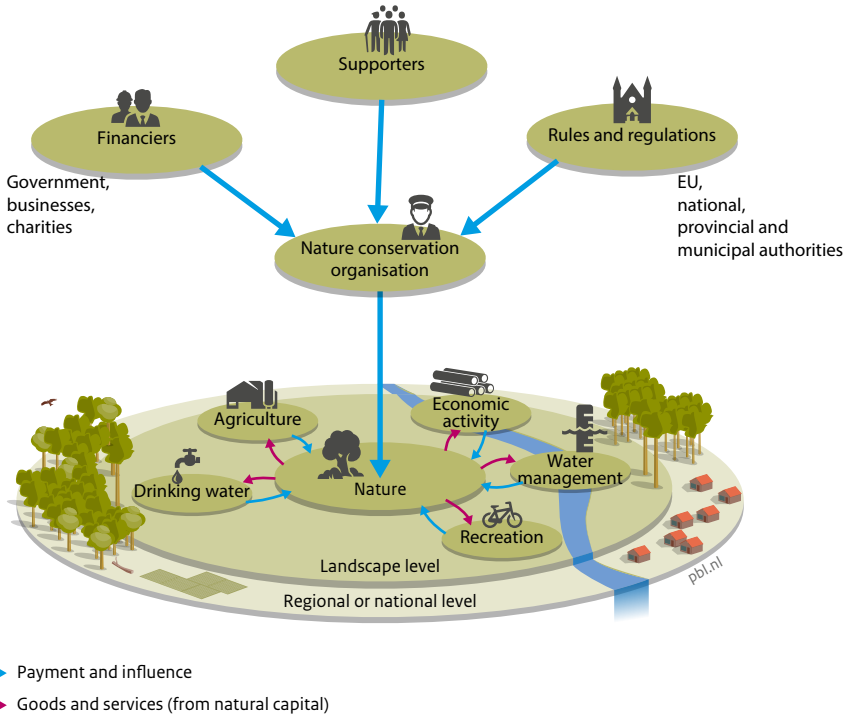
Possible strategies
- Draft a nature vision that is shared by all the involved parties in the area
- Generate knowledge on the set up and implementation of promising revenue models
- Take entrepreneurial nature management into account for permits, visions for the area and regulation
- Experiment with mechanisms such as *habitat banking*, a revolving fund for nature and new payment mechanisms for citizens and companies to contribute to nature protection

(recreation) (Figure 3.1). Nature areas are also attractive to drinking water companies, as they protect the water quality and retain the water during both wet and dry spells. Nature areas are important for recreation, too; they belong to the most popular tourist-attracting areas in the Netherlands, but there is still room for expansion. For National Park Weerribben-Wieden, there are opportunities for collaboration with the popular tourist destination of Giethoorn, to offer recreation arrangements that would allow both areas to profit from each other's strong points.

3.2 From barriers to options for entrepreneurial nature management

Many new revenue models for nature organisations demand a new way of operating. For example, in that they need to collaborate more closely with other parties in the area who each have their own interests. The projects studied show that it is not easy to reach consensus on a vision that recognises all of those vantage points and interests as a starting point for collaboration. For many nature areas and estates, we found that people often are not immediately prepared to change working methods that have evolved over time. For example, at National Park Weerribben-Wieden, not all recreational businesses in the area feel that the looming decline in recreational facilities indicates a need for change. They consider the societal and economic significance of the

Figure 3.1
Entrepreneurial nature management and natural capital



Source: PBL

area as sufficient justification for nature management being funded by the government, and they are not in favour of a more entrepreneurial form of nature management that requires revenues to be generated by nature areas to finance their management.

In addition, organisations often have little knowledge of new revenue models to finance nature, or they lack the competences needed to employ such revenue models. Many new revenue models require a business-like approach to nature management. A transition from being a task-oriented organisation with a steady capacity towards becoming more market-oriented takes time and perhaps also personnel changes.

If nature organisations wish to expand their means and support base, they will have to focus on developing joint visions and planning with other parties in the area. In addition, they must be willing to adjust their own organisation and operational management to the new situation and take on another, more entrepreneurial role, and look for new financing sources based on the possibilities offered by natural capital in the area.

Experiences with such entrepreneurial approaches in the sectors of culture, education and health care have shown that there are indeed opportunities for marketing by-products; for example, nature organisations could exploit biomass in their area, and advise other local companies about handling natural capital in a more sustainable way. They could also actively involve citizens, companies and non-governmental organisations and find new financing sources or reduce costs (In 't Veld et al., 2015). Here, government authorities also have a role to play; provincial authorities as the party responsible for implementing and enforcing nature policy, and the national government as the party responsible for both the system and the legislative framework.

Government authorities can support nature organisations, particularly with respect to knowledge development. There appears to be no lack of examples of alternative revenue models. The questions, rather, are what type of circumstances would require which revenue model for a particular nature conservation organisation, and what are the barriers to successful implementation. Together with other parties that wish to protect nature in an entrepreneurial way, the government could work on developing a knowledge base and tools on the subject, in order to support those organisations.

Furthermore, the government could also partly guide economic activities in and around nature areas and estates, using permits, spatial planning and nature policy. For example, many delays may be avoided if certain development strategies on nature areas or estates would be taken into account in spatial planning. Moreover, the government, possibly together with nature organisations, could implement new systems to attract private capital for nature development and maintenance. One option would be to try out a *habitat banking* system for nature compensation. Another option would be that of encouraging nature-friendly agriculture in the buffer zones around nature areas.

Area development

Area development typically offers opportunities for broad, integrated approaches, as areas generally include multiple functions. Addressing an urgent issue, thus, could be combined with or even improve natural capital. For example, dyke reinforcement between Eemshaven and Delfzijl would offer opportunities for improving both flood protection and biodiversity, for extracting resources used in dyke reinforcement, and for combining aquaculture and brackish water agriculture.

4.1 Area development issues and natural capital

The Netherlands has a long tradition in area development and spatial planning, because of the great pressure on space and high population density. There are many issues that require certain area adjustments. For example, to guarantee flood protection and water quality, and to address climate change. Those adjustments could represent opportunities for natural capital. Area development projects may provide opportunities for a combination of development and conservation of natural capital, and in turn, ecosystem services may contribute to solving certain social issues in the area.
The proposed double dyke zone in the Ems-Dollart, for example, will use more of the natural capital as well as lead to new nature areas with brackish water and opportunities for greening agriculture and recreation.

The environmental and planning visions that various government authorities will develop, over the coming years, in relation to the new Environment and Planning Act, offer an opportunity for a more coherent approach to the issues and tasks in the area. The initiative for these spatial adjustments often originates from the government, as this often concerns public objectives, but it may also come from businesses.

For the projects studied, we found that function combinations that included natural capital always changed several of the ecosystem services involved (Figure 4.1).
The greening of agriculture in Salland and the Peat Colonies (Veenkoloniën), for example, does not concern the enhancement of one ecosystem service – agricultural production – but rather the change in production methods of agricultural and other tradable crops, so that other ecosystem services are enhanced. For example, in the

Area development	
	*Leading parties* • Parties in the area who are planning certain activities that could be coupled to natural capital *Urgency / opportunities* • Opportunities for synergy and for combining functions • An area approach would offer opportunities for nature outside nature areas • Looking at multiple problems in a certain area at the same time would increase the options for solutions *Barriers* • Objectives and interests are often difficult to reconcile • Function combinations do not fit in with existing spatial planning processes • Knowledge on impacts, how function combinations work, and the related costs and benefits, is still limited • Regulations, permit procedures and financial rules prevent the combination of functions *Possible strategies* • Tabling the potential of function combinations and jointly addressing issues • Making room for function combinations in decision-making processes and procedures • Making function combinations attractive by attuning regulation, permit procedures and government support to the potential of the combinations

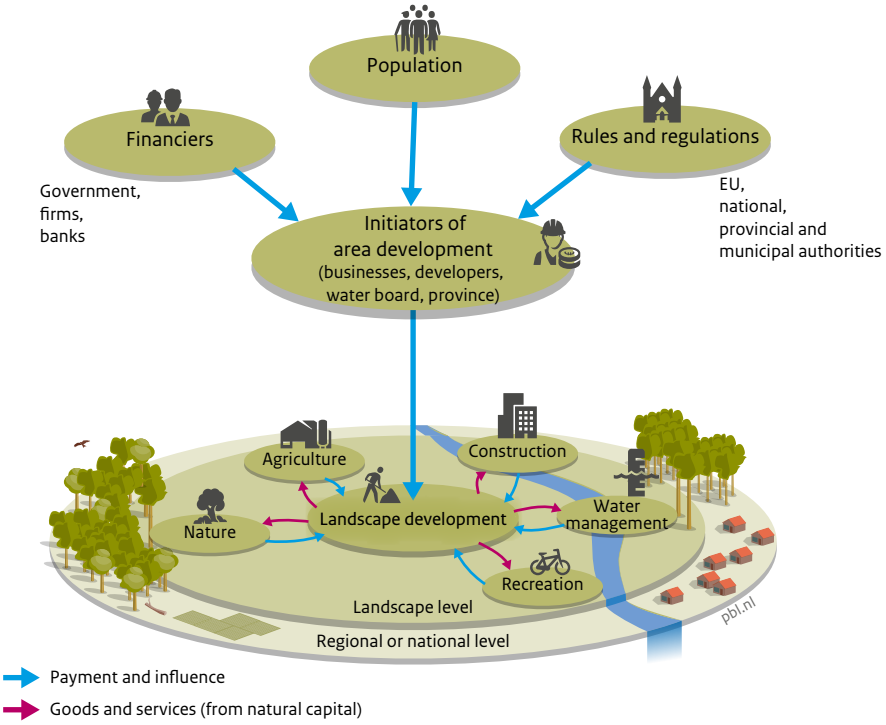
improvement of regulating services such as carbon sequestration, soil fertility, pollination and pest control, and the improvement of cultural and recreational services, as well as other productive services such as that of clean drinking water.

4.2 From barriers to options for area development

The projects studied have shown that combining multiple functions does add value, but also that this is a complicated thing to accomplish. It calls for collaboration between parties that are unfamiliar with working together, who do not speak each other's language, work according to different procedures, have differing objectives, and sometimes find themselves on opposite sides. These parties then have to find a shared vision in which each other's interests are recognised. This requires time and effort, and sometimes cannot be achieved at all.

In the north of the Netherlands, at the Ems-Dollart estuary, parties involved in dyke reinforcement were successful in uniting the various interests regarding flood protection, agriculture and economic development, whereas another project on flood protection failed to do so. For the river Waal near Varik-Heesselt, there were plans for a flood-control channel that would increase the area's protection against flooding.

Figure 4.1
Landscape development and natural capital



Source: PBL

However, the possibilities of various function combinations, ultimately, were not explored when, from within the region, questions were raised about the need for such a channel. An initial desk study had also shown that combining functions would be problematic. For example, flood protection could be increased by combining a wide flood-control channel with nature development and recreation, but the area already had sufficient recreational locations and the province did not designate it as a nature development location. In addition, local land prices were believed to be rather high, due to the presence of orchards.

Another problem that the parties involved were faced with was that of standard procedures; these do not invite integral approaches using natural capital. Examples of such procedures that stand in the way of natural-capital-including alternatives in area development are the Multiannual Programme for Infrastructure Spatial Planning and Transport (MIRT)[1], the mandatory Environmental Impact Report (MER) and cost-benefits analysis (CBA). In urban renewal, green often also receives the least amount of

attention. The TEEB-city tool could be used to incorporate nature in urban projects, but using this tool is still up to the parties involved (for details, see the text box on projects in practice).

The lack of knowledge among parties forms yet another barrier, as the projects often concern innovations and new combinations of functions. What would for example be the criteria to meet the flood defence standards for a multifunctional double dyke at Ems-Dollart? Or how reliable is natural pest control, and which implementation methods should farmers use for this to be a reliable alternative to chemical plant protection products?

Furthermore, also lacking is knowledge on the costs and benefits of function combinations as well as their distribution over the stakeholders involved. For the multifunctional double dyke at Ems-Dollart, an estimation of the additional benefits to society was considered important by the various parties involved, for them to be able to justify the extra costs, whereas standard procedures focus particularly on costs and do not encourage the inclusion of any additional benefits in the decision-making process. We found that, in the case of drinking water company Brabant Water, a mechanism was missing for dealing with the unfair distribution of costs and benefits between them, farmers and water management authorities, which is why it proved difficult to preserve the results.

We found that the projects that were successfully combining various functions with the use of natural capital all complied with three preconditions: 1) proposed function combinations had been placed on the agenda in time for them to be considered in the decision-making process; 2) function combinations were included in the decision-making process; and 3) the alternative they would offer was more attractive than the conventional options.

For function combinations to be included in area development processes, it is important that the initiators of those processes are made aware of the potential of natural capital. Initiators often are national or regional government authorities working on flood protection, water quality, climate change adaptation, greening of agriculture, food production and/or sustainable urban development. Sometimes this concerns individual, large investments at particular locations, such as those in flood protection within the Delta Programme, or in urban development projects. In other cases, it is about smaller, more gradual changes within much larger areas, such as the greening of agriculture at Salland and the Peat Colonies, through the European Union's Common Agricultural Policy.

The parties involved in the successful projects were found to have focused on the multiple benefits of natural capital. This gave them opportunity to become acquainted with and understand each other's interests and to place certain function combinations on the agenda. There appeared to be no single formula for success; the parties involved and the shaping of the processes varied. Natural capital could also become a more

regular part of the decision-making process if function combinations including natural capital would be taken into account in a number of often used methods and procedures. Examples of such methods and procedures in Dutch decision-making on public investments are the CBA guidance on nature, the MIRT and the MER.

Lastly, the government could also work towards making function combinations more appealing. The related greater benefits to society when natural capital is included in those combinations would justify co-financing by the government. In practice, this could mean that the nature conservation sector could pay the additional costs of combining a flood protection project with nature objectives, or a water management authority co-financing a nature project that also enables water storage.

Note

1 The MIRT documents the projects that will be carried out in the coming years, in infrastructure, spatial development and transport, and also states the preliminary research required so that choices can be made about which approach to take and which procedures must be followed in executing them. Natural capital only plays a limited role in the MIRT. Expanding this role would ensure the development of plans in which sustainable utilisation of natural capital takes on a more prominent position in planning and decision-making. The MER and CBA are both tools that are mandatory for large spatial development projects, used for determining whether those projects comply with environmental regulations, and whether the costs and benefits, on balance, would justify government funding.

Conclusion

'Natural capital' is a relatively new concept. We found that government authorities, the business community and non-governmental organisations in the Netherlands are still in the process of discovering what natural capital means for them and how it could be employed in practice. Natural capital is being utilised in such a large variety of ways and is so much still being developed that no standard approach to success could be determined. Other countries also appear to be going through this exploratory phase. The opportunities for sustainable utilisation of natural capital depend particularly on context and on the decision-making phase and procedure according to which it is addressed.

5.1 Incorporating natural capital leads to innovation

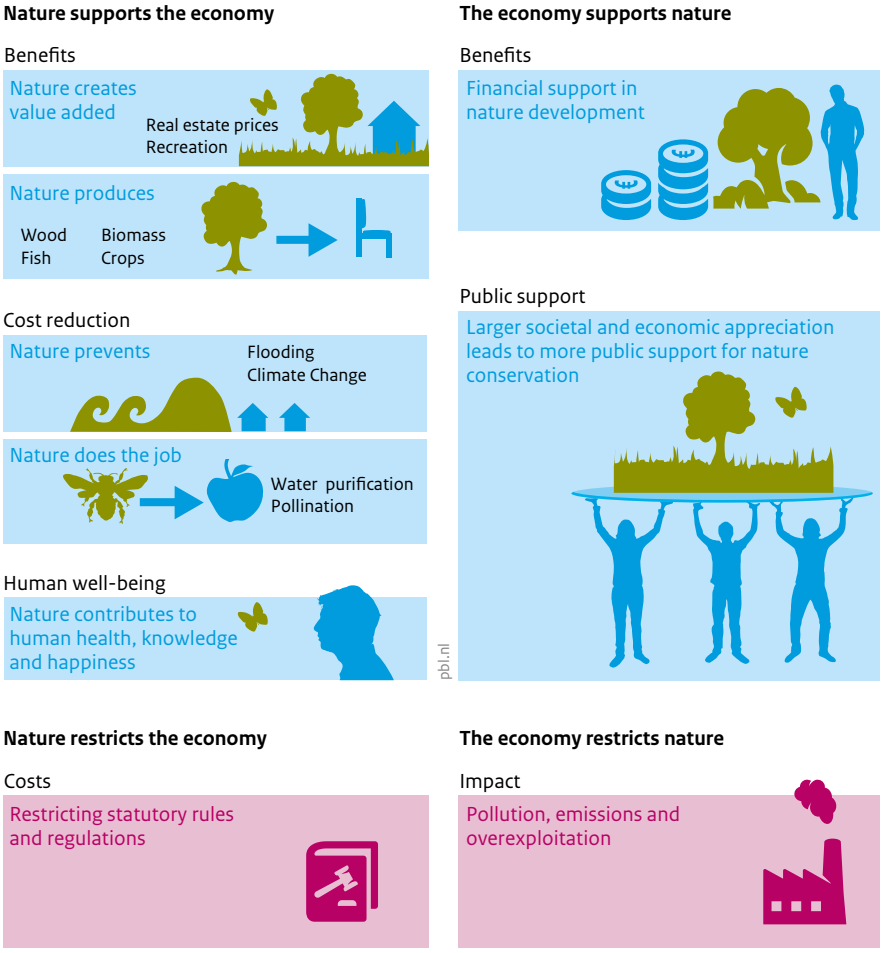
Government authorities, companies and non-governmental organisations could benefit from incorporating the value of natural capital into their strategic decision-making. This would also help nature conservation organisations find better ways to protect biodiversity. Companies are discovering possibilities for securing the sustainable supply of resources, or to enhance their social licence to operate. In area development, the incorporation of natural capital induces the development of function combinations, thus, creating both societal and economic benefits.

The specific attention that is paid to the value of natural capital also contributes to its management and conservation. Such improved management also has a positive impact on biodiversity, often due to the improved environmental conditions. Whether this will be sufficient to achieve the Dutch biodiversity targets is debatable, but it will help. In other words, the focus on natural capital leads to a quest for increased interlinkages between nature and the economy, with new market opportunities as well as nature development, as a result (Figure 5.1).

In practice, natural capital mainly centres around the search for new function combinations and collaborations between various parties. The concept forms a bridge between societal, economic and biodiversity agendas, along which opportunities for incorporation can be identified. Natural capital inspires and connects parties that

Figure 5.1

What is the relationship between nature and the economy?



Source: PBL

benefit from its sustainable utilisation, each from their own perspective. This then promotes new ideas and collaborations, thus leading to innovations in working methods and organisation. Natural capital also unites public and private interests, which is in line with the social and policy trends in the Netherlands, according to which companies and civilians increasingly try to achieve public objectives and where synergy between policy areas is sought.

The projects studied often would start in one of the domains of either sustainable entrepreneurship, entrepreneurial nature management or area development, but subsequently would connect to one of the other domains. Companies in international trade chains, for example, have been experimenting with various landscape approaches. In the Netherlands, these linkages sometimes originate from sheer necessity, because there is not enough space to address issues separately. In other countries there are also many opportunities for addressing multiple issues by using nature-based solutions.

5.2 From small to large scale

In the Netherlands, as well as in many other countries, explicitly incorporating the value of natural capital in strategic decision-making is rather a new thing. For the projects studied, we often found that this is still in development. The subsequent challenge lies in the development of a type of policy that would contribute to more of these projects being started and subsequent experiences being shared for wider application.
The government could have a role in this by removing some of the barriers that prevent this, and by applying the natural capital concept in more policy fields.

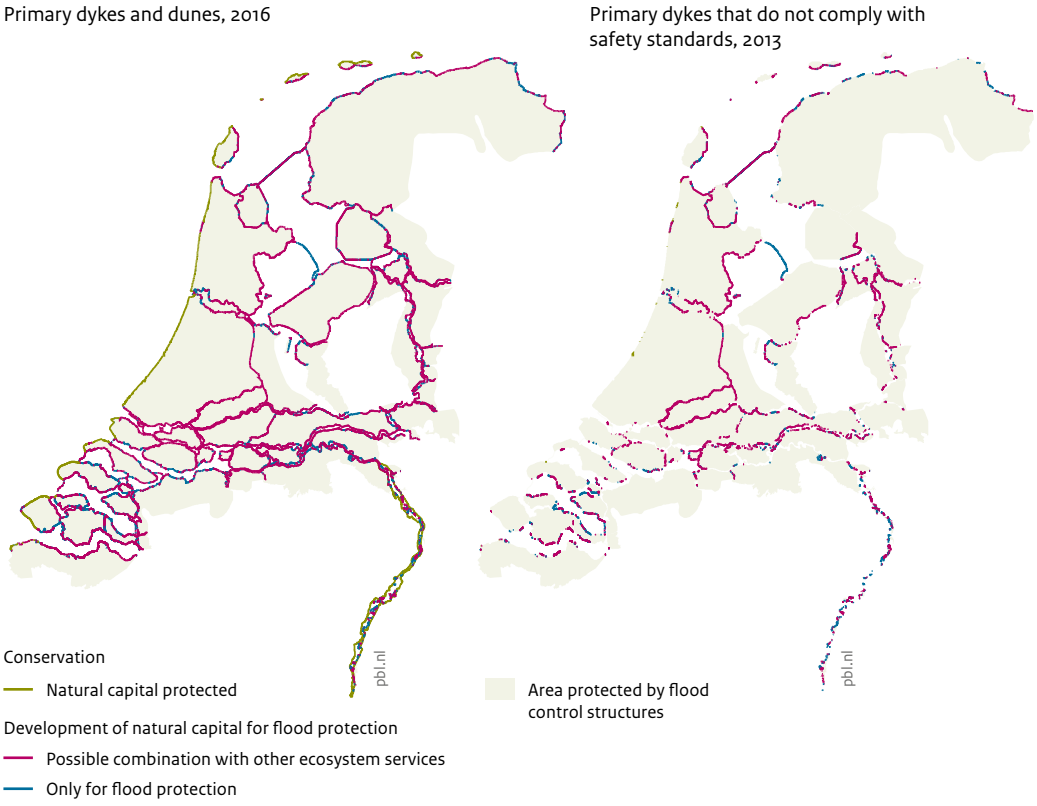
Opportunities for natural capital in many policy fields

If the Dutch Government wishes natural capital to play a larger part, it needs to organise more attention for this topic; for example, in relevant policy fields. In order for this to happen, the potential added value of the natural capital concept in existing policy themes could be made more explicit. We studied a number of these policy themes, but certainly not all of them. Ambitions, as expressed in the national vision on nature, to realise more nature combinations could be concretised using the concept of natural capital. Since the decentralisation of nature policy, provincial authorities have become responsible for achieving the targets of sectoral policy on nature. They, too, have expressed their ambition to place a greater emphasis on the relationship between nature and the economy. Also for them, natural capital may help to strengthen that relationship. The environmental policy renewal also provides momentum; in the coming years, environmental visions will be developed by both national and regional authorities, in which the concept of natural capital could be used to clarify which and how societal issues could be addressed in a more integrated way.

In addition, we identified opportunities for a more sustainable use and conservation of natural capital in policy themes related to greening the economy, health care, food supply, the human environment including flood protection, water quality and urban adaptation to climate change. The opportunities are location-dependent and their timing varies. Figure 5.2, for example, shows where the primary dykes are located that ensure flood protection in the Netherlands (left panel), and where extensive use is made of natural capital, such as in the dune areas. Along the rivers and edges of the IJsselmeer and the Wadden Sea coastline, there are many locations were natural capital could be utilised, to a larger degree, to offer solutions for flood protection, in addition to the

Figure 5.2

Conservation and development of natural capital for flood protection



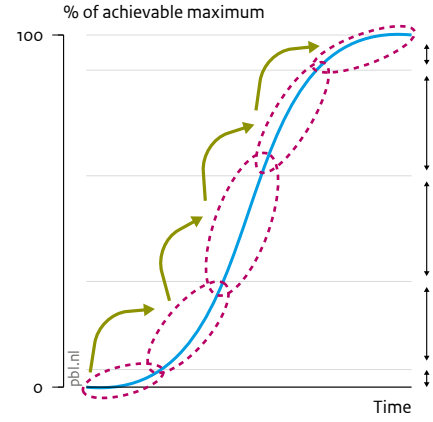
Source: ILT, 2013; PBL

more conventional technical solutions. For these areas, as in the Ems-Dollart project, could be assessed whether addressing the issue of flood protection could be combined with a better utilisation of natural capital and the demand for other ecosystem services. The map on the right shows the areas where the use of natural capital in addressing flood protection issues is most urgent, as flood protection standards are not expected to be achieved in those locations. These areas will be the first to be addressed in the Delta Programme and the Flood Protection Programme (De Knegt et al., 2016).

Government could support innovation in various ways

Two types of barriers were repeatedly found in nearly all projects studied. The first of which concerns the lack of knowledge in various areas, both on the opportunities offered by natural capital and the risks these opportunities pose, as well as on how natural capital utilisation could be incorporated in organisational models and

Figure 5.3
Transition towards a sustainable use of natural capital



Transition phases	Actor	Options	Government role
Normalisation	Laggards, in denial	Legislate and tax	Regulating
Connection	Slow adopters	Increase transpararency and competition	Regulating
Mainstreaming	Convinced adopters	Create networks for knowledge transfer	Participating
Breakthrough	Frontrunners, market leaders	Stimulate cooperation and partnering	Inviting
Sustainable niche	Sustainable entrepreneurs	Recommend, subsidise	Facilitating

Source: PBL

collaborations. The other type of barrier is related to the shortcomings on the side of institutional and financial frameworks. New institutions and collaborations are needed, so that costs and benefits can be distributed more fairly.

Government authorities (both national and regional, and the European Commission) could take on various roles to remove those barriers and to encourage the use of natural capital (Figure 5.3). While the concept of natural capital is still in its infancy and mostly addressed in pilot projects, it would be useful to start projects that would inspire people as well as those that develop knowledge. From their supporting and facilitating roles, the authorities could unite parties, offer platforms, create opportunities for experiments to be carried out, and offer practical support in cases of knowledge gaps and financing problems.

Businesses, knowledge institutes and consultancies may also invest in knowledge themselves, as this could also lead to new assignments, nationally and internationally. These projects could be led by government – whether European, national or regional – in its participatory role as stakeholder or as the party responsible for the systems involved. This could involve offering new solutions, connecting agendas, and finding mutual interests and visions. Government involvement would be justified in many function combinations that include natural capital, because of the public benefits these would generate. Furthermore, increasing or raising awareness about the value of natural capital among the various parties would remain important. This matter is currently already being addressed – for example, in an EU framework programme on Horizon2020, in which knowledge is being developed on function combinations that include natural capital.

In subsequent phases, in their governance role and as the party responsible for making rules and regulations, government authorities could make those function combinations more appealing. For example, experiments involving sustainable innovation and sustainable revenue models could be facilitated by granting subsidies or lowering interest rates on loans to invest in the sustainable use of natural capital. In cases where such experiments prove successful and could be scaled up, authorities could accelerate the transition; for example, by setting certain pre-conditions for the sustainable use of natural capital for spatial plans, guarantees, loans and sustainable public procurement. And, finally, in order to oblige laggards to follow suit, more stringent rules and standards would impose clear minimum requirements. This should be applied at the most suitable level, which is often on a European scale. Regional and local authorities could play their part by issuing permits and through their visions for the area, thus ensuring the natural capital is both utilised and conserved.

References

De Knegt B, Woltjer I, Van der Hoek DCJ, Veerkamp C, Van der Aa M, Hendriks CAM, Staritsky I, De Vries F, Agricola H, Veeneklaas F, Koekoek A, Goosen H, Lesschen JP, Van Boekel E and Groenendijk P. (2016). *Kansenkaarten voor duurzaam benutten Natuurlijk Kapitaal*. Wageningen: Alterra Wageningen UR.

In 't Veld R, Van Mill B and Lenselink I. (2015). *Geld voor en met natuur – Leren van andere sectoren*, The Hague: KWINK Groep.

Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-Being: Current State and Trends*, Washington D.C.: Island Press.

Ministry of Economic Affairs (2014), *Natuurlijk Verder: Rijksnatuurvisie 2014*. The Hague, Dutch Ministry of Economic Affairs.

Oosterhuis F and Ruijs A. (2015). *Ecosysteemdiensten in het buitenland: toepassing in pilots en beleid*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.

TEEB (2009). *The Economics of Ecosystems and Biodiversity for Policy Makers – summary*, Geneva: UNEP.

TEEB (2010). *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*, edited by Pushpam Kumar, London and Washington: Earthscan, Routledge.

Appendix: Publications by the Natural Capital Netherlands programme

Website

All the information on the Natural Capital Netherlands programme is available at http://themasites.pbl.nl/natuurlijk-kapitaal-nederland/natural-capital-netherlands.

Reports

Borgstein M and Vijn M. (2015). *Natuur en economie verbinden op landgoederen: van belemmeringen naar handelingsopties*, PPO Nr. 668. Wageningen, The Hague: Praktijkonderzoek Plant & Omgeving Wageningen UR, LEI Wageningen UR.

Bos M and Hartgers E. (2015). *Pespectieven voor ecosysteemdiensten en natuur van een hoogwatergeul bij Varik Heesselt*, Alterra Rapport 2652, Wageningen, Utrecht: Alterra Wageningen UR, Deltares.

Bouma JA and Koetse MJ. (2016), *Alternatieve financieringsmechanismen voor natuurbeheer: de betalingsbereidheid voor burgers voor agrarisch natuurbeheer*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.

De Knegt B, Woltjer I, Van der Hoek DCJ, Veerkamp C, Van der Aa M, Hendriks CAM, Staritsky I, De Vries F, Agricola H, Veeneklaas F, Koekoek A, Goosen H, Lesschen JP, Van Boekel E and Groenendijk P. (2016). *Kansenkaarten voor duurzaam benutten Natuurlijk Kapitaal*. Wageningen: Alterra Wageningen UR.

Gorissen H, Ruijs A, Van der Heide M and Schaminée J. (2016), *Van dominee tot koopman? Habitatbanking in Nederland*, LEI Rapport, The Hague: LEI Wageningen UR.

In 't Veld R, Van Mill BPA and Lenselink I. (2015). *Geld voor en met natuur – Leren van andere sectoren*, The Hague: KWINK Groep.

Kwakernaak C and Lenselink G. (2015). *Economische en ecologische perspectieven van een dubbele dijk langs de Eems-Dollard*, Alterra Rapport 2635, Wageningen, Utrecht: Alterra Wageningen UR, Deltares.

Maas G. (2015). *The Green Fund Scheme in the Netherlands: a give and take game between stakeholders*, MSc Thesis Environment & Resource Management, Amsterdam: IVM-VU.
Melman D, Van Doorn A, Buij R, Gerritsen A, Van der Heide M, Bos E, Martens S, Blanken H and Ten Holt H. (2015). *Natuurlijk kapitaal als bron voor verdere vergroening van het GLB*, Alterra Rapport 2641, Wageningen: Alterra Wageningen UR.
Oosterhuis F and Ruijs A. (2015). *Natuurlijk Kapitaal Nederland: een conceptuele verkenning en afbakening van het TEEB-kader*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.
Oosterhuis F and Ruijs A. (2015). *Ecosysteemdiensten in het buitenland: toepassing in pilots en beleid*, PBL Notitie, The Hague: PBL Netherlands Environmental Assessment Agency.
Schuerhoff M and Ruijs A. (2015). *Hoe gaan bedrijven om met biodiversiteit? Leren van de subsidieregeling Biodiversiteit & Bedrijfsleven*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.
Schuerhoff M and Ruijs A. (2015). *Lessen van twee decennia korenwolfbeleid – naar verbindend natuurbeleid*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.
Schuerhoff M. (2016), *Geldstromen voor natuur*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.
Smit M and Schuerhoff M. (2016). *De plek van ecosysteemdiensten in regelgeving – kansen en uitdagingen voor een nieuwe ambitie: natuur en economie verbinden*, PBL Notitie, The Hague: PBL Netherlands Environmental Assessment Agency.
Smit M, Oosterhuis F, Van Kreveld A, Braakhekke W, Ruijs A, Litjens G and Buijs A. (2014). *De natuur als partner bij klimaatadaptatie: een procesevaluatie van tien klimaatbufferprojecten*, PBL Notitie 1486, The Hague: PBL Netherlands Environmental Assessment Agency.
Turnhout E and De Lijster E. (2015). *Discoursanalyse ecosysteemdiensten*, Culemborg, Wageningen: CLM, Wageningen Universiteit.
Van den Burg SWK, Jak R, Smits MJ, De Blaeij A, Rood GA, Blanken H and Martens S. (2016). *Zeewier en natuurlijk kapitaal – kansen voor het verzilveren van geleverde diensten*, The Hague: LEI Wageningen UR.
Van der Heide M. (2015), *Waardering van stedelijk groen en blauw – Evaluatie van het gebruik van de TEEB-Stad tool*, PBL Notitie, The Hague: PBL Netherlands Environmental Assessment Agency.
Van der Heide M, Hendriks CMA and Borgstein MH. (2016). *Financiering Bestaande Natuur – Praktijkcasus Weerribben-Wieden*, The Hague: LEI Wageningen UR.
Van der Meulen S, Kwakernaak C and Bos M. (2015). *Natuurlijk Kapitaal Nederland pilots Waterveiligheid; Ecosysteemdiensten in de praktijk van het Deltaprogramma*, Alterra Rapport 2653, Wageningen, Utrecht: Alterra Wageningen UR, Deltares.
Van Lienen F and Schuerhoff M. (2015). *Duurzaam gebruik van natuurlijk kapitaal voor schoon water in Brabant: van succesvol project naar verankering in de bedrijfs-praktijk*, PBL Note, The Hague: PBL Netherlands Environmental Assessment Agency.
Van Lienen F and Veldhuis C. (2016). *Natuurlijk kapitaal en voeding in ondernemersperspectief: biodiversiteit en natuurlijk kapitaal in een duurzaam voedingssysteem*, PBL Notitie, The Hague: PBL Netherlands Environmental Assessment Agency.

Van Oorschot M, Wentink C, Kok M, Van Beukering P, Kuik O, Van Drunen M, Oosterhuis F, Van de Berg J, Ingram V, Judge L, Arets E and Veneklaas F. (2016). *Integrating values of ecosystem goods and services into Dutch supply chains: Potential private and public benefits of voluntary markets standards for sustainable production*, PBL Beleidsstudie, The Hague: PBL Netherlands Environmental Assessment Agency.

Vos CC, Grashof-Bokdam CJ and Opdam PFM. (2015). *Biodiversity and ecosystem services: does species diversity enhance effectiveness and reliability?* Wot-technical paper 25, Wageningen: Wageningen UR.

Articles

Bouma J, Ruijs A and Van Egmond P. (2015). 'Deregulering en natuurbeleid', *ESB* 100(4721): 649–650.

De Knegt B, Van der Hoek DCJ and Veerkamp C. (2016). 'Kansenkaarten voor duurzaam benutten Natuurlijk Kapitaal', *Tijdschrift Milieu, Mei 2016, pp. 41–47.*

Franken ROG, Van der Meulen S, Kwakernaak C, Bos M, Lenselink G and Hartgers E. (2016). 'Meerwaarde ecosysteemdiensten voor Deltaprogramma', *Tijdschrift Milieu, Mei 2016, pp. 12–14.*

In 't Veld R, Van Mill BPA and Stutje A. (2016). 'Leren van andere sectoren', *Tijdschrift Milieu, Mei 2016, pp. 22–23.*

Kwakernaak C, Lenselin G, Officer I and Buurman M. (2015). 'Een dubbele dijk met driedubbele doelen', *Vakblad H2O, 18 June 2015.*

Melman D and Van Doorn A. (2015). 'Verdere vergroening van het GLB: collectieven en ecosysteemdiensten', *Landwerk, Augustus 2015, pp. 21–25.*

Oosterhuis F and. Van der Esch S. (2016). 'Milieustatistieken, milieurekeningen en milieubeleid', *Tijdschrift Milieu, May 2016, pp. 48–51.*

Ruijs A and Van der Heide M. (2016). 'De (on)schatbare waarde van Natuurlijk Kapitaal', *Tijdschrift Milieu, Mei 2016, pp. 36–40.*

Van den Burg SWK, Rood GA, Van Lienen F and Veldhuis-van Essen C. (2016). 'Bedrijfseconomisch perspectief de maat genomen', *Tijdschrift Milieu, Mei 2016, pp. 30–32.*

Van der Heide M, Borgstein MH and Hendriks CMA. (2016). 'Klinkende munt slaan uit natuur vergt gerichte aanpak', Tijdschrift Milieu, May 2016, pp. 18–19.

Van Doorn A and Melman D. (2015). 'Greening the CAP with ecosystem services ', *Groupe de Bruges Newsletter,* 26 November 2015.

Van Egmond P and Ruijs A. (2016). 'Lessen voor de praktijk'. *Tijdschrift Milieu, May 2016, pp. 6–10.*

Van Lienen F and Schuerhoff M. (2016). 'Handen ineen voor schoon water resulteert in win-win', *Tijdschrift Milieu, Mei 2016, pp. 15–17.*

Van Oorschot M. (2016). 'Duurzame handel heeft wind mee', *Tijdschrift Milieu, May 2016, pp. 33–35.*

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