

# WORKING PAPER



“A joint responsibility for connectivity”

## ECOLOGICAL NETWORKS: Experiences in the Netherlands

“A joint responsibility for connectivity”



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agriculture, nature  
and food quality

## Foreword

Natura 2000 is the European network of protected nature areas, which consists of areas originating from the 'Council Directive on the conservation of natural habitats and wild fauna and flora' (92/43/EEC) and the 'Council Directive on the conservation of wild birds' (79/409/EEC); the Habitat Directive and Birds Directive.

Among other issues, Article 10 of the Habitat Directive discusses the improvement of the spatial connectivity in European nature: a 'spatially coherent network'. Once the Natura 2000 areas have been designated it will have to be examined whether the spatial connectivity between the protected areas is sufficient for the sustainable protection of biodiversity. At the present time, a common vision on what is necessary to realise a spatially coherent network is lacking and is not high on the agenda. In view of the far-reaching fragmentation of the countryside and the consequences of climate change for the long-term conservation of species and various habitats there is a great urgency for such a vision in the Netherlands.

Even though Article 10 calls for the preservation and restoration of the spatial coherence, at present the Natura 2000 network still has insufficient interconnectivity between the Natura 2000 areas in the Netherlands. The protected Dutch nature areas are fragmented and are often located far from one another. The average distance between all Natura 2000 areas is approximately 10 to 15 km.

This paper on "Ecological networks in the Netherlands" presents a general description of the experiences in the Netherlands regarding the policy concept Ecologische Hoofdstructuur (EHS or National Ecological Network): the coherent system of nature areas for securing the future of species and ecosystems. The National Ecological Network consists of core ecological areas, ecological development areas, preservation areas, buffer zones and ecological connections. This paper mainly focuses on our experiences and the proven success and failure factors in nature policy since 1990.

I hope that this paper will lead to a better understanding of and insight into the Dutch nature policy, and that the lessons learnt will be useful for the implementation of Article 10 of the 'Directive on the conservation of natural habitats and wild fauna and flora' in the other Member States. For the preservation of European species and ecosystems it is important that there is intensive collaboration between the Member States.

The Natura 2000 areas

- form the core of the European nature policy;
- are an interconnected, coherent ecological network;
- provide opportunities for the protection of species and ecosystems in the wider landscape and seascape;
- and safeguards against external developments such as climate change.

Interconnected nature areas are important for both plants and animals as well as for people to create and maintain places where they can work, take part in recreational activities or simply relax.

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# 1 What is the background of the National Ecological Network (EHS)?

## The Netherlands: many people and little space

Nature in the Netherlands is characterised by a large variety of natural and semi-natural ecosystems within a short distance from one another. This variation is typical of the Dutch countryside that has formed as a result of the interaction between man and nature. The Dutch countryside is an inextricable part of a larger whole. The Netherlands are, for example, a junction of many migratory bird routes, whereby our nature areas form an essential and indispensable link for the protection of birds.

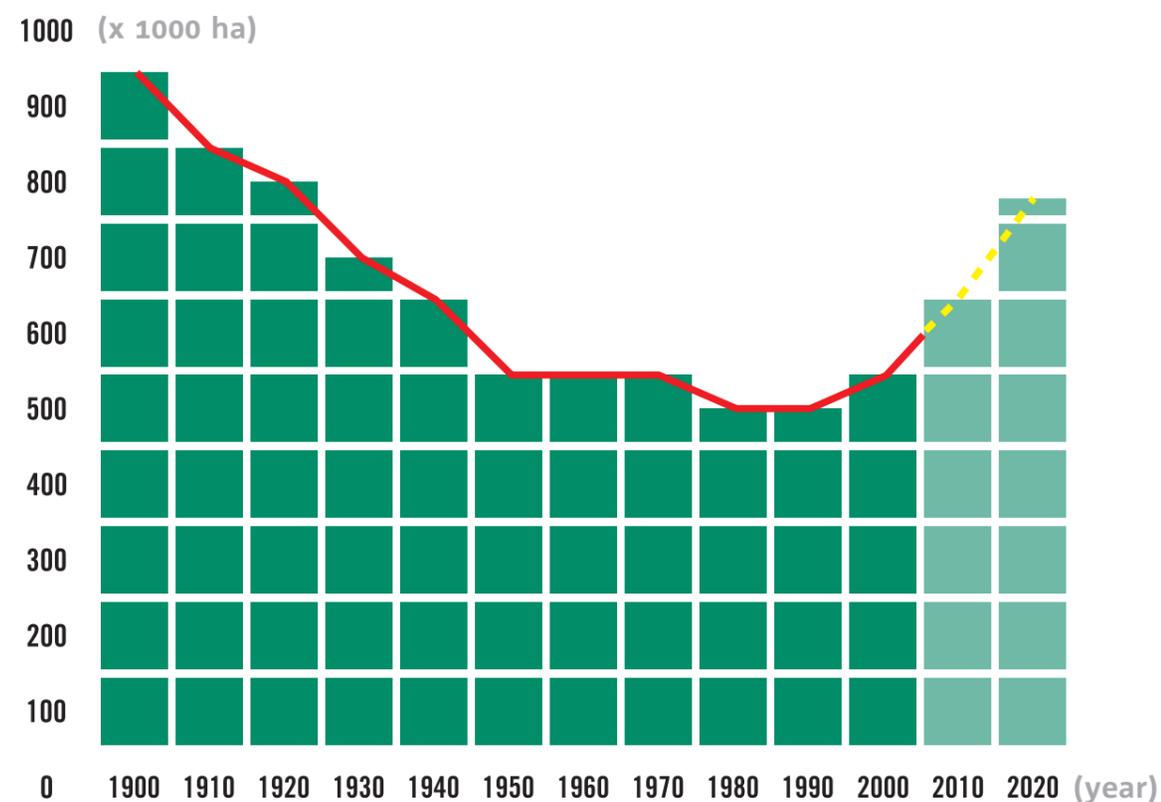
In a densely populated country as the Netherlands, space is a scarce commodity. We have 16 million people living, working and recreating in a small area – largely below sea level. At the same time we want to protect and maintain the biodiversity, also for generations to come.

## Fragmentation of the countryside and a deterioration of the countryside and environmental quality

Due to the large changes in land use since the start of the 20th century, the quality of nature in the Netherlands has deteriorated a great deal. The area of nature in the countryside has halved from around 900,000 ha in 1900 to 450,000 ha in 1990, see figure below. This is caused by the great pressure placed upon open spaces; initially primarily through agriculture and forestry. Over the last decades particularly the demands made by housing, work and infrastructure have taken their toll.

As a result, nature areas have become fragmented and damaged by environmental problems such as acidification, over-fertilisation, water depletion and soil pollution by, for example, heavy metals.

## Nature area in the Netherlands



In many cases there is no spatial coherence between the nature areas. The natural habitats of plants and animals are relatively small, located far from one another and often dissected by rail tracks, roads and waterways, which cause the areas to become increasingly isolated. What's more, small habitats suffer more from edge effects, which further deteriorates the quality of the habitat.

The demand for countryside has increased a great deal over the last few decades. In part due to a change in the ways in which people spend their leisure time, increased prosperity, urbanisation and an ageing population, there is an increasing demand for the countryside. The Dutch want to have accessible nature closer to their doorstep and therefore without barriers or borders. Nature to enjoy, to walk in and cycle through.

## Policy for nature

The social and political urgency to put an end to the deterioration of the countryside has been widely felt in the country. In 1990 the first edition of the national 'Nature Policy Plan' was set down by the government and approved by Parliament. In 2000 this policy plan was followed up by 'Nature for People, People for Nature', the policy document for nature, forest and landscape in the 21st century. In addition to the provinces and municipalities, various ministries are responsible for its execution. The main goal of the nature policy is to make "an essential contribution to a liveable and sustainable society through the conservation, restoration, development and sustainable use of nature and landscape." As a tool to achieve this goal the concept of the Ecologische Hoofdstructuur (EHS or National Ecological Network) was introduced.

## The solution to fragmentation and loss of quality: the National Ecological Network

The National Ecological Network is a spatially coherent network of existing and new nature areas that has to be developed and should be ready by 2018. The goal of the National Ecological Network is "the sustainable preservation, restoration and development of important national and international ecosystems". The National Ecological Network has to solve the problem of the fragmentation and quality loss of nature in the Netherlands. This is done in various ways:

- increasing the National Ecological Network area to approx. 730,000 ha of countryside (see figure, page 4);
- expanding the individual nature areas;
- restoring the environmental quality;
- creating coherence between nature areas by 'connecting' these areas.

## The objective

The objective of the National Ecological Network is in fact two-fold: to increase the carrying capacity of the nature areas (increasing the area and improving the quality of the natural habitats) and increasing the coherence, or connectivity, of the nature areas (density of the network and the permeability of the countryside).

On 23 April 2004 the government adopted the new National Spatial Strategy (Nota Ruimte). This policy document contains the main outlines of the national ecological policy in the field of spatial development. The figure on page 7 shows the map with the bordering National Ecological Network areas, and the robust connections.



## 2 The structure of the National Ecological Network and the desired results

### Form of the National Ecological Network

The National Ecological Network is composed of a coherent network of core areas, ecological development areas, preservation areas, connection zones and buffer zones.

- Core areas are large nature areas or a number of smaller areas linked together whose value is of national and international significance.
- Ecological development areas are those designed to increase (and reinforce) the existing core areas, but they can also grow so large that they develop into new core areas. Development areas may also develop into new core areas themselves. Examples may include former agricultural areas.
- Preservation areas are nature areas, often agricultural land, in private hands. These are lands under a management contract where farmers are mostly paid to work the land in an environmentally friendly way to protect the valuable flora and fauna on their land.
- Connection zones are areas or structures that enable the expansion, migration and exchange of plant and animal species between various core areas. These connections may take the form of interconnections or stepping-stones of varying sizes. Its form depends on the way in which (groups of) animals disperse. It also depends on the difference between the small and large animals and between “walking and flying”. See figure ‘development of ecological network’ on page 8.
- Buffer zones are areas situated around the core ecological areas to protect them against adverse external influences.

### Function of the National Ecological Network

The function of a coherent network of ecological core areas is to provide species with the opportunity for a sustainable existence and a safe haven in a relatively hostile environment. Species need a habitat that is sufficiently large. In highly fragmented areas such as in the Netherlands this is often not the case. By combining a number of habitats that are too small individually into an ecological network a strong whole can be produced where sustainable existence is possible as the small subpopulations maintain one another, just like businesses within a cooperative. At the same time it is important for many species to be able to migrate between these habitats in order to keep the populations healthy and resilient. This is important, for example, for reproduction as it promotes the genetic variation within the species. Also, should the conditions (temporarily) deteriorate in a particular habitat a species would be able to move to another suitable habitat and possibly return when conditions improve again. The exchange between areas is important for the preservation of the species. It is very important for the National Ecological Network that the system of areas and connections does actually function as a true network. This means that the animals and plants need suitable opportunities for migrating between the various constituent areas. This can be ensured by robust ecological connections.

Conditions that force species to migrate are, for example, land surface changes as a result of climate change, fires and other disasters. Due to changing climatic conditions species may develop an increasing need to relocate to other more suitable areas. Barriers such as roads, railway lines and canals will then have to be crossed. For this reason attention is being focused on the ‘defragmentation’ of the National Ecological Network. This is being done by constructing fauna passages, such as tunnels and ecoducts.

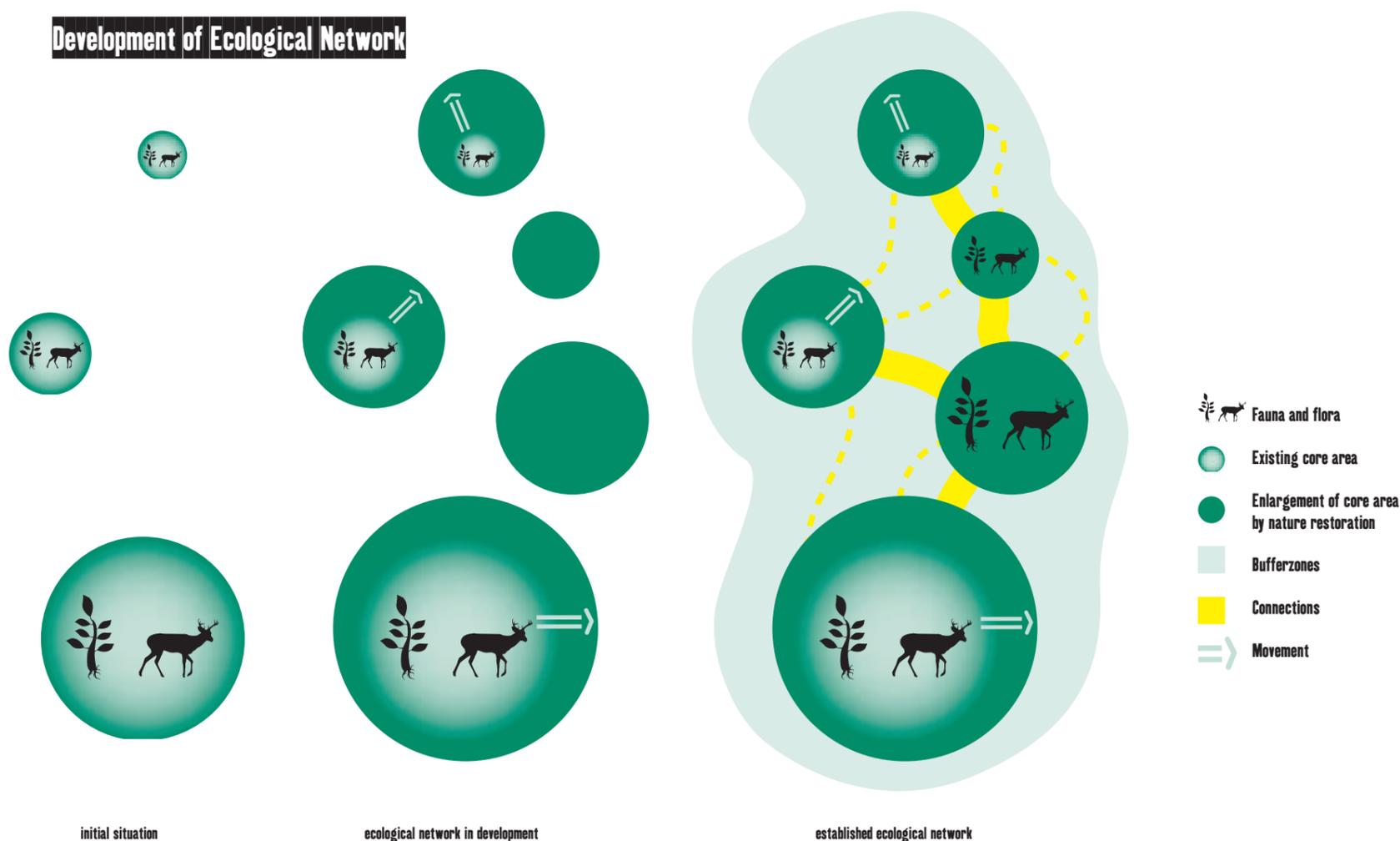
Making too many connections, however, can have adverse side-effects; some species thrive better in isolation. An example of this is the root vole, which exists as a rare subspecies in the Netherlands. This species is only able to exist in isolated patches where it can avoid competition from other rodents. This therefore places specific demands when designing ecological networks. Other aspects that require attention are the non-indigenous animals and plants and epidemics, which can spread more easily through the connections.

### National Ecological Network (EHS)

Source: National Spatial Strategy (Nota Ruimte)



## Development of Ecological Network



### >> Connection

Connecting habitats enables or facilitates the exchange of individuals between the individual habitats. In this way the local populations together form a population network. At species level connection zones consist of a system of (interconnected) nature elements and habitats (stepping stones and key areas), which promotes the exchange of one or more species. Connection is desirable particularly in the following situations:

- the landscape in between the habitats is unsuitable: exchange is impeded by barriers or land use.
- the surface area requirements of the species are not met, even when new nature has been created.
- the species are hardly or not at all present in the planning area and the chance of natural establishment from neighbouring populations is small.
- essential elements of the species' habitat are isolated from one another and are difficult to access.

Source: Alterra

### The envisaged results for 2018

In 2018 the National Ecological Network will eventually have to comprise approx. 730,000 ha of the countryside. The major part of this will consist of existing woodland and nature areas (approx. 450,000 ha). Nature areas that are to be developed, including the robust connections, will amount to approximately 280,000 ha.

The total National Ecological Network including the sea, consists of 6 million ha of wet natural sites: lakes, rivers, estuaries, the IJsselmeer and the Dutch areas of the Wadden Sea and the North Sea.

The management is aimed at developing nature objectives for the areas. A nature objective describes a particular quality in relation to nature and can be used as a verifiable target for a natural area. The provinces are responsible for the designation of the nature objectives. Once the desired nature objectives have been developed at the desired locations and the National Ecological Network is a coherent whole, the National Ecological Network will be complete.

### Multifunctional objectives

Sustainable preservation and restoration of nature and biodiversity are priorities, but they are not the only objectives of the National Ecological Network. Such a large claim for space in a densely populated country as the Netherlands can only be justified if it also provides a solution for other problems and needs. The National Ecological Network has multifunctional objectives by contributing towards:

- the realisation of a number of environmental objectives through the production of clean water, sustainable utilisation of raw materials (such as wood) and the absorption of CO<sub>2</sub>;
- the protection of important rural, cultural, cultural-historical, archaeological and geological values; fulfilling – under conditions – important recreational functions, soil-related sustainable agriculture and defence within the areas designated for these purposes, fishing and transport over water (depending on the specific nature objective and the degree of sustainability of the co-use);
- an attractive climate for living and for business locations by maintaining the qualities that are commonly desired (such as green space, tranquility and darkness);
- mental relaxation and mental public health in a country where many people work under “psychological” rather than physical pressure.

### Design requirements

The key issue in designing the National Ecological Network is finding a balance between the carrying capacity (quality of the habitat and area) and connectivity (density of the network and the permeability of the countryside). The correct balance depends on the objectives (the type of species) for an area that can be modified within the specific spatial context of a region. This can place high demands on the location of the various elements of the National Ecological Network and consequently on the design. External influences should be considered well in advance, as well as the opportunities and the risks that are brought about by co-use. The future management, and who is responsible for this, should be determined as well. In addition, attention has to be paid to disasters that may occur, such as the outbreak of contagious animal diseases. The design of the robust connections should therefore incorporate the possibility of temporarily closing off the routes, which can prevent the spread of such diseases. An example of a robust connection can be seen in the figure below.

### >> Ecoduct Woeste Hoeve – A50

This photo shows a good example of an ecoduct in its landscape, which consists of a number of biotopes: a flat part but also a north and south incline. It is actually a hill with several tunnels running through it. The ecological and climatological differences render such a robust connection suitable for plants and animals, which place different demands on their environment. Such an ecoduct can also be easily closed off by a fence in order to prevent possible contagious animal diseases spreading through migrating animals.



# 3 How was the realisation of the National Ecological Network initiated?

## Social participation in the execution

In 1990 the government started the development of the National Ecological Network. The government indicated how many hectares of National Ecological Network had to be realised and produced a provisional map of these areas. Subsequently the provinces were asked to indicate the exact boundaries of the National Ecological Network. For this they have entered into discussions with all the parties involved in their region, such as farmers, land owners, environmental organisations and local government.

Various local authorities help develop and execute the National Ecological Network, whilst the central government takes on a general guiding role. Other governmental bodies and local authorities are responsible for the details and the actual execution. The state (as well as the provinces) provide a large part of the funding of the National Ecological Network, take care of the preservation and development of diversity and indicate the national task allocation in terms of the kind of countryside. The provinces determine the borders of the National Ecological Network in provincial regional plans and indicate what type of nature is to be planned, where in consultation with the parties involved; in these consultations not only the area is considered but certainly also the quality. This double strategy therefore focuses on the quantity and on the correct ecological principles in order to realise a good National Ecological Network. The local councils execute the policy within the framework of the state and the province and at local level they contribute their own policy to this; it is they who determine the exact location of the National Ecological Network by setting this down at plot level in the zoning plans.

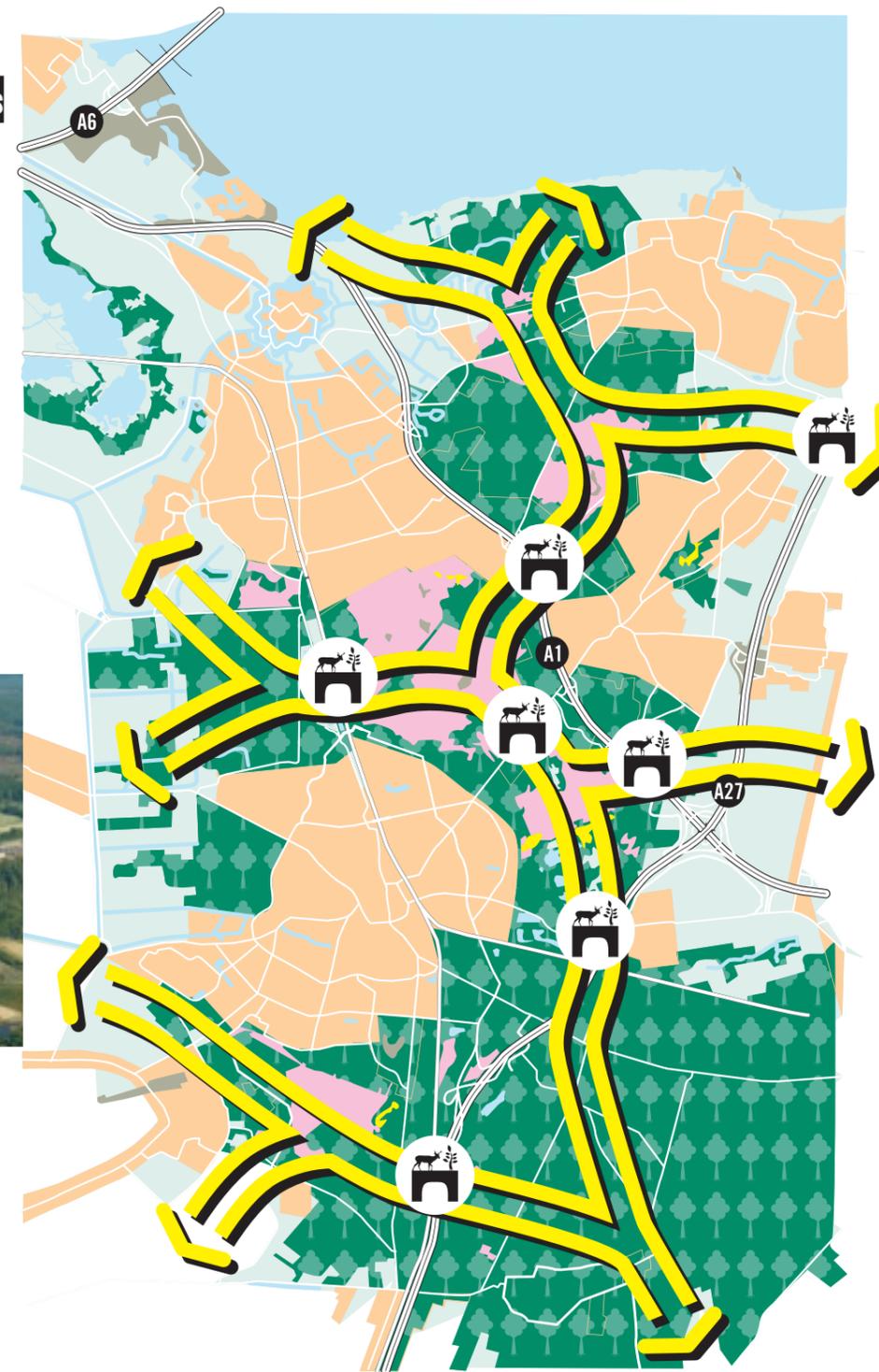
Managers of protected areas play an essential role in the management of the National Ecological Network, they make the areas accessible for recreation and increase the public support for the nature policy. Managers of protected areas vary from individual farmers for whom nature management is a sideline activity, to large organisations for which nature management is a central task, such as Staatsbosbeheer (National Forest Service in the Netherlands), Natuurmonumenten (Dutch Society for the Preservation of Nature) and the twelve provincial nature conservation societies (Union of Provincial Landscape Organisations). Through agricultural nature conservation, farmers are able to obtain extra financial resources in order to manage their land in a way conducive to the conservation of nature, providing their land is situated within the appropriate areas. Owners of country estates can also play an important role in nature and countryside conservation.

## The expansion of the National Ecological Network area takes place in two ways:

1. Protection of the existing nature areas and ecological development areas: (spatial) planning protection via the Spatial Planning Act and the Habitat Directive and Birds Directive.
2. Converting land with another function for the purpose of nature. This is often agricultural land. Until now this has mainly been done by the government buying land, which is then handed over to the nature conservation organisations. In 2004, a change in government policy introduced private management with the objective of realising a larger area of the National Ecological Network. In this, the land remains the property of the current owner, who converts the land for nature conservation purposes aided by government subsidies. These involve long-term contracts for the private managers and farmers. The objective is to acquire 60% of the part of the National Ecological Network that is still to be realised by the government buying and designing the land. The remaining 40% of the National Ecological Network will be realised by the subsidised management by private managers and farmers.



## Nature Bridges



### >> Financed by the government, businesses and private initiatives

This figure shows the development in the region Het Gooi where Het Goois Natuurreservaat (the Goois nature area Foundation) is working on an ecological network at regional level. The picture shows one of the Natuurbruggen (Nature Bridges) under construction. The bridge which lies across a secondary road, a railway line and shunting complex, has been financed by the government and businesses as well as through private initiatives.

# 4 Evaluation of the results after 10 years

From the evaluation that preceded the drafting of the policy document 'Nature for People, People for nature' (the second nature Policy Plan of the government) the Office for Environmental Assessment has drawn the following conclusions.

## Political and administrative success

The evaluation of the National Ecological Network in 2001 revealed that the concept of the National Ecological Network was well received: both by the various authorities (provinces, local councils) and nature organisations, as well as by other sectors such as transport, public housing and spatial planning. The execution of the National Ecological Network was (and is) in full swing. There are differences between each province as to the execution, but there is good co-ordination with respect to the main outlines and between the provinces. The National Ecological Network was a political and administrative success in 2004 as well. Despite the necessary cutbacks in the government budget Parliament has unanimously decided to continue with the execution of the National Ecological Network at the same pace. Realising the National Ecological Network by 2018 continues to be the objective (the budget remains as well).

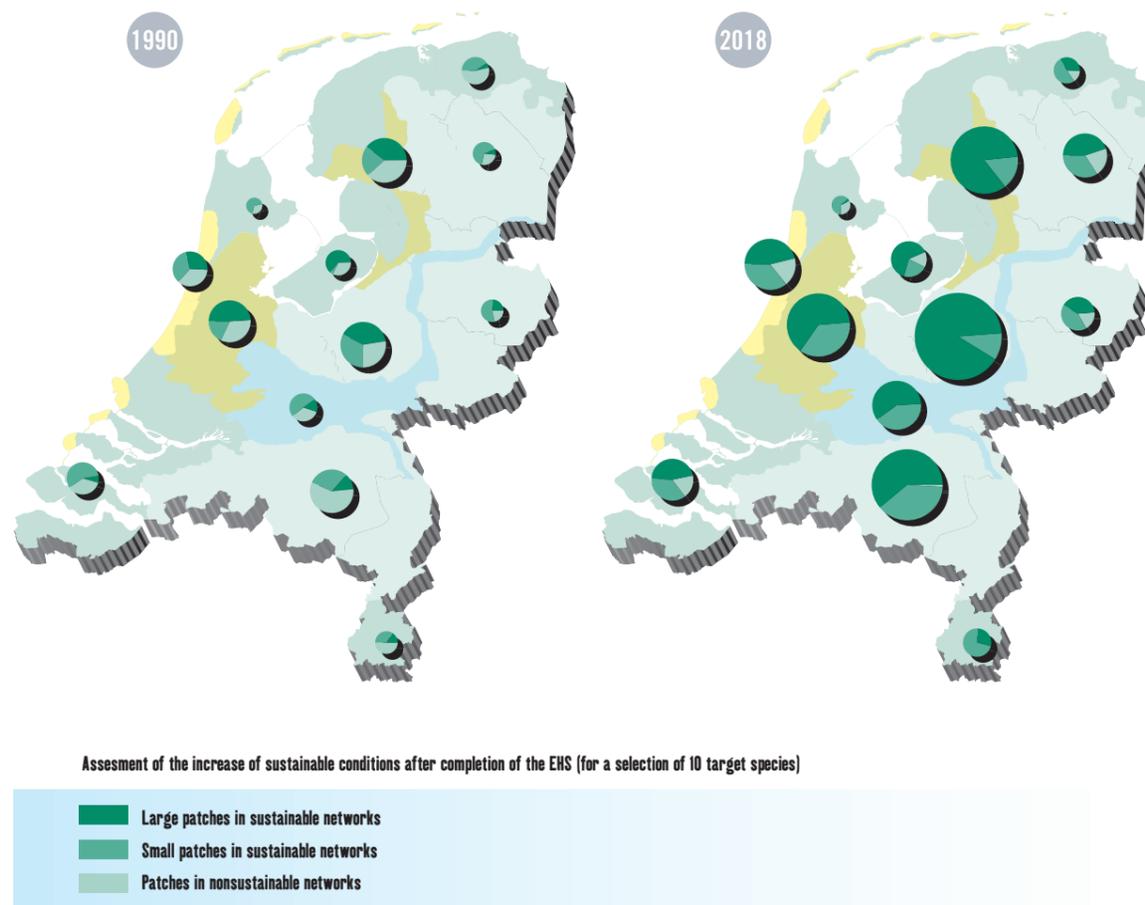
The success of the National Ecological Network has not only been based upon the qualitative results, but also on the political and administrative success. The National Ecological Network is very much in the minds of the politicians, administrators and public at large. This being the case, the National Ecological Network can help in restoring and developing nature in areas where there is considerable pressure on public open spaces is.

## Multifunctional use a success

The National Ecological Network remains accessible for multifunctional use. Depending on the sensitivity of the nature in a certain area, the areas can be available for other functions, such as recreation, shipping, extraction of sand and drinking water. Through careful planning and zoning these functions will take account of the nature objectives of the area. Examples include suspending certain activities during the breeding season and allowing catering facilities to only be located on the edge of, or outside of certain areas.

Meeting the requirements of nature while at the same time taking into account local people's wishes creates public support and willingness for third parties to invest in the areas. The general public, owners of country estates and businesses (particularly from the small-to-medium-sized businesses sector) are interested in this.

## Expected results



## Quantitative success and qualitative disappointments

### Increase area for nature:

Ten years of nature policy the evaluation carried out by the Office for Environmental Assessment (MNP - Milieu en Natuur Planbureau) in 1999 revealed that the concept of the National Ecological Network has been a success. For the first time in a long while, the total surface area of nature areas in the Netherlands has increased. Considering the National Ecological Network will have to be realised by 2018, the Netherlands are fairly well on schedule with regards to the conservation of existing nature areas and the development of new ones; this despite the fact that this requires a great deal of money, which is not always available in sufficient amounts.

### Reduction of the number of species:

The number of species, however, continues to decline, although the pace at which this is happening has slowed down during the last years. The nature quality has declined by some 45% since 1900. Environmental quality (particularly as a result of soil and water quality problems such as acidification, over-fertilisation as well as water quality problems such as water depletion) is still too low.

### Pace of realisation too slow:

The policy that has been carried out until now is not sufficient to realise the EHS on time and with sufficient quality. The pace at which the National Ecological Network is being realised continues to be under pressure due to the increasing land prices. On top of this the 'low-hanging' fruit has already been picked, which now leaves the land that is more difficult to acquire. In a number of cases the financial resources form a limiting factor.

### Insufficient coherence:

There is not enough spatial coherence between certain areas. In the period 1990-2000 too few truly large nature areas were created. The increase of the total surface area of Dutch nature areas (see figure on page 4) was largely due to the increase of smaller nature areas. In most cases where new nature areas are created, their interconnection is poor. What normally happens is that the new area is simply 'stuck on' to existing nature areas. Ecological connection zones are still hardly ever created and the ones that have been created tend to be rather small: they are not robust enough to be functional for less mobile species. Even for the more mobile species the design is often not sufficiently geared towards the possible requirements of a species for a connection zone to function well. What's more, infrastructural barriers are still rarely overcome. Therefore these frequently still form an obstacle for the interaction between subpopulations. This is mainly caused by the lack of specific instruments and financial resources.

## >> Prognosis of spatial quality

The Dutch knowledge institute Alterra has made a prognosis of the spatial quality of the habitat of a number of indicator species (large, medium-sized and small birds, large and small mammals, flying and crawling insects) for each physical-geographical region in The Netherlands. The figure in the centre shows a comparison of the situation in 1990 before the National Ecological Network began to be implemented with the situation when the National Ecological Network will be completed.

Circles that increase in size indicate that the surface area of the habitat has increased. Changes of colour from light to dark green indicate that the species are becoming more sustainable and consequently have a better chance of surviving and expanding. In this figure it has been assumed that the quality of the habitat is good (in terms of hydrology and nutrient status).

# 5 What are the five lessons learnt from the evaluation and what do these mean for the nature conservation policy?

## a. Increasing the area of National Ecological Network further

In order to realise the National Ecological Network by 2018 and to enhance the coherence within the National Ecological Network great efforts have to be made towards realising the surface area of the National Ecological Network (some 730,000 ha of land by 2018). In the years to come the strategy is aimed at further increasing the area of the National Ecological Network.

## b. Improving the quality of the National Ecological Network

The number of species is still declining, although the pace at which this is happening has slowed down. An impulse should be given with respect to the environmental conditions and the spatial coherence between the areas. Acidification and over-fertilisation in particular can be tackled more vigorously through instruments specifically designed for certain areas (for example, expanding the nature areas and developing buffer zones around them). The efforts against water depletion need to be intensified and require an a large-scale approach aimed at the entire water catchment, not just at individual sites. The benefits for the nature in the bordered National Ecological Network can be increased provided that specific measures are taken in each of the areas, while taking the entire water catchment into account.

## c. Maintaining pace of realisation

In addition to the government acquiring land for the organisations that manage large areas, the National Ecological Network can in part be realised by involving farmers and other private individuals (for example country estate owners) in the development and management of natural sites. The farmer remains owner of the land but in addition to being a farmer he would then be a manager of the natural site as well. The government provides the farmer with a subsidy for this management function. In addition, over the last few years the government has reserved extra financial resources for land acquisition because of the increased land prices. The present cabinet has also made more funds available in order to be able to complete the National Ecological Network by 2018. These extra funds are intended for land acquisition, design, management, defragmentation measures and for measures to combat water depletion in the nature areas.

## d. Creating more connections as a solution for the problem of too little coherence

The construction of robust connections i.e. covering a large surface area (often both in terms of width and length) is receiving priority over the smaller connections. In 2000 the policy document “Nature for People, People for Nature” was issued in which the policy was modified according to the evaluation. The ambition of this policy document is to proceed more vigorously with the realisation of the National Ecological Network. The spatial coherence – and therefore the functioning – of the National Ecological Network is enhanced by constructing boundaries in a smarter way and by realising green connections between and within nature areas. That is why on the one hand extra efforts are being made to create ‘green-blue pathways’ in the man-made landscape. This helps establish a coherent network of lines and flat elements in the landscape. On the other hand efforts are being made towards realising a number of robust connections between larger ecological core areas. The design phase is a very important stage in this process in order to convert the objectives (and the wishes) into the desired result.

### Ecological Network



## e. Creating robust connections has priority

Robust connections can either be green (terrestrial) or blue (aquatic). They connect nature areas that are spatially separated from one another and increase the spatial coherence at national level. This involves connections between comparable nature areas (ecosystems such as marshes, woodland and heath) or very dissimilar areas, for example transition areas from wet to dry or from oligotrophic to eutrophic. Examples of this are river valleys on sandy soil and the transition areas from dunes to peat marshes. Robust connections ensure that new nature areas are accessible and that areas where the species die out can be colonised once more. The connections also enable species to move to other regions (for example, in the event of climate change or disasters). The connections obtain their robustness through their area and form.

### Robust connections & Wet Axis



As the robust connections have to accommodate a very wide range of species (for example red deer, adders, otters and butterflies, but also birds) they should consist of wide zones with a mosaic of various types of habitats. To an increasing extent they have to form more or less complete ecosystems in themselves.

The robust connections will cover a total area of 27,000 ha (see figure on the left). The form and the size of the individual robust connections will vary from one another. Depending on the situation, a ‘corridor’ or ‘stepping stone’ may be required, or a combination of the two. In other words: the connections consist of smaller links and larger junctions (living habitats). For other species these links can also function as habitats.

Robust connections are part of the National Ecological Network and function as part of nature. They form a condition for the preservation of the biodiversity at national, regional and local levels. But they can also provide space for recreation, water management or water extraction. In addition they improve the landscape and the cultural-historical identity of an area. In 2003 governmental agreements were made between the Ministry of Agriculture, Nature Management and Fisheries and the provinces regarding the general locations, the area required, the pace of the realisation and the ecological ambitions of the 12 robust connections. The setting of accurate boundaries and the delivery of robust connections is a task of the provinces. In 2018 the robust connections, along with the rest of the National Ecological Network, should be complete. The defragmentation of all state infrastructures within the robust connections would then also be accomplished.

# 6 Examples of the National Ecological Network, robust connections and nature development in the region

## A great cultural feat

The aim is to realise the National Ecological Network by approximately 2018. It is a lengthy process, as it involves a large part of the Netherlands. Results, however, have already been observed after a relatively short period of time, for example in the Oostvaardersplassen and in the nature development areas along the large rivers. Just as in the days of the reclamation of the peat bogs and/or the construction of the dikes in the battle against the water, this involves a great cultural feat. It will take time but will result in a sustainable, liveable and characteristic Netherlands.

## Nature restoration: not all past interventions are irreversible

After 10 years of National Ecological Network policy, the various efforts can already be seen to produce results. It even proves possible to change back interventions that initially seemed impossible to reverse to the original situation, for example the recent decision to demolish an industrial site in the Renkum river valley. This is the first step towards the realisation of the Renkumse Poort, an ecological corridor from the Veluwe to the Rhine. Reversing interventions of the past, such as the demolition of an industrial site that was built in a river valley, conveys the important message that it is indeed possible to create high-quality nature in a densely populated country such as the Netherlands. The same applies to returning straight running rivers to the meandering form they once had, nature development in the river valleys (river forelands) and peat bogs, stopping military activities on military exercise terrains and air-fields, constructing ecoducts over motorways, etc. These all provide new opportunities to nature.

## Robust connection: the 'Wet Axis'

The 'Wet Axis' is a planned robust connection from the Lauwers Lake and the Dollard to the Zeeland Delta (see figure, page 15). The purpose of this connection is to increase the coherence between important international peat bogs. With the 'Wet Axis' some 11,000 ha of new natural wetland will be added to the ecological network as robust connections. The development of connected marshes, reed-lands and marsh woodlands creates opportunities for increasing the numbers of bitterns, otters and many other species.

The bittern is a species of bird that lives in large marsh areas. The larger part of the Dutch population of bitterns is to be found in the planned 'Wet Axis'. Although the Netherlands are internationally obliged to protect this species, the number of bitterns is dwindling. This is not because of a lack of suitable habitats.

Rather, this is because the bittern cannot make optimum use of the habitats as they are located too far from one another. In addition to increasing the natural value the 'Wet Axis' contributes towards the solution of the water quality problems, improvement of the landscape and the cultural-historical quality but also pro-vides opportunities for recreational use.

An example of an area that is currently being realised in the 'Wet Axis' is the Strategisch Groenproject De Venen (De Venen Strategic Green Project), an area of 33,000 ha, situated in the triangle of Amsterdam, Utrecht and Gouda. De Venen has two core ecological areas (Nieuwkoopse plassen en Vinkenveense plassen) which are enlarged by nature restoration and the realisation of preservation areas. This provides a solution for sustainable agriculture, nature and recreation.

The Renkumse Poort



## Robust connections as gradient: expanding habitat of red deer as guide species

The red deer is the largest wild mammal in the Netherlands. Its natural habitat includes woodlands of both the poorer, higher sandy areas, and the lower wet and nutrient richer grasslands of the river valleys, where more food is available. At present, however, the parts of its natural habitat that are rich in food are hardly accessible to the red deer. By realising robust connections between the Veluwe and the river valleys, the Oostvaardersplassen and the nature areas in Germany, various parts of the natural habitat would become interconnected and the gradient differences reinforced. There would then be sufficient food throughout the year, which would increase the survival rates of the present populations and the viability of these populations. Other species in the wake of the red deer would be able to benefit by this connection, species such as wild boar, roe deer and pine martens. Migrating species would be able to carry all sorts of seeds and eggs in their fur or feathers or on their hooves. In this way less mobile plant and animal species can benefit by a coherent ecological network as well.



## Intermezzo: nature development - from random processes to purposeful interventions

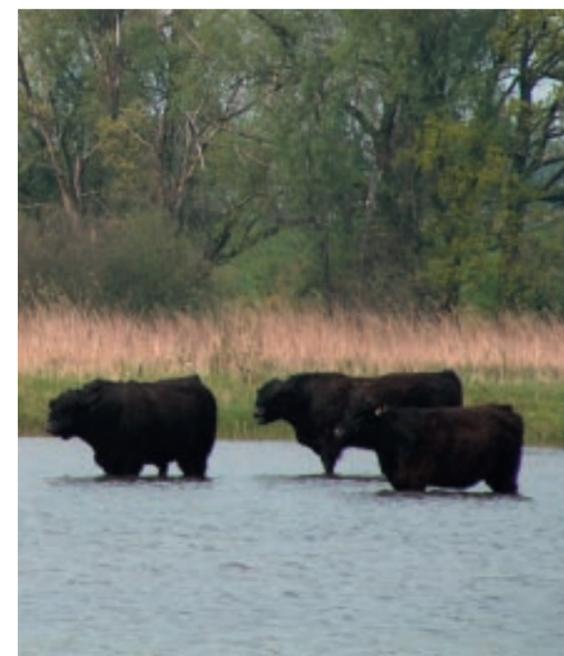
Nature development aims at creating new nature. It is not possible to protect nature merely by conservation and management, nature should also be given the opportunity to develop. This insight has been reinforced by a surprising event that started to take place in the Flevo polder during the eighties. In this polder, within a short period of time, the Oostvaardersplassen have developed into a wonderful natural site with an unprecedented wealth of bird life, although initially it was intended as an industrial area. The area now enjoys international recognition. It is quite remarkable how nature can create such wonderful new valuable ecological areas in just a short period of time.

Nature development in the Netherlands has already proven to be a successful instrument in the battle against the decline of nature. In theory this can be applied anywhere: in (former) agricultural areas, along rivers and in city parks.

## Opportunities

There are all sorts of new opportunities as well, such as co-operation with private managers, for example farmers. An example, although still in its infancy, is the creation of new country estates as stepping-stones in the National Ecological Network.

Another example is the co-operation with the Ministry of Transport, Public Works and Water Management. Better protection against high waters can be achieved by solutions such as providing the rivers with more space. This can very well be combined with nature development, for example the creation of ancillary channels that flow along with the river. In this way both the budget for river safety and the budget for the realisation of the National Ecological Network can be used for connectivity.



## Dutch Ecological Network in 2018

>> This map shows the Dutch ecological network, to be realised by 2018. As described in the National Policy Plan 'Nature for people, people for nature', the network will consist of core areas and robust connections. The ecological network is to be set up in co-operation with provincial authorities, local communities and a wide range of non-governmental organisations. The Natura 2000 areas in the Netherlands (Habitat Directive and Birds Directive areas) will to a large extent be part of the Dutch Ecological Network.



## 7 To what extent does the National Ecological Network connect with other ecological networks?

### Natura 2000 and the National Ecological Network

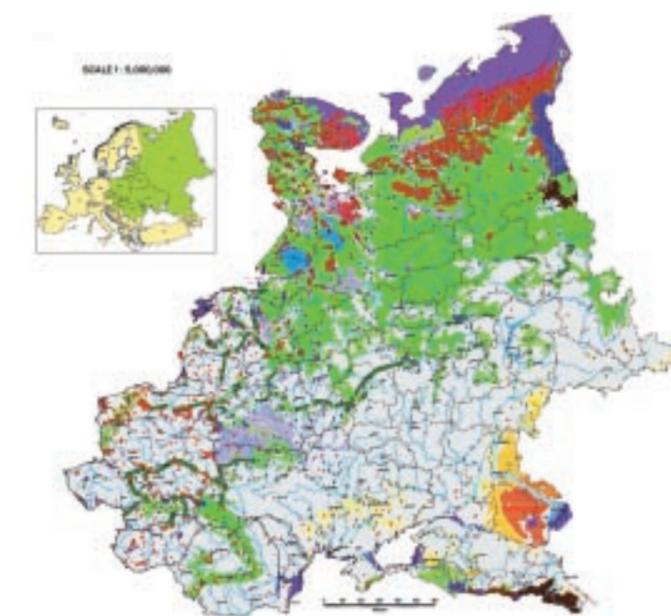
A large part of the National Ecological Network is designated or put forward as areas in accordance with the Habitat Directive and Birds Directive. In total 87 sites have been designated under the Birds Directive and 141 sites have been designated under the Habitats Directive. This involves approximately 1 million hectares, two-thirds of which consist of sea or large open expanses of water. The map on the opposite page shows the interconnections between the National Ecological Network, the robust connections and the Dutch contribution to Natura 2000. This clearly shows that the national efforts towards connecting the National Ecological Network and consequently creating a robust network, also contribute towards a more coherent Natura 2000 network.

### Relationship to international treaties

The National Ecological Network also helps fulfill international obligations such as the Convention for Biological Diversity (CBD), the Ramsar convention, the Bonn convention, the Bern convention and OSPAR. During the 7th Conference of Parties of the CBD (February 2004) a draft working programme of Protected Areas was agreed upon. An important objective of the programme is the integration into the wider landscape and into other sectors. This means that approaches have to be integrated with respect to the biodiversity policy within protected areas as well as outside of these areas. Within this working programme the importance of developing and implementing national and ecological networks and the like has been pointed out. The objective of the working programme of Protected Areas is a worldwide network of all the important biodiversity areas.

### Pan European Ecological Network

for Central & Eastern Europe



### Looking beyond national frontiers: Natura 2000 and Pan European Ecological Network

The National Ecological Network does not stop at the borders of the country. Connections with nature areas in Belgium and Germany are vital for the dispersion and migration of species. What applies at national level can be applied at international level as well: preventing the isolation of natural habitats. That is the reason why there is intensive co-operation with our neighbouring countries with respect to international marine areas (like the Wadden sea), rivers and nature parks. In addition, the connections between the habitats of migrating species constitute an important basis for co-operation with other European countries. Natura 2000 forms an important framework for this international co-operation. Furthermore, the National Ecological Network is in line with the Pan-European Ecological Network (PEEN) that has been developed in Central and Eastern Europe.

## 8 What are the challenges for the future?

### Responding to climate change

The realisation of the National Ecological Network has become even more urgent because of the climate changes that recently have become perceptible. The concept of the National Ecological Network that consists of large areas and robust connections can probably offset the consequences of these changes. Due to the changes in temperature and rainfall the climatic conditions for species are shifting from south to north in Europe. These consequences can already be perceived. Connections between the areas are necessary to enable species to follow these shifts. The chance of species becoming extinct will also increase because extreme weather conditions have become more frequent. Constructing a sufficient number of connection zones will ensure that the re-colonisation from other areas can continue.

### Increase multifunctionality

Nature does not exist for itself alone. An essential objective of the Dutch nature policy is to bring nature and people together. In a densely populated Netherlands nature cannot exist without the input of man, and man in turn cannot live without nature. For this reason, the countryside has been opened up for the walker, cyclist, horse rider and (quiet) water user wherever this is possible. New partnerships are also being examined, such as intensifying the co-operation with existing and candidate Member States to form building blocks for ecological connections.

### Increase quality of nature

Apart from the objective of a coherent ecological network, great efforts are being made towards improving the environmental quality. The Water Framework Directive, for example, is one of the instruments used to improve hydrology in the Netherlands, both qualitatively and quantitatively.

### Realising the maintenance objectives through good management

The Netherlands have a long tradition of nature conservation. Conservation is primarily the responsibility of the landowner. For protected nature areas these are usually nature protection organisations such as Staatsbosbeheer (National Forest service in the Netherlands), Natuurmonumenten (Dutch Society for the Preservation of Nature) and the twelve Provinciale Landschappen (Provincial Landscape Organisations).

The shift from less acquisition of nature areas towards more management by private parties will require a more intensive co-operation between the traditional nature protection organisations and the private managers. This shift in policy is a challenge for all the parties concerned, but it also offers opportunities for the individual parties to become more involved in the National Ecological Network. In this shift in policy, realising the desired nature quality remains a top priority.

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Since it all  
started in  
nature, he  
decided to  
nurture it.

Roger Brooks - English poet 1865

Colofon



agriculture, nature  
and food quality

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