The Research Institute for Nature and Forest (INBO) is the Flemish research and knowledge centre for nature, sustainable management and sustainable use. It carries out research and provides knowledge to all of those involved with governmental policy.

As a leading scientific institute, INBO primarily reports to the Flemish government, but it also provides information for international reports and deals with queries from local administrations. In addition, INBO supports organisations working for, amongst others, nature management, forestry, agriculture, hunting and fishing. INBO is part of national and European research networks and also communicates its results to the general public.

There are approximately 250 INBO staff, most of whom are scientists and technicians. In addition to its main office in Brussels, INBO has sites in Geraardsbergen, Groenendaal and Linkebeek.

INBO has reported biennially on the state of nature in Flanders since 1999. The report describes the state of nature through the integration of available datasets.

This report presents 21 Flemish biodiversity indicators according to the focal areas of the Convention on Biological Diversity and the EU biodiversity headline indicators, in order to track progress towards the achievement of the 2010 target.
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Responsible publisher:
Jurgen Tack

Citation:


D/2008/3241/251
INBO.M.2008.6

Printed on 100% recycled paper, produced from post-consumer waste and bleached without chlorine.

Cover photos: Yves Adams / Vildaphoto

The Nature report is available at www.inbo.be.
The complete set of biodiversity indicators is available at www.biodiversityindicators.be.
Biodiversity Indicators

2008

Myriam Dumortier, Luc De Bruyn, Maarten Hens, Johan Peymen, Anik Schneiders, Francis Turkelboom, Toon Van Daele and Wouter Van Reeth
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Executive summary

Flanders has endorsed the European objective to halt the loss of biodiversity by 2010. This report evaluates the present state of nature in Flanders by reporting on 21 biodiversity indicators which give the closest interpretation of the 26 European biodiversity indicators proposed by the European Environment Agency (European Environment Agency, 2007).

Components of biodiversity and integrity of ecosystems

Very specific habitats degrade to more common, usually nutrient-rich habitats. As a consequence, many rare species, restricted to these specific habitats, are declining. Examples are the species mentioned in the Annexes of the Habitats Directive. Many farmland species (e.g. Skylark) are also suffering from habitat loss. On the other hand, a number of common species such as Magpie and some alien species such as Black Cherry, are increasing. As a result, variation in biodiversity decreases. This process is called homogenisation. Freshwater biodiversity (e.g. fish, water plants) declined sharply during the last century, although a significant improvement has been noticed during the last decade (e.g. fish, dragonflies). After a decade of increase, numbers of overwintering waterfowl have started to decline, particularly along the Sea Scheldt. Numbers are dropping due to a decreased food supply as a result of improved water quality. As such, the decline is a part of the ecosystem restoration. Woodland birds have also fared better in recent times (e.g. woodpeckers).

Protected areas and sustainable management

Flemish nature policy, increasingly guided by European policy, includes a mix of instruments for the conservation and sustainable use of biodiversity. The Flemish Environmental Policy Plan (2003-2010) sets a number of targets for 2010. The reduction of nitrogen residues in agricultural soils and the uptake of agri-environmental schemes for field margins, pools, hedges and wooded banks are on track to meet those targets. The targets set for conservation management and the exceedance of the critical load for nitrogen are expected to be achieved during the next decade. Delays of several decades are predicted in meeting targets for reversing watercourse fragmentation and improvements in water quality. The area covered by agri-environmental schemes for species conservation seems to be static. Flanders has designated 7.5 % of its territory as Sites of Community Interest under the EU Habitats Directive. Conservation goals for these sites are now being set.

Threats to biodiversity

Protected areas are small and fragmented. Flemish agriculture is amongst the most productive in Europe, but it scores badly in terms of farmland biodiversity. Sprawling urbanisation and intensifying agriculture exacerbate the negative impact of habitat fragmentation. Nitrogen residues on arable land, atmospheric nitrogen deposition, and phosphorus concentrations in rivers are amongst the highest in Europe. Thanks to policy efforts, nitrogen and phosphorus emissions have decreased, although the decline has halted in recent years. Meanwhile, evidence that climate change is starting to affect nature in Flanders is mounting and the number of alien species in Flanders increases by 25 species per year.
Management of both these threats is particularly difficult given the global scale of the processes involved.

Footprint and public support
The consumption footprint of an average Flemish inhabitant is greater than our planet can offer everyone. Membership of nature related societies is increasing, although the number of visits to forests and natural areas is declining slightly.

An overall assessment of the 21 reported biodiversity indicators suggests that without extra interventions the loss of biodiversity in Flanders will not be halted by 2010. It is important to tackle the various negative influences more thoroughly (such as detrimental land use, nitrogen, phosphorus and greenhouse gas emissions and the import and export of species). Sufficiently large natural areas should be managed to achieve explicit nature goals, while outside those areas, a basic quality of nature should be maintained. The latter allows, amongst other things, for the dispersal of populations when habitats become unsuitable.
Introduction

In 2001 the European Union committed itself to halting the loss of biodiversity within its territory by 2010. In 2003 this target was accepted on a pan-European scale. In May 2006, the European Union reconfirmed this commitment (European Commission, 2006). The Flemish region adopted it as a long-term biodiversity objective in its Flemish Environmental Policy Plan (2003-2010). During the United Nations environmental summit in Johannesburg (2002), the participating countries agreed to significantly reduce the loss of biodiversity on a global scale by 2010.

In 2004, the SEBI 2010 process ('Streamlining European Biodiversity Indicators') was established to monitor progress towards the 2010 biodiversity objective. For that purpose, 16 'headline indicators' were developed. In 2007, a provisional set of 26 European biodiversity indicators was proposed by the European Environment Agency (European Environment Agency, 2007).

This report evaluates the status of biodiversity in Flanders by means of 21 biodiversity indicators, which are closely linked to the aforementioned 26 European biodiversity indicators. The set of 21 biodiversity indicators is used to evaluate the Flemish progress towards the 2010 target. For each indicator a description of relevant policy targets is given together with status, trends and, when data is available, an international comparison.

The 21 Flemish biodiversity indicators were originally described in the Nature Report 2007 (www.inbo.be), on the biodiversity indicators website (INBO, www.biodiversityindicators.be) and the environment indicators website (VMM, www.milieurapport.be). The original data sources are included in the back of the report, where currently available Flemish data for the proposed 26 European 2010 indicators is also presented.
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(*) Flemish biodiversity indicator is tuned to proposed European indicator.
**Flanders at a glance**

Ongoing state reforms over the last 35 years have transformed Belgium into a federal state, giving its three regions increasing responsibilities. Flanders, Wallonia and Brussels have their own governments, parliaments and administrations. Nature conservation and forest management have been a regional responsibility since 1988. Major milestones have been the Decree on Forests in 1991 and the Decree on Nature Conservation in 1997. Their goals were further elaborated in the 1997-2001 and 2003-2010 Flemish Environmental Policy Plans.

Flanders is a densely populated and economically very active region. Nearly a quarter of the area is urbanised and about half of its surface is occupied by agriculture. The Flemish landscape is the most fragmented in Europe.

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Flanders is located in the Western European lowland and belongs almost entirely to the Atlantic biogeographic region. The only exception is the far eastern area of Flanders, which belongs to the Continental biogeographic region. Flanders has 65 kms of seashore. There are coastal dunes, alluvial clay soils in the coastal Polders and along the Sea Scheldt, and sandy soils upstream in the Pleistocene river valleys and in the Campine region in the east. In the south of Flanders, the landscape is undulating and the soils are loamy and increasingly calcareous towards the south east. The altitude ranges from a few meters above sea-level in the Polders to 288 m above sea-level in the south-eastern exclave. The Scheldt basin covers the major part of Flanders. The Meuse is a gravel river in the east.

Approximately 40 000 indigenous plant and animal species are found in Flanders, of which 1 % are vertebrates, 75 % invertebrates, 8 % vascular plants, mosses and lichens, and 16 % fungi.
Major land uses in Flanders (year 2000).

Ecoregions and main rivers in Flanders
Trends in the abundance and distribution of selected species

1 Common breeding birds

The European common breeding bird index describes the trend for a selection of European common breeding birds based on monitoring in the member states. There are three subcategories: farmland birds, woodland birds and other common birds, usually generalist species.

Farmland birds in Flanders declined markedly during the last decade (e.g. Skylark, Barn Swallow) due to intensification and scale consolidation of agriculture, while the state of woodland birds improved (e.g. woodpeckers). The latter might be explained by several factors, such as increased afforestation, a more natural composition and structure of woodlands and forests, and the maturing of trees. Other common birds, usually generalists, have also shown an overall increase (e.g. Magpie and Carrion Crow).

Farmland birds declined to a greater degree in Flanders than in the surrounding countries and woodland birds increased to a lesser extent than in The Netherlands and the United Kingdom, although still by more than in Wallonia. There, woodland birds have declined. Other common bird species fared better in Flanders and the United Kingdom than in The Netherlands and Wallonia.
2 Grassland butterflies

The European butterfly index describes a number of butterfly populations in several European countries based on a standardised monitoring system.

The Flemish data show a fluctuating pattern. In 2004, the index reached the same level as during 1992, the initial year of recording. Some species such as Small Heath and Small Copper show strong fluctuations. Small Copper and Orange Tip show an increasing trend, while Small Heath and Meadow Brown have remained more or less stable. Large Skipper, Common Blue and Wall Brown all declined, especially during the period 1992 to 1999 (-70 %), but subsequently they have stabilised (slight improvement for Common Blue).
3 Overwintering waterfowl

The overwintering waterfowl index describes the number of overwintering waterfowl based on 6 mid-monthly surveys.

The abundance of waterfowl increased fivefold between the winter of 1991-1992 and the winter of 2002-2003, but declined again afterwards. The spectacular increase took place all over north-western Europe. Possible causes were better protection of the species (reduced hunting) and their habitat (protection of wetlands), increased food availability (as a result of eutrophication), but also a north-western shift of south-eastern populations.

The recent Flemish decline is a consequence of various factors. In a number of important areas the carrying capacity has been reached and numbers have stabilised or even dropped (e.g. ducks in Bourgoyen-Össemeersen or geese in Oostkustpolders). Along the Sea Scheldt, numbers declined considerably due to changes in the food supply as a result of improved water quality. During the past years, flooding in the IJzer valley decreased, also affecting waterfowl. The drop in Greylag Goose numbers is possibly a result of hunting and other population control measures.
4 Species status

The status of a species is based on the categories defined by the International Union for the Conservation of Nature (IUCN). Red List species belong to the categories ‘Critically Endangered’, ‘Endangered’ and ‘Vulnerable’. Knowledge of the status of species in Flanders is strongly biased towards vertebrates and vascular plants, and the status is known for 100 % and 58-70 % of the species respectively. Fungi (10 %) and invertebrates (5-6 %) are hardly documented. The present Flemish indicator is based on the Red Lists of Mammals, Breeding Birds, Reptiles, Amphibians, Fish, Spiders, Butterflies, Dragonflies, Carabids, Grasshoppers, Crickets and Locusts, Water Bugs, Ants, Dolichopodids, Empidids, Vascular Plants and Macrofungi.

Of the 3479 documented species, 228 became locally extinct during the last century. A total of 981 species (28 %) are on the Red List and are vulnerable to extinction if necessary measures are not taken. These species are generally dependent on specific, often nutrient poor habitats. Species associated with farmland are increasing appearing on the Red List.
5 Conservation status of species of European interest

The main goal of the Habitats Directive is to maintain a ‘favourable’ conservation status of selected species. These species are assumed to be threatened and Europe has an important role in their global conservation. Generally these are species living in specific habitats. The evaluation of their conservation status is based on four criteria set down by Europe. These are the population of the species, its distribution, the state of its habitat and its future prospects.

Slightly more than one quarter of the species (16 species, 27 %) have a favourable conservation status. For 12 species (20 %) the conservation status is inadequate and for 22 species (37 %) the status is poor. For nine species there was insufficient data to evaluate the status. The status of aquatic species gives the greatest cause for concern, with only one of the 10 species being considered as having a favourable status. Water pollution and eutrophication are the main threats reported for most species.
The main goal of the Habitats Directive is to maintain a ‘favourable’ conservation status of selected habitats. These habitats are assumed to be threatened and Europe has an important role in their global conservation. Generally they are very specific habitats. The evaluation of the conservation status is based on four criteria set down by Europe. These are the area of the habitat, its distribution, its quality and its future prospects.

Three-quarters of the habitats (37 habitats) are of poor conservation status and 15% (7 habitats) have an inadequate conservation status. The latter comprise two peat and marsh habitats, one heathland, two grassland and two woodland habitats. Consequently, only two habitats have a favourable conservation status, these being one saline habitat (Mudflats and sandflats not covered by seawater at low tide) and one coastal dune habitat (Dunes with Sea Buckthorn). All aquatic habitats are of a poor conservation status. Water and air pollution pose the most serious threats for most habitats.
7 Area with conservation management

The Flemish Environmental Policy Plan (2003–2010) targeted 50,000 ha with active conservation management by 2007. These areas include the officially recognised nature and forest reserves managed by non-governmental organisations, local authorities or private owners, the nature and forest reserves managed by the Flemish government and the military sites mainly managed for conservation. A method of quantifying the effectiveness of this conservation management is still under development. It is clear that biodiversity within these areas is much higher than outside of them.

At the start of the planning period (end 2002) the area with conservation management covered 29,480 ha, or 59% of the target. By the end of 2007, 39,365 ha, or 79% of the target had been reached. Nearly half of the increase was achieved via recognised nature reserves which are managed by non-governmental organisations. If the present trend continues, the target will be achieved by 2013. However, if the decline in funds for nature acquisition continues, there will be a further delay.

At the end of 2007, 6,008 ha had been designated by the Flemish government as Flemish nature reserve and was managed by the Agency for Nature and Forest. A further 12,626 ha was officially recognised and funded as nature reserve and managed by non-governmental organisations. In addition, there are 2,554 ha of forest reserves, 2,305 ha of which are owned by the Agency for Nature and Forest (designated as forest reserves) and 249 ha owned by local authorities and private owners (officially recognised forest reserves). The Agency for Nature and Forest also manages about 10,200 ha of military land, with a nature protocol agreed with the federal government. Both the Agency for Nature and Forest and non-governmental organisations own and/or manage natural areas which are not officially recognised as nature reserves but are managed in a similar way.
Coverage of protected areas

8 Sites designated under the EU Habitats and Birds Directives

The goal of the Birds and Habitats Directives is to protect a number of species and habitats which are threatened and for which Europe has an important role in their global conservation. To achieve this goal, the European ecological network ‘Natura 2000’ is being delineated. It consists of areas designated according to the Birds Directive (Special Protection Areas) and the Habitats Directive (Sites of Community Interest). The Sites of Community Interest still have to be designated as Special Areas of Conservation.

In Flanders, 24 Special Protection Areas have been designated with a total area of 98,423 ha, or 7.3% of the Flemish territory. There were 38 sites designated and put on the list of Sites of Community Interest by the European Commission. The Sites of Community Interest have a total area of 104,888 ha, or 7.8% of the Flemish territory. The total Natura 2000 area comprises 166,187 ha (12.3% of the Flemish terrestrial area). Marine areas are not included, as they are under the jurisdiction of the Belgian federal government. In 2008, there was a limited increase in the Sites of Community Interest, when the main channel of the Sea Scheldt and Uzer were included. This was on request of the European Commission. An international comparison shows that 12.3% is low in comparison to the European average, but high when compared to neighbouring densely populated regions.
Coverage of protected areas

9 Critical load exceedance for nitrogen

Eutrophication has been one of the most important factors influencing biodiversity during the last century. The critical load exceedance for nitrogen indicates the potential disturbance by atmospheric nitrogen deposition. The critical load is the maximum deposition level that, based on current understanding, does not adversely affect biodiversity in the long term. Ecosystems which are sensitive to nitrogen such as forests, heathland and species rich grasslands are characterised by a low critical load. The Flemish Environmental Policy Plan (2003-2010) aims to reduce nitrogen deposition to levels below the critical load by 2030. This is a prerequisite for conserving nitrogen sensitive ecosystems. Nitrogen deposition should be monitored in conjunction with the state of the nitrogen sensitive biodiversity.

Atmospheric deposition of nitrogen in Flanders amounted to an average of 37.0 kg N/ha in 2006, a reduction of 33 % compared to 1990. In 2006, nitrogen deposition exceeded the critical load in 100 % of forest, 100 % of heathland and 68 % of species rich grassland areas. Together, this amounts to 91 % of the nitrogen sensitive areas. The exceedance in 2006 averaged 17.6 kg N/ha. The mean exceedance is highest in forests (+23.4 kg N/ha in 2006), followed by heathlands and species rich grasslands (+13.4 and +5.8 kg N/ha respectively in 2006). The exceedance of the critical loads in Flanders is one of the highest in Europe (European Environment Agency, 2005).

The average exceedance of the critical load has been decreasing since 1999 (trend 2000-2006: -1.7 kg N/ha/year). If this trend continues, there will be on average no more exceedance of the critical load by 2016.
10 Alien species

Due to the increasing mobility of humans and goods, more and more plant and animal species are - deliberately or otherwise - imported and exported. Imported alien species can become invasive in nature and pose an increasing threat to the indigenous biodiversity. The rising number of alien species increases the risk of problematic invasive species. An indicator for the damage caused by invasive alien species is still to be developed.

Between 1900 and 2007, about 900 alien plant species appeared in the Flemish countryside. Nearly 400 established permanent populations. The number of alien species increases exponentially. Whether these species will disappear or spread far beyond their place of introduction, is unknown at the moment. Between 1900 and 2007, about 80 alien animal species established permanent populations in the countryside. During the last five years, the number of alien plant and animal species has increased by more than 25 per year in Flanders. The cost of controlling invasive species (e.g. Black Cherry and Canada Goose) is high.
Impact of climate change on biodiversity

**11 Southern-European dragonflies**

There is increasing evidence that climate change affects nature in Flanders. The arrival date of migratory birds and the first appearance of butterflies and dragonflies in spring is advancing.

Not only the phenology, but also the geographical range of species is changing. Southern species are expanding northwards. Some southern European dragonflies are increasingly observed in Flanders. The number reported in 2006 was the highest since the start of recorded observations. Some species that were only occasional visitors in the past, such as the Migrant Spreadwing (Lestes barbarus), now have permanent populations.

**Since some species adapt better than others, there is a risk of changes in the foodweb and/or ecological cohesion of ecosystems.** This is illustrated by the Pied Flycatcher. The arrival date of this migratory species advances more slowly than the period of occurrence of the main food for its young, the caterpillars of the Winter Moth. This is a possible cause of the decline of this woodland bird.

![Observations of dragonflies and damselflies from southern Europe.](image)
12 Defragmentation of rivers

Fragmentation of watercourses by weirs and sluices, together with the degradation of water and habitat quality, is an important problem for the conservation of aquatic species, in particular fish. In 1996, Benelux countries announced their intention of achieving free fish migration in all water catchments by 2010. The Flemish Environmental Policy Plan (2003-2010) aims to achieve free fish migration within a priority network of 3000 km that comprises the most important breeding sites and migration routes.

An evaluation of the Benelux situation shows that restoration is in progress, but far too slowly to achieve the 2010 target. A postponement to 2015 (90%) and 2021 (100%) is under preparation, synchronising the target with the European Water Framework Directive.

By the end of 2007, 116 of the 796 barriers (15%) along this network had been dealt with. If the present trend continues, the fish migration barriers on the priority network will be removed by 2047, far later than 2015. Obstacles to a swifter achievement are lack of budget and work force and social complications. Meanwhile, migratory fish species are recovering slightly, probably as a result of improving water quality (see next indicator).
13 Phosphorus concentrations in rivers

According to the European Water Framework Directive a "good ecological status" should be achieved in all natural surface waters by 2015. Sufficiently low phosphorus concentrations are an important precondition for obtaining this status. In accordance with the Water Framework Directive, two target values for phosphorus have been set for each Flemish river type: one to obtain very good ecological conditions, and another to obtain good ecological conditions. These targets are a prerequisite for the recovery of aquatic communities. The indicator reports on the share of survey points where these standards are achieved.

An increase in water purification capacity and the introduction of low-phosphate detergents at the beginning of the 1990s resulted in improvements which have not continued since 1998. Subsequent variation correlates with fluctuating precipitation levels. In 2007, 22 % of the survey points achieved a good or very good ecological state. At the moment, several policy instruments (construction of buffer zones, additional water purification, erosion and fertiliser control, agri-environment schemes) are being implemented. To achieve the target (100 % in 2015) significantly stronger measures on a larger scale will be needed. The phosphorus concentrations in Flemish rivers are among the highest in Europe (European Environment Agency 2001, 2008).

In the mean time, a number of species from running waters responded positively to the improved oxygen concentrations (e.g. some dragonflies and fish species). Localities with a pristine water quality however, are still difficult to protect and very difficult to expand, e.g. due to phosphorus pressure in nutrient poor brooks. Therefore, the risk of further deterioration of vulnerable water habitats and species remains high (e.g. Floating Water-plantain).
A forest management plan is important in order to achieve sustainable forestry. The Flemish Forest Decree allows two types of management plan: limited and extensive. Limited management plans need to comply with only minimum standards, while extensive management plans need to comply with the criteria for sustainable forest management. These approximately follow the guidelines of the Forest Stewardship Council (FSC), whose certificate can then be easily obtained.

Forest management plans are by decree compulsory for all forests larger than 5 ha. Private owners are offered the choice between limited and extensive management plans, whereas extensive management plans are compulsory for public forests. They are also compulsory for private forests located within certain nature oriented land use planning areas. The other private owners are encouraged to develop extensive management plans through grants and forest owner groups.

Between 1990 and 2006, 42,190 ha of forest management plans were approved (13,958 ha extensive and 28,232 ha limited). Around 29% of the 150,000 ha of Flemish forest area is now covered by approved management plans. At the moment, there is no data available to evaluate the effectiveness of forest management. An analysis shows that limited forest management plans gradually increase their attention towards the ecological functions of forests. **As the total forest area is three times the size of the area with conservation management, forest management plans are an important tool for maintaining biodiversity.**

![Graph showing cumulative area of limited and extensive forest management plans from 1990 to 2006.](image)
Area of forest, farmland, fishery and aquaculture ecosystems with sustainable management

15 Agriculture: Nitrogen residue in agricultural soils

The nitrogen (N) balance of agricultural soils is calculated as the difference between nitrogen input (fertilisers, atmospheric deposition, biological nitrogen fixation, seeds) and nitrogen output (plant nutrient uptake, ammonia emission from soil and fertiliser and other emissions to the environment passing through the farmland soil). The emissions through the soil (N accumulation in soil, N losses from soil to water) constitute the nitrogen residue, an indicator for the loss of nitrogen from agricultural soils to the environment. The transfer of N from soil to surface water and ground water increases with increased soil nitrogen residue. High N residues also lead to eutrophication of agricultural soils. The 2010 target in the Flemish Environmental Policy Plan (2003-2010) is 70 kg N/ha.

The nitrogen residue decreased by 57% between 1990 and 2006 due to reduced livestock numbers, reduced chemical fertiliser use, increased processing of animal manure, increased feeding efficiency and an increased N uptake and removal associated with yield increases. In 2006 the total N residue in Flanders amounted to 54 million kg N, or 87 kg N/ha, excluding ammonia emissions. This is 11 million kg N or 17 kg N/ha short of the target. If the measures proposed in the third Manure Action Plan (from 2007 onwards) enable the same progress, the target should be achieved by 2010.

The current nitrogen residues in Flemish agricultural soils, as well as the ammonia emissions from agricultural land use, are among the highest in Europe (European Environment Agency, 2005).
Area of forest, farmland, fishery and aquaculture ecosystems with sustainable management

16 Agriculture: Area of high nature value farmland

Extensive agricultural land use in the past has shaped a variety of our characteristic, rare or European important habitats for plants and animals. Intensification and specialisation of agricultural practices have lead to habitat loss in agricultural landscapes and to the abandoning of agricultural land. In 2006 Flemish farmland (675,757 ha of registered parcels) contained 3,200 ha (0.47 %) of biologically very valuable parcels, 12,000 ha (1.8 %) comprising a mix of biologically very valuable and valuable parcels and 34,300 ha (5.1 %) of biologically valuable parcels. This farmland with high nature value is highly fragmented and spread out all over Flanders, with locally high densities in the coastal polders and in the IJzer valley. The area of biologically very valuable parcels mainly consists of small landscape elements such as hedges, ponds and tree rows (30 %), grasslands (30 %) and forests (26 %). Together these elements shape a varied, species rich, historically evolved cultural farmland landscape.

Based on the Corine geodataset, the European Environment Agency has identified about 1 % of Belgian agricultural land as high in nature value. **Belgium possesses the most nature poor farmland of all EU-15 countries.** The fact that only 0.47 % of the Flemish farmland area is biologically very valuable, is consistent with this study.
17 Agriculture: Area with agri-environmental measures that support biodiversity

In the framework of the Flemish programmes for rural development (2000-2006, 2007-2013), farmers get the opportunity to sign up for agri-environmental schemes, in which they commit themselves to do more for the environment, nature and the landscape than is legally required. The Flemish Environmental Policy Plan (2003-2010) aims to have 16 750 ha of agricultural land under agri-environmental schemes by 2010.

Because of a delayed legislative action, hardly any new schemes were installed in 2007.

**Schemes for field margin management and for the management of small landscape elements** (pools, hedges, wooded banks), which aim to strengthen the ecological infrastructure in farmland areas, **have been widely adopted by farmers**. At the end 2007, 1 236 ha of field margins (4.9 times the target) had been installed and schemes for 81.7 ha of wooded banks and 179 km of hedges were in place (60 % of the target).

**The agri-environmental schemes aimed at the development, conservation and restoration of specific farmland species and communities have been far less successful.** By the end of 2007 only 37 % of the intended 1 500 ha for species protection (meadow birds and Common Hamster) and 29 % of the intended 6 000 ha for botanical grassland management had been realised.

Information to evaluate the ecological effectiveness of the agri-environmental schemes and their management prescriptions is lacking due to the absence of appropriate monitoring.
18 Agriculture: Area under organic farming

Organic farming focuses on renewable resources and natural systems to prevent or control pests and diseases of crops and livestock. Synthetic pesticides, chemical fertilisers, antibiotics and genetic modification are banned. Organic farming contributes to the conservation of ecosystems, usually harbours higher biodiversity and has a lower environmental impact than traditional agricultural practices.

The area under organic farming increased from 640 ha in 1994 to 4 026 ha in 2001. However, between 2002 and 2005 the total area and the number of organic farms decreased noticeably. In 2006 this trend was halted with a slight increase in the organically farmed area to 3 836 ha in 2007. This area corresponds to about 0.62 % of the total farmland area in Flanders. Several socio-economic factors underpin the stagnation since 2000. Firstly, biological farmers have experienced difficulties in marketing their products. Secondly, traditional farming organisations erroneously uphold the idea that organic farming is technically and economically less sustainable. The stagnation of organic farming in Flanders since 2001 sharply contrasts with the strong increase in organically farmed area elsewhere in the EU-15, where organic farms comprised about 4 % of the total farmland area in 2005.

Since mid 2008, the Flemish government is seeking to stimulate organic farming with a new action plan aimed at achieving noticeable growth.
In order to produce renewable natural resources, biologically productive land is required: e.g. farmland for crops and livestock, forest land for wood, and water bodies for fish. The ecological footprint of renewable natural resources consumption of a certain region is defined as the area of biologically productive land which is required to fulfil these consumption needs. The ecological footprint of renewable natural resources consumption is measured in "universal hectares", which refers to the world average biological productivity of one hectare. On a global scale, there are 1.8 universal hectares of biologically productive land available per person (1999 data). This means that on average, the land required to produce all the renewable natural resources and energy needs for one person should not exceed 1.8 ha.

In 2002, the ecological footprint for renewable natural resources in Flanders was on average 1.94 universal hectares per person, excluding energy consumption. Since on average, only 1.8 universal hectares of biologically productive area is available per person, it is clear that each Flemish inhabitant requires more than the average available area per person on the globe. Under these conditions, halting the loss of biodiversity becomes a difficult task. At the moment, 59% of the area necessary to satisfy Flemish consumption is located abroad. This applies mainly to farmland producing energy-rich feed crops for Flemish livestock. As such, the environmental pressure caused by the Flemish region is partly exported. The only change between 1993 and 2002 was a reduced pressure on forest resources thanks to an increased recycling of paper fibre.
According to Flemish Nature policy, access to nature and forest areas is considered as a stimulating measure in order to increase public support for nature and forest. The Flemish Government Agreement (2004-2009) pleads for an increased public accessibility of nature and forest areas. The annual survey of the Flemish Government monitors public visits in forest and natural areas (Beyst & Pickery, 2006).

Within a sample of 1500 people, 60% visit a forest or natural area at least several times a year. **Over the last ten years, the frequency of visits has decreased slightly, especially for the frequent visitors.** The proportion of people that never visit forests or natural areas is also increasing. The Flemish Government is preparing a new resolution with which to harmonise the regulations for public accessibility of forests and nature reserves. Where public access is allowed, land managers must try to reconcile the needs of the public with the ecological carrying capacity of the visited areas.
Public attitudes and participation

21 Membership of nature organisations

The size of membership of nature organisations is considered a good indicator of public interest in nature and of support for nature conservation in Flanders. However, this indicator is also influenced by the policy of these organisations.

Membership of the nature organisations which are active within Flemish territory, shows a mixed picture. The membership of Natuurpunt, WWF and Bird Protection is steadily increasing, while Greenpeace and JNM (Youth organisation for Nature and Environment) have recently lost members. Given the considerable growth of Natuurpunt, the number of Flemish households which are members of a nature organisation appears to be increasing.

‘Natuurpunt’ was established in 2002 when two local non-governmental organisations decided to join forces (‘Natuurreservaten’ and ‘De Wielewaal’). Since then, its membership has steadily increased and in 2007 Natuurpunt reached 73,000 members (or 2.8 % of Flemish households).
### European headline indicators
1. Trends in the abundance and distribution of selected species
2. Change in status of threatened and/or protected species
3. Trends in extent of selected biomes, ecosystems and habitats
4. Coverage of protected areas
5. Nitrogen deposition
6. Trends in invasive alien species
7. Impact of climate change on biodiversity
8. Connectivity/fragmentation of ecosystems
9. Water quality in aquatic ecosystems
10. Area of forest, farmland, fishery and aquaculture ecosystems under sustainable management

### 21 Flemish biodiversity indicators
1. Common breeding birds (*)
2. Grassland butterflies (*)
3. Overwintering water bird index
4. Species status
5. Conservation status of species of European interest (*)
6. Conservation status of habitats of European interest (*)
7. Area with conservation management
8. Sites designated under the EU Habitats and Birds Directives (*)
9. Critical load exceedance for nitrogen (*)
10. Alien species (*)
11. Southern-European dragonflies
12. Defragmentation of rivers (*)
13. Phosphorus concentrations in rivers (*)
14. Forests: Area with management plan according to the criteria for sustainable forest management
15. Agriculture: Nitrogen balance (*)

### Data sources
- INBO, butterflies working group Natuurpunt
- Available Red Lists in Flanders
- Paelinckx et al. (2007)
- INBO, Agency for Nature and Forest, non-governmental organisations for nature conservation
- INBO, EEA
- National Botanical Gardens Meise, Verloove (2002), INBO
- Working group on dragonflies
- VMM, section Water
- VMM
- Agency for Nature and Forest
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(*) Flemish biodiversity indicator is tuned to proposed European indicator.
References


## Abbreviations

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<td>ANB</td>
<td>Agency for Nature and Forest</td>
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<td>BTO</td>
<td>British Trust for Ornithology</td>
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<td>EEA</td>
<td>European Environment Agency</td>
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<td>LNE</td>
<td>Department of Environment, Nature and Energy</td>
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<td>L&amp;V</td>
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<td>SOVON</td>
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<td>VITO</td>
<td>Flemish Institute for Technological Research</td>
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<td>VLM</td>
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<td>VMM</td>
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The Research Institute for Nature and Forest (INBO) is the Flemish research and knowledge centre for nature, sustainable management and sustainable use. It carries out research and provides knowledge to all of those involved with governmental policy.

As a leading scientific institute, INBO primarily reports to the Flemish government, but it also provides information for international reports and deals with queries from local administrations. In addition, INBO supports organisations working for, amongst others, nature management, forestry, agriculture, hunting and fishing. INBO is part of national and European research networks and also communicates its results to the general public.

There are approximately 250 INBO staff, most of whom are scientists and technicians. In addition to its main office in Brussels, INBO has sites in Geraardsbergen, Groenendaal and Linkebeek.

INBO has reported biennially on the state of nature in Flanders since 1999. The report describes the state of nature through the integration of available datasets.

This report presents 21 Flemish biodiversity indicators according to the focal areas of the Convention on Biological Diversity and the EU biodiversity headline indicators, in order to track progress towards the achievement of the 2010 target.