Biodiversity Indicators 2017

State of Nature in Flanders (Belgium)

Nature Report Flanders

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Colofon

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Headlines

Introduction

Flanders has endorsed the European target to halt biodiversity loss and the degradation of ecosystem services, and restoring them in so far as feasible in the EU by 2020. Already in 2001, the European Union committed itself to halting biodiversity loss on its territory by 2010. However, this 2010 target has not been met (EEA, 2010). Nearly a quarter of the wild species are critically endangered in Europe and most ecosystems are so affected that they are much less able to provide their valuable services. These harmful effects confront the EU with huge social and economic losses (Braat & ten Brink, 2008). In response the European Commission adopted a new strategy for 2020 (European Commission, 2011). It is built around six mutually supportive and inter-dependent targets addressing the main target 'Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss'. They aim to reduce key pressures on nature and ecosystem services in the EU. Each target is complemented by a set of focused, time-bound actions to ensure these ambitions are fully realized.

This report aims to summarize the main conclusions concerning the European Biodiversity Strategy targets. The biodiversity indicators inform both about the implementation of the strategy (what measures the Flemish government has taken and what they have reached) and about the impact of these measures on biodiversity. However, we do not have the right indicators for each target in place. For the implementation of Targets 4 and 6 we call on external reports.

Where possible and relevant, we supply numbers and we formulate expectations for 2020. These figures are based on a statistical analysis (Jansen 2017, see also reading guide). When interpreting this prediction for the more policy-dependent indicators, one has to take into account that on the one hand this prediction only applies in an unchanged social context. On the other hand, we also assume that the policy of the relevant period will be continued in the future. For some indicators, describing this expectation is less useful or relevant. In those cases the text does not include a decision on this matter.

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more than 50% more species assessments under the Birds Directive show a secure or improved status.

Habitats of European interest

For more than half of the species listed in the Habitats Directive Annexes, the conservation status is poor. For example, the population goals for breeding birds of European importance are met for three out of 20 species. Of the habitat types listed on the Habitats Directive, 89% of the last reporting at the end of 2013 were in an unfavorable conservation status. It will require a major effort to bring all habitat types and species to a favourable conservation status by 2020. These findings are consistent at the European level with the conclusions of the Mid Term Review of the European Biodiversity Strategy 2020. A next assessment of the conservation status will take place in 2019. In order to protect the species and habitats of the Habitat- en Bird Directive more efficiently, 24 Special Protection Areas and 38 Sites of Community Interest have been designated. Together, these areas constitute the Natura 2000 network, comprising 166.322 ha or 12,3% of the Flemish terrestrial area.

Red List Status

Red Lists indicate the risk of extinction of a species in a certain region and thus show the status of species in Flanders. They therefore form an important basis for species policy in Flanders and more specifically the species protection initiatives such as species protection programmes or plans. Of the 2.112 species on validated Red Lists, 148 became locally extinct, representing one in 14, during the last century. A total of 504 species, or one in four, are 'Critically endangered', 'Endangered' and 'Vulnerable'. Their populations have declined sharply and / or have reached a critical minimum so that the species is about to disappear from Flanders. This is the case, amongst others for *Emberiza calandra*, *Muscardinus avellanarius*, *Pelobates fuscus* and *Pyrgus malvae*.

Species protection

In order to halt the further loss of threatened species, the Flemish Government is taking several measures. In the past, 18 species conservation plans have been drawn up with an emphasis on species of international importance. Since 2011, species protection plans have been replaced by species protection programmes. The Agency for Nature and Forest can draw up these programmes for both priority species in Flanders and European protected species.

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.

While Target 1 emphasizes the favourable conservation status for species and habitats of the Habitats and Birds Directive, Target 2 aims more generally at the restoration of ecosystems and their services. One can realise this, among other things, by developing green infrastructure. At the moment, there is no clear definition of green infrastructure or a good description of a 'degraded ecosystem'. This makes this target difficult to evaluate at the moment. The next nature report (NARA-S) is working on a definition of green infrastructure based on a participatory process with policy and stakeholders.

The extinction and decline of species is the result of decreasing habitat area and a decline in habitat quality. Very specific habitats degrade to more common, usually nutrient-rich, habitats. As a consequence, many rare species, restricted to these specific habitats, are in decline. On the other hand, numbers of some common species and some alien species are increasing. As a result, variation in biodiversity decreases. Numbers of some breeding birds like magpie, carrion crow and wood pigeon occurring in a wide variety of habitats, increase. On the other hand the improved quality of water courses has a positive effect on water-bound organisms, like freshwater fish. But the decreasing organic pollution of these water courses also resulted in a decrease of the food supply for waterfowl, as observed in the Scheldt estuary. Perhaps this is one of the factors that has led to a decrease in the number of overwintering waterfowl during the past decades. However, the statistical analysis shows that in 2020 we can expect a significant increase in wintering birds compared to the reference year 1991.

In order to maintain and restore ecosystems and species, the Flemish Government provides a mix of rules and other policy instruments. On top of these rules the Flemish Government has also introduced a number of subsidy schemes and other instruments aimed at increasing, managing and opening up of nature areas. By the end of 2016 the area with conservation management reached 81.699 ha. This is a significant increase of 18.370 ha compared to 2011. If the policy of the 2011-2016 period is continued in the future and the social context does not change, we expect a total surface with effective nature management between 92.400 ha and 103.600 ha by 2020.

Acquiring nature areas ensures that nature also becomes the main function in those areas. In 2016, the non-governmental nature organizations and the Flemish Government together purchased 1.275 hectares. Of these, the Flemish Government purchased 599 ha. That is more than in 2015, but clearly less than the years before. The area that the Flemish Government acquires annually has even dropped significantly over the last ten years. In 2016, non-governmental nature organizations bought 676 ha. That is the highest number of the past five years, but still significantly less than the purchases realized in the period 2000-2005.

Since 1998, a tool called 'ecological restoration' has been used by the Flemish Government in order to restore areas in function of nature. The total area in which ecological restoration works have been realized shows a significant increase in the period 1999-2016 and amounts to 5.769 ha. Based on this trend, we expect a further increase in the total surface area of ecological restoration projects between 7.600 and 10.300 ha by 2020.

Ecosystem services

Besides maintaining and restoring ecosystems, Target 2 also stresses the enhancing and the sustainable use of ecosystem services. This report introduces an new indicator for the state and trend of 16 ecosystem services in Flanders. The state and trend of these 16 ecosystem services is examined in depth in Stevens *et al.* 2014.

The state of an ecosystem service is determined by the relationship between its supply and demand, the trend in that relationship and the impact of the use of ecosystem services on the supply of other ecosystem services. For 15 of the 16 ecosystem services (ESS), the demand exceeds always the supply, in seven of which greatly.

Because demand exceeds supply (by a large margin in some cases), most ecosystem services in Flanders are used intensively or exploited. The demand for various services is also increasing, and is no longer in equilibrium with the natural local supply. The demand for food production continuously increases and the supply is unable to keep pace with this trend. Flanders therefore imports directly and indirectly large quantities of food. The demand for wood in Flanders is also growing, while the supply slowly decreases. As a consequence, a great amount of wood is imported to meet the demand. For some ecosystem services a shortage in supply is supplemented by imports. For other ecosystem services (e.g. water quality regulation, air quality regulation, flood regulation or green space for outdoor activities) a part of the social demand remains unfulfilled. Unmet demand often takes the form of environmental damage, economic damage or health costs. The supply deficit for some ecosystem services is also met by technological solutions, e.g. water treatment plants.

Approximately one in five of the Flemish people does not have green space for daily use within walking distance (Simoens *et al.* 2014) at one's disposal. Furthermore, about 55% of the area in Flanders is less attractive for recreation and experiencing nature. This open area is less attractive because of buildings, noise or because natural and /or cultural elements are missing. Safeguarding existing green spaces, improving accessibility and targeted creation of green infrastructure can generate high socio-economic benefits, especially in an urban context where space is scarce (Simoens *et al.* 2014). On top of a good and sustainable forests and nature reserves management, the Flemish Government also wants to increase the accessibility of nature and forest areas. At the end of 2016 the total surface of accessible forests and nature reserves reached 36.893 ha and we expect the surface area to increase further in 2020 to at least 49.870 ha or about 25% of the total surface of accessible forests and nature reserves.

Both in public and private forest and nature reserves, playing areas can be designated. In order to increase the livability of cities in Flanders, the Flemish Government wants to create more accessible city forests near urban areas. At the end of 2016, 61% of the urban areas had launched a city forest project. The number of members of nature organizations active in Flanders can be interpreted as an expression of support for nature within our society. A growing number of people or families joined a nature organization in the period 2004-2016. By the end of 2016, 247.992 households are members of one or more nature organizations.

Threats to biodiversity

Habitat loss, fragmentation, pollutants and eutrophication, invasive alien species, overexploitation of groundwater and climate change still have an important negative impact on the biodiversity of ecosystems in Flanders (Demolder *et al.* 2014). Evidence that climate change is starting to affect nature in Flanders is mounting. The trend of the peak of pollen production shows a clear advance in time over the years for a number of trees (e.g. birch). It is uncertain whether peak of pollen production by birch will occur earlier in 2020. Leaf development of oak and beech shows changes too. The emergence of both oak and beech runs earlier in warm years than in cold. In 2007 (warm spring) they flushed ten days earlier.

Further warming will cause an earlier start to and an extension of the growing season, possibly causing trees to grow harder. The long term consequences from this are still unclear. Not only the phenology, but also the geographical range of species is changing. Southern species are expanding northwards. This is the case for dragonflies and damselflies like *Crocothemis erythraea* or the *Coenagrion scitulum*. In the past they were vagrant species, but in recent years several southern species have also settled here. This trend will probably continue in the following years. Due to climate change, exotic mosquitoes can also expand from southern Europe to our regions. An example of this is the tiger mosquito that can transmit certain virus diseases to humans (source: Institute of Tropical Medicine).

Eutrophication has been one of the most important factors of the last century influencing biodiversity. The nitrogen deposition has been in decline since 1990. The annual deposition amounts to approx. 20 kg N ha⁻¹ less than in the reference year 1990. The decrease of the nitrogen deposition has led to a reduction of the habitat area where the critical load is exceeded. In 2016, an exceedance of 61% of the Natura 2000 area ($\pm$ 71,300 ha) is still found. In 1990 this was still 93%. An exceedance of nitrogen is a threat to a favourable conservation status: it favors the more general, nitrogen tolerant species that further displace the more rare species. In order to realize the biodiversity goals, the Flemish government has taken specific measures to approach the problem of the deposition of nitrogen in the special areas of protection zones. These measures are both source-oriented (on the emission side) and effect-oriented (the countering of the effects of nitrogen deposition in vulnerable vegetation).

Forest health is also affected by climate change and atmospheric deposition. In 2016, 20.3% of the forest trees in Flanders were damaged. Beech and Corsican pine were the most damaged tree species. Forest management and natural factors such as insects and fungi also have an impact on forest health.

Fragmentation of watercourses by weirs and sluices, constitutes an important problem for the conservation of fish populations. The BENELUX decision on fish migration states that 90% of the fish migration barriers categorized as first priority on the strategic priority map must be eliminated before December 31, 2015 (phase 1) and the obstacles of second priority before December 31, 2021 (phase 2). On December 31, 2016, a total of 22 of the 46 (48%) barriers of phase 1 were remediated. Phase 1 of the Benelux decision was not achieved. If the current rate of sanitization is maintained the inventoried fish migration barriers of phase 2 will probably be sanitized only after 2021. Meanwhile, migratory fish species are recovering slightly, probably as a result of improved water quality in the bigger rivers.

Road infrastructure in Flanders divides the landscape into continuously smaller pieces, and results in all kinds of problems for nature. By the end of 2015, only 4.5% of 1.200 km of road infrastructure with a certain priority was more or less defragmented by fauna passages.

As a result of these human influences, ecosystems can no longer deliver the services we need as society. Stevens *et al.* 2014 also mention urbanization, changing agricultural measures, environmental pollution, overexploitation of groundwater reserves and soil as causes for the loss of ecosystem services.

Target 3: Increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity.

By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity and to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by agriculture and in the provision of ecosystem services as compared to the EU2010 baseline, thus contributing to enhance sustainable management.

By 2020, forest management plans or equivalent instruments, in line with Sustainable Forest Management (SFM), are in place for all forests that are publicly owned and for forest holdings above a certain size (to be defined by the Member States or regions and communicated in their rural development programmes) that receive funding under the EU rural development policy so as to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by forestry and in the provision of related ecosystem services as compared to the EU 2010 baseline

Agri-environmental measures to protect farmland biodiversity

In order to protect a number of typical farmland species and ecosystems, agri-environmental schemes have been adopted since 2000. The most successful (implying the largest surface area) are the management agreements for species protection. The surface area has been rising again since 2015. In particular, the agreements for the management of fauna strips and grassland and the cultivation of food crops for fauna have increased significantly. Because the policy concerning this management agreement (for both new species and new packages) has changed considerably and will change further (new species) VLM expects a further increase in the surface area. The necessary financial resources for this increase have already been earmarked. The agreements “maintenance of hedges” and especially “trimmed hedges” are quite successful too. The agreements ‘botanical management and ‘field borders’ are stagnating.

Status farmland species

Despite the above-mentioned measures, farmland biodiversity continues to decline. The evolution of the conditions of farmland species in Flanders is illustrated by the farmland breeding bird index. Since 2007, there is probably a systematic decrease for the farmland birds. In 2014 the numbers were significantly lower than 2007. Species of pastures and fields, such as *Perdix perdix*, *Vanellus vanellus* and *Anthus pratensis*, decreased in the period 2007 and 2016. The decline of *Alauda arvensis* seems to have more or less stopped (Devos *et al.* 2016a).

Management plans to protect our forests

Forest species possibly decrease since 2007. However, there is currently no significant change compared to 2007. In order to protect biodiversity in forests, the Flemish Government enacted the Forest Decree. This decree makes management plans for all forests larger than five ha compulsory. For public forests and some private forests these management plans have to comply with the criteria for sustainable forest management. These approximately follow the guidelines of the Forest Stewardship Council (FSC). Between 1990 and 2016, 36.778 extended and 31.681 ha limited forest management plan was approved. The total area of forests with a management plan amounts to 68.459 ha.

Through the establishment of these management plans, the Flemish Government also tries to create a balance between the environmental, economic and social functions of forests. In accordance with the new Nature Decree, the different types of management plans (forest and nature) will in the future be integrated into one new type, the nature management plan.

Target 4: Ensure the sustainable use of fisheries resources

Achieve Maximum Sustainable Yield (MSY) by 2015. Achieve a population age and size distribution indicative of a healthy stock, through fisheries management with no significant adverse impacts on other stocks, species and ecosystems, in support of achieving Good Environmental Status by 2020, as required under the Marine Strategy Framework Directive.

Overfishing is the main threat to fish stocks on a global level. According to a recent report from the Scientific Technical Economic Committee for Fisheries (STECF, 2016), overfishing in the EU has declined from 147% in 2003 to 104% in 2014 and for the North Sea from 148% in 2003 to 92% in 2014. The recent Agriculture and Fisheries Report (Plateau *et al.* 2016) shows that different fish stocks in the North Sea are doing much better than in recent years. The *Pleuronectes platessa* stock in the North Sea, for example, has shown a sharp increase since 2002. The recovery of *Gadus morhua* stocks is slow, despite the strong restrictions imposed on fishing. The *Scophthalmus maximus* stock has been very low for a long time. The slow growth of the stock in recent years has now stabilized, but is still relatively low. The fishing pressure is still a little too high. The stock of *Scophthalmus rhombus* appears to have decreased somewhat since an increase in the period 2007-2012.

Target 5: Help combat Invasive Alien Species

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.

Invasive alien species (IAS) are considered a major threat to biodiversity worldwide (Pimental *et al.* 2002; Vié *et al.* 2009; Cox, 2004). Besides a threat to native species, they can also become invasive and severely impact ecosystem structure and function. In addition, they may have negative consequences for social interests (public health, agriculture, economy). The rising number of alien species increases the risk of problematic invasive alien species. The cumulative number of non-native species has been increasing since 1800 and shows exponential growth. The fastest increase occurs in freshwater and marine ecosystems. The proportion of alien plant species within the global plant composition in Flanders has doubled since the 1970s from 5% to almost 10% and has increased significantly over the period 1972-2016. If the current trend continues, we expect that this proportion will be between 9.5% and 13% in 2020. As part of the European policy an international list of problematic species was drawn up. In Flanders, at least 89 of such potentially harmful IAS occur. At least 41 of them also really behave invasive in nature.

On January 1, 2015 the new European regulation on the prevention and management of invasive alien species went into effect (EU PE-CONS 70/14). This new European legislative framework imposes for Flanders a number of new rules regarding the prevention of new introductions, the intervention on introduction pathways of unintentional introductions and management of established invasive species. It obliges Member States to carry out an analysis of the most important introduction pathways of alien species. Based on the number of alien species, the most important pathways of alien species are es-

capex and transport contaminants. Escapes of exotic pets and plants from horticulture (e.g. through the dumping of garden waste), botanical gardens, zoos and pet shops and aquaria are an important source of new introductions. In addition, the introduction of living organisms as contaminants of goods (e.g. seeds, soil, live bait, wood and wood products) are an important source of unintentional introductions. Several animal species have also reached Flanders through dispersal from introduced populations in neighbouring regions. For aquatic alien species, unintentional introductions through contaminated fish lots constitute an important issue, for alien macrophytes the aquarist culture is a source.

Target 6: Help avert global biodiversity loss

By 2020, the EU has stepped up its contribution to averting global biodiversity loss.

Bruers and Verbeek (2013) calculated the ecological footprint of Flanders in 2013. According to this recalculation the footprint of a Flemish person in 2004 was nine global hectares (gha). Flanders consumption footprint is mainly energy related: 49% of the Flemish footprint consists of so-called energy land. This is the virtual forest area required for CO₂ absorption. The consumption of renewable materials (cropland, grazing land, fishing grounds and forest land used in agriculture, fisheries and forestry) has a 46% share. 5% is built-up land (buildings and infrastructure). For more information on the ecological footprint we refer to the website of the Environment Report (www.milieurapport.be) of the Flanders Environment Agency.

About this publication

Introduction

The Research Institute for Nature and Forest (INBO) produces its Nature Report by decree.

This report includes:

- a description and evaluation of the status of biodiversity in Flanders
- the expected evolution of the biodiversity if policy remains unchanged and by the intended policy of the Flemish Government
- the evaluation of past policy

This report is part of the nature report (Natuurrapport, NARA) and contains the biodiversity indicators anno 2016. These indicators summarize facts and figures about the status of nature and nature policy in Flanders. Where possible, this is done via time series that show how a phenomenon evolves. A broad set of indicators can be consulted (in Dutch) online on www.natuurindicatoren.be. Every indicator is presented in an indicator sheet that contains figures and brief background information. This report compiles the 'priority indicators' from this set.

An extensive set of environmental indicators can be found on www.milieurapport.be of the Flanders Environment Agency.

Priority Indicators

This report provides an overview of the nature indicators that are considered the most important to follow, based on a number of criteria. They refer to objectives of the Flemish nature and forest policy, the European Biodiversity Strategy 2020 or Forest Europe. The Flemish nature indicators are tested against the target set out in the European biodiversity strategy for 2020 (see also Headlines). The Flemish biodiversity indicators are tested against the target set out in the European biodiversity strategy for 2020 (see also Headlines). This set of indicators thus evaluates the Flemish progress towards the EU 2020 targets.

In 2004, the SEBI 2010 process ('Streamlining European Biodiversity Indicators') was established. SEBI 2010 develops and follows headline indicators in order to monitor progress towards the 2010 biodiversity objective (EEA, 2007; European Commission, 2006). In 2012, the original set of 26 indicators was adapted to the targets of the European Biodiversity Strategy for 2020. All the SEBI indicators can be used to measure progress against this six EU Targets (EEA, 2012a). When a Flemish biodiversity indicator coincides with a SEBI indicator, the corresponding number of these SEBI indicator is mentioned.

The EU 2020 targets for Biodiversity align with the global 'Aichi Targets' drawn up by the Convention on Biological Diversity in 2010.

The Ministerial Conference for the Protection of Forests in Europe, commonly referred to as Forest Europe develops common strategies for the protection and sustainable management of forests by various European countries, including Belgium. Forest Europe has drawn up guidelines, criteria and indicators for sustainable forest management. The list of indicators has recently been extended and has been endorsed by the various ministers from these countries responsible for forest and forest policy. Ministers also commit to report on these indicators every four years. These reports are made separately for each country, and then compiled into a 'Forest Europe' Report: 'State of Europe's Forests'

The description of each indicator contains the corresponding EU 2020 target for Biodiversity, a definition of the indicator and a description of the status and trend. When possible, an explanation for the evolution of the trend is given.

The assessment of the trend is based on a statistical trend analysis. The data do not allow this for all indicators. The time-series for instance is too short or too many records are lacking. The graph of the indicators with a trend calculation also includes the trend line with a confidence interval. This interval gives a picture of the uncertainty on the calculated trend line, where the actual trend is with a 95% certainty somewhere between the upper and lower limit. For more information on the assessment of the trend, we refer to the report of Jansen I. (2017).

At the bottom of the page, under 'Trend', the results of the trend calculation are briefly described. If the trend assessment is not feasible, 'no trend determination possible' is stated.

The assessment of the expectation to 2020 takes place on the basis of a 95% prediction interval that is calculated for the extrapolated trend line in function of the target year 2020 (European biodiversity

strategy). This interval contains with 95% certainty the value that will be reached in 2020. The figures for this interval are shown for each indicator under the item 'verwachting'2020' in Jansen (2017). In the case of indicators where policy actions can influence the future figures, this expectation is conditional: the policy of the period in question must be continued in the future and the social context must remain unchanged. For certain indicators, describing this expectation is less meaningful or relevant and a statement about this is not included in the text.

The prediction interval is used for calculating the target range for a number of indicators (with current policy objective).

If the goal is within this interval, the target estimate is unclear. The value in 2020 can still be anywhere in the prediction interval.

If the target is above the interval, then the chance is small that the goal is achieved. We can say that the value in 2020 with 95% certainty will be lower than the target.

If the target is below the interval, the chances are that the goal will be achieved. We can say that the value in 2020 with 95% certainty will be higher than the target.

For the indicators for which no trend calculation can be performed, there is no calculation of a prediction interval as a consequence.

Most indicators are based on the most recent data available, in the majority of the cases this is up to 2016.

Quality indicators

Quality indicators ideally meet a number of internationally established criteria (see box). We try to meet these criteria as much as possible when we develop biodiversity indicators.

Criteria for the selection of biodiversity indicators (Ash *et al.* 2010, EEA (2012b), Layke (2012), (Pires 2011))

- Scientifically sound: indicators should be based on clearly defined, verifiable and scientifically acceptable data, collected using standard methods with known accuracy and precision, or based on traditional knowledge that has been validated in an appropriate way.
- clarity and obviousness: the indicator must be designed in such a way that it measures and communicates what it claims to measure or communicate, so that misinterpretation is avoided.
- Availability of data: the long-term availability of the data must be guaranteed for the calculation of the indicator. This also means that the update frequency is guaranteed in the future. Reproducible and based on a monitoring scheme: indicators must be reproducible and ideally based on a monitoring scheme.
- Practically feasible, easy to calculate: ideally, the layout of an indicator is practically feasible: the data must be readily available and the indicator can be easily calculated
- Understandable and communicable: in order to guarantee the functioning of an indicator, the indicator must be understandable for non-specialists, without requiring thorough prior knowledge, both in terms of presentation, interpretation and the relationship between the measurement and what the indicator is intended to interpret.
- Sensitive to changes in time and spatially sufficiently detailed: indicators need to respond quickly enough to show policy or other users changes in relevant phenomena.

About this publication

- Policy objective known: if a policy objective is linked to the indicator, this indicator must allow for evaluation of (policy) objectives, using established baselines.
- Functionality: Indicators should be relevant to the mission/objectives and the result that the indicator attempts to measure.
- Area Coverage: since the indicators must describe the state of nature in Flanders, it is advisable that indicators have a regional scope and/or significance for the whole of Flanders.
- Legitimacy & acceptance by stakeholders: The power of an indicator for monitoring and steering policy depends to a large extent on sufficiently broad stakeholder support.

Biodiversity indicators in Flanders		EU Biodiversity Strategy 2020	Pag. nr.
1	Common Breeding Bird Index	Target 2	21
2	Grassland butterflies	Target 2	22
3	Overwintering waterfowl	Target 2	23
4	Red List amphibians and reptiles	Target 1	24
5	Red List breeding birds	Target 1	25
6	Red List butterflies	Target 1	26
7	Red List freshwater fish	Target 1	27
8	Red List ladybirds	Target 1	28
9	Red List mammals	Target 1	29
10	Red List saproxylic scarab beetles	Target 1	30
11	Red List water bugs	Target 1	31
12	Species status	Target 1	32
13	State and trend of ecosystem services	Target 2	33
14	Number of species conservation plans and protection programs	Target 1	34
15	The number of sanitized fish migration barrier (Priority 1 of the strategic priority map)	Target 2	35
16	Conservation status of species of European interest (Habitats Directive)	Target 1	36
17	Conservation status of habitats of European interest	Target 1	37
18	Status breeding birds of European importance	Target 1	38
19	Status wintering waterbirds of European importance	Target 1	39
20	Sites designated under the EU Habitats and Birds Directives	Target 1	40
21	Area with conservation management	Target 2	41
22	Acquisition of nature areas by the Flemish Government and non-governmental nature organizations nature	Target 2	42
23	Forest area	Target 2	43
24	Share of damaged forest trees	Target2	44
25	Area with accessible forests and nature reserves	Target 2	45
26	Playing areas in forests and nature reserves	Target 2	46
27	Urban areas with a city forest or a city forest project	Target 2	47
28	Exceedance nitrogen critical load deposition in Natura 2000 habitat- area	Target 2	48

Biodiversity indicators in Flanders	EU Biodiversity Strategy 2020	Pag. nr.
Southern-European dragonflies	Target 2	49
Leaf phenology oak and beech	Target 2	50
Peak pollen production by birch and several grasses	Target 2	51
Trend in the number of alien species in different biotopes	Target 5	52
Number of alien plants species	Target 5	53
Pathways of alien species in Flanders	Target 5	54
Number of listed 'worst' invasive alien species threatening biodiversity	Target 5	55
Number of wintering ruddy duck in Flanders	Target 5	56
Defragmentation along road infrastructure in Flanders	Target 2	57
Area with implemented ecological restoration projects	Target 2	58
Forest area with management plan according to the criteria for sustainable forest management	Target 3	59
Area with agri-environmental measures	Target 3	60
Frequency of visits to forests and natural areas	Target 1	61
Membership of NGO's for nature conservation	Target 1	62

Common Breeding Bird Index

European Biodiversity Strategy 2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems. (SEBI 01)

The Common Breeding Bird Index combines the trends of a selection of common and widespread breeding birds in Flanders, where 2007 is the baseline year. The data (collected in the 2007-2016 period) are based on observations by volunteer bird watchers for the common bird monitoring scheme coordinated by INBO and Natuurpunt. The indicator features three categories: farmland birds, forest birds and generalist species occurring in a wide variety of habitats (sometimes including forests and farmland).

Generalist species show a slight increase between 2007 and 2012. For the period 2010-2012, this is just below significant compared to 2007. After 2012, the index falls back to the 2007 level.

Since 2007, there is probably a systematic decrease for the farmland birds. In 2014 the numbers were significantly lower than 2007.

Forest species possibly decrease since 2007. However, there is currently no significant change compared to 2007.

Trend:

Farmland birds: possibly a systematic decline since 2007, in 2014 the numbers were significantly lower than in 2007.

Forest birds: possibly gradually deteriorating since 2007. Currently no significant difference compared to 2007.

Generalist: slight increase between 2007 and 2012. For the period 2010-2012 very close to significantly more than in 2007. After that there was a fall back to the number of 2007.

Trends in the abundance of woodland, farmland and other common birds in Flanders

Source: INBO

Grassland butterflies

European Biodiversity Strategy 2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems. (SEBI 01)

The European grassland butterfly index describes the trend of a selection of butterfly species associated with grasslands in 22 European countries, based on a standardized monitoring system (van Swaay *et al.* 2015). In Flanders, sufficient data are available only for five common species: *Maniola jurtina*, *Ochlodes sylvanus*, *Polyommatus icarus*, *Lycaena phlaeas* and *Anthocharis cardamines*. The index shows changes between years, 1992 being the reference year (= 100).

The grassland butterfly index shows a strongly fluctuating pattern with highs and lows depending on the year. Because of the low number of transects walked in Flanders, data do not allow a proper statistical analysis. Therefore, we cannot find a significant trend for any of the species. Van Dyck *et al.* (2015), however, have shown a strong decline in the *Lasiommata megera* in Flanders during the last decades.

On a European level, the grassland butterfly index has declined with 30% between 1990 and 2015, but the rate of decline has slowed during the last 5-10 years (van Swaay *et al.* 2016).

Evolution of the grassland butterfly index in Flanders

Source: Butterfly working group Natuurpunt, INBO

Trend: no trend determination possible

Overwintering waterfowl

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems. (SEBI 01)

The overwintering water bird index describes the number of overwintering water birds based on 6 mid-monthly surveys.

The abundance of water birds shows a significantly increasing trend till 2005 and declines slightly again afterwards, but this varies from species to species.

The abundance of waterfowl in Flanders is a combined effect of north-western European and regional factors. In north-western Europe almost all goose and duck species increased in number during the last 20-30 years. Possible causes are better protection of the species (reduced hunting) and their habitat (protection of wetlands), and increased food availability. In addition, the trends in Flanders are at least partially determined by local changes in water quality, human activities and conservation management. These factors can have a big influence on the capacity of areas for waterfowl, mainly through changes in the food supply (as recently seen along the river Scheldt). It is likely that climate change is also an increasingly important factor in regionally changes in abundance and distribution.

On the base of a statistical analysis of data from the period 1991-2016 (Jansen 2017) we can expect a significant increase in 2020 compared to 1991.

Trend: significantly increase till 2005, decline afterwards

Red List amphibians and reptiles

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red lists indicate the risk of species extinction in Flanders. This risk assessment is based on objective and international criteria issued by the International Union for Conservation of Nature (IUCN).

Out of 22 indigenous amphibians and reptiles ten are threatened: two species are 'Critically endangered', four are 'Endangered' and four are 'Vulnerable'. One species is 'Near threatened'. The remaining nine species are considered as being 'Least concern'. This means that 50% of all species in Flanders is threatened and/or extinct (Jooris *et al.* 2012).

The cause of this continuous decline is mostly the decrease of suitable habitat, resulting in the isolation of populations. Because of a strong reduction in the number of individuals and the lack of connection elements, hardly no new areas can be colonized. Furthermore genetic effects can have catastrophic consequences in these small populations. Deterioration of the water quality in the reproduction zones can play an important role with the 'Critically endangered' *Pelobates fuscus* and the 'Vulnerable' *Triturus cristatus*. An increase of nutrients in the water and an increased predation by fish prevent successful reproduction. Specific management of these water bodies can provide success in short time, as in the case of *Hyla arborea*. Removing fish in the reproduction waters resulted in a spectacular increase of the number of adults for these species, with a colonization of new areas as a consequence.

Red List breeding birds

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red lists indicate the risk of extinction of a species in Flanders. This risk assessment is based on the objective and international criteria of the International Union for Conservation of Nature (IUCN).

For the new Red List of breeding birds in Flanders, 161 species were assessed and assigned to the different Red List categories. As such, 6 species are considered 'Regionally Extinct', 24 'Critically Endangered', 16 'Endangered', 21 'Vulnerable', 25 'Near Threatened', 67 'Least Concern' and 2 'Data Deficient'. Irregular breeding species and non-native breeding birds were excluded from the evaluation process.

Compared to neighbouring regions or countries, Flanders has a large percentage of species that are 'Critically Endangered' and a low proportion in the category 'Least Concern'. Breeding bird communities of extensively managed grasslands, dynamic coastal areas and farmland areas have the largest proportion of threatened species. Due to the use of different criteria, a reliable comparison between the former (2004) and current Red List of breeding birds in Flanders is not possible.

Red List butterflies

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red lists indicate the risk of extinction of a species in Flanders. This risk assessment is based on objective and international criteria of the International Union for Conservation of Nature (IUCN).

Out of 71 butterfly species that have been observed in Flanders since the beginning of the last century, 20 species have gone extinct, 18 are threatened (six species are 'Critically Endangered', five are 'Endangered' and seven are 'Vulnerable'). A further seven species are 'Near threatened'. The remaining 26 species are considered as being 'Least Concern'. This means that 66% of all butterfly species in Flanders are threatened and/or extinct (Maes *et al.* 2012).

Compared with the Red List of 1999, the declining trend is continuing for a large number of species: four species have gone extinct between 1994 and 2003 and twelve species are doing worse than in the previous Red List. Especially species from heathlands (e.g., *Hipparchia semele*), flower-rich nutrient-poor grasslands (e.g., *Melitaea cinxia*) and large woodlands (e.g., *Nymphalis antiopa*) continue to decline. Additionally, some previously common species such as the *Gonepteryx rhamni* and the *Lasiommata megera* are showing string declines recently.

The causes of these continuing declines are eutrophication, a decline in nectar sources and the ongoing fragmentation of natural habitats in Flanders. Restoration measures should focus on the conservation of large and well-connected natural areas. Nature management should take the specific ecological resources of butterflies into account. Additionally, an improvement of the overall environmental quality (e.g., reducing nitrogen deposition) would certainly favor butterflies and biodiversity in general.

Nine species are doing better compared to a decade ago. *Carcharodus alceae*, for example, recently colonized Flanders from more southern areas. For such mobile species, but also for a couple of woodland species, biotope quality has improved slightly, but also warmer summers have resulted in an increase of warm-loving species such as the *Issoria lathonia* and the *Aricia agestis*.

Number of butterflies by Red List category

Source: Butterfly working group Natuurpunt, INBO

Red List freshwater fish

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red Lists point out the chance extent of species becoming extinct in Flanders. Objective and internationally accepted criteria from the International Union for Conservation of Nature (IUCN) are used for this indicator. Regional IUCN criteria were applied to categorize 42 indigenous freshwater fish species in Flanders into Red List categories. **As such, three species are assessed as regionally extinct, seven as 'Critically endangered', three as 'Endangered' and eight as 'Vulnerable'. A further five species are considered 'Near threatened', 15 species as 'Least concern' and one species is 'Data deficient'. In total, 62% of freshwater fish in Flanders is endangered or extinct (Verreycken *et al.* 2012; 2013).**

Recent improved wastewater treatment has led to the amelioration of the water quality of the Scheldt estuary in which some diadromous species such as *Petromyzon marinus* and *Alosa fallax* occur again. Thus, they disappear from the category Regional Extinct. As a result of several reintroduction programmes, *Leuciscus leuciscus* and *Leuciscus cephalus* are doing remarkably well while *Lota lota* has been taken out of the category Regional Extinct. A notable decline was noticed for *Anguilla Anguilla*: it entered the 'Critically endangered' category despite the annual stocking with glass eels.

Number of freshwater fish by Red List category

Source: INBO, Natuurpunt, ANB

Red List ladybirds

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Listing species according to their relative risk of extinction and comparing regularly updated Red Lists, is a powerful tool in assessing the efficacy of species conservation policies. The Red List assessment in Flanders is based on objective and internationally accepted criteria of the International Union for the Conservation of Nature (IUCN). These were applied on the larger, easily recognizable species from the subfamilies *Coccinellinae*, *Chilocorinae* and *Epilachninae* for which good data were provided by a large scale citizen science survey. The assessment compared the periods 1990-2005 and 2006-2013. Non-native species such as the invasive Asian harlequin ladybird are not scored with the IUCN methodology.

Of the 36 species of ladybirds observed since the beginning of the last century in Flanders two are now regionally extinct. Three species are 'Endangered' and six species are 'Vulnerable'. A further seven species are considered 'Near threatened' and the remaining 15 species were assessed as 'Least concern'. For three species insufficient information is available about their status in Flanders. In total 31% of all species are threatened (25%) and/or extinct (6%).

The percentage of threatened ladybird species is similar to other terrestrial insects groups (Adriaens *et al.* 2015). Since this represents the first Red List assessment for ladybirds no trend can be discussed for this indicator. Threatened ladybirds in Flanders are mostly confined to rare habitats with specific microclimates such as dry heathlands, nutrient-poor dry or wet grasslands, marshes etc. Often such species also display specific life history traits such as habitat and/or dietary specialisation or myrmecophily. The principal threats include habitat loss, loss of habitat quality and non-native species. Some species require a customized nature management. Many species benefit from simple measures enhancing ecological quality in parks, gardens and public greenery. These include e.g. using native trees and shrubs that are of value to ladybirds at some stage of their life cycle or avoiding disturbance of ground cover in winter which can provide shelter for overwintering ladybirds (Adriaens *et al.* 2014).

Number of ladybirds by Red List category

Source: Ladybird working group, Natuurpunt Studie (waarnemingen.be), INBO

Red List mammals

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red Lists point out the chance extent of species becoming extinct in Flanders. Objective and internationally accepted criteria from the International Union for Conservation of Nature (IUCN) are used for this indicator.

Out of the 66 mammalian species that occurred since the beginning of the previous century in Flanders, five species have become extinct in the meantime, and 25 species are in danger: six are 'Critically endangered', eight are 'Endangered' and 11 are 'Vulnerable'. A furthermore, 12 species (18%) are 'Near threatened'. The remaining 19 species (29%) are classified in the 'Least Concern' category. For five species 'Data deficient' is recorded (8%). Globally, 45% of all species is in danger and/or became extinct (Maes *et al.* 2014).

Some species like *Martes martes*, *Lutra lutra*, *Felis silvestris* and *Meles meles*, realized a comeback recently, although their population status still remains precarious. The distribution area of *Muscardinus avellanarius* and *Cricetus cricetus* is limited geographically; the latter has reached the threshold of extinction and needs a species specific management. Many other species show an insidious and unexplained decline, such as *Mustela putorius*, *Eliomys quercinus*, and several 'mice species' of which more than half of all bat species.

Number of mammals by Red List category

Source: Natuurpunt, Bat working group, Barn owl working group, Likona, INBO

Red List saproxylic scarab beetles

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Red lists indicate the risk of extinction of a species in Flanders. This risk assessment is based on objective and international criteria of the International Union for Conservation of Nature (IUCN).

This Red List includes the stag beetles (6), rhinoceros beetle (1) and the flower chafers (12) present in Flanders. We compared the population trend and the distribution for three periods (before 1950, 1951-1990 and 1991-2014). **From the 19 species, five species are of 'Least Concern', one is 'Near threatened', five are 'Endangered', two 'Critically Endangered' and two are 'Regionally extinct' (Thomaes *et al.* 2015a).**

This is the first Flemish Red List concerning this group so the trend of the status could not be evaluated. Mainly mobile species with a more generalistic habitat use clearly increase in numbers or recolonise Flanders. In contrast, species with limited mobility and often very specialised habitats are becoming rarer. The threatened species cover both species of half open habitats as well as from forests but the most threatened species are all linked to hollow trees (Thomaes *et al.* 2015b).

The conservation of these species should focus on the protection and restoration of hollow trees in as well as outside forests (for example old orchards, pollards, parks). Concerning dead wood protection in the forest, a clear improvement has already been made. However, concerning conservation of old and hollow trees outside forests a significant effort is needed. The main hotspots in Flanders are Voeren and the Sonian forest where nearly all species are present.

Number of saproxylic scarab beetles by Red List category

Source: KBIN, INBO, University of Gembloux and Ghent, Likona and Natural History Museum Maastricht

Red List water bugs

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

Listing species according to their relative risk of extinction and comparing regularly updated Red Lists, is a powerful tool in assessing the efficacy of species conservation policies. The Red List assessment in Flanders is based on objective and internationally accepted criteria of the International Union for the Conservation of Nature (IUCN). The new Red List of water bugs (*Heteroptera: Gerromorpha and Nepomorpha*) compares the periods 1989-1999 and 2000-2011.

Of the 62 species of water bugs observed since the beginning of the last century in Flanders six are now regionally extinct. Two species are 'Critically endangered', five species 'Endangered' and seven species are 'Vulnerable'. A further three species are considered 'Near threatened' and the remaining 38 species were assessed as 'Least concern'. One species was considered vagrant. The new Red List shows that 32% of all water bugs are either threatened (22%) or regionally extinct (10%) (Lock *et al.* 2013). This relatively high proportion confirms the sensitivity of aquatic environments for environmental pressures.

Despite the different methodologies applied for drafting the former Red List (Bonte *et al.* 2001), both lists are remarkably similar. The proportion of threatened species did not change considerably. There was however a marked increase in distribution range of water bugs of running waters due to a general improvement in water quality (Lock *et al.* 2013). As a result, three species improved their status. *Aphelocheirus aestivalis* was downgraded from critically endangered to near threatened, *Velia caprai* from vulnerable to least concern and *Aquarius najas* from critically endangered to least concern.

Some species, however, remain rare and are still under threat. This includes stenotopic species from fens such as *Notonecta olivacea* and *Cymatia bonndorffii*, and species of shallow lakes with abundant macrophytes. Also species of forest pools and ditches (e.g. *Gerris gibbifer*, *G. lateralis*) and water bugs from slightly brackish waters (e.g. *Corixa panzeri*, *Sigara stagnalis*) deserve extra attention.

Number of water bugs by Red List category

Source: VMM, KBIN, INBO, Natuurpunt

Species status

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved 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'. According to the Flemish Decree on Species (1/09/2009), INBO has to draw up and validate Red Lists.

Validated Red Lists exist for amphibians, breeding birds, butterflies, dragonflies, freshwater fish, ground beetles, ladybirds, mammals, orthoptera (crickets, grasshoppers and locust), reptiles, saproxylic scarab beetles, vascular plants and water bugs. For spiders, ants, *Dolichopodidae* and *Empididae* non validated Red Lists exist. Because reliable and sufficient data are not available, these species can't be validated.

Of the 2.112 species on validated Red Lists, 148 became locally extinct during the last century. A total of 504 species (26%) are on the Red List and are vulnerable to extinction if necessary measures are not taken. The decline of these species is the result of the decreasing habitat area and a decline in habitat quality. Species associated with farmland are increasingly present on the Red List.

State and trend of ecosystem services

European Biodiversity Strategy 2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows to state and trend of ecosystem services in Flanders.

The nature report 2014 examined the state of 16 ecosystem services (Stevens *et al.* 2014). The state of an ecosystem service is determined by the relationship between supply and demand, the trend in that relationship and the impact of the use of ecosystem services on the supply of other ecosystem services. **For 15 of the 16 ecosystem services, the demand exceeds always the supply, in seven of which greatly.** The trend in the supply of and demand for the 16 ecosystem services is variable. Both demand and supply show (slightly) increasing or decreasing trends depending on the ecosystem service. The demand is increasing more frequently (13 ESD) than the supply (7 ESD) (Jacobs *et al.* 2014).

Because demand exceeds supply (by a large margin in some cases), most ecosystem services in Flanders are used intensively or exploited, including regulating services*. The demand for nearby green space for instance exceeds the supply: approximately 21% of the population in Flanders does not have green space for daily use within walking distance. Furthermore, about 55% of the area in Flanders is less attractive for recreation and experiencing nature. This open area is less attractive because of buildings, noise or because natural and /or cultural elements are missing. Safeguarding existing green spaces, improving accessibility and targeted creation of green infrastructure can generate high socio-economic benefits, especially in urban context where the space is scarce (Simoens *et al.* 2014).

The demand for various services is also increasing, and is no longer in equilibrium with the natural supply. For some ecosystem services this supply shortage is supplemented by imports (e.g. wood, drinking water), for other services (e.g. water quality regulation, air quality regulation, flood regulation or green space for outdoor activities) part of the social demand remains unfulfilled. Unmet demand often takes the form of environmental damage, economic damage or health costs. The supply deficit for some ecosystem services is also met by technological solutions, e.g. water treatment plants.

* Regulating ecosystem services refer to processes such as water purification, climate regulation or pollination.

Trend: no trend determination possible

		Demand	Relation	Supply	
Food production		↑	>	↑	
Game production		↗	>	↘	
Wood production		↗	>>	↗	
Energy crop production		↑	>>	↑	
Water production		↘	>	↘	
Pollination		↗	<	↓	
Pest control		↗	>>	↘	
Maintaining soil fertility		↓	>	↑	
Air quality regulation		↓	>>	↑	
Noise regulation		↗	>	→	
Erosion risk regulation		↑	>	↑	
Flood control		↑	>>	↑	
Coastal protection		↑	>	↘	
Global climate regulation		↑	>>	↘	
Water quality regulation		↗	>>	↑	
Green space for outdoor activities		↑	>	↘	

Supply/demand subject to:

↑ increase
↗ slight increase
→ no pronounced trend
↘ slight decrease
↓ decrease

Demand is:

>> much greater than supply
> greater than supply
< smaller than supply
<< much smaller than supply

State and trend of 16 ecosystem services

Source: INBO

Number of species conservation plans and protection programs

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

This indicator shows the evolution of the number of species conservation plans.

With the establishment and execution of species conservation plans and by taking conservation measures, with emphasis on the species of international importance, the Flemish government aims to halt the decline of these species and to ensure the favourable conservation status of viable populations, or to restore (the populations of) endangered species.

Up to the end of 2016 18 species conservation plans were drawn up for the following species or species groups: several *Chiroptera* species, *Cricetus cricetus*, *Meles meles*, *Muscardinus avellanarius*, *Vipera berus*, *Alytes obstetricans*, *Hyla arborea*, *Pelobates fuscus*, *Salamandra salamandra*, *Hipparchia semele*, *Lasiommata megera*, *Lycaena tityrus*, *Phengaris alcon*, *Satyrrium ilicis*, *Acrocephalus paludicola*, *Anser brachyrhynchus*, *Caprimulgus europaeus*, *Sanguisorba officinalis*. This is 64% of the target.

In 2015, five species protection programs were established (Antwerp harbor, *Castor fiber*, *Circus pygargus*, *Cricetus cricetus* and *Crex crex*). In 2016 four 'were added: namely for *Botaurus stellaris*, *Coronella austriaca*, *Hipparchia semele* and *Pelobates fuscus*.

Various LIFE projects, nature development projects, municipal species adoption plans and nature management plans also help protect species in Flanders. As a result, the number of initiatives to protect species exceeds in practice the number displayed through this indicator.

Trend: significant increase

Number of species conservation plans and protection programs

Source: ANB

The number of sanitized fish migration barriers (Priority 1 of the strategic priority map)

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems. (SEBI14)

The indicator presents the number of sanitized migration barriers on the watercourses of the strategic prioritization map for fish migration. The BENELUX decision on fish migration states that 90% of the fish migration barriers categorized as first priority on the strategic priority map must be eliminated before December 31, 2015 (phase 1) and the obstacles of second priority before December 31, 2021 (phase 2).

On a significant part of the watercourses of second priority, fish migration barriers have not yet been fully inventoried. Therefore it is currently not possible to assess the second indicator (phase 2).

The total number of bottlenecks may change as they sometimes naturally disappear or may turn out to be less problematic after in depth assessment

The network of watercourses allocated to first priority is about 800 km long, and includes 51 fish migration barriers, of which 90% (or 46 barriers) should have been be sanitized by December 31, 2015. These 46 barriers include 35 priority migratory barriers defined in the eel management plan. On December 31, 2016, a total of 22 of the 46 (48%) barriers of phase 1 were remediated. Of the 35 high priority barriers of the eel management plan, however, only 13 (37%) were sanitized. Hence, by the end of 2016 still 22 barriers included in the eel management plan and four other bottlenecks in waterways of first priority need to be sanitized.

As a result phase 1 of the Benelux decision was not achieved. Besides, the inventoried fish migration barriers of phase 2 will probably be sanitized only after 2021. The main bottlenecks remain available budgets, staff capacity and societal considerations.

Trend: significant increase

Conservation status of species of European interest (Habitats Directive)

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status. SEBI 03

The main goal of the Habitats Directive is to maintain a 'favourable' conservation status of selected species. These species are assumed to be endangered and Europe should play an important role in their conservation. Generally these are species living in specific habitats. The evaluation of the 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.

In Flanders, only nine species (three amphibians, one fish and five bats) have a favourable conservation status. For more than half of the species (34 on 59) the conservation status is poor and for nine species (16%) the status is inadequate. For six species there was insufficient data to evaluate the status. Compared with 2007, the conservation status of 14 species improved, but at the same time the situation for 17 species deteriorated (Louette *et al.* 2013). A next assessment of the conservation status will take place in 2019.

Trend: no trend determination possible

Conservation status of habitats of European interest

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status. SEBI 03

The main goal of the Habitats Directive is to maintain a 'favourable' conservation status of selected habitats. These habitats are assumed to be endangered and Europe should play an important role in their 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.

More than three-quarters of the habitats (38 habitats) are of poor conservation status and 9% (four habitats) have an inadequate conservation status. The latter comprise one peat and marsh habitat, one coastal dune habitat, one heathland, one grassland and one aquatic habitat. **Consequently, only five habitats have a favourable conservation status**, these being one saline habitat (mudflats and sandflats not covered by seawater at low tide), one coastal dune habitat (dunes with sea buckthorn), one aquatic habitat (Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.), one grassland habitat (*Rupicolous calcareous* or basophilic grasslands of the *Alysso-Sedion albi*) and one cave habitat (caves not open for public). For seven habitats the situation on the field improved slightly, compared with 2007 (Louette *et al.*) 2013. A next assessment of the conservation status will take place in 2019.

Evaluation of the conservation status of habitats of European interest in Flanders (2013). For each category we give the number of habitats that improves (+), deteriorates (-), remains unchanged (=) or when the trend is not known (x)

Source: INBO

Trend: : no trend determination possible

Status breeding birds of European importance

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status. SEBI 03

For the period 2007-2012, the indicator shows the average percentage in the distance of the breeding population (number of breeding pairs or territories) to the specified regional target population within the conservation goals of the breeding birds of European interest * (distance to target).

The population goals were met for *Dendrocopos medius*, *Falco peregrinus*, *Larus graellsii*.

The latter two continued to increase in number since 2007 (Anselin *et al.* 2013). At the end of 2012, the population was still up to 50% removed of the goal for six species, ranging from 13% for *Egretta garzetta* to 45% for *Platalea leucorodia*. In the case of *Egretta garzetta*, *Larus melanocephalus* and *Sterna hirundo* the goal was reached once or twice in the period under investigation. For the other 11 species, the distance remains very large, between 50-100% of the target. For most of these species, their population is still at such a low level that drastic measures are required to achieve a recovery. For most of them, nature development and large nature restoration projects could help to reverse negative trends. Certain species with large homeranges often need a higher general quality environment. Increasing the quality of mosaic farmland landscapes should also be another important goal for the future.

* Species of Appendix 1 of the Birds Directive and species of which the international 1% standard is exceeded in at least one breeding ground

Trend: no trend determination possible

Evolution 'distance to target' breeding birds of European importance (2008-2013)

Source: Monitoring project Special Breeding Birds, INBO, KBIN (*Falco peregrinus*)

Status wintering waterfowl of European importance

European Biodiversity Strategy 2020

Target 2

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status. SEBI 03

The indicator shows 19 waterfowl species of European interest (= those in Flanders with important numbers in Europe), the percentage in distance of the average Flemish winter population over the last five winters to the specified regional target population within the conservation goals of the species of European interest * (distance to target).

At the end of 2013, the population goals were met for all four goose species, *Cygnus columbianus*, *Numenius arquata* and *Egretta alba* (Anselin *et al.* 2013). With *Anas penelope*, *Anas strepera* and *Aythya fuligula* the distance to the targets is relatively small (less than 10%). For nine species, this distance is considerably larger, ranging from 34% for *Anas clypeata* 74% for *Pluvialis apricaria*. Most of them showed a clear negative trend during the last ten years. This decrease can be partially attributed to large-scale shifts within the European winter area for certain species (e.g. *Philomachus pugnax*). For most species, however, there is a clear link with ecological changes in wetlands within Flanders, such as in the Scheldt estuary. In order to meet the population goals, the carrying capacity for waterfowl can be increased in a large number of areas by means of nature development and restoration projects (increasing water level, limitation of disturbance).

Evolution 'distance to target' wintering waterfowl of European importance (2008-2013)

Source: INBO

Trend: no trend determination possible

Sites designated under the EU Habitats and Birds Directives

European Biodiversity Strategy 2020

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status. (SEBI 01)

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 26.000 areas designated according to the Birds Directive (Special Protection Areas) and the Habitats Directive (Sites of Community Interest). Together they cover 18% of the land surface of the EU.

In Flanders, 24 Special Protection Areas have been designated with a total area of 98.243 ha or 7,3% of the Flemish territory. There are 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 105.022 ha or 7,8% of the Flemish territory. The total Natura 2000 area comprises 166.322 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 2013, there was an increase (133 ha) in the Sites of Community Interest. Floodplains along the river Maas were included.

Coverage of protected area under Natura 2000

Source: ANB, INBO

Trend: no trend determination possible

Area with conservation management

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows the evolution of the surface of nature area with a conservation management plan. These include the officially recognized nature and forest reserves managed by non-governmental organizations (NGO), the nature and forest reserves managed by the Flemish governmental Agency, public and privately owned forests and parks with a management plan, and the military sites mainly managed for conservation.

By the end of 2016 the area with conservation management reached 81.699 ha. This is a significant increase of 18,370 ha compared to 2011. In 2016, the surface increased most in public and privately owned forests with a management plan and the officially recognized nature reserves. To a more limited extent, the surface of privately owned parks with a management plan also increased.

Each area included in this indicator has an approved management plan. However, the extent to which the management is focused on achieving nature goals can vary considerably. In some areas with a management plan, the nature function may be secondary or subordinate to economic or social function. According to the new Nature Decree, the different types of management plans will in future be integrated into one new type, the nature management plan. Four levels of ambition are distinguished. In Type 1 sites, the objective is to maintain a basic nature quality, while Type 4 sites are similar to the current reserves. A more specific analysis will then be possible.

Since 2013, the Agency for Nature and Forests has been using a category that is not included in the definition of this indicator. These are nature areas with an approved management plan, but that do not yet have the status of Flemish nature reserve. With this type of area added, the total area with conservation management amounts to 83.776 ha.

If the policy of the 2011-2016 period is continued in the future and the social context does not change, we expect a total surface with effective nature management between 92.400 ha and 103.600 ha by 2020.

Area with conservation management (trend area) above and for the individual categories (bottom).

Source: ANB, nature organizations, INBO

Trend: significant increase

Acquisition of nature areas by the Flemish Government and non-governmental nature organizations

European
Biodiversity Strategy
2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

The indicator shows the evolution of the purchases (in number of ha) of nature and forest by the non-governmental nature organizations and the Flemish Government and the corresponding investment by the Flemish Government (in 1000 €).

The acquisition of land by the Flemish Government and the non-governmental nature organizations is a strategically important instrument. Acquiring nature areas ensures that nature also becomes the main function in those areas. Of all nature areas, the nature and forest areas owned by non-governmental nature organizations and the Flemish Government generally have a higher natural value.

In 2016, the non-governmental nature organizations and the Flemish Government purchased 1.275 hectares altogether. Of these, the Flemish Government purchased 599 ha. That is more than in 2015, but clearly lower than the years before. The area that the Flemish Government acquires annually has even dropped significantly in the last ten years. In 2016, the non-governmental nature organizations bought 676 ha. That is the highest number of the past five years, but still significantly less than the purchases realized in the period 2000-2005.

The focus of nature policy today is on the realization of the European Natura 2000 goals. The government is committed to supporting everyone wanting to engage in this. This is regarded as complementary and partly as an alternative to the acquisition of nature areas by the government and the non-governmental nature organizations.

Trend:

Surface Flemish government: significant trend, decrease becoming stronger beyond 2004

Surface nature organizations: significant trend, beyond 2005 decline seems to have stabilized

Flemish government purchase: significant decrease

Subsidies to nature organizations: significant trend, beyond 2007 decline seems to have stabilized

surface
Flemish government

surfaces to non-governmental
nature organizations

Flemish government purchase

grants to non-governmental
nature organizations

— trend
— trend
— uncertainty

Evolution of the purchases (in number of ha) of nature and forest by the non-governmental nature organizations and the Flemish Government and the corresponding investment by the Flemish Government (in 1000 €)

Source: ANB

Forest area

European Biodiversity Strategy 2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

The forest area indicator is a measure of forest cover in Flanders based on an instrument using high-resolution digital aerial photos. These photos are analyzed using set criteria. The method shows the cover of groups of trees, which results in a higher surface area than what is considered forest in the Forest Decree. On the other hand this instrument does not display areas without trees, e.g. caused by felling provided in the management as forest, while this area is still forest in the Forest Decree.

Based on the latest measurement (Boswijzer 2.0; 2015), the area comprises 164.263 ha (± 5899), information Flanders 2017. Due to the refinement of the instrument 1.0 (2012), the absolute forest area in 2.0 is lower than in 1.0 (185.686 ha; confidence limits -14,163 ha and +1.803 ha; Van der Linden *et al.* 2013). **However, since the difference with the previous measurements (the baseline measurement in 2009 and the re-measurement in 2012) is well within the confidence interval, it is not possible to discern a recent trend and as a consequence to determine whether or not forest area surface has increased or decreased.**

Trend: no trend determination possible

Share of damaged forest trees

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

During the first years of the monitoring, defoliation increased. From 2000 to 2008 crown condition improved, with lower defoliation scores. After 2008, defoliation increased again. The share of damaged trees decreased in 2013, followed by a small increase in 2014 and 2015. **In 2016 a slight improvement was assessed. 20.3% of the trees in the survey were considered as damaged. The level of damage was high in Common beech (*Fagus sylvatica*) and Corsican black pine (*Pinus nigra subsp. laricio*).** In 2016 strong fructification was assessed in beech forests all over Flanders. In combination with a bad crown condition this resulted in very high defoliation scores. There was also a category 'other broadleaves' with a high percentage of trees classified as being damaged (*Fraxinus excelsior*, *Alnus glutinosa*...).

Several factors have an impact on forest health. Deposition of atmospheric pollutants and extreme weather circumstances are influencing the whole forest ecosystem. Biotic agents (insects, fungi...) could cause defoliation and/or discolouration of leaves and trees. Site characteristics and management are also possible impact factors. The variability of the crown condition of beech is related to mast years.

Decreasing levels of atmospheric deposition and increasing attention to sustainable forest management could lead to a better forest condition. Unfortunately forests are facing new threats caused by international trade and climate change. At this moment, a statistical analysis of the data from 1990-2016 could not predict a significant change of the share of damaged trees in 2020.

Share of trees in defoliation classes 2-4 (Level I survey)

Source: INBO - Level I crown condition survey (Belgium/Flanders)

Trend: period 1995-2008: decrease, since 2009: increase again

Area with accessible forests and nature reserves

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows the evolution of the area with accessible forests and nature reserves with an accessibility regulation, in accordance with the resolution of the Flemish Government (05/12/2008).

On top of a good and sustainable forests and nature reserves management, the Flemish Government also wants to pay attention to the accessibility of nature and forest areas. Both the Forest and the Nature Decree require basic accessibility. That means that all forest and nature reserve trails should be accessible to pedestrians. Private forest owners can always reverse this principle, and unconditionally close their forests. Managers of forests and nature reserves can extend this fundamental accessibility by means of accessibility regulations. Through this instrument other users than pedestrians, e.g. horsemen, can be allowed, or certain areas can be indicated as play or bivouac zone.

In 2013 accessible forests and nature surface had more than doubled compared to 2012 and went from 7.074 ha to 15.486 ha. In the period 2014-2016 the area increased with 21.407 ha, and the total surface of accessible forests and nature reserves reached 36.893 ha. The steady increase has partly to do with the often lengthy consultation process that is necessary in the creation and adoption of an accessibility regulation.

If the policy of the 2009-2016 period is continued in the future and the social context does not change, we expect the surface area to increase further in 2020 to at least 49.870 ha or about 25% of the total surface of accessible forests and nature reserves.

Evolution of the area with accessible forests and nature reserves with an accessibility regulation

Source: ANB

Trend: significant exponential increase

Playing areas in forests and nature reserves

European
Biodiversity Strategy
2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

This indicator shows the evolution of the surface of playing areas in forests and nature reserves.

Playing areas are zones in forests (private and public) and nature reserves where one can play without prior permission from the Agency for Nature and Forest and the owner. **In 2016 ± 2.642 ha were designated as playing area.**

Most of these playing areas are situated in forests. Since the modification of the Nature decree in 2006, it is also possible to designate playing areas in nature reserves. In 2015 about 36 ha playing grounds exist in nature reserves. Since 2013 summer playing areas were created that can only be used in July and August. They are mostly used by the ca. 150.000 children and youngsters who are camping nearby during the summer months.

Evolution of the total area of play areas in Flanders

Source: ANB

Trend: significant increase

Urban areas with a city forest or a city forest project

European
Biodiversity Strategy
2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

This indicator shows the evolution of the share of urban areas with a city forest or a city forest project.

Flanders is one of the most densely populated regions in the world. Approximately 21% of the population in Flanders does not have green space for daily use within walking distance (Simoens *et al.* 2014) at one's disposal. In order to increase the livability of cities in Flanders, the Flemish Government wants to create more accessible city forests near urban areas.

A number of criteria drawn up by the Agency for Nature and Forest define a city forest. The surface, accessibility, approachability by bicycle and/or public transport, the presence of recreational functions and the presence of a reception desk are taken into account.

In the period 2010-2012, 35 of the 56 urban areas had a city forest or a city forest project representing 62% of the urban areas. No new projects were launched in the period 2013-2015. **In 2016, the number of urban forest projects increased to 37, but because the number of urban areas also rose to 62, the share has dropped slightly to 61%.**

Trend: no trend determination possible

Exceedance nitrogen critical load deposition in Natura 2000 habitat-area

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems. SEBI 09

Excessive nitrogen deposition is a threat to the favourable conservation status of Annex I habitats, situated within and beyond Flemish designated Special Protection Areas. In order to assess the risk for decreased habitat site quality due to excessive nitrogen loads, recommended critical load values from empirical ranges for occurring Annex I habitats are introduced (Bobbink & Hettelingh, 2011). When atmospheric nitrogen input exceeds the critical load of the envisaged habitat, an enhanced risk for the deterioration of the habitat site quality exists.

We examined for which percentage of the habitat area exceedance of the critical load took place. Nitrogen depositions were modeled for every square kilometer using the Flemish OPS model (VLOPS17, source: Flemish Environmental Agency). In 2016, the average nitrogen input in Flanders amounted to 24 kg ha⁻¹. From 1990 onwards, the nitrogen input has decreased by about 20 kg N ha⁻¹. The decrease in nitrogen deposition has led to a reduction of the habitat surface area with critical load exceedance. **In 2016 61% of the area (± 71 300 ha) showed exceeded critical load. Back in 1990 this was 93%.**

With the exception of the coastal dunes, almost no exceedance of the critical load value occurs in 2016 in the marine habitat types (coastal and halophyte vegetation). In grasslands, the nitrogen critical load value is exceeded in about 40% of the habitat area. For coastal and land dunes, deciduous forests and freshwater habitat types, exceedance is observed in ± 70% of the area. In heather and peatlands, critical loads are still exceeded in 95% of the mutual habitat area.

Because this indicator was calculated in a different way than the MIRA indicator 'Surface area of nature with exceedance of critical load eutrophication', the two indicators cannot be compared.

Trend: no trend determination possible

Source: INBO, VMM

Southern-European dragonflies

European Biodiversity Strategy 2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows the trend of the number of localities and the number of species from Mediterranean dragonflies observed in Flanders since 1980.

Indications are getting more and more consistent and show convincingly that climate change has a great impact on biodiversity. This results both in temporal changes, for example, phenology (flowering period, arrival of migratory birds, flight time etc.), as well as spatial shifts.

Many southern dragonflies and damselflies (Odonata) have expanded their range northwards in Europe these last decades. Until 1980, established populations of these species were unknown in north-western Europe. Here we analyse the evolution of the number of localities since 1980 for each of the southern species and the total number of species observed.

The figure shows clearly that both the number of localities for each of these species as well as the total number of species has increased since 1980. The first increase started in 1994, followed by a second steep increase from 2006 onward, both for the number of localities and for the number of species observed annually. Even though annual fluctuations occur, mostly due to weather conditions during the time of the flight season, the trend is clear and statistically significant.

These southern species were never before seen at so many localities in Flanders as in 2016. *Orthetrum albistylum* has for the first time ever been observed in Flanders. Species such as *Crocothemis erythraea* or *Coenagrion scitulum* had many flourishing populations in Flanders for a number of years already (De Knijf *et al.* 2006, 2010). *Anax parthenope* showed a steep increase in 2016 and can be considered as locally very common.

Based on the statistical analyses of the data from the period 1980-2016, it is doubtful if the number of southern species in Flanders will further increase by 2020. These analyses predict a further increase of the number of localities for most of these southern species by 2020. It remains unclear if the number of localities of the *Aeshna affinis* and of *Hemianax ephippiger* will further increase.

Trend: number of localities: significant increase
number of species: significant increase

Leaf phenology oak and beech

European
Biodiversity Strategy
2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

This indicator examines the evolution of leaf development of oak and beech.

Since 2002, the Research Institute for Nature and Forest (INBO) records the phenological activities of a number of selected oak trees in Meerdaalwoud (Flanders, Belgium) and beech trees in Zoniënwoud. For this indicator we analyse the evolution of both the date of flushing and the date of full leaf development.

Climate change directly affects biodiversity, i.e. temporal changes in phenological processes. Phenology can visualize such changes. **The emergence of both oak (*Quercus robur*) and beech (*Fagus sylvatica*) runs earlier in warm years (e.g. 2007) than in cold (e.g. 2013).** Leaf development of oak starts mid-april. This happened almost at the same time in the period 2003 – 2016, but in 2007 (warm spring) they flushed ten days earlier. In years with colder spring, such as 2006 and 2013, flushing started by the end of April to the beginning of May. Due to the large annual fluctuations in spring temperature, an earlier or longer growing season mentioned in van der Aa *et al.* (2015) is not yet visible in this time series.

The results for beech are quite similar, but leaf development is much faster. Beech also flushed earlier in 2007 and later in 2013, but the differences are smaller compared to oak.

Further warming will cause an ever earlier start of the growing season. This will extend the duration of the growing season, possibly causing trees to grow harder. At first sight, this seems positive, but it is still unclear what the consequences are for tree vitality. The current growth rate is matched by many organisms. Changes in tree phenology may contribute to the presence or absence of insects, pests or diseases.

Based on a statistical analysis of the data from the period 2002-2016, it is uncertain whether the leaf phenology of oak and beech will start earlier in 2020.

Trend: start leaf flushing oak: no significant decrease
full development leaf oak: no significant increase
start leaf flushing beech: no significant decrease
full development leaf: no significant decrease

Peak pollen production by birch and several grasses

European
Biodiversity Strategy
2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows the evolution of the peak of pollen production by birch and several grasses

Since 1974 the concentration of pollen in the air from birch and several grasses is measured by the Belgian Scientific Institute of Public Health. When the date with the highest value of pollen concentration (= peak pollen production) is set over the time, it turns out that the peak shows big yearly fluctuations. **The trend of the peak of pollen production by birch shows a significant advancing in time over the years.** For this tree species the peak appeared around April 21 in 1975-1985, but in 1995-2015 the peak occurs one week earlier. For the last ten years the peak has remained the same. **The trend of the peak of pollen production by several grasses fluctuates significantly, advancing in the period 1986-2005, and again occurring later since 2006.**

On the basis of a statistical analysis of data from the period 2002-2016 it is uncertain whether peak of pollen production by birch and several grasses will occur earlier in 2020.

Trend: birch: significant advancing
grasses: significant advancing

Evolution of the yearly peak of pollen production by birch (left) and grasses (right)

Source: Belgian Scientific Institute of Public Health

Trend in the number of alien species in different biotopes

European Biodiversity Strategy 2020

Target 5

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS. (SEBI 10)

This indicator shows the cumulative number of alien animal species in different habitats.

With increased mobility of people and goods, more and more plant and animal species are imported and exported. Although the (un)intentional introduction of alien species in some cases presents an opportunity and increases local species diversity, other alien species can become invasive over time and can disrupt native biodiversity or affect the ecological functioning of ecosystems. The rising number of alien species increases the risk of problematic invasive species.

The cumulative number of non-native species has been increasing since 1800.

The fastest increase occurs in freshwater and marine ecosystems. Coastal areas and estuaries such as the Scheldt estuary, where ports, shipping and transport are of particular importance, are susceptible to biological invasions and do not escape this trend.

The number of alien plant and animal species has increased drastically in Flanders in the last decades. This increases the risk of invasive alien species. The cost of controlling invasives (e.g. Japanese knotweed, black cherry, Canada goose, floating pennywort, water primrose, New Zealand pigmyweed) is already high.

Since 1 January 2015, the new European regulation 1143/2014 on the prevention and management of invasive alien species has been in force. This legal instrument aims at tackling invasive alien species to protect indigenous biodiversity and ecosystem services (Genovesi *et al.* 2014, Tollington *et al.* 2015). The regulation imposes new rules on Flanders for the prevention of new introductions, rapid response for new invaders, surveillance of alien species and the management of established invasive alien species.

Trend in the number of alien species in different biotopes

Source (animals): Alien Species Checklist based on data INBO and VLIZ.

Trend: no trend determination possible

Number of alien plant species

European Biodiversity Strategy 2020

Target 5

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS. (SEBI 10)

This indicator shows the cumulative number of alien plant 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 the natural environment and pose an increasing threat to the indigenous biodiversity. The rising number of alien species increases the risk of problematic invasive species.

The proportion of alien plant species within the global plant composition in Flanders has doubled since the 1970s from 5% to almost 10% and has increased significantly over the period 1972-2016.

The increase in international transport ensures a permanent supply of new plant species. Some of them succeed in establishing themselves and expand spontaneously. Based on the number of alien plant species, the most important pathways are escapes and transport contaminants. Escapes of exotic plants from horticulture (e.g. through the dumping of garden waste) is an important source of new introductions.

Trend: significant increase

Pathways of alien species in Flanders

European Biodiversity Strategy 2020

Target 5

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS. (SEBI 10)

The indicator shows the number of exotic plant and animal species introduced in Flanders via a certain pathway. It is based on a checklist of alien species, composed of various existing sources and databases. The information will be updated and refined as the checklist is further supplemented. The available information on introduction pathways was organized following the Convention on Biological Diversity standard (CBD, 2014; Adriaens 2016).

Alien species do not naturally occur in Flanders but arrived via human activity. Invasive species are those alien species that negatively impact on native biodiversity, ecosystem services or human well-being. Since 1st January 2015, the new European Regulation (1143/2014) on the prevention and management of the introduction and spread of invasive alien species is in force. The Regulation imposes new rules on Flanders for the prevention of new introductions through the control of their pathways of introduction. It obliges Member States to carry out an analysis of the most important introduction pathways of alien species, to prioritize them and to draft action plans for pathways of unintentional introductions.

Pathways are both the transport vectors and the routes along which species are introduced. They are subdivided according to the mechanism of introduction: the import of species as goods, the arrival of species through a transport vector or the natural spread from an area where the species is also alien. Hulme *et al.* (2008) distinguish five mechanisms ('release', 'escape', 'transport contaminant', 'transport stowaway' and 'corridor') and a category ('unaided') for the secondary spread of a species from an area where it was first introduced. The definitions are described in CBD (2014) and Hulme *et al.* (2008).

Based on the number of alien species, the most important pathways of alien species are escapes and transport contaminants. Escapes of exotic pets and plants from horticulture (e.g. through the dumping of garden waste), botanical gardens, zoos and pet shops and aquaria are an important source of new introductions. In addition, the introduction of living organisms as contaminants of goods (e.g. seeds, soil, live bait, wood and wood products) are an important source of unintentional introductions. Several animal species have also reached Flanders through dispersal from introduced populations in neighbouring regions. For aquatic alien species, unintentional introductions through contaminated fish lots constitute an important issue, for alien macrophytes the aquarist culture is a source of introductions.

Trend: no trend determination possible

Pathways of introduction of alien plant and animal species in Flanders. The categories adhere to the CBD hierarchical pathway classification (CBD 2014). To be determined by experts refers to pathway information that was not yet mapped onto the CBD standard.

Source: Manual of Alien Plants (Verloove 2017), INBO

Number of listed 'worst' invasive alien species threatening biodiversity

European Biodiversity Strategy 2020

Target 5

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS. SEBI 10

Alien invasive species (IAS) are considered a major threat to biodiversity worldwide. The Convention on Biological Diversity wants to identify and prioritize invasive alien species and their introduction pathways and wants to control priority species by 2020. The indicator shows the presence of alien species that are threatening biodiversity in Flanders and the proportion that behaves invasive in nature.

The selection of 'worst' invasive alien species is based on international lists of problematic species such as the global IUCN worst list and lists from regional research networks such as NOBANIS and DAISIE. Species on the list can severely impact on ecosystem structure and function, replace native species or impose a threat to unique biodiversity. In addition, they may have negative consequences for human activities, health and/or economic interests.

In Flanders, at least 89 of such potentially harmful IAS occur. At least 41 of them also really behave invasive in nature. Most of them are plants (16 species), fish (five species), mammals (four species), crustaceans (four species) and birds (four species).

Trend: no trend determination possible

Number of wintering ruddy duck in Flanders

European Biodiversity Strategy 2020

Target 5

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.

The indicator shows the number of wintering birds since 1979 based on the mid monthly waterfowl counts (counting October-March) and the monthly maximum of observed birds in Flanders. The monthly maximum is calculated as the sum of the maximums per month and per area. In addition, we also provide an overview of the number of birds being culled.

During the mid-monthly waterfowl census in the winter of 2015-2016, a maximum of five different individuals (October) were counted in Flanders, spread over eight areas. On the basis of loose observations, a monthly maximum (again in October) of 17 observed animals was calculated, spread over 29 areas*. One breeding case was also identified in 2016. Ruddy ducks are considered the greatest long-term threat to the white-headed duck *O. leucocephala* (Munoz-Fuentes *et al.* 2006, 2007; Rhymer & Simberloff, 1996; Kumschick & Nentwig, 2010). The Bern Convention therefore set the goal of eradicating ruddy ducks in the wild in Europe and North Africa by 2015 (Hughes *et al.* 2006, Cranswick & Hall 2010). The target of 2015 was not met in the Netherlands, Belgium and France where birds are still present (Hall 2016). For that reason the plan was revised (Hall 2016) and extended to 2020 (Bern Convention 2016).

In the period 2009-2016, a total of about 30 adults and 40 juvenile birds / pulli were culled in Flanders. Some weakened birds were also trapped, they were probably bred. These actions will be continued in 2017.

Trend: no relevant trend determination possible

Number of wintering ruddy duck in Flanders

Source: INBO, waterfowl database

Defragmentation along road infrastructure in Flanders

European
Biodiversity Strategy
2020

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Target 2

Landscape fragmentation as a result of road infrastructure is very high in Flanders. This results in many problems for the conservation of wildlife and nature areas.

The road infrastructure defragmentation indicator shows the quantity and quality of current defragmentation measures along highways, large and secondary roads, railways and canals in relation to an earlier established priority atlas for defragmentation, where all roads were assigned a low to very high priority to defragment. At the same time, the indicator provides an overall picture of the quality of the existing defragmentation projects: direct defragmentation (= area of the fauna passage itself) and medium or good quality indirect defragmentation (track with eco-grids around the passages), in which the difference between moderate and good indirect scattering depends on the daily range of the relevant species (group).

The indicator shows defragmentation in Flanders is limited. By the end of 2015, about 4.5% of 1.200 km of road infrastructure with a certain priority for defragmentation has a medium to good quality defragmentation for a certain species group. This medium to good quality defragmentation is effective for about 39% of transport routes with very high priority, 9% of transport routes with high priority, and 1% for normal and lower priority transport routes.

In comparison with 2011 (Everaert & Peymen, 2011) and the almost unchanged situation in 2012 and 2013, the number of defragmentation measures increased slightly in 2014.

Trend: no trend determination possible

Priority for defragmentation (1= low priority, 2= normal priority, 3= high priority, 4= very high priority)

Quantity (%) defragmentation in relation to the total road infrastructure (1 = low priority, 2 = normal priority, 3 = high priority, 4 = very high priority)

Source: INBO, AWV

Area with implemented ecological restoration projects

European Biodiversity Strategy 2020

Target 2

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

This indicator shows the evolution of the total surface with implemented ecological restoration projects. This concerns the surface project area in which restoration works have been carried out. This does not necessarily mean that the entire surface within the project area has been restored. Since 1998, the instrument 'ecological restoration' is used by the Agency for Nature and Forest (ANB) and the Flemish Land Agency (VLM) to restore areas in function of nature. Ecological restoration aims at creating better conditions for the development of nature in designated areas through active intervention.

Ecological restoration projects are carried out in phases: feasibility study, establishment of the project, identifying measures and modalities, approval of implementation plan and execution. **At the end of 2016, 18 projects were implemented and 10 running. The total realized surface increased significantly to 5.769 ha in 2016.**

If the 1999-2016 period policy is continued in the future and in an unchanged social context, we expect a total area in 2020 with implemented ecological restoration between 7.600 and 10.300 ha. If all projects are carried out, this area will increase to over 13.000 ha in the next years.

Evolution area with implemented ecological restoration projects

Source: VLM

Trend: significant increase

Forest area with management plan according to the criteria for sustainable forest management

European Biodiversity Strategy 2020

Target 3

By 2020, forest management plans or equivalent instruments, in line with Sustainable Forest Management (SFM), are in place for all forests that are publicly owned and for forest holdings above a certain size (to be defined by the Member States or regions and communicated in their rural development programmes) that receive funding under the EU rural development policy so as to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by forestry and in the provision of related ecosystem services as compared to the EU 2010 baseline.

This indicator shows the evolution of the surface of forest area with a management plan in accordance with to the criteria for sustainable forest management.

A forest management plan is important in order to achieve sustainable forestry. Sustainable forestry attempts to create a balance between the ecological, economic and social functions of forests. The Flemish Forest Decree allows two types of management plan: limited and extended. Limited management plans need to comply with only minimum standards, while extended management plans need to comply with the criteria for sustainable forest management. These approximately follow the guidelines of the Forest Stewardship Council (FSC), a certificate that can be obtained for forests with an extended management plan.

Forest management plans are compulsory for all forests larger than five ha. Private owners are offered the choice between limited and extended management plans, whereas extended 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 extended management plans by means of grants and by cooperating in forest owner groups.

Between 1990 and 2016, 68.459 ha of forest management plans were approved (36.778 ha extended and 31.681 ha limited).

In accordance with the new Nature Decree, the different types of management plans (forest and nature) will in the future be integrated into one new type, the nature management plan.

Trend: extended management plan: significant increase
limited management plan: significant trend which is weakening

Area with agri-environmental measures

European Biodiversity Strategy 2020

Target 3

By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity and to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by agriculture and in the provision of ecosystem services as compared to the EU2010 baseline, thus contributing to enhance sustainable management.

The indicator shows the changes in the surface of the area with agri-environmental measures implemented. The Flemish programme for rural development (PDPO, 2000-2006; 2007-2013) offered the opportunity to farmers to commit themselves, for a minimum period of at least five years, to adopt environmentally-friendly farming techniques that go beyond legal obligations concerning environment, nature and landscape. The agri-environment schemes concerning field borders and the restoration, development and conservation of small and linear landscape components aim to consolidate the natural infrastructure of the agricultural landscape.

The botanical management agreement has a relatively small success and has been stagnating, also in 2016. The new package “development of species-rich grassland” occupies the most surface area. The area of field borders also stagnates and planting and conservation management of woodrows further reduced.

The agreements “maintenance of hedges” and especially “trimmed hedges” (the latter since 2012) are quite successful. The apparent stagnation in recent years gives a somewhat distorted picture because it also contains new plantings. These do not disappear, of course, when a management agreement expires. Since 2015, no new management agreements have been concluded for planting. The length of the agreement “maintenance of hedges and trimmed hedges” has also been slightly reduced.

The most successful (largest surface area) are the management agreements for species protection. The surface area has been rising since 2015. This trend continues sharply with an increase of 837 ha (+ 48%) in 2016. In particular, the agreements for the management of fauna strips and grassland and the cultivation of food crops for fauna increased sharply. Because the policy concerning this management agreement (for both new species and new packages) has changed considerably and will change further (new species) VLM expects a further increase in the surface area. The necessary financial resources for this increase have already been earmarked.

In total, an increase of 971 ha was achieved for the flat-shaped management agreements, an increase of 29% compared to last year. The line-shaped elements do not follow this trend.

Trend: species protection: significant increase

botanical grassland management: significant trend, decrease getting stronger as from 2003

field margin management: significant trend, top reached, decrease started

woodrow management: significant trend, decrease getting stronger as from 2010

hedge: significant trend, decrease getting stronger as from 2009

trimmed hedge: no significant trend

Frequency of visits to forests and natural areas

European Biodiversity Strategy 2020

Target 2

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

This indicator shows the evolution of the frequency of visits to forests and natural areas. Flemish Nature policy considers access to nature and forest areas a stimulating measure to increase public support for nature and forest. The Flemish Government Agreement 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). The frequency of visits to forests and nature areas is one of the indicators of public support for nature (VRIND 2016).

Looking at the percentage of Flemish people who pay a visit to a forest or nature area at least several times a month (approx. 14%) compared to those who did this once a month (approx. 21%), we see that this proportion is higher in 2009, then drops to a low point in 2012 and from then on starts to rise slightly. The percentage of the Flemish people who never or only once a year pay a visit to a forest or nature reserve, fluctuates around 55% over the last three years.

Approximately nine percent of the population visited at least weekly a forest or nature reserve in 2016. Approximately 23% of the Flemish population did not visit any forest or nature reserve during the past 12 months and 26% did so only once last year. The percentage of visits to a forest or nature area at least once a week increased slightly in 2016, from 7.3% to 9.2%.

Frequency of visits to forests and natural areas

Source: Studiedienst van de Vlaamse Regering

Trend: no trend determination possible

Membership of NGO's for nature conservation

**European
Biodiversity Strategy
2020**

Target 1

To halt the deterioration in the status of all species & habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status by 2020 compared to current assessments: 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status and more 50% more species assessments under the Birds Directive show a secure or improved status.

This indicator shows the evolution of the number of members of nature organizations active throughout Flanders. Statistical analysis of the data shows a significant increase of the total number from 1994 to 2016. This can be interpreted as an expression of support for nature within our society.

In 2016, the total number of memberships increased by 7.005 compared to the previous year. However, the increase was less than in the previous three years. In 2015, 2014 and 2013, the number of members of nature organizations increased by 12.519, 17.344 and 11.725.

Each nature organization counted new members in 2016. Natuurpunt, which originated in 2002 from the merger of Nature Reserves and De Wielewaal, is with its 102.324 members the largest nature organization in Flanders. WWF is the second largest with 71.274 members, followed by Greenpeace with 61.617 members, Vogelbescherming Vlaanderen with 9.755 members and JNM with 3.022 members.

Trend: significant increase (total)

Evolution membership of NGO's for nature conservation active throughout Flanders: total (above) en per nature organization (under)

Source: NGO's for nature conservation

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Abbreviations

ANB	Agency for Nature and Forest
AWV	Administratie Wegen en Verkeer
EEA	European Environment Agency
INBO	Research Institute for Nature and Forest
SEBI	Streamlining European 2010 Biodiversity Indicators
VLIZ	Flanders Marine Institute
VLM	Flemish Land Agency
VMM	Flemish Environment Agency
VRIND	Vlaamse Regionale Indicatoren