

# Biodiversity monitor for ARABLE farming



The Biodiversity Monitor is a results-based methodology to measure and reward the performance for biodiversity (including soil, landscape, environment and climate) per arable farm in the Netherlands. The scores per farm on biodiversity-stimulating key performance indicators (KPIs) can be used as the basis for rewarding, and as such new revenue models. In this way, ecosystem-based arable farming can be stimulated.

## Summary

*With the successes with the Biodiversity Monitor dairy farming (started in 2014 – see other Console case study), the arable farming sector has been inspired to create a Biodiversity Monitor specifically for arable farming in the Netherlands (started in 2018). The concept is similar; differences include the stakeholder coalition and KPIs.*

The Biodiversity Monitor for arable farming is a result-based methodology, with a primary focus on the public good biodiversity (including strong links with soils, landscape, environment and climate). The aim of the methodology is to make biodiversity-enhancing performance per arable farm measurable. In this way it becomes possible to benchmark farms and allow multiple stakeholders to appreciate and reward positive biodiversity performance. These stacked financial rewards should lead to new revenue models for ecosystem-based arable farming. As a consequence, it offers farmers action perspective to improve practices for more sustainable production. The methodology is currently being developed by WWF-NL, Branch Organization Arable Farming, province Groningen and Rabobank, in collaboration with scientists, experts, stakeholders and farmers.

The biodiversity-enhancing performance per arable farm is measured with an integrated set of Key Performance Indicators (KPIs). The set of KPIs is currently (Jan. 2020) still under construction, but will likely include indicators on topics around emissions, inputs, soil management and nature & landscape elements on the farm. These KPIs will be selected based on multiple criteria, including their scientifically proven relation with biodiversity, connection to existing data systems (minimize extra admin), and that performance can be influenced in the short term by taking on farm measures. The KPI research, selection and piloting will be executed in 2020-2022 by scientists from Wageningen University & Research and Louis Bolk Institute, in collaboration with Boeren Natuur and farmers. For each KPI, scientists will also determine threshold- and target values based on existing legislation and policies, and the best available scientific knowledge. Good performance on the integrated set of KPIs can be linked with financial rewards from multiple stakeholders. Note that the Biodiversity Monitor provides a scientifically substantiated methodology to measure biodiversity-enhancing performance per farm, while contracting parties who use this data are free to decide how they reward the farmer.

Because the research/development and piloting of KPIs is still ongoing, no contracts using the Biodiversity Monitor systems have been implemented yet. Similar to the dairy sector, the arable sector can use the Biodiversity Monitor KPIs in private-private and private-public contracts, and there is much potential for integrating it in the new Common Agricultural Policy (CAP). It is foreseen to involve multiple rewarding parties (e.g. arable produce buyers, cooperatives, banks, land leaseholders, water boards, governments) to use the Biodiversity monitor to reward and stimulate ecosystem-based arable production.

## Objectives

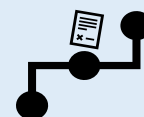
The objective of the Biodiversity Monitor is to make biodiversity-enhancing performances per arable farm measurable (using an integrated approach). This allows multiple stakeholders to financially reward positive biodiversity impacts based on unambiguous scientifically relevant results. The stacked financial rewards from multiple stakeholders, based on the same KPIs, will stimulate farmer to practice ecosystem-based arable farming. In this way, the Biodiversity Monitor stimulates the transition towards more sustainable production while enhancing biodiversity recovery, additional farmer income, and a future perspective for the arable sector.

## RESULT-BASED



The Biodiversity Monitor measures per arable farm the performance on multiple biodiversity-enhancing Key performance Indicators (KPIs). Following, these results can be linked with financial rewards from supply chain stakeholders – this is the contract solution. Stacked rewards from multiple stakeholders can form the new revenue model for ecosystem-based arable farming.

## VALUE CHAIN



Potential, not yet applied:

- A) Farmer – buyer – certification – store – consumer (product price)
- B) Farmer – bank – (interest discount)
- C) Farmer – government (compensation)
- D) Farmer – water board (tax rate)
- E) Etc.

## LAND TENURE



Potential, not yet applied:

- A) Farmer – land leaseholder (favorable)
- B) lease conditions)

## COMBINATIONS

Farms can have different contracts with multiple parties. For example, a farm can have a contract with the product buyer, bank, and government - which all sent financial rewards for good performance on the same set of KPIs.

## PUBLIC GOODS



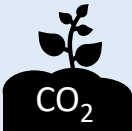
(Farmland) biodiversity



Landscape and scenery



Soil quality (and health)



Climate regulation - carbon storage and greenhouse gas emissions



Water quality



## Problem description

The Netherlands are among the European countries with the biggest challenge when it comes to protecting biodiversity (EEA, 2015). Populations of wild animals in the agricultural landscape decreased by 50% since 1990 (WWF-NL, 2020). These massive losses of nature are largely related to increased intensification and scale of agricultural production over the past decades.

With a 29% land share (CBS, 2019), the arable sector is one of the biggest users of agricultural land in the Netherlands and puts significant pressure on biodiversity – both on farmland and on adjacent nature areas. The arable lands are generally intensively managed with short rotations, high input levels of fertilizers, pesticides and soil tillage. This type of management threatens wildlife species such as field birds and insects. Most non-agricultural landscape elements, such as hedges and flowery corners, have disappeared during land consolidation processes for scaling. This leaves less and less space for birds, butterflies, and other animals to forage, seek shelter and nest. Moreover, the quality of these habitats declines due to environmental pollution caused by agricultural (and other) activities. Especially nitrogen deposition and leaching causes eutrophication of soils and water, leading to losses of plant species and life in freshwater. All these practices together affect the entire wildlife food-web, leading to a massive loss of biodiversity in the agricultural landscape and beyond.

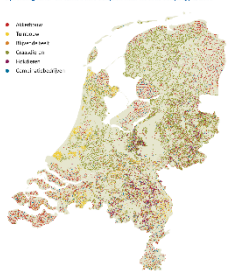
Changes in farming practices are urgently needed to stop and reverse biodiversity losses, but also to ensure the continuation of agricultural production which depends on ecosystem services (e.g. clean water and healthy soils). However, current markets provide small margins on arable produce, resulting in low income for farmers what stimulates intensification even further.

In order to create a future perspective for nature and arable farmers, new business models are required to make ecosystem-based arable farming a sustainable, profitable and attractive practice for farmers. In the light of that challenge, the Biodiversity Monitor for arable farming has been established by a multi-stakeholder coalition consisting of WWF-Netherlands, BO Akkerbouw (branch organization arable farming Netherlands), province Groningen, and Rabobank (largest agricultural financier in the Netherlands).

## LOCATION

## NETHERLANDS

Spreading land- en tuinbouwbedrijven naar hooftbedrijfssoorten



The Biodiversity Monitor can be applied on all approx. 11.000 arable farms in the Netherlands (red dots on map). Source: CBS, 2019.

## CONTRACT

**So far, there are no official contract partnerships, but this instrument provides full potential for:**

### Financing parties:

- Market sector: food industry, bank, landowner
- Government: province, municipality, waterboard, EU



### Contract types:

- Private-public (farm-government)
- Private-private (farm-business)

### Payment mechanisms:

- Higher product price
- Loan interest discount
- Favourable land lease conditions
- Water tax discount
- Subsidy
- CAP rewards
- Etc.



## Data and Facts – Contract

**Indirect effects:** The primary focus is on (farmland) biodiversity, with strong links to soil quality and health, climate regulation (carbon storage and greenhouse gas emissions), and landscape and scenery. Indirect beneficial effects are on air quality (e.g. less ammonia emissions), recreational access (improved landscape quality), resilience to natural hazards (improved soil health), rural viability and vitality (increased farmer income and social appreciation), and water quality (less soil-N surplus).

**Involved parties:** The initiators of the Biodiversity monitor arable farming are WWF-NL, Rabobank, BO Akkerbouw (branch organization arable farming Netherlands) and province Groningen. These parties together currently (2018-ongoing) develop the Biodiversity monitor in close collaboration with researchers from Wageningen University & Research and the Louis Bolk Institute. These parties have a public-private-partnership (2020-2022) which includes KPI research and field pilots in close collaboration with farmer organization Boeren Natuur (represents 40 farmer collectives for agricultural nature conservation). During the development process, farmers, farmer organizations, experts and relevant stakeholders will continuously be consulted.

**Participation:** So far, no contracts have been implemented, as the research/development and piloting phase is yet ongoing. The Biodiversity monitor should become available for all arable farms in the Netherlands (~11.000 farms) and all potential contracting parties.

### Advantage for involved parties

- Arable farmer: financial support for biodiversity-enhancing efforts, what contributes to a improved revenue model for ecosystem-based arable farming.
- Assumed advantages for potential contract parties: sustainable/future-proof supply chain and safeguarding of societal support for the sector (supply chain stakeholders), financial risks minimalization and corporate responsible image (banks), sustainable soil management (land leaseholders), improved water quality (water boards), enhanced conservation of nature reserves, ecosystem services and landscape quality (governments).

**Funding/payments:** So far, there are no official contracting parties. Rabobank (market-sector-oriented) will implement the Biodiversity monitor in the sustainability policy for each individual farmer. Besides, arable sector supply chain businesses (market-sector-oriented) are interested, and there is much potential for governments (both with and without EU funding) to apply this instrument in contract solutions.

## Context features

**Landscape and climate:** The geography of the Netherlands can roughly be split into two areas: the low and flat lands in the West and North, and the higher lands with some hills (max. 300 meter) in the East and South. Much of the lower lands have been reclaimed from the sea (polders) and are below sea level, protected by dikes. The water is continuously pumped away through many small canals, and the groundwater level is in most places regulated at low levels. Soils in the lower lands are predominantly peat and loam, while the higher lands are more sandy-peat, sand and clay. The Netherlands have a temperate maritime climate, with cool summers (average daytime temperatures varies from 17-20 °C) and moderate winters (2-6 °C).

**Farm system:** The Netherlands is for 44% covered with agricultural land (1,82 million ha out of the total country area of 4,15 million ha), which is for about one-third in use for arable farming (0,53 million ha – 13% of the country, 16% of total land area, and 29% of all agricultural land; this excludes temporary grasslands and silage maize; CBS, 2019). Therewith, arable farming is one of the largest land use categories in the Netherlands. Arable farms are spread throughout the Netherlands, with hotspots in the Northeast, Southwest and center (see Fig. 2). The area includes about 11.000 arable farms, which have an average size of 62 ha (BIN, 2019). The main cultivated crops are grains (34% of arable land), potatoes (31% of arable land) and sugar beets (15% of arable land), which are often cultivated in rotation with potatoes once every 2-4 years. Other common crops (20% of arable land) include seed onion, grass seed, chicory, flax seed, fiber flax, rapeseed, hemp and kidney beans (CBS, 2020). The crops are conventionally grown in short rotations and relatively intensively managed with chemical fertilizers and crop protection agents. Most non-agricultural landscape elements, such as hedges and bushes, have disappeared over the past decades during land consolidation processes for scaling. Consequently, very little suitable habitat is left over for wild plants and animals to live in and around arable land in the Netherlands – contributing substantially to the biodiversity losses in the agricultural area in NL. Especially typical farmland birds have declined massively (WWF-NL, 2020).

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## SUCCESS OR FAILURE? And reasons for success:



The success of the Biodiversity monitor for arable farming is unknown until today, as the content is yet under research & development and contracts have not yet been implemented. However, we (WWF-NL) consider the initiation of this methodology with a motivated coalition of key stakeholders, upon the arable sector's own request, already as a major step into the right direction. In general, the Biodiversity monitor (for both dairy and arable farming) is acknowledged in national policies as a good and useful example to work on the dual challenge of nature restoration and future perspective for farmers across the entire agricultural sector.

Also the innovative Delta Plan for Biodiversity Recovery (an ambitious plan signed by 50+ leading Dutch agri- and horticulture retail, agro-industry, nature and environmental organizations and science institutions) embraced the Biodiversity monitor as key methodology for monitoring and rewarding best performances. The key success factors determined by the Delta Plan for Biodiversity Recovery are: shared values, coherent laws and regulations, knowledge and innovation, collaboration at the landscape level, and new business models. The Biodiversity monitor enhances all success factors, and particularly the new business models. Provinces and businesses have shown interest to implement the monitor and reward farmers for their performance on biodiversity. In general, the Biodiversity monitor methodology is quite innovative and widely acknowledged as a high-potential contract solution. Especially the use of KPIs to quantify impact (performance) instead of prescribing measures or best agricultural practices, is critical to enhance impactful change. The methodology has potential to be unrolled in other sectors and regions, as has also been done for the dairy farming sector in the Netherlands. However, whether this contract solution contributes substantially to biodiversity recovery requires verification. Monitoring of the relationship between KPI performance and actual biodiversity enhancement, is scheduled for future trajectories.

## SWOT analysis

### Main Strengths

1. The result-based approach based on Key Performance Indicators (KPIs)
2. The integrated approach (aiming for positive results on all KPIs, on each farm) is powerful to stimulate biodiversity recovery without allowance for trade-offs
3. The Biodiversity monitor will become available for all Dutch arable farms and can be used by all relevant stakeholders for result-based financial rewards.
4. Minimal extra administrative burden as most data comes from already obliged farm management data tools.

### Main Weaknesses

1. Uncertainty about availability and reliability of data needed to calculate the KPI performance per farm.
2. The environmental effectiveness requires verification by monitoring. This is scheduled for future trajectories.

### Main Opportunities

1. The Biodiversity monitor can be used in many different private-private and private-public contracts
2. High potential for integration in ecoschemes for the post 2020 CAP.
3. Multiple stakeholders can reward farmers based on the same biodiversity-enhancing results, enabling farmers to manage on clear unambiguous goals.
4. Stacking financial rewards based on the same KPIs can enhance new revenue model for ecosystem-based arable farming.

### Main Threats

1. Contracting parties can determine their own rewarding system and goals per KPI, allowing for the risk of rewarding targets below the required levels for biodiversity recovery (from ecological perspective).
2. Even though this methodology is theoretically very promising, the instrument is sometimes perceived as rather complex and difficult to apply. Information exchange and practical education is essential here.