Biodiversity Monitoring System

Manual for the collection of data and presentation of monitoring results

Gefördert durch:

Bundesministerium
für Umwelt, Naturschutz, nukleare Sicherheit
und Verbraucherschutz

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Naturschutz

Introduction

Food standards certify a certain quality of the production process or product and guarantee compliance with legal regulations. Currently, however, more and more food processing companies and retailers, as well as society, are demanding more than just legal compliance with regard to environmental and social aspects - including biodiversity. Currently, standard-setting organisations and companies lack a common, objective and transparent monitoring tool to track and evaluate the development of the potentials for biodiversity. Very often, monitoring is only carried out selectively, for example in pilot projects or for individual agricultural products in certain regions. The extensive data of the auditing companies are not evaluated from a biodiversity perspective.

Within the framework of the EU-LIFE project "Biodiversity in Standards and Labels for the Food Industry", the Biodiversity Monitoring System (BMS) was developed, which enables to monitor the development of the potential for biodiversity on farms. The focus is on the monitoring of

- Management of existing habitats and other structures for biodiversity
- Reduction of negative impacts on biodiversity

Both fields of action contribute to the creation of potentials for more biodiversity on the farm and in its surroundings. The BMS asks a total of 94 questions, the answers to which result in 107 key figures and 41 overarching indicators. Table with the indicators and key figures: See Annex II.

A structured overview and visualisation of the data grouped into nine clusters enable an evaluation of the agricultural practices and conclusions to be drawn about the potential for biodiversity and its development over time. Initial data collection establishes the starting point (baseline), which describes the current state of the farms. Changes become apparent through subsequent data collection at regular intervals, i.e. the data of the farms participating in the monitoring should be collected again as often as possible every 2 - 3 years.

The Biodiversity Monitoring System was revised in 2022. This revision considered important findings from two initiatives:

The "Basic Set of Biodiversity Criteria" of the German sector initiative “Food for Biodiversity” was taken into account. Food for Biodiversity places the promotion, restoration and conservation of biodiversity at the centre of its work. Food producers and traders, standards and other industry players, scientific institutions and environmental organisations commit to implementing measures that anchor the protection of biodiversity in the food sector and its upstream value chains.

The “Basic Set of Biodiversity Criteria” is not a new standard, but describes about 60 criteria for standard setting organisations and for farms, which should at least be included in all standards and procurement specifications of companies. All members of Food for Biodiversity commit to testing the Basis Set first in pilot projects and then to consider in all supply chains with risks for biodiversity. The current basic set is available in German and English and can be downloaded here: https://food-biodiversity.de/kriterienundtools/

The sector initiative Food for Biodiversity is a lighthouse project of the dialogue platform "Unternehmen Biologische Vielfalt (UBi)" funded by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection within the framework of the Federal Programme on Biological Diversity.

The current version of the Basic Set in German and in English: https://food-biodiversity.de/kriterienundtools/

EU LIFE Insect Responsible Sourcing Regions: In cooperation with agriculture, the food sector, local authorities and NGOs, seven Insect Responsible Sourcing Regions (IRSRs) have been established in Germany. More are to follow. In these "Insect Supportive Regions", regional working groups have developed Biodiversity Action Plans (BAPs) at the landscape level, which should be implemented by the end of 2024. The aim is to implement measures for the protection of biodiversity and especially of insects beyond individual farm boundaries. Each region has frontrunner farms that also implement and document innovative measures. Based on the experiences in the insect-responsible regions, indicators have been incorporated into the BMS that are particularly relevant for insect protection. The products produced in an insect-responsible way are to be marketed with their added value.
Insect Responsible Sourcing Regions is financed by the EU LIFE Programme and Deutsche Bundesstiftung Umwelt.

Preparation

The time for filling in the monitoring questionnaire will take 1 - 2 hours. The duration depends on the production system (e.g. with or without livestock) and on the available data.
The Biodiversity Monitoring System records data that is also collected by the Biodiversity Performance Tool Insects (BPTi). If a farm already uses the BPTi, answering the questions in the BMS is done quickly. We are currently working on a solution to automatically transfer the data from one system to the other.
For food companies, standards and producer groups interested in using both tools, benefits are listed in Table 1.

The platform of the Biodiversity Monitoring System can be found on the website:
https://www.biodiversity-monitoring.info/

1: BPTi and BMS – two complementary tools to manage Biodiversity and improve Biodiversity Performance

Biodiversity Performance Tool Insects	Biodiversity Monitoring-System
• Biodiversity assessment at farm level • Supports farmers and auditors in biodiversity management and the development of a sound Biodiversity Action Plan • Collects information on the farm environment, farming practices and cooperation = 79 indicators relevant to biodiversity • Assesses the farm's baseline situation: strengths, weaknesses and opportunities • Shows the development of certain indicators over a period of time • Recommends measures to improve biodiversity performance = input for the Biodiversity Action Plan • By updating the baseline, the BPTi provides an overview of the development of biodiversity on the farm (monitoring).	• Comparison of trends in the long term • Users are standard organisations, companies, agricultural producer groups or associations. • Overview of the development of 41 indicators and 107 key figures relevant to biodiversity • Indicators of the basic set of biodiversity criteria are covered • Filter options (country, province, production type, farm size) • Monitoring results are an important input for further development of criteria and requirements, setting up of farmer support programmes, information on biodiversity performance in environmental or sustainability reports, for communication with the end customer.

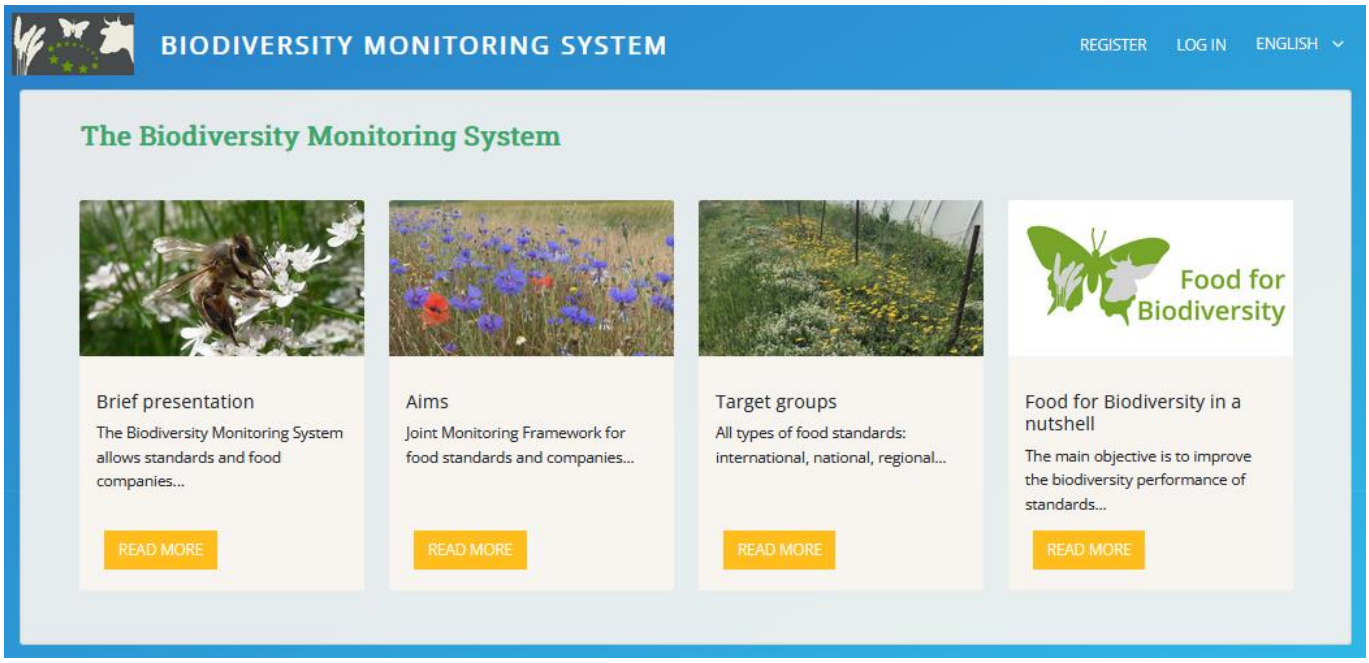


Figure 1: Start page of the Biodiversity Monitoring System
(Screenshot of https://bms.biodiversity-monitoring.info/)

1. Registration

Register for the website with the data entry mask:

- Go to the website https://bms.biodiversity-monitoring.info/user/register
- Fill in the registration form (see below),
- For organisation selection, enter the first letter of the name and select the organisation to which you belong,
- Accept the General Terms of Use,
- Click on "Register",
- Your registration will now be sent to the Lake Constance Foundation. It will be checked whether the registration is valid (e.g. whether the person registered actually belongs to the organisation he/she has chosen),
- After the check, you will receive a confirmation email and you can log in with your chosen password and start entering data.

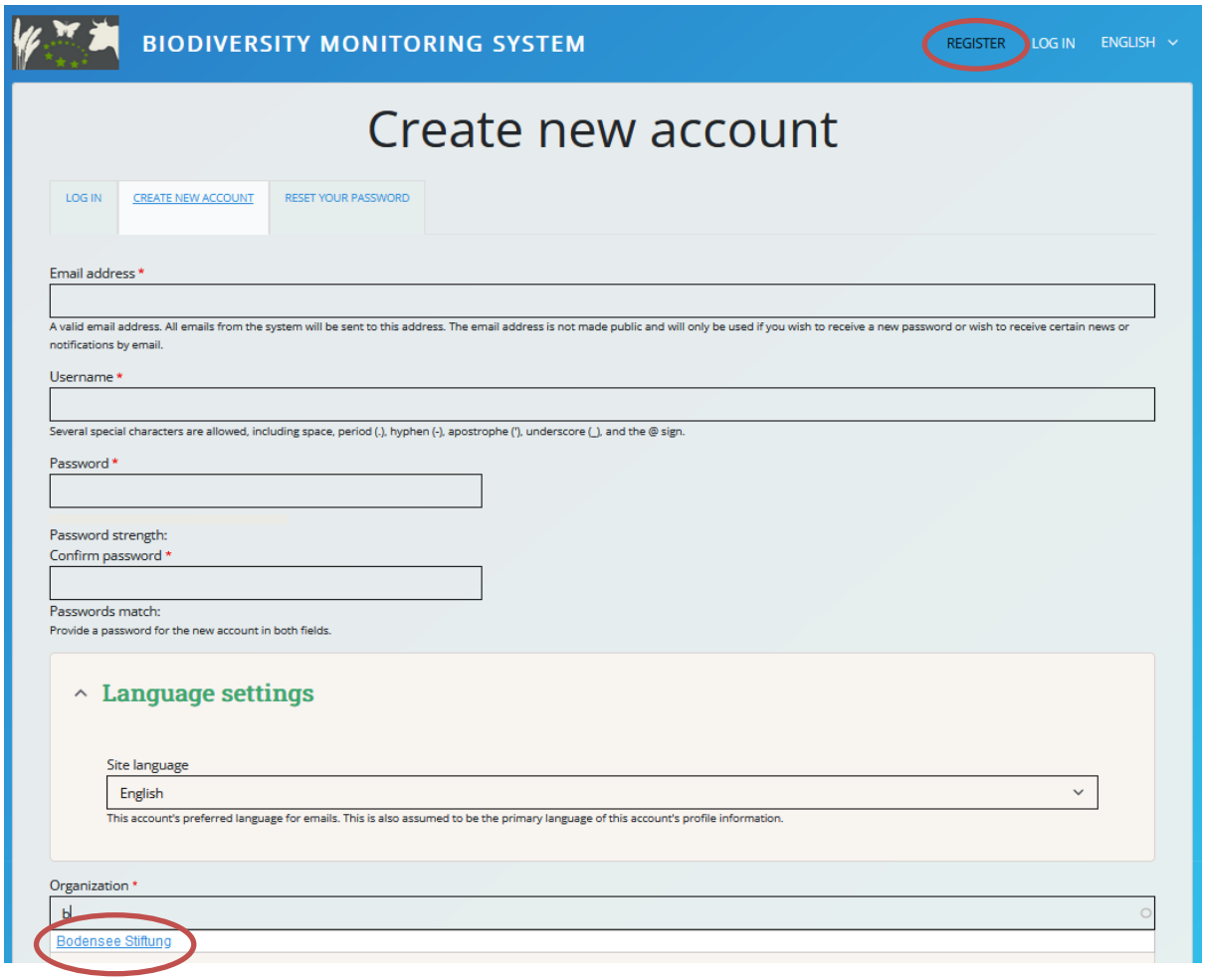


Figure 2: Screenshot of the registration website

2. Roles of users

The BMS defines two different user roles. In addition to the administrator (Lake Constance Foundation), "project managers" and "users" can be defined.

- Project leaders are the persons within their organisation who have access to the data sets of all users as well as access to the dashboard, i.e. the monitoring results. These are produced by the BMS on the basis of the aggregated data sets (more on this in the chapter on key figures and indicators below). A project manager can view, edit, copy, block and/or delete all data records of "his" organisation. Furthermore, he can manage the users of "his" organisation: Add, delete, etc.
- Users are authorised to enter data and manage their own records: view, edit, copy, block and/or delete.

The role is assigned when the user registers for the first time. From the admin team of the Lake Constance Foundation, in consultation with the organisation, one or more project managers will be appointed to whom the rights described above will be granted.

3. Data entry and access to existing data

To enter data into the BMS database, log on to the data entry website: https://bms.biodiversity-monitoring.info/

Click on the button "Start data entry" to open a new data entry form where you can enter your data. You can submit the data entry form after you have entered all the required information. You can also save the form to continue data entry later.

You can view the completed and submitted data sheet by clicking on "Analyses" and then on the name of the data sheet. Note: You can further edit a data sheet by selecting "Edit" from the menu to the right of the data sheet name (see Figure 3).

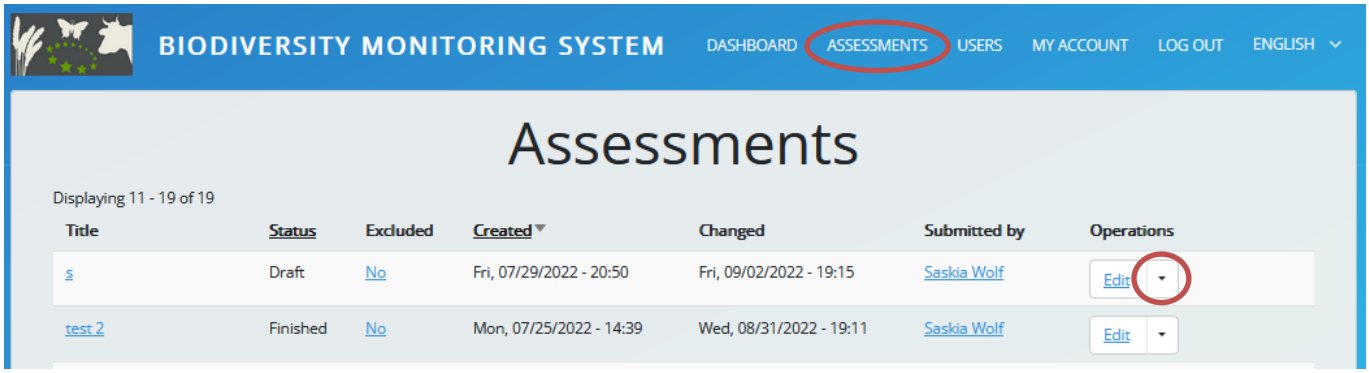


Abbildung 1: Screenshot des Menüs für ein Datenblatt

You cannot change or add information just by clicking on the name of the data sheet.

You can copy an existing data sheet. This is useful for later monitoring as the information is transferred. Data that has not changed, e.g. the size of the farm (ha), the presence of water bodies on the farm, the participation of the farm manager in biodiversity-related training in the past, etc., does not need to be re-entered.

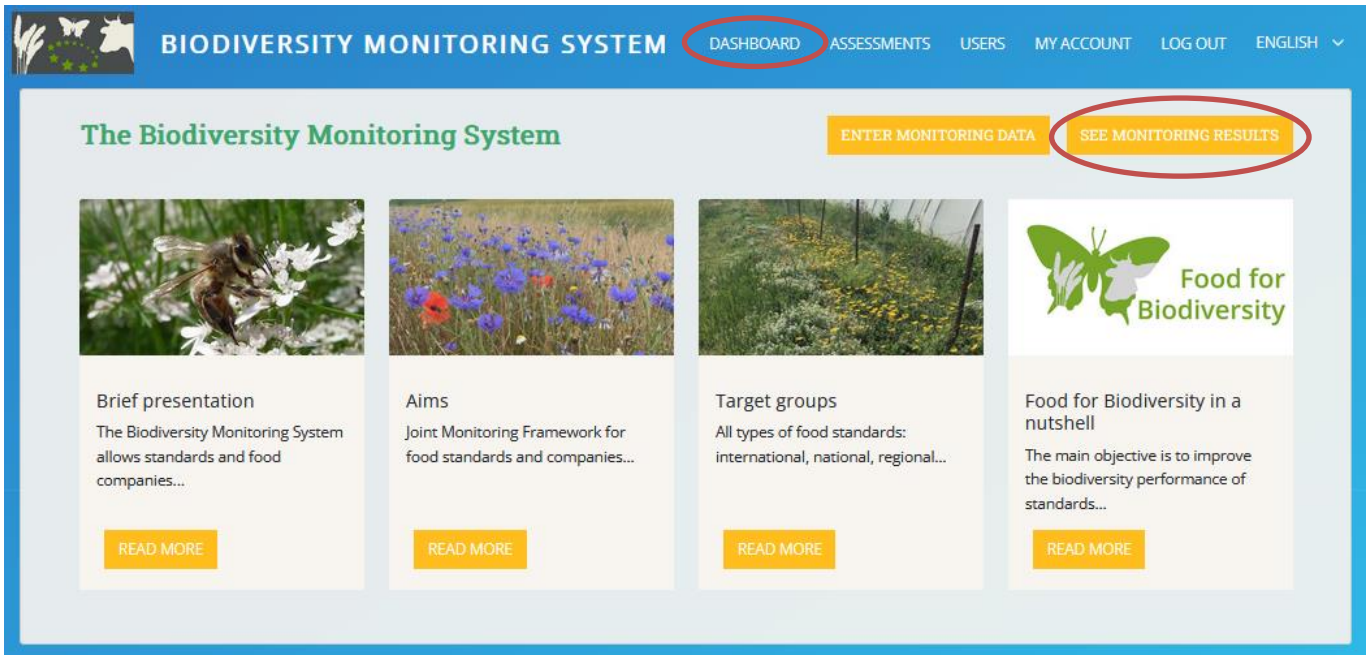
4. Practical advice

For many indicators it is possible to collect exact values to fill in the questionnaire, e.g. whether the farm manager and farm workers have participated in biodiversity-relevant training. There are other indicators or ratios where it might be more difficult to determine the exact values.

If you have to estimate, please try to do so as correctly as possible. It is useful to note down how you have estimated the value so that you can estimate it in the same way in the next monitoring period, if necessary.

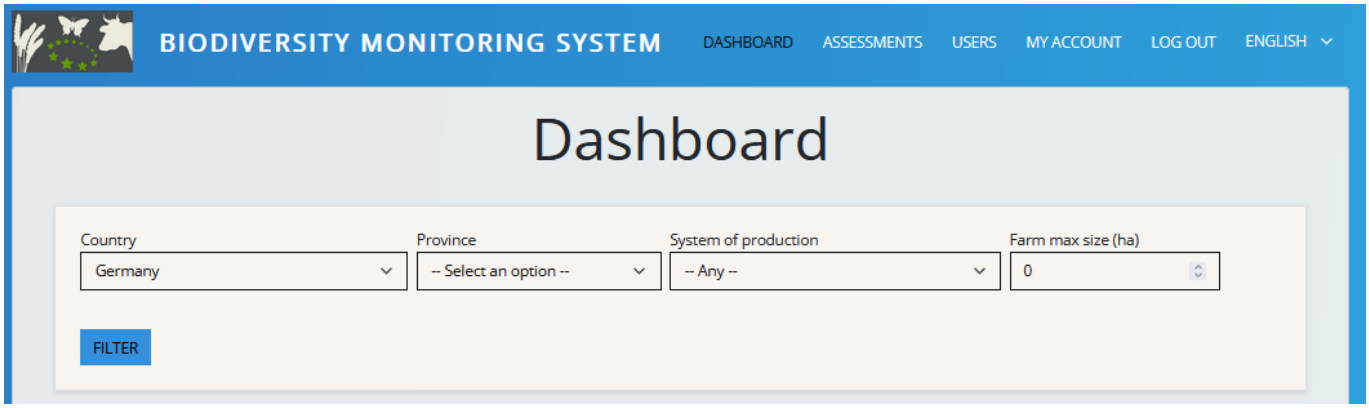
5. Dashboard: Visualization of Monitoring Results

The information for the monitoring is collected via 94 questions. The answers flow into 107 key figures, which are assigned to 41 higher-level indicators. The monitoring results are aggregated for all data sets of an organisation and displayed in the Dashboard. Only the project leaders have access to the monitoring results of their organisation. There are two ways to access the Dashboard, here circled in red:



In the Dashboard, the results from the aggregated data sets can be filtered by the following categories:

- Country
- State
- Production system
- Farm size (ha)
- Year of assessment



Indicators and key figures are assigned to 9 clusters, which can also be hidden if required:

Cluster 1: Data about the farms	**Cluster 6: Genetic diversity**
Cluster 2: Natural and semi-natural habitats	**Cluster 7: Protection of soil**
Cluster 3: Livestock farming; fodder & deforestation	**Cluster 8: Pesticide Management**
Cluster 4: Use of water resources	**Cluster 9: Management and training**
Cluster 5: Invasive alien species	

6. Explanation of the indicators and key figures

The following chapter describes the indicators and key figures for the Biodiversity Monitoring System (BMS) and the results. Unless otherwise stated, the percentage shares of farms always refer to the total number of farms that were filtered out using the filter function.

Cluster 1: The farm

Indicators 1 - 2: Farm area

Key Figures	Indicator	Result	Basis data
Total farm area (ha)	1: Total farm area (FA) (ha)	Average; Minimum; Maximum	Total amount of farms
Total utilised agricultural area of the farm (UAA)	2: Total utilised agricultural area (UAA) of the farm (ha)	Average; Minimum; Maximum	Total amount of farms

Indicators 3 - 5: Protected areas

Farms in or in the immediate vicinity of protected areas have a special responsibility with regard to the protection of ecosystems, fauna and flora. In some cases, they must also take into account special legal regulations that are laid down in the protection status and/or management plan of a protected area. Besides the special responsibility, the farm often has possibilities to take measures for the protection of endangered habitats as well as animal and plant species.

Key Figures	Indicator	Result	Basis data
Farms location in or in the immediate vicinity of a protected area	3: Share of farms located in or close to a protected area	In %	Total amount of farms
Farm manager's knowledge of the management plan of the protected area; respect for possible restrictions on agriculture.	4: Farmers knowledge about management plan of the protected area and respect of possible restrictions regarding the agricultural use in the area	In %	Total amount of farms
Farm managers informed about endangered and protected species in the region	5: Farmers knowledge about endangered and protected species in the region (e.g. list or other information)	In %	Total amount of farms

Cluster 2: Natural and semi-natural habitats

Indicators 6 - 12: Conservation and creation of semi-natural habitats

The ratio of semi-natural habitats compared to the total size of the farm is a normative indicator that shows the potential of a farm to host wild species. Thus, this indicator describes the potential for biodiversity created by the conservation /creation of natural and semi-natural habitats on the farm. These SNH should preferably be located adjacent to and within (large) agricultural parcels to maximise the edge effect and distribution of beneficial arthropods between crops and these habitats. The plots should be designed according to quality aspects and, if possible, linked to each other to further improve the quality of the habitats.

The following key figures are included in the indicator:

Total area of the farm (ha): This information is known to the farmer and can also be found in the field register that every farmer in the EU must keep in order to receive subsidies under the Common Agricultural Policy (CAP). If these areas are not known, they can be calculated with the free map tool https://www.doogal.co.uk/polylines.php

Key Figures	Indicator	Result	Basis data
▪ Utilised agricultural area (UAA): is the total of all arable land, meadows and pastures of a farm. ▪ Temporary SNH areas (ha): This area includes all temporary SNH, e.g. annual flower strips or field mar-gins that will change in short periods of time (≤ 1 year). If these areas are not known, they can be calcu-lated with the free mapping tool https://www.doogal.co.uk/polylines.php. The farm area includes both rented and owned land. ▪ Permanent SNH areas (ha): This area includes permanent structures such as hedgerows, individual trees or rows of trees, riparian buffer zones, extensive grasslands and others. These permanent structures are designed and implemented for the longer term (≥ 1 year). The operational area includes leased as well as owned areas.	6: Area covered by temporary semi-natural habitats (ha)	Average; Minimum; Maximum; Total area	Total amount of farms
	7: Area covered by permanent semi-natural habitats (ha)	Average; Minimum; Maximum; Total area	Total amount of farms
	8: Share of semi-natural habitats (%) compared to total farm area	Average; Minimum; Maximum	Total amount of farms
	9: Share of farms with more than 10 % of semi-natural habitats compared to total farm area	In %	Total amount of farms
	10: Share of semi-natural habitats (%) compared to the agricultural area (UAA) of the farm	Average; Minimum; Maximum	Total amount of farms
	11: Share of permanent semi-natural habitats (%) compared to the agricultural area (UAA) of the farm	Average; Minimum; Maximum	Total amount of farms
	12: Share of farms with more than 5 % of semi-natural habitats compared to the agricultural area (UAA) of the farm	In %	Total amount of farms

Indicators 13 - 14: Conversion of grassland into arable land

Permanent grassland, especially that which is extensively managed, provides valuable habitat for many species. Due to the low tillage, it is also a reservoir for humus and CO_2. The conversion of permanent grassland to arable land therefore represents a loss of biodiversity and ecosystem services.

Key Figures	Indicator	Result	Basis data
Conversion of grassland to arable land	13: Percentage of farmers which converted grasland into arable land (%)	In %	Total amount of farms
Share of grassland that was converted to arable land	14: Share of grassland converted to arable land (%)	Average; Minimum; Maximum; Total	Total amount of farms

Indicator 15: Grazing management plan

Grazing is a complex issue and requires regional assessment. Pastoral habitats harbour a significant wealth of biodiversity - often with numerous endemic species. In Germany, too, a large number of species are dependent on grazing. Grazing plans should prevent overgrazing, protect and enhance existing habitats, and maintain or increase the species richness of the rangeland. In order to develop a good grazing plan, it is necessary to understand the interactions between grazing and rangeland.

Key Figures	Indicator	Result	Basis data
Grazing management plan	15: Share of farms with pasture land and grasing management plan	In %	Total amount of farms

Indicators 16 - 19: Flowering strips and and/or field margins

Flowering strips with biennial or perennial flower mixes provide flowers, nectar and pollen for wild bees, bumblebees and other insects. Furthermore, they support beneficial macro- and micro-organisms. They also provide overwintering habitats for insects in parts that are retained over winter and give space for insects to retreat and forage during agricultural work.

Field margins serve to promote species-rich flora alongside the fields and to increase the number of flowers available for insects. They can be important as elements for biotope connectivity. Due to lower substance inputs and the usual edge effects, typical arable flora finds an extended habitat here. They also serve as a ecological buffer function against material inputs and outputs. Field margins are cultivated with the same crop at the same seed density as the rest of the field, predominantly in cereal stands, not in maize. Ideally, the marginal strips are planted on lean land with no or very little weeds such as dock, couch grass or thistles. Shady and nutrient-rich sites are unsuitable.

Key Figures	Indicator	Result	Basis data
Regular flower strips or field margins	16: Percentage of farms with regular flowering strips and/or field margins (%)	In %	Total amount of farms
Average area (in m²)	17: Surface area of regularely flowering strips and/or field margins (m²)	Average; Minimum; Maximum; Total	Total amount of farms
Use of native flowering mixtures	18: Use of local seeds for targeted floral mixtures used only (%)	In %	Farms with flower strips / field margins.
Spontaneous vegetation on the field margins	19: Spontaneous vegetation for field margins or grass strips (%)	In %	Farms with flower strips / field margins

Indicators 20 - 23: Hedges

Hedges are important elements of the landscape. They provide nesting sites, breeding and refuge opportunities, stepping stones for biotopes and stabilise the ecosystem. The multi-layered structure of hedges (soil, herb, shrub and (if present) tree layer) enables a potentially high species diversity. Hedges support structural diversity, act as climate regulators and windbreaks (e.g. for the benefit of heat-dependent species such as butterflies). Many species also use hedges as winter quarters, shelter, forage as well as a territory boundary.

Only plants of autochthonous origin from the relevant landscape should be used. The middle of the hedge may include taller growing shrubs. The distances between the plants must not be less than 2 x 2 m. At the edges, lower shrubs are to be planted at a distance of not less than 1 x 1 m. There should be sufficient space around the hedges and shrub islands for the establishment of wild herbs. A planting scheme can help determine the number of plants needed and their distribution.

Key Figures	Indicator	Result	Basis data
Hedges on the farm	20: Percentage of farms with hedges on the farm land /along the farm borders (%)	In %	Total amount of farms
Hedge length (metres)	21: Length of hedges (m)	Average; Minimum; Maximum; Total	farms with hedges
Hedges with predominantly native plants	22: Use of native species in hedges only (%)	In %	farms with hedges
Average number of plant species in the hedge	23: Amount of native species used in hedges	In %	farms with hedges

Indicator 24: Connection of the semi-natural habitats on the farm

Many valuable habitats for animal and plant species - both large and small - have been and are being lost due to changes in land use, building development and the fragmentation of our landscape by roads, railways or power lines. It is not only the pure loss of area that is problematic. Biotopes are divided into isolated individual parts which, due to their small size, are particularly exposed to disturbing influences from their surroundings. They are often too small for the survival of many species and their isolation makes the exchange of individuals between areas difficult. The resulting genetic impoverishment of our fauna and flora endangers the permanent survival of biotic communities and leads to a loss of biodiversity.

Linking habitats (biotope network) enhances them and ensures genetic exchange between populations and enables dispersal and recolonisation processes.

The following elements can contribute to the connections fo habitats:

- Permanent habitats of fauna and flora (e.g. large grassland areas of low intensity, rough grasslands, forests with fringes, ruderal vegetation areas and orchards).

- Stepping stones (rather concentrated and small structures such as wooded areas, cairns or ponds) are smaller habitats that allow the establishment of temporary animal populations.

(Foto sources: Lake Constance Foundation):

- Corridor structures (e.g. hedgerows, grass and wildflower strips, tree rows, ditches and streams) support animal species in moving between large habitats and small stepping stones.

Key Figures	Indicator	Result	Basis data
No habitat corricors	24: Connection of semi-natural habitats within the farm: No connection, connected but this disconuities, connected in a way that they build biotip corridors	In %	Total amount of farms
Partial corridors of habitats and share in percent			
Complete habotat corridors			

Indicators 25 - 26: Connections of the semi-natural habitats with its environment

A crucial factor in stopping the loss of biodiversity is the landscape approach. Farming activities have negative impacts beyond the farm itself and the protection of habitats and species should not end at the farm gate. If neighbouring farms and other actors can be involved and measures can be coordinated and implemented across the landscape, this would make a huge difference to biodiversity conservation. More and more standards are taking up the landscape approach and expect farmers to take action to protect biodiversity beyond their own farms.

An important measure is to link habitats on the farm with habitats in the vicinity of the farm. This is not always possible. The positive effects and possibilities are described under indicator 7.

Key Figures	Indicator	Result	Basis data
Connection of semi-natural habitats with surrounding habitats	25: Connection of semi-natural habitats with surrounding habitats	In %	Total amount of farms
Amount of habitats on the farm connected with surrounding habitats	26: Amount of habitats on the farm connected with surrounding habitats	Average; Minimum; Maximum; Total	farms that have linked habitats

Example of SNH forming a network of biological corridors. (Source: Pixabay)

Indicators 27 - 28: Threatened and protected animal and plant species

Red Lists of endangered species have been published since 1966 by the International Union for the Conservation of Nature and Natural Resources (IUCN), a global nature conservation organisation based in Gland, Switzerland, on endangered animal and plant species worldwide. An annual update is available in the internet since several years now. Individual states and federal states also publish corresponding lists, and regional "Red Lists" have been compiled for large-scale transnational regions such as Europe or the Baltic Sea region. In the Red Lists, species are divided into various categories, including extinct, threatened with extinction, critically endangered or endangered.

In Germany and Europe, threatened species are strictly protected[1]. Unfortunately, this is not always the case. Furthermore, laws and regulations are often not comprehensively implemented.

Farmers can contribute to the protection and conservation of threatened animal and plant species by taking measures, including traditional crops and livestock species. The first step is to know whether threatened and protected species are present on farmland.

Key Figures	Indicator	Result	Basis data
Knowledge about endangered / protected species on the farmland	27: Farmers knowledge about endangered and protected species in the region (e.g. list or other information)	In %	Total amount of farms
Realisation of measures for threatened / protected species	28: Measures to enhance/protect endangered species on the farm	In %	farms with knowledge about endangered/protected species on the farm / in the region

Indicators 29 - 30: Wild collection of species

Wild collection is the collection of plants at their natural growing location, largely uninfluenced by humans. Market-relevant quantities come mainly from Southeast Europe (Albania, Romania, Bulgaria, Bosnia-Herzegovina), China or India. There, the wild plants mostly come from structurally weak regions where wild collection has a long tradition and represents an important source of income. Finland has the largest non-agricultural organic area in the world: berries and fruits are collected there on an area of approximately seven million hectares.

For the commercial collection of wild, not specially protected plants, a permit must be applied for from the competent authority - in Germany the state authorities for nature conservation and landscape management. The official collection permit specifies, for example, how much may be harvested and during what period. Or how exactly the harvesting is to be carried out technically: For example, may ladders be used? Are vehicles allowed to drive to the collection point? On the part of the collectors of wild plants, especially in the field of medicinal and aromatic plants, compliance with the GACP guidelines (Good Agricultural and Collection Practice[2]) is required.

At the international level, the Fairwild Standard[3] is widely used. With the standard, the FairWild Foundation provides a global framework for the implementation of a sustainable and fair-trade system for wild-collected plant ingredients and their products.

Key Figures	Indicator	Result	Basis data
Collection of wild species	29: Collection of wild species	In %	Total amount of farms
Compliance with with all national /international regulations regarding the collection of wild species	30: Compliance with with all national /international regulations regarding the collection of wild species	In %	farms that carry out wild collection

[1] Siehe https://de.wikipedia.org/wiki/Anlage_1_zur_Bundesartenschutzverordnung
Siehe https://ec.europa.eu/environment/nature/conservation/index_en.htm

[2] https://www.ema.europa.eu/en/good-agricultural-collection-practice-starting-materials-herbal-origin

[3] https://www.fairwild.org/fairwild-standard-overview

Indicators 31 - 32: Application of pesticides on semi-natural habitats

For the development of biological diversity, no pesticides shall be implemented on SNH areas.

Key Figures	Indicator	Result	Basis data
SNH treatment with pesticides	31: Share of farmers treating their semi-natural habitat areas with pesticides (%)	In %	Total amount of farms
Share of SNH treated with pesticides	32: Share of semi-natural habitat area that is treated with pesticides (%)	Average; Minimum; Maximum	Total amount of farms

Indicators 33 - 34: Application of fertilisers on semi-natural habitats

In order to allow soil biodiversity to develop and to protect aquatic ecosystems, no fertilisers should be applied on SNH areas. Exceptions: Extensively managed permanent grassland, agroforestry systems and silvopastoral systems.

Key Figures	Indicator	Result	Basis data
SNH treatment with fertilizers	33: Share of farmers treating their semi-natural habitat areas with fertilizers (%)	In %	Total amount of farms
Share of SNH treated with fertilizers	34: Share of semi-natural habitat area that is treated with fertilizers (%)	Average; Minimum; Maximum	Total amount of farms

Cluster 3: Animal feed and Deforestation

Indicator 35: Forage autonomy

The provision of fodder through on-farm grazing or autonomous fodder production gives information on the balance between livestock and local soil microclimatic conditions in terms of ecological intensification. The conservation and management of pastures is closely linked to forage autonomy at farm level. In this respect, forage supply is based on two main objectives[4] : (i) increasing current forage production in order to reduce or even avoid hay purchase, and (ii) improving resistance and resilience to disturbances and climatically induced stress, with forage production in mountainous regions (e.g. in the Alps or the Mediterranean) increasingly affected by recurrent summer droughts and late spring frosts[5] . Solving this problem, increasing forage production while improving its resilience and environmental quality, is an important ecological intensification process[6] **.**

Farms should preferably achieve a degree of forage autonomy of > 80 % to mitigate off-farm biodiversity loss.

Key Figures	Indicator	Result	Basis data
Proportion (%) of the required animal feed (per season) that can be produced on the farm or procured in the region (50 km radius).	35: Livestock forage origins from the farm or region (radius of 50 km)	In %	Total amount of farms

[4] *Dobremez et al. 2013*
[5] *Sérès, 2010.*
[6] *Loucougaray G, Debremez L, Gos P, Pauthenet Y, Nettier B & Lavorel S, 2015. Assessing the effects of grassland management on forage production and environmental quality to identify paths to ecological intensification in mountain grasslands. Environmental Management 56 (5).*

Indicators 36 - 38: Livestock density

Livestock density, measured by livestock units (LU), is an important metric for land-based systems to describe the pressure of livestock on the environment and thus on biodiversity. Through manure production and methane emissions, livestock contribute to climate change and nutrient leaching into water and air. A higher livestock unit means that a higher amount of manure is applied per ha of utilized agricultural area (UAA), which increases the risk of nutrient leaching. The actual impact of livestock farming on the environment depends not only on the amount of livestock, but also on farm practices.

The indicator partly maps the state of overgrazing and destruction of agroforestry ecosystems. Farms should continuously reduce the livestock unit/ha over time until an optimal level is reached. As the Biodiversity Monitoring System does not set binding thresholds, some values are given below to serve as orientation:

The average livestock unit according to the EU organic farming guidelines is set at a maximum of 2 LU/ha.
The average livestock unit of the main forage area is set at a maximum of 1.4 LU/ha according to the document "Recommendations for effective criteria to protect biodiversity in food industry standards and food company procurement guidelines" published by the partner consortium of the EU Life project "Biodiversity in food standards and labels". As further guidance, the Biodiversity Performance Tool also uses this indicator and has set four threshold ranges for assessing the performance of this parameter. The Biodiversity Performance Tool threshold ranges for the average livestock unit are:

Average livestock unit (LU/ha) of the main forage area			
> 1.7	1.7 – 1.1	1.1 – 0.5	< 0.5

Key Figures	Indicator	Result	Basis data
Average livestock density (LU/ha) of the main forage area.	36: Intensive livestock	Average livestock density (LU/ha/a); Share of farms with livestock density of more than 2.0 LU/ha/year; Share of farms with a plan to reduce livestock	Farms with livestock
Proportion of farms with a livestock densitiy of more than 2 LU/ha/year (%)			
Farms with livestock densities above LU 2.0/ha/year and a plan to reduce numbers			
Farms with intensive, medium and extensive livestock production	38: Share of farms with intensive, intermediate and extensive livestock systems (LU/ha/year)	In %	Farms with livestock

Indicators 39 - 40: Destruction of ecosystems through dependence on soy as animal feed

Global population and economic growth have led to an overall increase in the production of animal products such as meat, milk and eggs. Soybeans account for more than 30 % of the feed for all animal categories[7]. There is a direct link between the use of soybean meal as protein feed in livestock production and changes in land use that negatively impact biodiversity worldwide (in 2011, 33% of Central and South America's biodiversity impact and 26% of Africa's

[7] *Manceron, Stéphane & Ben Ari, Tamara & Dumas, Patrice (2014): Feeding proteins to livestock: Global land use and food vs. feed competition. DOI: https://doi.org/10.1051/ocl/2014020*

impact was caused by consumption in other world regions)[8] . Therefore, this indicator is used as a proxy to assess whether or not the production of procured soy-based feed has contributed to the loss of biodiversity through land conversion such as deforestation to create arable land for animal feed production.

Farmers should switch to soy that is produced responsibly and has not led to deforestation and the associated loss of biodiversity, or substitute soy with more sustainable feeds where possible.

Key Figures	Indicator	Result	Basis data
Proportion of the soy-based feed concentrate (%) in the total composition of the animal feed. Calculation example: If the concentrate makes up one third of the total feed composition and all the concentrate is soy-based, then the proportion of soy-based concentrate in the total composition is: 0.33 multiplied by 100 = 33%.	39: Share of soy-based feed concentrate. Basis data: All farms with livestock.	Average; Minimum; Maximum	Farms with livestock
Share of soy-based animal feed certified as deforestation-free (e.g. Round Table on Responsible Soy certification) in % compared to total soy-based feed. Calculation example: For example, if one-third, one-half or all of the soy-based feed concentrate is certified as deforestation-free, then the answer to this parameter is 33%, 50% or 100%, respectively	40: Certification for animal feed (%) that is based on soy: deforestation free. Basic set: All farms with livestock	Average; Minimum; Maximum	Farms with livestock

Indicator 41: Genetically modified animal feed

The increase in productivity of arable land explains much of the continuous increase in total livestock production since the 1960s. In this context, feed production has benefited from the huge increase in yields of the main feed crops such as rapeseed, maize, wheat, soy and other cereals[9]. Much of this increase in productivity has come from intensified agricultural practices such as increased and improved use of fertilisers and pesticides, but also from genetic modification of these feed crops.

Imported soy is predominantly genetically modified. This is because a large part of the world trade in soybeans and soybean meal goes to countries where almost only genetically modified soybeans are grown - above all Brazil and the USA. Apart from soy, there are other genetically modified plants that can end up as imported feed in the troughs of our livestock. These are maize, rapeseed, cottonseed and sugar beet pulp.

GMO-free raw materials are a key factor in maintaining biodiversity in the food sector. Seedfast (non-hybrid) crops are better adapted to the locations, making them less vulnerable to pest infestation and diseases and thus often less need to be treated with pesticides. Increased use of pesticides has a negative impact on the diversity of wild herbs both on and off the field, and thus also affects the insect fauna that depends on them. Another major problem of genetically modified plants is cross-pollination and the resulting uncontrolled spread.

Key Figures	Indicator	Result	Basis data
Proportion of genetically modified animal feed concentrate (%)	41: Certification for animal feed (%) GMO-free. Basis data: All farms with livestock.	Average; Minimum; Maximum	Farms with livestock

[8] *Marques, Alexandra et al. (2019): Increasing impacts of land use on biodiversity and carbon sequestration driven by population and economic growth. Nature Ecology & Evolution volume 3, pages 628-637 (2019). DOI: https://doi.org/10.1038/s41559-019-0824-3.*

Cluster 4: Use of water resources

Indicators 42 + 43: Protection of water bodies

Water bodies are particularly at risk of leaching of fertilisers and pesticides, which endanger water quality and lead to the loss of biodiversity. Another risk is the eluviation of soil into the water body, with which pesticides and fertilisers also enter the ecosystem and also promote sedimentation. Buffer zones are protective areas along streams and lentic waters. They can reduce risks and effectively protect water bodies from pollution. Furthermore, buffer zones store moisture, slow down water runoff during heavy rain events and provide protection against flooding. Wide buffer zones (at least 10 metres) with native vegetation also fulfil the function of a biotope corridor and provide nesting and resting places for birds as well as food sources and habitats for insects. This creates more potential for species and promotes the natural development of water bodies and habitat connectivity.

Key Figures	Indicator	Result	Basis data
Existence of water bodies on the farm	42: Presence of waterbodies on the farm. Basis: total number of farms	In %	Total amount of farms
Proportion of waterbody with a buffer zone (%)	43: Length of shore line (meters)	Average; Minimum; Maximum, Sum	total riparian length
Proportion of waterbody with a buffer zone of 1- 4 metres width (%)	44: Share (%) of water courses with buffer zone in comparison to total shore line	no bufferzone, 1-4 metres, 5-9 metres, > 10metres width	total riparian length
Proportion of waterbody with a buffer zone of 5 - 9 metres width (%)			
Proportion of waterbody with a buffer zone of ≥ 10 metres width			

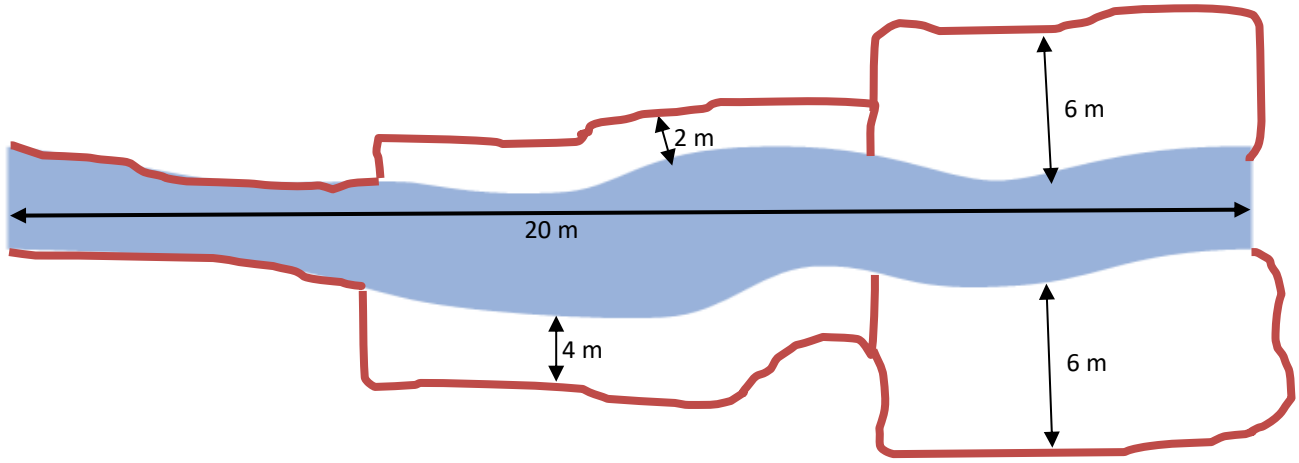


Figure: Visual example of buffer zone width along a watercourse
(Source: Flexible River von der ConceptDraw DIAGRAM App)

Note: If you have to estimate the values, please try to estimate as correctly as possible and make sure that the sum is 100%. Please fill in the fields for all questions on buffer zones around water bodies. If the value for one or more questions is "0", please fill in "0".

Indicator 45-47 is missing.

Indicator 48: Sustainable management of water resources

Only 40 percent of surface waters in Europe are in good ecological and 38 percent are in good chemical status. In Germany, only seven percent of rivers and streams are in good or very good ecological condition. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (*IPBES*) estimates that 85 % of lakes and wetlands worldwide have disappeared or are severely degraded. The water quality of groundwater resources has also deteriorated severely. Intensive agriculture has played a major role in this development.

The degradation and transformation of aquatic ecosystems has far-reaching negative impacts for biodiversity - but also for agriculture. Disrupted water ecosystems cannot provide ecosystem services. It is therefore important that farmers engage to protect and sustainably manage water sources.

Further reading: www.business-biodiversity.eu/en/biodiversity-training/advisors
Guideline to water use and biodiversity

Key Figures	Indicator	Result	Basis data
Farmers involvement in programme/activities with the aim to increase water use efficiency and sustainable management of water sources	48: Farmers involvement in programme/activities with the aim to increase water use efficiency and sustainable management of water sources	In %	Total amount of farms

Indicators 49 - 53: Irrigation

Water is a crucial factor for agricultural production and plays an important role in food security. Globally, 70 % of freshwater resources are used by agriculture. Irrigated agriculture accounts for 20 % of the total cultivated area and contributes to 40 % of the food produced worldwide. By 2050, feeding 9 billion people will require an estimated 60 per cent increase in agricultural production and a 15 per cent increase in water withdrawals (FAO). [9]

However, with increasing demand and competition for water, the planet's water resources are under increasing pressure due to climate change, poor management and pollution. Due to ongoing droughts, the need for irrigation is increasing even in regions that have not previously experienced water shortages. It is imperative that water and the ecosystems that provide it are managed sustainably. This also includes efficient irrigation.

Key Figures	Indicator	Result	Basis data
Valid permit for the withdrawal of water present	49: Valid permit for the withdrawal of water present	In %	Total amount of farms
Farms that irrigate their agricultural plots	50: Share of farms with irrigation and without irrigation	In %	Total amount of farms
Documentation about the amount of water used in each irrigation	51: Documentation about the amount of water used in each irrigation	In %	Total number of farms irrigating.
Water consumption for the farm in the last year.	52: Total water withdrawn (m^3/a) in the last year	Average; Minimum; Maximum, Sum	Total number of farms irrigating.
Average water consumption (m^3) per hectare of agricultural land	53: Average water withdrawl (m^3/a) per hectare UAA	Average; Minimum; Maximum, Sum	Total number of farms irrigating.

Indicator 54: Use of the appropriate amount of irrigation

Decision supporting tools are technologies that can help farmers make knowledge-based decisions regarding crop irrigation. They are used to measure various parameters related to climate, soil and crop and enable the farmer to determine crop water requirements and the default settings of his irrigation system with high accuracy. Examples:

[9] https://www.fao.org/land-water/water/en/

- Tensiometric probes, TDR / FDR measurements
- Suction probes
- Remote sensing

Key Figures	Indicator	Result	Basis data
Use decision supporting tools to assess the appropriate amount of irrigation	54: Farmers use of decision support tools to assess the appropriate amount of irrigation	In %	Total amount of farms

Further reading: www.business-biodiversity.eu/en/biodiversity-training/advisors
Guideline to water use and biodiversity

Cluster 5: Alien invasive species

Indicators 55 - 56: Alien invasive species

Alien invasive species are considered a major cause of biodiversity loss in the Millennium Ecosystem Assessment report[10] . The report of the The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (*IPBES*) confirms the negative impacts of alien invasive species and the rapidly growing threat that invasive alien species pose to biodiversity, ecosystem services, sustainable development and human well-being. In Germany alone, more than 600 introduced plants and about 260 animals have become firmly established.

At EU level, the Regulation on the Prevention and Management of the Introduction and Spread of Invasive Alien Species was adopted in 2014. Invasive species listed under the Regulation are subject to EU-wide bans, in particular a trade ban, a ban on breeding and keeping, and release into the wild.

Key Figures	Indicator	Result	Basis data
Presence of invasive alien species on the farm.	55: Presence of alien invasive species on the farm	In %	Total amount of farms
Application of measures to control invasive alien species on the farm	56: Measures for fighting these alien invasive species on the farm	In %	Farms with alien invasive species.

Cluster 6: Genetic diversity

Indicator 57: Number of traditional crop species

In both agriculture and horticulture, global cultivation is increasingly limited to a few crop species, mainly due to prevailing market competition, low demand for traditional varieties and breeds and the resulting lack of value-adding opportunities. Breeding programmes also focus on economically viable species. However, if breeding programmes for traditional species are not continued and used on farms, a loss of agrobiodiversity is inevitable. Therefore, the conservation of traditional crops on the farm can make an important contribution to the protection of agro-biodiversity and to the development and exploitation of new niche markets. Moreover, in times of climate change, we will come to the point where we need to rely on these traditional species: With a much larger gene

[10] *Millennium Ecosystem Assessment Biodiversity Synthesis (2005): Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC. https://www.millenniumassessment.org/documents/document.354.aspx.pdf*

pool, they are better able to adapt to weather extremes such as droughts and floods than the usual high-yielding varieties.

Key Figures	Indicator	Result	Basis data
Number of traditional crop species and varieties grown on the farm.	57: Amount of traditional cultivated crops	Average; Minimum; Maximum	Total amount of farms

Indicator 58: Traditional livestock breeds

In agriculture, global livestock breeding is increasingly limited to a few species and breeds, mainly due to prevailing market competition, low demand for traditional breeds and the resulting lack of value-added opportunities. Breeding programmes also focus on economically viable breeds. However, if breeding programmes for traditional breeds are not continued and maintained on the farm, a loss of agro-biodiversity is inevitable. Therefore, maintaining traditional breeds on the farm can make an important contribution to the protection of agro-biodiversity and to the development and opening of new niche markets. Moreover, in times of climate change, we will come to the point where we need to rely on these traditional breeds: With a much larger gene pool, they are better able to adapt to weather extremes such as droughts and floods, but also to diseases, than the usual high-performance breeds.

Key Figures	Indicator	Result	Basis data
Number of traditional livestock breeds kept on the farm	58: Amount of traditional livestock breeds	Average; Minimum; Maximum	Total amount of farms

Indicators 59 - 60: Genetically modified organisms in arable crops

Genetically modified organisms (GMOs) lead to a reduction in natural biodiversity and also pose - partly unknown - risks to human health and the environment.

Key Figures	Indicator	Result	Basis data
Presence of GMOs on the farm	59: Percentage of farms with genetically modified crops (%)	In %	Total amount of farms
Proportion of UAA on which GMOs are cultivated (%)	60: Share of UAA (%) on which GMO crops are cultivated	Average; Minimum; Maximum	

Cluster 7: Boden

Indicators 61 – 65: Soil protection

Soil erosion is caused, for example, by the removal of protective vegetation through overgrazing or deforestation, as well as too short fallow periods. Geological conditions such as slopes, sandy knolls and other aspects play an additional role in erosion. Particularly problematic is the loss of topsoil, i.e. the most fertile and agriculturally important part of the soil.

Soil cover in the form of cover crops, mulches or other cover shows many benefits that have a direct or indirect impact on biodiversity:

- Reduction of water and wind erosion;
- Increase in organic matter in the soil;
- Immobilisation and storage of nutrients;
- Biological nitrate fixation (legume family);
- Increase biodiversity;
- Soil moisture management;

- Suppression of weeds and pests;

Key Figures	Indicator	Result	Basis data
Percentage of farm with regular soil analysis (%)	61: Percentage of farm with regular soil analysis (%)	In %	Total amount of farms
Frequency of soil analyses	62: Soil analysis including soil organic matter content according to a recognized method (%)	1 – 2 years / 2 - 3 years / 3 - 5 years / > 5 years	Farms with soil analysis
Result of soil analyses: Change in humus content over the last six years	63: Result of the organic matter analysis in the last six years	In %	Farms with soil analysis
Measures against erosion and its documentation	64: Measures against erosion and its documentation	In %	Total amount of farms
Proportion of agricultural land that has a soil cover (vegetative soil cover but also mulching) at least in critical periods (e.g. peak precipitation months), in %.	65: Proportion of farming area (UAA) with soil cover at least during critial periods (%)	Average; Minimum; Maximum	Total amount of farms

Indicators 66 - 69: Crop rotation

Crop rotation in arable crops was developed empirically by farmers to reduce and control soil-borne pests and diseases. By the mid-twentieth century, a well-developed crop rotation consisted of six to eight different crops in succession[11] . Increasing economic pressure and demand for food led farmers to increase the use of pesticides and maximise land use. Crop rotation was shortened to very few crops, leading to an increase in pest proliferation and a decrease in the biodiversity of beneficials. Especially with regard to soil biodiversity, the crop rotation should be extended. A crop rotation with seven different plant families is desirable.

Balanced crop rotation systems support soil function, soil biodiversity and humus enrichment, as well as alternative weed and pest control.

Key Figures	Indicator	Result	Basis data
Length of crop rotation of the main crops in years, i.e. the period of time until the same crop is planted again.	66: Length of crop rotation (in years)	Average; Minimum; Maximum	Total amount of farms
Farms growing at least three main crops, with the main crop occupying a maximum of 75 % of the agricultural area.	67: Share of farms (%) growing at least three different main crops on it´s UAA with the one most relevant crop growing on max. 75% of the UAA	In %	Total amount of farms
Farms growing at least three different main crops and whose two main crops account for a maximum of 95 % of the utilised agricultural area.	68: Share of farms (%) growing at least three different main crops on it´s UAA with the two most relevant crop growing on max. 95% of the UAA	In %	Total amount of farms
Farms growing at least three different main crops and growing at least 10 % legumes or mixtures with legumes on the utilised agricultural area.	69: Share of farms (%) growing at least three different main crops on it´s UAA with at least 10 % of the UAA is covered by legumes or mixtures including legumes	In %	Total amount of farms

[11] Häni FJ, Boller EF & Keller S, 1998. Natural regulation at the farm level. In Enhancing biological control - Habitat management to promote natural enemies of agricultural pests, (Pickett C.H., Bugg R.L., eds.), University of California Press, Berkeley - Los Angeles - London: 161-210.

Indicator 70: Amount of nitrogen applied

Nitrogen (N) is an important plant nutrient and an important factor for plant growth in temperate climates. As a result of intensive nitrogen inputs (synthetic fertilisers) and intensified and locally concentrated livestock farming (organic N inputs), nitrate concentrations in surrounding water bodies as well as groundwater resources have become a problem, leading to degradation of many natural ecosystems and threatening biodiversity and possibly human health. The EU Nitrates Directive is the regulatory response to this development, but the problem is far from solved.

A reduction in the total amount of nitrogen applied on the farm is to be achieved. The aim is to continuously improve the efficient use of organic and mineral N fertiliser towards an optimal level. The optimal level can be determined on a plot-specific basis on the basis of a post-harvest N balance.

The recommendation for standards and companies here is to go beyond the legal requirements when setting thresholds. Organic fertiliser is preferred and it is recommended to first reduce fertilisation through mineral fertilisation.

Key Figures	Indicator	Result	Basis data
The total amount of nitrogen (including inorganic and organic sources) applied on the farm in kg/ha/year	70: Total Amount of mineral nitrogen fertilizer (kg/ha/year)	Average; Minimum; Maximum; Sum	Total amount of farms

Note**:** For synthetic fertiliser products, the N content is indicated on the packaging. These values must be taken into account when calculating the total amount of N. For organic fertilisers, there are special tables that indicate the N content for different types of organic fertiliser (e.g. manure, compost).

Indicators 71 - 74: Fertilizer management

Key Figures	Indicator	Result	Basis data
Farms that carry out annual nutrient balancing according to a recognised method	71: Share of farms (%) realizing an annual nutrient balance with an approved method	In %	Total amount of farms
Farms determining annual fertiliser requirements before significant amounts of nutrients are applied (N = 50 kg/ha; P = 30 kg/ha)	72: Share of farms (%) with annual analysis of fertiliser requirements	In %	Total amount of farms
Farms applying pre-emergence herbicide or PSM on bare soil to no more than one third of the total annual fertiliser rate.	73: Share of farms (%) applying not more than 1/3 of the total N in early stages of growth or with bare soil	In %	Total amount of farms
The average nitrogen surplus on arable land in the last three years (in kg N/ha)	74: Average N overflow in the past 3 years in kg N / ha	Average; Minimum; Maximum	Total amount of farms

Cluster 8: Pesticide management

Indicators 75 - 81: Integrated pest management (IPM)

Integrated Pest Management (IPM) means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that alter the development of populations of harmful organisms. In addition, the use of pesticides and other forms of intervention should be kept at a level that is economically and environmentally justified and reduces or minimises risks to human health and the environment. IPM emphasises the growth of a healthy crop with minimal disruption to agroecosystems and promotes natural pest control mechanisms.

Key Figures	Indicator	Result	Basis data
Farms with a person responsible for IPM.	75: Share of farms (%) with a person responsible for IPM	In %	Total amount of farms
Responsible persons who attend training events on IPM at least once a year	76: Share of farms (%) with person(s) trained on IPM minimum once per year	In %	Total amount of farms
Farms with an IPM Strategy or IPM Plan.	77: Share of farms (%) with IPM strategy or plan	In %	Total amount of farms
Updating the IPM strategy or plan.	78: Share of farms (%) with regular updated IPM strategy/plan	In %	Total amount of farms
Documentation of the IPM measures.	79: Share of farms (%) with full IPM documentation	In %	Total amount of farms
Implementation of the IPM principles in operation	80: Number of IPM principles implemented	In %	Total amount of farms
	81: Share of farms (%) with a fully implemented Integrated Pest management	<8; 8	Total amount of farms

Indicators 82 - 85: Alternative measures against weeds and pests

Together with the promotion of organic farming, IPM is one of the tools for low pesticide use pest management that legislation requires all professional users to implement. Examples that we categorise as alternative measures are:

- mechanical weed control
- optimal sowing conditions
- appropriate sowing treatment: Strip-till, direct sowing, mulch sowing, use undersowing
- cultivation of catch crops
- extended crop rotation

Further reading: www.business-biodiversity.eu/en/biodiversity-training/advisors
Guideline on pesticide management

Key Figures	Indicator	Result	Basis data
The proportion (%) of the UAA on which alternative measures against weeds to avoid and reduce pesticide use (IPS measures) are applied	82: Share of UAA (%) on which alternative measures are applied against weeds to avoid and to reduce pesticide application (IPM measures)	In %	Total amount of farms
Areas where alternative measures against weeds are applied (ha).	83: Total amount of hectare with alternative measures against weed to avoid pesticide application (ha)	Average; Minimum; Maximum	Total amount of farms
The proportion (%) of the UAA on which alternative pest management measures to avoid and reduce pesticide use (IPM measures) are applied according to the following ranges	84: Share of UAA (%) on which alternative measures are applied against pests to avoid and to reduce pesticide application (IPM measures)	In %	Total amount of farms
Areas where alternative measures against pests are applied (ha).	85: Total amount of hectare with alternative measures against pests to avoid pesticide application (ha)	Average; Minimum; Maximum	Total amount of farms

Indicator 86: Utilized agricultural area (UAA) treated with pesticides

Application of pesticides is common in conventional agriculture and poses an enormous risk to biodiversity in general. Every conventional crop in Europe is treated several times with a combination of active substances. This indicator is composed of several key figures, mostly considered as indicators of pressure on natural resources (e.g. soil, water elements due to pesticide drift, etc.) and biodiversity[12] .

The amount of pesticides used should be continuously reduced and the active substances most harmful to biodiversity avoided.

Further reading: www.business-biodiversity.eu/en/biodiversity-training/advisors
Guideline on pesticide management

Key Figures	Indicator	Result	Basis data
Proportion of utilized agricultural area on which pesticides are applied	86: Share of UAA (%) treated with pesticides	In %	Total amount of farms

Indicators 87 - 88: Development of synthetic pesticide use

Key Figures	Indicator	Result	Basis data
Reduction of total amount of synthetic pesticides since the Baseline Report			
Average reduction in the amount of synthetic pesticides per hectare	87: Average reduction of synthetic pesticides applied per hectare (%)	Average; Minimum; Maximum	Total amount of farms
Average increase in the amount of synthetic pesticides per hectare	88: Average increase of synthetic pesticides applied per hectare (%)	Average; Minimum; Maximum	

Indicator 89 - 90: Application of broad-spectrum herbicides

Broad-spectrum herbicides act comprehensively and not selectively against undesirable weeds. Their use in the cultivated landscape leads to a strong decrease in wild herbs. As a result, ecological food chains are disturbed, sometimes considerably. Alternatives: mechanical weeding of the whole plot once or several times. In addition, the concept of Integrated Pest Management offers several agronomic and crop management measures to control weeds, such as diverse crop rotations, balanced fertilisation, adjustment of the sowing date and adapted soil cultivation. The indicators show on how much area (proportionally and absolutely in hectares) broad-spectrum herbicides are used.

Key Figures	Indicator	Result	Basis data
Share of utilized agricultural area (%) on which a broad-spectrum herbicide is applied	89: Share of UAA (%) where broad-spectrum herbicides are applied	Average; Minimum; Maximum	Total amount of farms

[12] *Pesticide Action Network international provides a very detailed list of pesticides still in use worldwide per country: http://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/*

Utilized agricultural area in hectares on which a broad spectrum herbicide is applied	90: Total amount of hectare where broad-spectrum herbicides are applied	Average; Minimum; Maximum	Total amount of farms

Cluster 9: Management und training

Indicator 91: Mapping of the farm; Geodata of the farm

An accurate description of the farm and its surroundings through a map facilitates the planning and management of biodiversity aspects. A map provides a good overview of the farm and the farm structures that influence biodiversity, e.g. size and location of agricultural plots, forest areas, aquatic ecosystems or semi-natural habitats (SNH). Changes should be recorded on the map and facilitate monitoring.

Key Figures	Indicator	Result	Basis data
Farm boundaries: The boundary that includes all land belonging to the farm. This may include land that is privately owned or leased. As a rule, it includes all land which the farm manager has permission to cultivate.	91: Share of farms (%) with a geospatial map	Average; Minimum; Maximum	Total amount of farms
Utilised agricultural area (UAA)			
Area not used for agriculture			
Natural and semi-natural habitats			
Production areas			
Protected areas on or adjacent to the farm			
Biotope corridors			

In Europe, the authorities require maps from the farm as part of the Common Agricultural Policy (CAP). In Germany, software tools that often enable the map export functions for agricultural areas required here are provided by the state ministries (e.g. the FIONA software from the Baden-Württemberg State Ministry for Rural Clearing and Consumer Protection).

Indicator 92: Biodiversity Risk Assessment

More and more standards and companies require a risk assessment of aspects relevant to biodiversity. Some standards provide tools for general risk assessments (e.g. Rainforest Alliance). Risks that arise or could arise from agricultural activities should be recorded, e.g. destruction/degradation of ecosystems, destruction of food sources for birds, leaching of soil, impairment or destruction of bird or insect populations. In addition, external risks should be recorded that (could) have a direct impact on the farm, e.g. a busy road, a landfill or illegal dump, discharge of untreated sewage, industrial facilities with noise and / or dust, raw material extraction sites, etc.

Key Figures	Indicator	Result	Basis data
Farms with a risk assessment on biodiversity	92: Share of farms (%) with a risk assessment on biodiversity	In %	Total amount of farms

Indicators 93 - 94: Biodiversity Action Plan

A Biodiversity Action Plan (BAP) is a management tool and a roadmap for improving biodiversity on farm. It helps farmers to focus on activities to promote biodiversity and provides an overview of the measures and the status of implementation. A BAP should always be developed on the basis of the baseline situation. This ensures that the measures chosen correspond to the strengths and, above all, the weaknesses on the farm and enable continuous improvement. It makes sense to draw up a BAP together with the advisor and/or an expert on biodiversity. The

written process of developing and implementing a BAP[13] makes it easier for the auditor to determine whether and with what results biodiversity measures have been implemented and whether the farm can demonstrate a continuous improvement in biodiversity performance.

More and more standards and procurement requirements of food companies demand a BAP or Biodiversity Management Plan.

Key Figures	Indicator	Result	Basis data
Elaboration of a BAP for the farm	93: Share of farms (%) with a Biodiversity Action Plan	In %	Total amount of farms
Degree of implementation (%) of the BAP: The degree of implementation of the BAP refers to the measures that have been selected and agreed upon for the respective company. The degree of implementation is given in %.	94: Average implementation of the BAP (%)	Average; Minimum; Maximum	Total amount of farms

Indicator 95: Management plan for natural and semi-natural habitats

The quality of natural and semi-natural habitats can be enhanced by extensive management measures. In general, no pesticides or fertilisers should be applied to these habitats. Other than that, maintenance measures are required on afforested areas and hedges. Maintenance cuts in flowering areas with perennial mixtures are carried out alternately on 50 % of the area just to mention another example.

The maintenance measures for several years are recorded in a management plan which is regularly updated. The management plan can also be part of the Biodiversity Action Plan.

Key Figures	Indicator	Result	Basis data
Farms with a management plan for natural and semi-natural habitats	95: Share of farms (%) with SNH management plan	In %	Total amount of farms

Indicators 96–104: Measures implemented to protect biodiversity

The farmer selects the measures for the Biodiversity Action Plan (BAP) - based on the assessment of the current situation. The Biodiversity Performance Tool (BPTi) supports farmers in recording the current situation and evaluates it in the form of a traffic light system: green = the farm is in a good position; yellow = there is potential for improvement; red = these aspects should be urgently improved.

This is a good basis for decision-making when selecting measures. Descriptions of effective measures are available here, among others: https://insect-responsible.org/unsere-massnahmen/

[13] *A guideline for the preparation of a Biodiversity Action Plan can be found here: https://www.business-biodiver-sity.eu/en/biodiversity-training/advisors.*

Key Figures	Indicator	Result	Basis data
Arable land with biodiversity measures in hectares	96: Biodiversity measures implemented on arable land (ha)	average; minimum; maximum; total	Total amount of farms
	97: Share of UAA (%) where biodiversity measures are implemented on arable land	Average; Minimum; Maximum	Total amount of farms
Grassland with biodiversity measures in hectares	98: Biodiversity measures implemented on permanent grassland (ha)	average; minimum; maximum; total	Total amount of farms
	99: Share of UAA (%) where biodiversity measures are implemented on permanent grassland	Average; Minimum; Maximum	Total amount of farms
Speciality crops with biodiversity measures in hectares	100: Biodiversity measures implemented on special crops (ha)	average; minimum; maximum; total	Total amount of farms
	101: Share of UAA (%) where biodiversity measures are implemented on special crops	Average; Minimum; Maximum	Total amount of farms
Permanent crops with biodiversity measures in hectares	102: Biodiversity measures implemented on permanent crops (ha)	average; minimum; maximum; total	Total amount of farms
	103: Share of UAA (%) where biodiversity measures are implemented on permanent crops	Average; Minimum; Maximum	Total amount of farms
Amount of measures implemented outside the UAA	104: Amount of measures implemented outside the UAA	Total Amount	Total amount of farms

Indicators 105 - 106: Training for farm managers on biodiversity

The successful protection and increase of biodiversity depend on effective measures and the quality of the implementation of these measures. So far, biodiversity protection has not been a priority in training for agricultural operators and workers and is often not addressed at all. In order to anchor biodiversity aspects in standards and procurement criteria in the long term and to implement them properly in the field, both farm operators and workers need more knowledge and support in implementing biodiversity-friendly measures.

Key Figures	Indicator	Result	Basis data
Farm manager who has participated in a training/workshop related to biodiversity in the past.	105: Share of farm operators (%) trained in regard to biodiversity	In %	Total amount of farms
Regular participation of the farm managers in a training/workshop related to biodiversity	106: Frequency of training on biodiversity for farm operator: Annually; less than once a year	In %	Total amount of farms

Indicators 107 - 108: Training for permanent staff on biodiversity

Key Figures	Indicator	Result	Basis data
Permanent staff who have participated in a biodiversity-related training/workshop in the past.	107: Share of permanent staff (%) trained in regard to biodiversity	In %	Total amount of farms
Regular participation of staff in a training/workshop related to biodiversity.	108: Frequency of training on biodiversity for permanent staff: Annually; less than once a year	In %	Total amount of farms

Glossary

Agro-biodiversity: The diversity and variability of animals, plants and micro-organisms used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries. It includes the diversity of genetic resources (varieties, breeds) and species used for food, feed, fibre, fuel and medicines. It also includes the diversity of non-harvested species that support production (soil microorganisms, predators, pollinators) and species in the wider environment that support agroecosystems (agriculture, pastoralism, forestry and water management), as well as the diversity of agroecosystems (FAO, 1999a).

Alien species: A species, subspecies or lower taxon introduced outside its natural range; includes any parts, gametes, seeds, eggs or reproductive organs of such species that could survive and subsequently reproduce (Secretariat of the Convention on Biological Diversity, 2002).

Alien invasive species: Alien invasive species are non-native species that harm the environment and potentially cause species extinctions, alter ecosystem processes and act as disease vectors. The problems caused by invasive alien species have potentially major economic consequences. They are also a major cause of biodiversity loss.

Arthropod: Any invertebrate of the phylum Arthropoda, with the main features of a segmented body, jointed limbs and usually a chitinous shell that undergoes moults, including insects, spiders and other arachnids, crustaceans and myriapods.

Autochthonous: Originating from the respective place of observation, native to the soil, for example rocks in geology, animal and plant species in nature conservation or woody plants in forestry (Glossary - Federal Agency for Nature Conservation (BfN) Germany, web address: https://www.bfn.de/glossar/unterteilung-nicht-im-menue/glossar-a-c.html).

Beneficial insects: Some insects have beneficial roles for nature: 1) plant reproduction (pollinators), 2) biodegradation of wastes (decomposers) and 3) natural resistance of agroecosystems/natural control of harmful species (natural enemies, predators, parasitoids). They also have a useful role for humans, for example as an edible protein source in the diet, as valuable insect products (e.g. silk and honey) and as biomimicry among others (FAO, 2013).

Biodiversity hotspots: An area on Earth with an unusual concentration of diverse species, many of which are endemic to the area and often under serious threat from humans (Convention on Biological Diversity - Glossary).

Biodiversity Action Plan (BAP): A plan to conserve or enhance biodiversity (Earthwatch, 2000).

For more information on the preparation of the Biodiversity Action Plan (BAP), see here: https://www.business-biodiversity.eu/en/knowledge-pool/biodiversity-action-plan).

If a farmer is already implementing relevant measures that create potential for biodiversity or reduce negative impacts on biodiversity, these measures can be integrated into a BAP that is yet to be established. Examples of well-established and tested measures that are either easy to implement or highly relevant for biodiversity are the establishment of:

- Flowering strips sown with wildflowers;
- Light fields - Seed gaps and reduced seeding density - Promotion of wild weeds;
- Overwintering catch crops - as overwintering habitat;
- Stone and deadwood piles - to support heat-dependent animals.

Further tried and tested measures with high relevance for biodiversity that can be part of a BAP can be found on the project website: https://insect-responsible.org/massnahmen instrumente/ .

Biological control: Method of controlling agricultural pests, diseases and weeds that relies on natural predation, parasitism or other natural mechanisms that inhibit the development of pathogenic organisms (FAO, 2019).

Biological diversity: "Biological diversity" means the variability among living organisms of all species, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity, 1992).

Biotope corridors: This is habitat that connects wildlife populations separated by human activities or structures (such as roads, development or logging, production sides on farms, etc.). This allows individuals to exchange between populations, which can

help prevent the negative effects on inbreeding and reduced genetic diversity that often occur within isolated populations (NSW Government, Department of Environment and Heritage).

Buffer zones: The region adjacent to the boundary of a protected area; a transition zone between areas managed for different objectives (Convention on Biological Diversity, Glossary).

Crop rotation: The practice of alternating the species or families of annual and/or biennial crops grown on a given field in a planned pattern or sequence to break weed, pest and disease cycles and to maintain or improve soil fertility and organic matter content (FAO, 2009).

Ecosystem: A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit (Millennium Ecosystem Assessment Glossary, 2005, web address: https://www.millenniumassessment.org/en/Condition.html#download).

Ecosystem services: Benefits that people derive from ecosystems. These include 1) provision of services such as food and water, 2) regulation of processes such as flood, drought, soil degradation and disease regulation, 3) supporting services such as soil formation and nutrient cycling, and 4) cultural services such as recreation, spiritual, religious and other non-material benefits (Millennium Ecosystem Assessment Glossary, 2005, web address: https://www.millenniumassessment.org/en/Condition.html#download).

Fauna: All animals occurring in a given area (Convention on Biological Diversity - Glossary).

Flora: All plants that occur in a given area. (Convention on Biological Diversity - Glossary)

Genetically modified organisms (GMOs): Any organism, other than a human being, in which the genetic material has been modified in a way that does not occur naturally by mating and/or natural recombination (European Union, 2001).

Habitat: It is a place where an organism or population occurs naturally (Convention on Biological Diversity, 1992).

Herbicide: Pesticide that kills weeds and other plants that grow where they are not wanted (US Environmental Protection Agency).

Integrated Pest Management (IPS): means careful consideration of all available crop protection methods and subsequent integration of appropriate measures that prevent the development of populations of harmful organisms and maintain the use of plant protection products and other forms of intervention at levels that are economically and environmentally justified and reduce or minimise risks to human health and the environment. Integrated pest management emphasises the growth of a healthy crop with minimum disturbance to agro-ecosystems and promotes natural pest control mechanisms. (EU Directive Plant Protection Framework (2009/128/EC)).

Intercropping: Intercropping means the simultaneous cultivation of two or more crops on the same field. It also means the cultivation of two or more crops on the same field with the planting of the second crop after the first has completed its development (PAN-Germany).

Livestock unit (LU or LU): a reference unit which facilitates the aggregation of animals of different species and ages according to the Convention through the use of specific coefficients originally established on the basis of the nutrient or feed requirements of each species (Eurostat).

Main crops: The crop grown during the longest period of the current year. Crops grown between two main crops are called catch crops.

Metabase: The data analysis platform linked to the Biodiversity Monitoring System's diagnostic and operational database.

Native species: Plant and animal species that occur naturally in a particular area or region. Also referred to as native species. (Convention on Biological Diversity - Glossary).

Natural ecosystems: Ecosystems that can or would be found in a given area if there were no significant impacts of human management. This includes all naturally occurring flowing and still waters (streams, rivers, ponds, pools, ponds...), all naturally occurring wetlands and forests (rainforest, lowland, mountain forest, deciduous forest, coniferous forest...) or other native terrestrial ecosystems such as forests, scrublands, etc.

Non-agricultural land: land previously used as agricultural land which is no longer cultivated during the reference year of the survey for economic, social or other reasons and which is not used in the crop rotation system, i.e. land which is not intended to be used for agricultural purposes. This land could be brought back into cultivation with the resources normally available on a farm. (adapted from the European Commission - glossary item "Unused agricultural area").

Permanent pasture: Permanent pasture is land used for growing grasses or other green fodder, either naturally (self-seeding including 'rough grazing') or by cultivation (sowing), and which is more than five years old. (Glossary; Scottish Government, Rural Payments and Services).

Pesticide: A pesticide is something that prevents, destroys or controls a harmful organism (pest) or disease or protects plants or plant products during production, storage and transport. The term includes but is not limited to: Herbicides, fungicides, insecticides, growth regulators and biocides (European Commission). In organic farming, synthetic chemical pesticides are not permitted for use. However, a list of certified pesticides is allowed. These are naturally occurring substances such as plant extracts or, on a microbial basis, such as fungal spores. Nevertheless, these substances can have a very toxic effect on living organisms.

Protected areas: Protected areas are a clearly defined geographical space that is recognised, dedicated and managed through legal or other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values. A protected area can be either publicly or privately owned (IUCN, 2008).

Protected/endangered species: Plant, animal and fungal species designated as threatened and endangered by national legislation or classification systems, or listed as endangered or critically endangered in the IUCN Red List of Threatened Species and/or listed in Appendices I, II or III of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Semi-natural habitats (SNH): are habitats that are influenced by human activities but have lost their structure and are very similar to natural habitats, e.g. afforested areas. Near-natural habitats are also artificially created habitats that have been largely left to natural development and harbour typical native plant and animal species, with the exception of permanent grassland and agroforestry. Examples could be, but are not limited to:

- Hedges, shrubs, rows of trees, avenue,
- Individual trees (living and dead), buffer strips, fallow land, flowering strips, slope, beams, afforested areas, water elements (ravine, stream, ditch),
- Unmanaged margins or strips not used for grazing

For the purposes of biodiversity monitoring and related indicators, the following distinction is made between NNLs:

- Temporary SNH: Are SNH areas that will change in short periods of time (≤ 1 year), e.g. fallow land, flower strips, field margins.
- Permanent SNH: Are SNH areas that are implemented and designed as permanent structures (≥ 1 year), e.g. individual trees, hedges, forest edges, shrub and woody areas, extensively managed grassland (< 1.5t dry matter production per ha/year), riparian strips, water bodies, tree rows, avenues, afforestation areas.

Species: A group of organisms capable of freely interbreeding with each other, but not with members of other species (Convention on Biological Diversity - Glossary). It refers only to the biological concept of species and thus does not include diversity. Note for filling in the Biodiversity Monitoring System questionnaire: Three apple varieties in indicator 11 (number of crop species) would lead to answer 1 (species to crop), but three different species of permanent crops (apple, pear and peach) would lead to answer 3.

Soil biodiversity: Millions of species of microbes and animals live in and make up soil, from bacteria and fungi to mites, beetles and earthworms. Soil biodiversity is the entire community from genes to species and varies depending on the environment. The immense diversity of soil enables a wide variety of ecosystem services that benefit the species that inhabit it, the species (including humans) that use it, and its environment (Global Soil Biodiversity).

Tree row: At least five trees planted in a row. The row of trees is at least 50 metres long. The trees are not used for agricultural purposes.

Traditional crop species/ livestock breeds: These terms refer to indigenous domestic breeds, either crop or livestock breeds, that have been selected by humans for their physical characteristics and are genetically closely related to their wild ancestors.

Utilised agricultural area (UAA): UAA is the total area occupied by arable land (including temporary grassland and fallow land), permanent grassland, permanent crops and kitchen gardens (Eurostat Glossary, 2014).

Wetlands: include marsh, fen, bog or water areas, whether natural or artificial, permanent or temporary, with static or flowing water, fresh, brackish or saline, including marine water areas whose depth at low tide does not exceed six metres (Convention on Wetlands, Ramsar).

Wild species: Organisms (animals, plants or fungi) that live in captivity or in the wild but have not been bred (Convention on Biological Diversity, Glossary).

Food for Biodiversity

Coordination	Global Nature Fund
Project Partner	Bodensee-Stiftung (Lake Constance Foundation)

The association "Food for Biodiversity" was founded in March 2021 to make a significant contribution to improve the protection of biodiversity in the food sector. Food producers and traders, food standards and other industry players, scientific institutions and environmental organisations commit to implementing measures that enhance the protection of biodiversity as a key concern of the food industry and its upstream value chains.

The initiative is pre-competitive, directly serves the non-profit objective of protecting biodiversity and contributes to the transformation towards sustainable and future-proof food systems. The members signed an ambitious self-commitment. Among other things, they commit to incorporating a basic set of biodiversity criteria into standards and supply chains, and to create incentive schemes for farmers willing to implement more and better biodiversity measures. The Biodiversity Performance Tool supports farmers in the elaboration and implementation of a Biodiversity Action Plan. The target group of the Biodiversity Monitoring System are food companies, standard organisations and producer associations. The BMS facilitates monitoring of the biodiversity performance of a group of farmers.

Training for farmers and advisors as well as managers in companies is available, strategies for raising consumer awareness are being developed and the political framework conditions for the protection of biodiversity are to be improved together.

Food for Biodiversity is a lighthouse initiative of "Unternehmen Biologische Vielfalt (UBi)" (Business & Biodiversity) and measures such as the update of the BMS are financially supported by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection and the Federal Agency for Nature Conservation.

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BfN Bundesamt für Naturschutz

EU LIFE Insect Responsible Sourcing Regions

Coordinator	Lake Constance Foundation
Project Partners	Global Nature Fund, Netzwerk Blühende Landschaft, Bäuerliche Erzeugergemeinschaft Schwäbisch Hall, Nestlé Deutschland

With the concept of insect-responsible sourcing regions, agriculture and the food industry in particular can contribute to reversing the trend in insect decline. The ambition of an insect-responsible sourcing region is not only to disseminate common and proven measures for the promotion of pollinating insects in agriculture, but additionally to test and strengthen the ecological effectiveness and practicability of more advanced cultivation practices.

Trustful cooperation of land users for a good connection between landscape and farm level

In close cooperation between agriculture, the food sector, nature conservation as well as with municipalities and other land use actors, insect-responsible sourcing regions are created and Biodiversity Action Plans (BAPs) are defined for the regions at the landscape level. Farmers and other land users are implementing BAPs at the farm level, which are designed to achieve the agreed goals for insect conservation for the region.

Monitoring and valorization of insect promotion

In addition to the further development of public funding, market-oriented concepts are also needed to better value the biodiversity services of farmers along the supply chain. The Biodiversity Performance Tool (BPT) is used to record and evaluate the implementation of insect-friendly measures. If farmers create an ecological added value, this should also be reflected in an economic added value. The provision of public goods should be profitable component for farms in the future.

Improving the quality and quantity of insect promotion

- More ecological potential: creation of new habitats for insects
- More ecological quality: improving the quality of existing habitats
- Less chemical pollution: Reducing the use of fertilizers and pesticides
- More innovation: testing and disseminating measures that have not been proved widely

Increasing the area effect of insect-promoting measures

- Increase in the area of insect-promoting measures in agriculture
- Increase in the area of insect-promoting measures in other land uses (forestry, municipal, commercial, private)

Create regional alliance for insect promotion

- Place insect promotion on a broad social basis
- Engage as many land use stakeholders as possible in sustainable insect promotion

Adding value to insect protection in a market-oriented way

- Implementation of marketing concepts for insect-promoting products
- raising consumer awareness through attractive communication on the part of the food industry

Further reading:

https://food-biodiversity.de/

https://insect-responsible.org/

https://www.unternehmen-biologische-vielfalt.de

Appendix 1

Questions and Indicators of the Biodiversity Monitoring System (BMS)

Overarching indicator	Related Question	Indicator shown on BMS Dashboard
Cluster 1: Farm		
Area of the farm	Total farm area (FA) (ha) Total utilised agricultural area (UAA) of the farm (ha)	1: Total farm area (FA) (ha) 2: Total utilised agricultural area (UAA) of the farm (ha)
Protected areas	Is the farm located in a protected area or close to a protected area? If yes, does the farm manager know about the management plan of the protected area and respect possible restrictions regarding the agricultural use in the area? If yes, is the farm manager informed about endangered and protected species in the region (e.g. list or other information)?	3: Share of farms located in or close to a protected area 4: Farmers knowledge about management plan of the protected area and respect of possible restrictions regarding the agricultural use in the area 5: Farmers knowledge about endangered and protected species in the region (e.g. list or other information)
Cluster 2: Semi-natural habitats		
Conservation and creation of near-natural habitats	Which area is covered by temporary semi-natural habitats (ha)? Which area is covered by permanent semi-natural habitats (ha)? Total farm area (FA) (ha) Total utilised agricultural area (UAA) of the farm (ha)	6: Area covered by temporary semi-natural habitats (ha) 7: Area covered by permanent semi-natural habitats (ha) 8: Share of semi-natural habitats (%) compared to total farm area 9: Share of farms with more than 10 % of semi-natural habitats compared to total farm area 10: Share of semi-natural habitats (%) compared to the agricultural area (UAA) of the farm 11: Share of permanent semi-natural habitats (%) compared to the agricultural area (UAA) of the farm 12: Share of farms with more than 5 % of semi-natural habitats compared to the agricultural area (UAA) of the farm
Conversion of grassland into arable land	Did the farmer convert grassland into arable land? If yes, % of grassland converted to arable land?	13: Percentage of farmers which converted grasland into arable land (%) 14: Share of grassland converted to arable land (%)

Management plan for grazing	Does the farmer have a grazing management plan for the pasture land?	15: Share of farms with pasture land and grasing management plan
Flower strips / field margins	Does the farm have regularely flowering strips and/or field margins? If yes, how much surface on average (in m²) If yes, are local seeds for targeted floral mixtures used only? Spontaneous vegetation for field margins or grass strips	16: Percentage of farms with regular flowering strips and/or field margins (%) 17: Surface area of regularely flowering strips and/or field margins (m²) 18: Use of local seeds for targeted floral mixtures used only (%) 19: Spontaneous vegetation for field margins or grass strips (%)
Hedges	Are hedges on the farm land/along the farm borders? If yes, how long are the hedges (m)? If yes, are only/mainly native species used? If yes, how many native species have the hedges on average?	20: Percentage of farms with hedges on the farm land /along the farm borders (%) 21: Length of hedges (m) 22: Use of native species in hedges only (%) 23: Amount of native species used in hedges
Linking habitats on the farm	Are the semi-natural habitat areas on the farm in some way connected so that they build a network of biological corridors?	24: Connection of semi-natural habitats within the farm
Linking habitats with the environment	Are the semi-natural habitat areas on the farm connected with semi-natural habitats in the surroundings of the farm? If yes, how many habitats are connected?	25: Connection of semi-natural habitats with surrounding habitats 26: Amount of habitats on the farm connected with surrounding habitats
Endangered and protected animal and plant species	Does the farmer know if there are endangered/protected species on the farm? If yes, does the farmer realize measures to protect and enhance these species?	27: Farmers knowledge about endangered and protected species in the region (e.g. list or other information) 28: Measures to enhance/protect endangered species on the farm
Wild collections	Does the farmer collect wild species? If yes, does the farmer comply with all national/international regulations?	29: Collection of wild species 30: Compliance with with all national /international regulations regarding the collection of wild species
Application of pesticides on semi-natural habitats	Does the farmer apply pesticides on any semi-natural habitat areas at the farm? If yes, on how much percent (%) of the semi-natural habitats?	31: Share of farmers treating their semi-natural habitat areas with pesticides (%) 32: Share of semi-natural habitat area that is treated with pesticides (%)
Application of fertilisers on semi-natural habitats	Does the farmer apply fertilizers on any semi-natural habitat areas other than permanent grassland under extensive management, agro-forestry systems, silvopastoral systems (located on UAA or other farm areas)?	33: Share of farmers treating their semi-natural habitat areas with fertilizers (%) 34: Share of semi-natural habitat area that is treated with fertilizers (%)

	If yes, then on how much percent (%) of the semi-natural habitats?	
Cluster 3: Animal feed and Deforestation		
Forage autonomy	How much percent (%) of the required forage for your livestock comes from the region (radius of 50 km)?	35: Livestock forage origins from the farm or region (radius of 50 km)
Livestock density	What is the average livestock density (LU/ha/year) of your main fodder area?	36: Intensive livestock 37: missing 38: Share of farms with intensive, intermediate and extensive livestock systems (LU/ha/year)
Destruction of ecosystems through dependence on soy as animal feed	What is the share of soy based feed concentrate (%)? Which share of the animal feed (%) that is based on soy is certified to be deforestation free (e.g. Round Table on Responsible Soy certification)?	39: Share of soy based feed concentrate (%) 40: Certification for animal feed (%) that is based on soy: deforestation free
Genetically modified cattle feed	Which proportion (%) of the total used animal feed concentrate is certified to be GMO free (e.g. Pro Terra certified)?	41: Certification for animal feed (%) GMO-free
Cluster 4: Use of water resources		
Protection of waters	Are there any water bodies on the farm? If yes, how long is the shore line (in meters)? What is the share (%) of water courses that have no buffer zone in comparison to total shore line? What is the share (%) of water courses that have a buffer zone width between 1-4 meters in comparison to total shore line? What is the share (%) of water courses that have a buffer zone width between 5-9 meters in comparison to total shore line? What is the share (%) of water courses that have a buffer zone width of >=10 meters in comparison to total shore line?	42: Presence of waterbodies on the farm 43: Length of shore line (meters) 44: Share (%) of water courses with buffer zone in comparison to total shore line 45-47: missing
Sustainable management of water resources	Does the farmer implement or is involved in any programme/activities with the aim to increase water use efficiency and sustainable management of water sources?	48: Farmers involvement in programme/activities with the aim to increase water use efficiency and sustainable management of water sources

Irrigation	Does the farm have a valid permit for the withdrawal of water? Is the amount of water used in each irrigation documented? Total water withdrawn (m^3/a) in the last year?	49: Valid permit for the withdrawal of water present 50: Share of farms with irrigation and without irrigation 51: Documentation about the amount of water used in each irrigation 52: Total water withdrawn (m^3/a) in the last year 53: Average water withdrawl (m^3/a) per hectare UAA
Adequate irrigation quantity	Does the farmer use any decision support tools to assess the appropriate amount of irrigation?	54: Farmers use of decision support tools to assess the appropriate amount of irrigation
Cluster 5: Alien invasive species		
Alien invasive species	Are there alien invasive species present on the farm? If yes, does the farmer apply any measures for fighting these alien invasive species on the farm?	55: Presence of alien invasive species on the farm 56: Measures for fighting these alien invasive species on the farm
Cluster 6: Genetic diversity		
Crop diversity	How many traditional crops does the farmer cultivate?	57: Amount of traditional cultivated crops
Traditional livestock breeds	How many traditional livestock breeds does the farmer have?	58: Amount of traditional livestock breeds
Genetically modified organisms	Does the farmer grow genetically modified crops on the farm? If yes, what is the share of UAA on which GMO crops are cultivated (in %)?	59: Percentage of farms with genetically modified crops (%) 60: Share of UAA (%) on which GMO crops are cultivated
Cluster 7: Soil		
Soil fertility	Does the farmer regularly carry out a soil analysis including soil organic matter content according to a recognized method? If yes, how often (in years)? Result of the soil organic matter analysis in the last six years Does the farmer apply measures against erosion and does he document these measures? What is the proportion of the farming area (UAA) that has a soil cover (e.g. cover crops but also mulching) at least during critial periods (e.g. peak precipitation months) (in %)?	61: Percentage of farm with regular soil analysis (%) 62: Soil analysis including soil organic matter content according to a recognized method (%) 63: Result of the soil organic matter analysis in the last six years 64: Measures against erosion and its documentation 65: Proportion of farming area (UAA) with soil cover at least during critial periods (%)

Crop rotation	How long is the crop rotation of your main crops in years i.e. the time span until the same crop is planted again? How much percent of the UAA is covered by the most relevant cash crop of the farm? How much percent of the UAA is covered by the two most relevant cash crops of the farm? Percent (%) of legumes on arable land including temporary grasslands?	66: Length of crop rotation (in years) 67: Share of farms (%) growing at least three different main crops on it´s UAA with the one most relevant crop growing on max. 75% of the UAA 68: Share of farms (%) growing at least three different main crops on it´s UAA with the two most relevant crops growing on max. 95% of the UAA 69: Share of farms (%) growing at least three different main crops on it´s UAA with at least 10% of the UAA is covered by legumes or mixture including legumes?
Amount of nitrogen applied	What is the entire amount of mineral Nitrogen applied on the farm in kg/ha/year?	70: Total Amount of mineral nitrogen fertilizer (kg/ha/year)
Fertiliser management	Does the farmer realize an annual nutrient balance with an approved method? Does the farmer determine the fertilizer requirement annualy before applying considerable amounts of nutrients (N = 50 kg/ha; P = 30 kg/ha)? Does the farmer applies no more than 1/3 of the total N in early stages of growth or with bare soil? How much N overflow do the arable areas have on average over the past 3 years? (in kg N / ha)	71: Share of farms (%) realizing an annual nutrient balance with an approved method 72: Share of farms (%) with annual analysis of fertilizer requirements 73: Share of farms (%) applying not more than 1/3 of the total N in early stages of growth or with bare soil 74: Average N overflow in the past 3 years in kg N / ha
Cluster 8: Pesticide management		
Integrated Pest Management (IPS)	Does the farm have a person responsible for Integrated Pest Management (IPM)? Did this person participate in trainings on IPM minimum once per year? Does the farm have an IPM Strategy or plan? Is the stragey or plan regularey updated? Are all IPM measures documented? How many principles of IPM are being implemented so far?	75: Share of farms (%) with a person responsible for IPM 76: Share of farms (%) with person(s) trained on IPM minimum once per year 77: Share of farms (%) with IPM strategy or plan 78: Share of farms (%) with regular updated IPM strategy/plan 79: Share of farms (%) with full IPM documentation 80: Number of IPM principles implemented 81: Share of farms (%) with a fully implemented Integrated Pest management
Alternative measures against weeds and pests	What is the share (%) of UAA on which alternative measures are applied against weeds to avoid and to reduce pesticide application (IPM measures)? What is the share (%) of UAA on which alternative measures are applied against pests to avoid and to reduce pesticide application (IPM measures)? Total utilised agricultural area (UAA) of the farm (ha)	82: Share of UAA (%) on which alternative measures are applied against weeds to avoid and to reduce pesticide application (IPM measures) 83: Total amount of hectare with alternative measures against weed to avoid pesticide application (ha) 84: Share of UAA (%) on which alternative measures are applied against pests to avoid and to reduce pesticide application (IPM measures)

		85: Total amount of hectare with alternative measures against pests to avoid pesticide application (ha)
Agricultural production area treated with pesticides	What is the proportion (%) of UAA that is treated with pesticides?	86: Share of UAA (%) treated with pesticides
Development of the use of synthetic pesticides	What is the average reduction (%) of synthetic pesticides applied per hectare? What is the average increase (%) of synthetic pesticides applied per hectare?	87: Average reduction of synthetic pesticides applied per hectare (%) 88: Average increase of synthetic pesticides applied per hectare (%)
Application of broad spectrum herbicides	What is the share (%) of UAA where broad-spectrum herbicides are applied? Total utilised agricultural area (UAA) of the farm (ha)	89: Share of UAA (%) where broad-spectrum herbicides are applied 90: Total amount of hectare where broad-spectrum herbicides are applied
Cluster 9: Management and Training		
Mapping and geodata of the farm	Do you have a geospatial mapping of the farm and surrounding areas that outlines the delineation and/or location of (please check all that apply)	91: Share of farms (%) with a geospatial map
Biodiversity Risk Assessment	Does the farm have a risk assessment regarding the potential risks for biodiversity from agricultural activities on the farm or risks from the surroundings (e.g. untreated waste water, illegal waste deposits)?	92: Share of farms (%) with a risk assessment on biodiversity
Biodiversity Action Plan	Has a Biodiversity Action Plan been elaborated for the farm? If yes, specify the degree of its implementation on the farm (% of implemented measures that were agreed in the BAP)	93: Share of farms (%) with a Biodiversity Action Plan 94: Average implementation of the BAP (%)
Management plan for natural and semi-natural habitats	Does the farm implement a SNH management plan for habitats and ecological structures in order to reduce the impact on species as much as possible?	95: Share of farms (%) with SNH management plan
Measures implemented to	Biodiversity measures implemented on arable land in ha Biodiversity measures implemented on permanent grassland in ha Biodiversity measures implemented on special crops in ha	96: Biodiversity measures implemented on arable land (ha) 97: Share of UAA (%) where biodiversity measures are implemented on arable land

protect biodiversity	Biodiversity measures implemented on permanent crops in ha Biodiversity measures implemented out of the production area (total amount) Total utilised agricultural area (UAA) of the farm (ha)	98: Biodiversity measures implemented on permanent grassland (ha) 99: Share of UAA (%) where biodiversity measures are implemented on permanent grassland 100: Biodiversity measures implemented on special crops (ha) 101: Share of UAA (%) where biodiversity measures are implemented on special crops 102: Biodiversity measures implemented on permanent crops (ha) 103: Share of UAA (%) where biodiversity measures are implemented on permanent crops 104: Amount of measures implemented outside the UAA
Training for farm managers on biodiversity	Did the farm operator participate in a capacity building activity with relevance to biodiversity? If yes, how often?	105: Share of farm operators (%) trained in regard to biodiversity 106: Frequency of training on biodiversity for farm operator
Biodiversity training for staff	Did the permanent staff participate in a capacity building activity with relevance to biodiversity? If yes, then how often?	107: Share of permanent staff (%) trained in regard to biodiversity 108: Frequency of training on biodiversity for permanent staff