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Biological diversity in agricultural landscapes

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AbL	Arbeitsgemeinschaft bäuerliche Landwirtschaft e. V. [Small Farmers Association]
AECMs	Agri-environment-climate measures
BBN	Bundesverband Beruflicher Naturschutz e. V. [Federal Association of Professional Nature Conservation]
BfN	Bundesamt für Naturschutz [Federal Agency for Nature Conservation]
BLE	Bundesanstalt für Landwirtschaft und Ernährung [Federal Office for Agriculture and Food]
BMEL	Bundesministerium für Ernährung und Landwirtschaft [Federal Ministry of Food and Agriculture]
BMELV	Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz [Federal Ministry of Food, Agriculture and Consumer Protection]
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit [Federal Ministry of the Environment, Nature Conservation and Nuclear Safety]
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit [Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety]
CBD	Convention on Biological Diversity
CC	Cross-compliance
DDA	Dachverband Deutscher Avifaunisten e. V. [Federation of German Avifaunists]
DBV	Deutscher Bauernverband e. V. [German Farmers Association]
DVL	Deutscher Verband für Landschaftspflege e. V. [German Association for Landcare]
DG	Directorate-General
EBCC	European Bird Census Council
EEB	European Environmental Bureau
EU	European Union
ECJ	European Court of Justice
ECA	European Court of Auditors
FFH	Fauna Flora Habitat
GAK(G)	(Gesetz über die) Gemeinschaftsaufgabe “Verbesserung der Agrarstruktur und des Küstenschutzes” [(Act Concerning the) Joint Task for the Improvement of Agricultural Structures and Coastal Protection]
CAP	Common Agricultural Policy
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
HNV	High nature value
COM	European Commission

LANA	Bund/Länder-Arbeitsgemeinschaft Naturschutz, Landschaftspflege und Erholung [Federal-Länder Working Group on Nature Conservation, Landscape Management and Recreation]
LKSH	Landwirtschaftskammer Schleswig-Holstein [Schleswig-Holstein Chamber of Agriculture]
LWK	Landwirtschaftskammer [Chamber of Agriculture]
NABU	Naturschutzbund Deutschland e.V. [Nature and Biodiversity Conservation Union]
NBS	Nationale Strategie zur biologischen Vielfalt [National Strategy on Biological Diversity]
EFAs	Ecological focus areas
PPPs	Plant protection products
SMUL	Sächsisches Staatsministerium für Umwelt und Landwirtschaft [Saxony State Ministry of the Environment and Agriculture]
SPA	Special protected area
SRU	Der Rat von Sachverständigen für Umweltfragen [German Advisory Council on the Environment]
TEEB	The Economics of Ecosystems and Biodiversity
UBA	Umweltbundesamt [Federal Environment Agency]
UN	United Nations
WBW	Wissenschaftlicher Beirat für Waldpolitik beim Bundesministerium für Landwirtschaft und Ernährung [Scientific Advisory Board on Forest Policy at the Federal Ministry of Food and Agriculture]

Summary and key demands

The status of biodiversity in agricultural landscapes is alarming

- **Species diversity:** Examples of dramatic species loss include population declines in wild segetal flora, farmland birds and insects. Disproportionate population declines in small-insect and spider-eating bird species are indirect evidence of a decline in insects. Biodiversity in agricultural landscapes is on an unrelenting downward trend, and it is the sharpest trend for all regularly assessed habitat ranges.
- **Biodiversity at ecosystem and landscape level:** Agricultural biodiversity is also in dramatic and widespread decline at ecosystem level. This is underscored by the findings of the current German Red Data Book on Endangered Habitats and high nature value farmland monitoring. In intensively farmed regions with land scarcities and high land prices, nature conservation lacks the financial resources to sustain even a minimum degree of biodiversity.
- **Grassland:** The quantitative decrease in the area of permanent grassland has slowed in recent years and in some places even seems to have stopped. Due to ongoing intensive grassland management, however, the qualitative deterioration of grassland continues unchecked. Alarmingly, floristically rich grassland types with medium nutrient content and medium management intensity are now also coming under widespread massive pressure.
- **The indicators for most targets of the National Strategy on Biological Diversity (NBS) relevant to agricultural landscapes show a negative trend. Without nature-friendly farming, the NBS targets will be unattainable.**

The European Union's Common Agricultural Policy (CAP) and national agricultural policy in Germany, even after the most recent reform in 2013, still do not contribute substantially and effectively towards countering the ongoing loss of biodiversity.

- **CAP first pillar:** To the best of our knowledge, 'greening' has not met the desired outcomes. Ecological focus areas create minimal added value for biodiversity and are highly inefficient. Protection remains inadequate for permanent grassland especially, and crop diversification is irrelevant to the promotion of biodiversity.
- **CAP second pillar:** The most important instrument for financing nature conservation in agricultural landscapes and for implementing Natura 2000 is the European Agricultural Fund for Rural Development (EAFRD). There is nonetheless a large funding gap in relation to nature conservation funding needs. The gap is significantly greater than the biodiversity-relevant expenditure actually planned. At the same time, the second pillar system with its rigid control requirements for administration is becoming less and less practicable and also less and less attractive for farmers, with a particularly negative impact on nature conservation.
- **The findings show that the problems seen can only be effectively addressed with a radical reorientation of European and national agricultural policy.**

Such a reorientation is not only necessary from a nature conservation perspective, but also has social legitimacy:

- **In macroeconomic terms**, agriculture that is not adapted to local conditions and is not nature-friendly can have huge costs, whereas providing ecological services above and beyond agriculture's primary task of production would deliver major added benefits.
- It has been shown that nature-friendly farming generally has **strong support** among the population.

Central demands for reorientation of agricultural policy from 2020:

- Payments to farmers to be consistently aligned with the common interest following the rule of ***public money for public goods***. Sufficient financial resources must be made available for this purpose.
- Creation of **incentives** for agriculture that is nature-friendly, adapted to local conditions and consequently sustainable, including the safeguarding of ecological services, while drastically reducing administrative effort and expense and **simplifying** monitoring rules.
- Securing a minimum level of biodiversity even in intensively farmed regions, among other things by consistent compliance with an improved **regulatory framework**.

Essential action points up to 2020:

- **Restriction of ecological focus areas** (EFAs) to types that create clear added value for nature conservation. Based on this premise, the EFA percentage should be raised from 5% to 7% in order to increase the area covered by EFAs.
- Significant **widening of the definition of 'environmentally sensitive' permanent grassland** for better protection of valuable permanent grassland areas. The definition must at least cover the entire Natura 2000 site range, organic soils, all threatened and legally protected grassland habitat types, and high nature value grassland. There must also be a complete national ban on ploughing up of grassland.
- Consistent use of the possibility of **increasing redistribution** from the first to the second pillar of the CAP to the 15 percent permitted under EU law.

1 Nature conservation and agriculture: mutually dependent in their shared interest

Debate about post-2020 reform of the Common Agricultural Policy is already underway. Due to this, the Federal Agency for Nature Conservation (BfN) presents the Agriculture Report 2017, with key up-to-date facts and figures, mainly drawn from BfN research projects, on the status of biodiversity in agricultural landscapes. The findings give strong support from a nature conservation perspective to the needs stated by various parties for a paradigm shift in the Common Agricultural Policy and in national agricultural policy. Halfway through the funding period, attention is also drawn to adjustments at a national level that are possible and necessary by 2020.

Agriculture contributes in many different ways to conservation of the cultural landscape.

Using 50% of the land, agriculture today is the largest land user in Germany. As such, it massively influences the condition and development of biodiversity and natural resources such as soil and water. It also permanently shapes the appearance of our cultural landscapes. The relationship between agriculture, nature conservation and environmental protection is naturally multifaceted due to complex links between the diversity of the natural environment and farming practices.

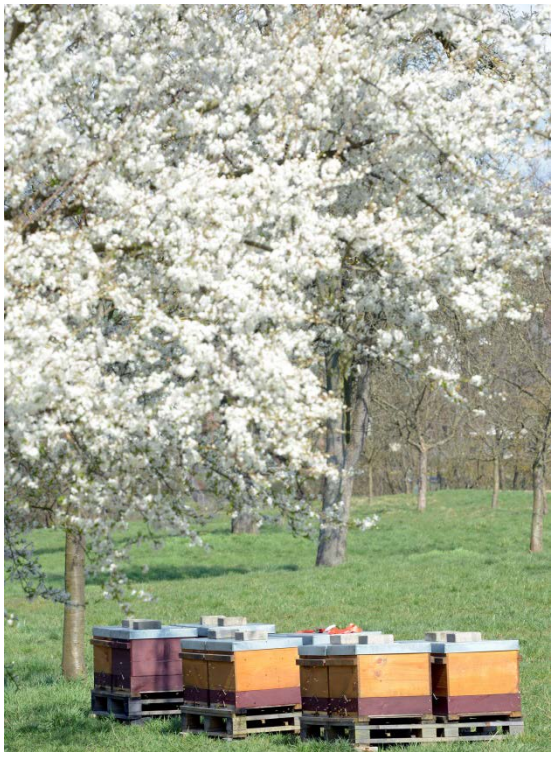
- On one hand, agriculture has **a key role** for varied cultural landscapes with diverse flora and fauna: some 39% of the Natura 2000 sites subject to special protection under European Union (EU) law are occupied by farmed land (arable and grassland) (RATHS et al. 2006). Regardless of the protection status, many valuable habitats and plant, fungus and animal species of open landscapes depend on a specific, usually extensive, form of agricultural management (KLEIJN et al. 2009; BFN 2015; LUICK et al. 2015; DÄMMRICH et al. 2016). Approximately 13% of habitat types in the current German Red Data Book on Endangered Habitats are directly dependent on agricultural practices (such as arable farming and land lying fallow) (FINCK et al. 2017).

- On the other hand, agriculture today negatively **impacts** the objects of nature conservation and environmental protection: farming up to the mid-20th century fostered habitat diversification and as a result, the growth of complex agro-ecosystems. However, today, modern 'industrialised' agriculture results in uniformity and monotony across entire

landscapes, with severe effects on biodiversity and ecosystems. Approximately 80% of habitat types of open landscapes that directly depend on farming are now classified as threatened (cf. FINCK et al. 2017). Other habitat types such as bogs, reedbeds, woodland margins, riparian fringes and tall perennial herb vegetation are increasingly affected by nearby farming. The German Advisory Council on the Environment (SRU) clearly described the environmental problems caused by agriculture as early as 1985 (SRU 1985). The situation 30 years later is bleak. With regard to biodiversity, the conflicts are as ubiquitous as ever (cf. UBA 2015c; UBA 2017): agriculture is the "main cause of the widespread decline in agricultural and biological diversity" (HABER 2014: 2).

- Agriculture itself is also **suffers**, however, precisely due to the largely self-inflicted loss of natural species and habitat diversity and the resulting depletion of ecosystem services. Examples include the services of pollinators, the role of natural enemies in pest control, and the maintenance of soil fertility.

Sustainable agriculture is essential to the production of healthy food. Environment-friendly agriculture produces not only food, but also 'cultural landscape' with all related functions such as intact soils, clean water and attractive natural spaces as the basis of tourism and recreation for large sectors of the population. In this way, both society and nature conservation depend on viable agriculture that is sustainable and nature-friendly. This complex state of affairs fundamentally means that agriculture has a special responsibility in society. Conversely, it also means that society has a responsibility towards agriculture – namely to provide a suitable political and economic framework so that farmers are indeed able to practice sustainable and nature-friendly agriculture on a widespread scale and hence to provide important and necessary services to society. The European Union's Common Agricultural Policy (CAP) and its implementation at national level plays an important part here. While the CAP is a key driver of developments in agriculture critical to biodiversity and the environment (e.g. FEINDT et al. 2017), it is also central to shaping nature-friendly agriculture that is compatible with biodiversity. This point is also stressed in the EU Biodiversity Strategy 2020 (cf. COM 2011a). As the present report clearly shows, the CAP in its current form is not suited to promoting environment-friendly agriculture and a fundamental reorientation is needed for the new CAP period from 2020.



If pollinators are lacking in the countryside, yields of pollination-dependent fruit and crop species also fall.

Various reform steps in the past have been aimed at halting environmental destruction by integrating environmental concerns into the CAP and making agricultural ecosystems more sustainable (COM 2017a). The most recent CAP reform of 2013 was even explicitly launched under the banner of

implementing greener, meaning more nature and environment-friendly agricultural policy, notably by incorporating a mandatory ‘greening’ component into direct payments. Halfway through the current funding period, the effectiveness of the greening component must be given a critical appraisal. This is because the window for necessary adjustments at a national level within the current funding period is only briefly open and the chance must be taken now to achieve some improvements in the direction of more nature-friendly agriculture.

Monotonous arable landscapes are a frequent outcome of modern farming.

2 The situation of biodiversity in agricultural landscapes

The Federal Government adopted a comprehensive agenda for the conservation and development of biodiversity in Germany in the National Strategy on Biological Diversity (NBS) in 2007 (BMU 2007). This extends into numerous policy areas and contains a substantial number of targets relevant to agricultural landscapes and agricultural land use. Biodiversity targets directly related to agricultural land use are also formulated in supranational and international agreements. The European Union's Biodiversity Strategy, for example, calls for a measurable improvement in the conservation status of species and habitats that depend on, or are affected by, agriculture (COM 2011a). The Aichi Targets adopted under the international Convention on Biological Diversity (CBD) require party states to ensure that all areas under agriculture are managed sustainably by 2020. The term 'biological diversity' or 'biodiversity' is generally understood to include genetic diversity as well as the diversity of species and ecosystems (UN 1992). Aspects relating to what are called genetic resources are excluded in this paper, although there are massive losses to report here also (cf. e.g. BMELV 2007).

The sections that follow highlight the current status of biodiversity in agricultural landscapes and show that the situation in many areas is indeed worrying. The continuing trend towards intensive agriculture is multifaceted and leads to an ever-increasing biodiversity crisis that is impossible to overcome with current resources and will have significant long term effects to society (see also section 4.1). The negative impacts of agriculture do not stop at the boundaries of protected areas, as relevant studies have shown (VOGEL 2017; VISCHER-LEOPOLD et al., *in preparation*).

Sections 2.1 and 2.2 focus on the situation of species (2.1) and of habitats of open landscapes (2.2). In view of its high nature conservation value (cf. also BFN 2014a), grassland and its current situation are examined separately (section 2.3).

2.1 Status of and trends in species diversity

Numerous species found in Germany depend on agriculture-related habitats (cf. also BFN 2015). This applies to a majority of native ferns and flowering plants whose distribution is concentrated on grassland, and notably also to the segetal flora dependent on arable habitats and to numerous animal species. The methods, scale and intensity of farming in the habitats of these species are the factors that determine their long-term survival. Conservation of richly structured cultural landscapes featuring a mosaic of natural and semi-natural habitats with few chemical and energy inputs (see also section 2.2) constitutes one of Central Europe's most important contributions towards the attainment of global biodiversity targets (for early corroboration PLACHTER 1999; HENNE et al. 2003).

Modern agricultural production methods have led to increasing land-use intensity and consequently – alongside impacts such as soil degradation and harm to waters – to a continuous decline in species diversity. The European hamster (*Cricetus cricetus*), that once was widespread in arable landscapes and was even massively combated as a pest, is now classified in Germany as 'critically endangered' (MEINIG et al. 2009). This is one of the most prominent casualties of large-scale intensive farming (MEINIG et al. 2014). The Red List of invertebrates (BINOT-HAFKE et al. 2011) likewise demonstrates continuing negative population trends, for example, in butterfly species found in nutrient-poor and dry grassland and wild bee species found in hay meadows, nutrient-poor grassland and

heaths (WESTRICH et al. 2011; REINHART & BOLZ 2011; BFN 2015; see also section 2.1.3).

The situation of biodiversity in agricultural landscapes with many cases of dramatic population decline of species is illustrated in the following with the examples of segetal flora, farmland birds and insects. The situation of farmland birds is of particular relevance in this context because it is part of the species diversity and landscape quality indicator, which is one of the core indicators in the implementation reports on the National Strategy on Biological Diversity and on the Federal Government's National Sustainability Strategy. A selection of ten bird species within this indicator is also used in assessment of the 'farmland' habitat (ACKERMANN et al. 2013; see also section 2.1.3).

2.1.1 Example: segetal flora

Of the approximately 270 species of segetal flora (flora characteristic of arable land) in Germany, over one third are classified as vulnerable (BFN 2015). Scientific surveys show that the regional species pool has shrunk by an average of 23% since the mid-1900s (1950/1960). Looking solely at field interior areas, the number of species even fell by 71% (MEYER et al. 2014). This has been accompanied by an extreme decrease in population density for the remaining species – by 95% to 99% for many characteristic segetal species (DOXA et al. 2012; MEYER et al. 2014). Many species such as field larkspur (*Consolida regalis*), summer pheasant's-eye (*Adonis aestivalis*) or lamb's succory (*Arnoseris minima*) were previously widespread and are now very scarce and often known only to specialists.

Today it is rare to be able to find more than five to seven species of segetal flora in the interior of an arable field and these are mostly ones well adapted to the cultivation cycle. The segetal flora communities that remain are impoverished and show a sharp decline in specialised taxa and a relative increase in what are often herbicide-tolerant generalists among segetal flora and grasses. This dramatic trend reflects the standardisation of cultivation systems and also increased nutrient availability over recent decades (MEYER et al. 2014; on further land-use causes cf., e.g., MEYER et al. 2015).

Field larkspur is now among the rarer segetal species in Germany.

2.1.2 Example: farmland birds

Regarding breeding birds in Germany, species of open landscapes have the largest decline in population by a substantial margin. The long-term negative trend in populations of formerly common farmland birds is well established within Germany. Analysis of the data from the 2013 national report under the Birds Directive (DIE BUNDESREGIERUNG 2013) demonstrate that about half of all bird species of the farmed open landscape have decreased in population between the mid-1980s and 2009 (cf. e.g. WAHL et al. 2015).

Two typical examples of species for which the situation continued to deteriorate significantly over the period covered by the 2013 national bird conservation report (1998–2009) are the skylark (*Alauda arvensis*) and the yellowhammer (*Emberiza citrinella*). Several species

previously in sharp decline had only a slight further decrease and stabilised by 2009, although at a very low level. These include the whinchat (*Saxicola rubetra*) and the grey partridge (*Perdix perdix*). However, populations of both of these declined further in subsequent years. Also, dramatic population declines had been observed in both groups: 63% for the whinchat between 1990 and 2013 and 84% for the grey partridge between 1990 and 2015 (see DDA 2017). In Europe as a whole, populations fell since 1990 by no less than 94% (GOTTSCHALK & BEEKE 2014). This makes the grey partridge the "sorry record holder" (ibid.: 95) within the overall alarming decline in bird species in agricultural landscapes.

The skylark is only one of many birds in population decline.

The situation of bird species characteristic of grassland is especially precarious. Populations of five out of seven species declined between the mid-1980s and 2009, particularly for shorebird species such as the black-tailed godwit (*Limosa limosa*), the common snipe (*Gallinago gallinago*) and the ruff (*Philomachus pugnax*).

Aside from habitat, nest siting also gives an indication of the cause of the observed population decline. A large proportion of the species in population decline is found among ground nesters such as the black-tailed godwit and the skylark, and also the northern lapwing (*Vanellus vanellus*): Lapwing populations declined by 80% between 1990 and 2013, black-tailed godwit populations by 61% and skylark populations by 35% (DIE BUNDESREGIERUNG 2017).

Overall the situation improved for only a small number of bird species in agricultural landscapes between 1998 and 2009. This was the case, for example, for the great grey shrike (*Lanius excubitor*) and the great bustard (*Otis tarda*), which were the subject of targeted recovery measures for highly endangered species (cf. also GRÜNEBERG et al. 2015).

The trend for such drastic declines in farmland birds in Germany is paralleled at European level (see Fig. 1).

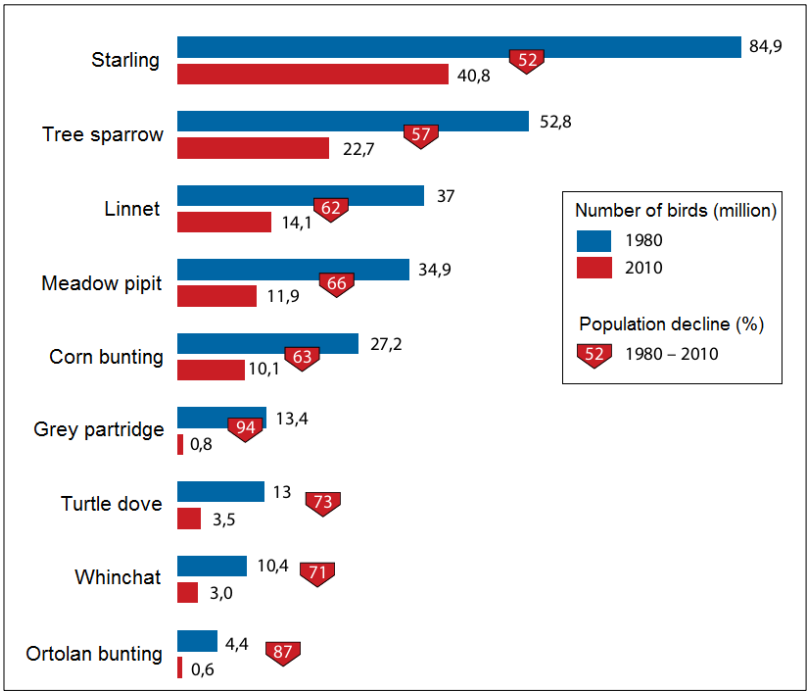


Fig. 1: Absolute population figures and percentage population decline in selected farmland bird species at European level. Source: DRÖSCHMEISTER et al. (2012).

Between 1980 and 2010, bird populations in agricultural landscapes in the European Union declined by approximately 300 million breeding pairs (DRÖSCHMEISTER et al. 2012). The European farmland bird index, which is regularly updated by the European Bird Census Council (EBCC), shows a decrease of 43% relative to the starting population between 1980 and 2014 (EBCC 2017).

The decline in farmland birds is attributable to more intensive farming, loss of fallow land, larger fields and the absence of field margins. Other causes include the lack of diversity of crop species, the increasing prevalence of certain, intensively farmed crop species (often at the expense of more extensively cultivated summer annual crops) and increased cultivation of energy crops, notably maize, concurrent with frequent ploughing up of grassland (WAHL et al. 2011; LEUSCHNER et al. 2014; WAHL et al. 2015).

In parallel with the habitat changes, food availability has also decreased for many bird species. Analysis of the population figures in the 2013 national report under the Birds Directive found that species that primarily feed on small insects and spiders during the breeding season display particularly steep population declines. A comparison of the long-term (25-year) and short-term (12-year) trends shows that many more species within this feeding type are declining in population. Over the 25-year population trend, about one third of bird species decline in population, whereas over the shorter period this figure is almost half (see also Fig. 2).

Fig. 2: Breeding population trend over 25 years (above) and 12 years (below) for 192 bird species that are primarily carnivorous during the breeding season, categorised by predominant prey spectrum in adult birds. Account must be given when interpreting these figures to the differing numbers of species within the categories. Source: WAHL et al. (2015).

It is assumed this trend is largely due to the increasing use of plant protection products (UBA 2012; BVL 2016). Furthermore, a study in the Netherlands (HALLMANN et al. 2014) demonstrates that in regions with particularly high concentrations of the insecticide imidacloprid, the populations of insect-eating farmland bird species had the steepest decline since the 1990s. The scientists involved suggested that this insecticide, which was introduced to the Netherlands in 1994 and is the most frequently used insecticide in a class of chemicals known as neonicotinoids, has a far greater impact than previously described. The reduction in food availability for birds through the use of pesticides is directly matched by a population decline in insect fauna (see section 2.1.4).

2.1.3 *Excursion:* the species diversity and landscape quality indicator

Populations of representative bird species serve as a proxy for the trend in biodiversity and permit assumptions with regard to landscape quality. This is the basis of the species diversity and landscape quality indicator, which the Federal Government uses to assess the condition of the natural environment under the varied influence of land use in Germany as a whole. Based on the population sizes of the currently selected representative breeding bird species (51 in total), the suitability of the landscape as a habitat is also suggested. If populations of the selected indicator bird species increase and their breeding population rises accordingly, then it may be assumed that other animal and plant species will also benefit and that a more richly structured, diverse landscape will develop with sustainable and nature-friendly land use. A number of sub-indicators permit inferences about each of the main habitat and landscape types. These are used to calculate the aggregate indicator.

In 2013, the most recent reporting year, the aggregate indicator was 68% of the target value and had a statistically significant trend away from the target in the last ten reporting years (DIE BUNDESREGIERUNG 2016a). This negative decline in the aggregate indicator is largely a result of the worrying trend in the farmland sub-indicator (see section 2.1.2), which in 2013 was only 59% of the target value and likewise showed a statistically significant move away from the target in the last ten years (see Fig. 3).

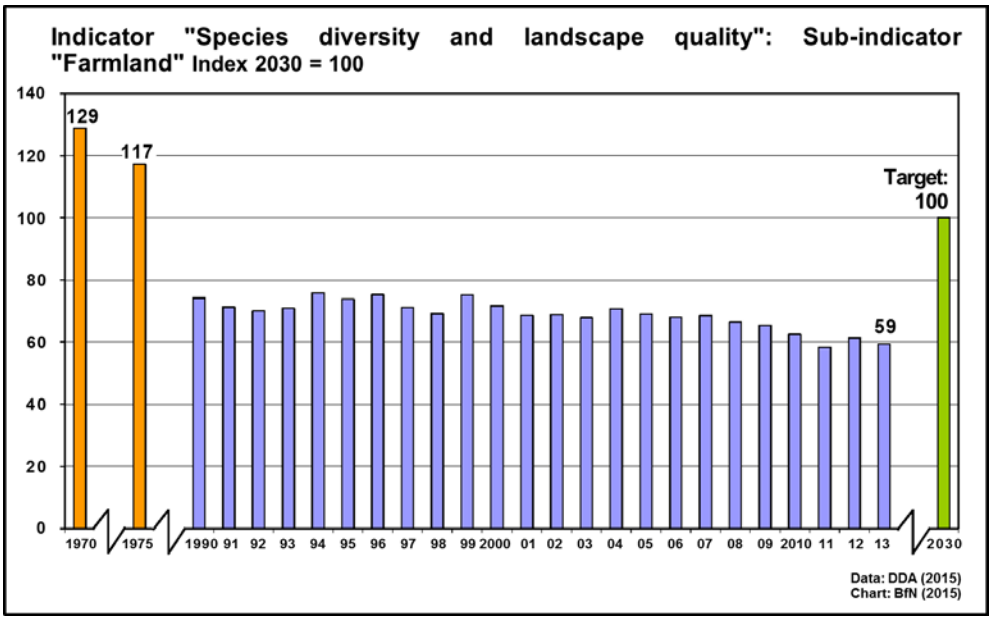


Fig. 3: Farmland sub-indicator of the species diversity and landscape quality indicator. The sub-indicator includes the following species: Red kite, northern lapwing, black-tailed godwit, little owl, red-backed shrike, woodlark, skylark, whinchat, corn bunting, yellowhammer. Source: BfN.

The number of insects has decreased significantly in Germany in recent decades.

2.1.4 Example: insects

The total population of insects in Germany has also decreased significantly in the last three decades. The Red List of wild bees, for example, shows that of the approximately 560 wild bee species, 41% are now classified as endangered (WESTRICH et al. 2011). As well as a decline in insect populations, there are also losses of insect species. Both of these necessarily lead to a reduction in insect biomass that is particularly pronounced in agricultural landscapes. Not even nature conservation areas are spared from this trend, various studies have shown a decrease of insect biomass by 80% (SORG 2013; SCHWENNINGER & SCHEUCHL 2016). In a study on hoverflies, for example, the number of species decreased between 30% and 70% between 1989 and 2014, with the total numbers of flies falling by between 70% and 96% (SSYMANK, *unpublished*). Agriculture has a major impact even in protected areas: farming is practiced on a large scale both directly adjacent to, and within, such areas without clarification on many factors such as what plant protection products (including neonicotinoids) are used in what quantities.

The decline in insects has a direct impact – as indicated in section 2.1.2 – on the populations of other species groups. Insects are a source of nutrition not only for birds, but also for animals such as bats and small mammals, and are thus important links in the entire food chain. In addition, the decline in insects has an impact on wild and crop plants, over 80% of the latter being insect-pollinated (WILLIAMS 1994). The loss of insects thus ultimately impacts the resources we live on (see also section 4.1.1).

Intensive farming results in structural impoverishment of the landscape, thus depriving many insects of food sources and habitats (DEUTSCHE GESELLSCHAFT FÜR ENTOMOLOGIE 2016; NUß 2016; ANONYMOUS 2016). The widespread use of plant protection products, fewer varieties of crops in the cropping cycle, field homogenisation and enlargement, harvesting methods and excess nutrient availability, together with the resulting impacts on plant species diversity are some of the main factors. In addition to the use of plant protection products as part of pest control, the prophylactic use of high-efficiency plant protection products such as seed coating must be viewed critically. This is against the principles of integrated pest control (COM 2009). Neonicotinoids,

which are a new generation of systemic pesticides and have a neurotoxic effect, are subject to particularly strong criticism. They have a massive impact on 'non-target' organisms that provide essential ecosystem services (see also section 4.1) (BIOTAS et al. 2016).

Summary

The widely lamented 'species loss' in agricultural landscapes encompasses frequently dramatic population declines and local or regional extinctions. This is demonstrated by the examples of segetal flora and farmland birds. With regard to the currently much-discussed trend in insect populations, disproportionate population declines in the small-insect and spider-eating bird species are indirect evidence of a decline in their food biomass. Various studies show dramatic declines in insect biomass in the cultural landscape. Of all the regularly evaluated terrestrial habitat ranges, biodiversity is in the sharpest decline in agricultural landscapes, with an ongoing negative trend. This also permits many inferences about landscape quality to be made.

2.2 Status of, and trends in, habitat diversity

Analysis of the range of species diversity in agricultural landscapes in the previous section has already shed some light on the status of related habitats. This is taken further from two different perspectives in the following. Reference is made to the current German Red Data Book on Endangered Habitats (FINCK et al. 2017) and to the findings of high nature value (HNV) farmland monitoring, focusing in particular on the proportion of HNV farmland as a percentage of the total area under agriculture (among others, BENZLER et al. 2015). The HNV farmland indicator that tracks this proportion is a central basic indicator for evaluating measures under the second pillar of the Common Agricultural Policy (see also section 3) and is thus closely connected with the question of the role of agricultural policy in relation to the situation of biodiversity in agricultural landscapes.

2.2.1 Habitat types

The current German Red Data Book on Endangered Habitats assesses the threat status of 863 habitat types. More than 65% of these habitat types have a risk of loss to varying degrees or are already classified as 'destroyed' (FINCK et al. 2017, see Fig. 4).

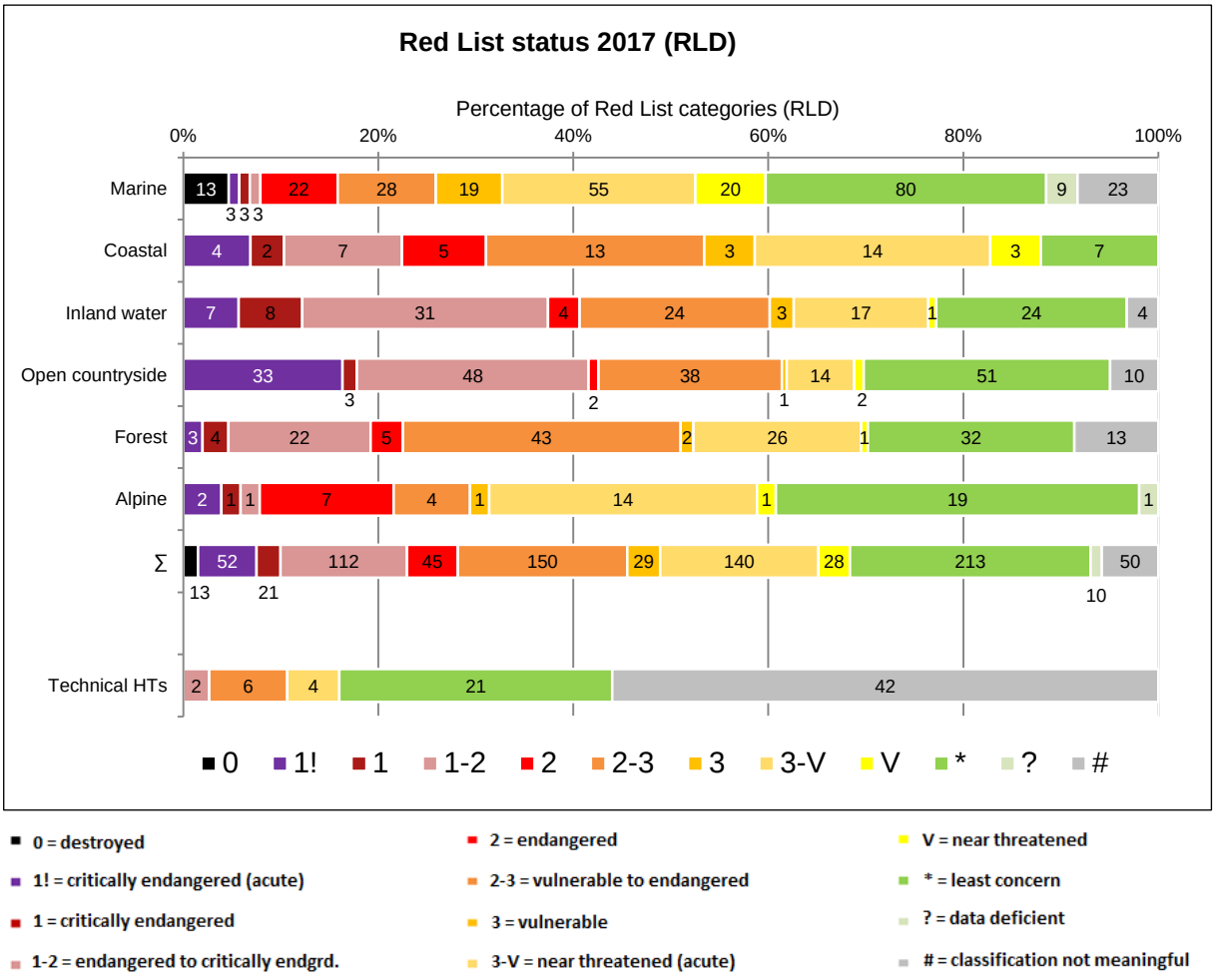


Fig. 4: Red List status of habitat types in Germany, by main habitat type groups.
Source: FINCK et al. (2017).

Habitat types of open landscapes, which notably include the various habitat types shaped by agricultural land use forms, shows a disproportionate risk of loss. Within this group, 70% of habitat types are classified as vulnerable, with more than 40% in the high to very high Red List categories (categories '1!' to '2').

An even clearer picture emerges if the habitat types of open landscapes are divided into habitat type groups predominantly with agricultural land use and without agricultural land use: about 13% of the 109 evaluated habitat types are directly dependent on agricultural land use, and of these habitat types about 80% are classified as vulnerable. The risk of loss is especially high for grassland habitat types (see Fig. 5; see also section 2.3). A total of 55% of arable habitat types also rank as vulnerable. With the exception of intensive arable land, which accounts for the largest proportion, all agrarian habitat types show a relatively high risk of loss. Extensively farmed land with full segetal vegetation is critically endangered (see section 2.1.1). Fallow fields on calcareous, silicaceous or sandy soils, however, are likewise vulnerable to endangered.

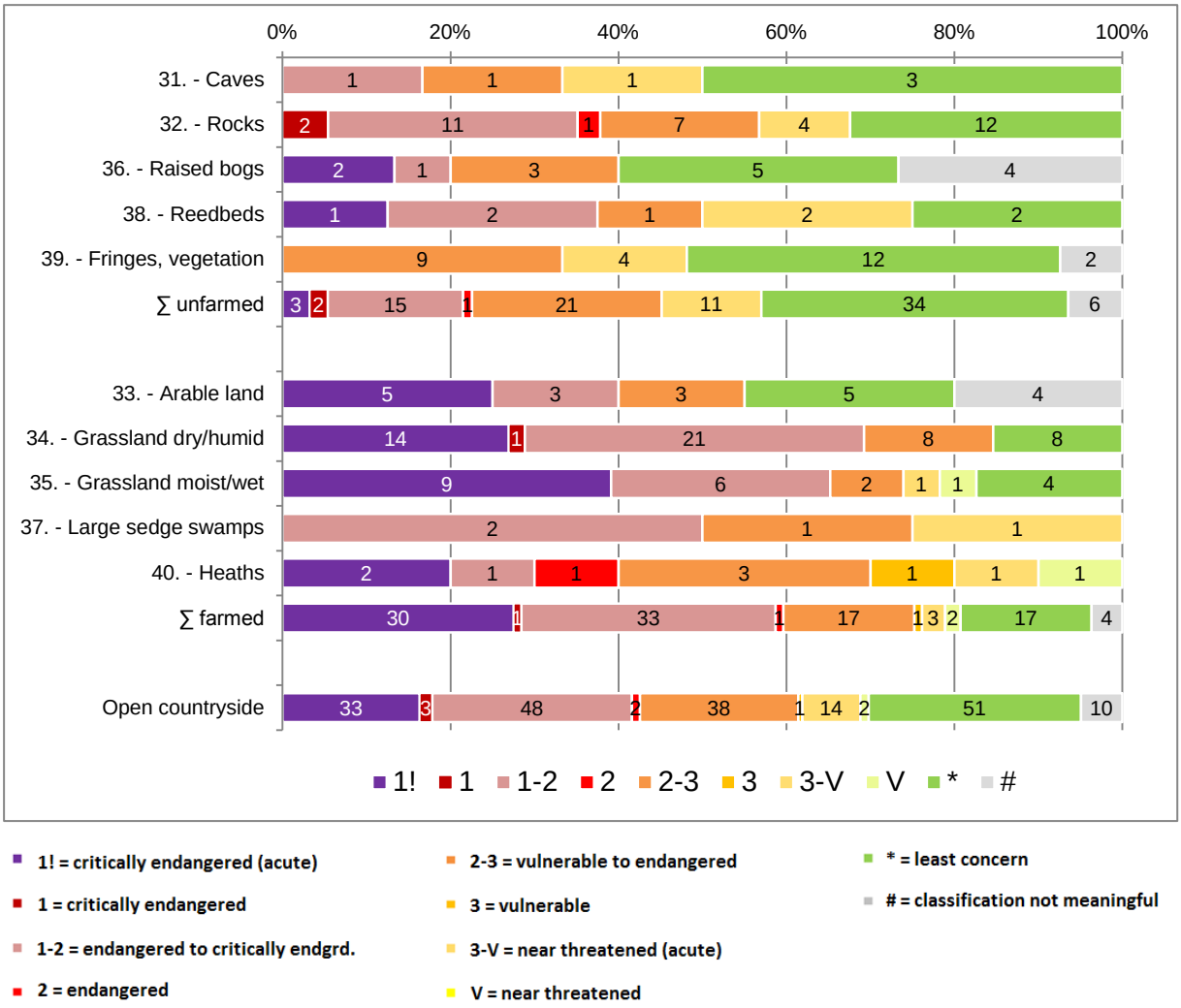


Fig. 5: Red List status of habitat types of open landscapes, by habitat type groups predominantly without agricultural land use and predominantly with agricultural land use. Data: FINCK et al. (2017).

A number of habitat types of open landscapes such as bogs, reedbeds and marginal habitats/tall perennial herb vegetation are also vulnerable as these can be indirectly affected by agricultural land use nearby – for example through pollution or regulation of water flow. Overall, the threat situation for habitat types of open landscapes that are not dependent on land use, at 'only' about 57%, is far more favourable than for the habitat types that are directly dependent on land use.

The threat situation of open landscape habitat types subject to strong direct or indirect agricultural influence has become significantly worse in recent years. This is demonstrated when habitat types under long-term threat are excluded and the analysis is restricted to the current trend (the trend in the last 10 years and a projection for the near future; see Fig. 6).

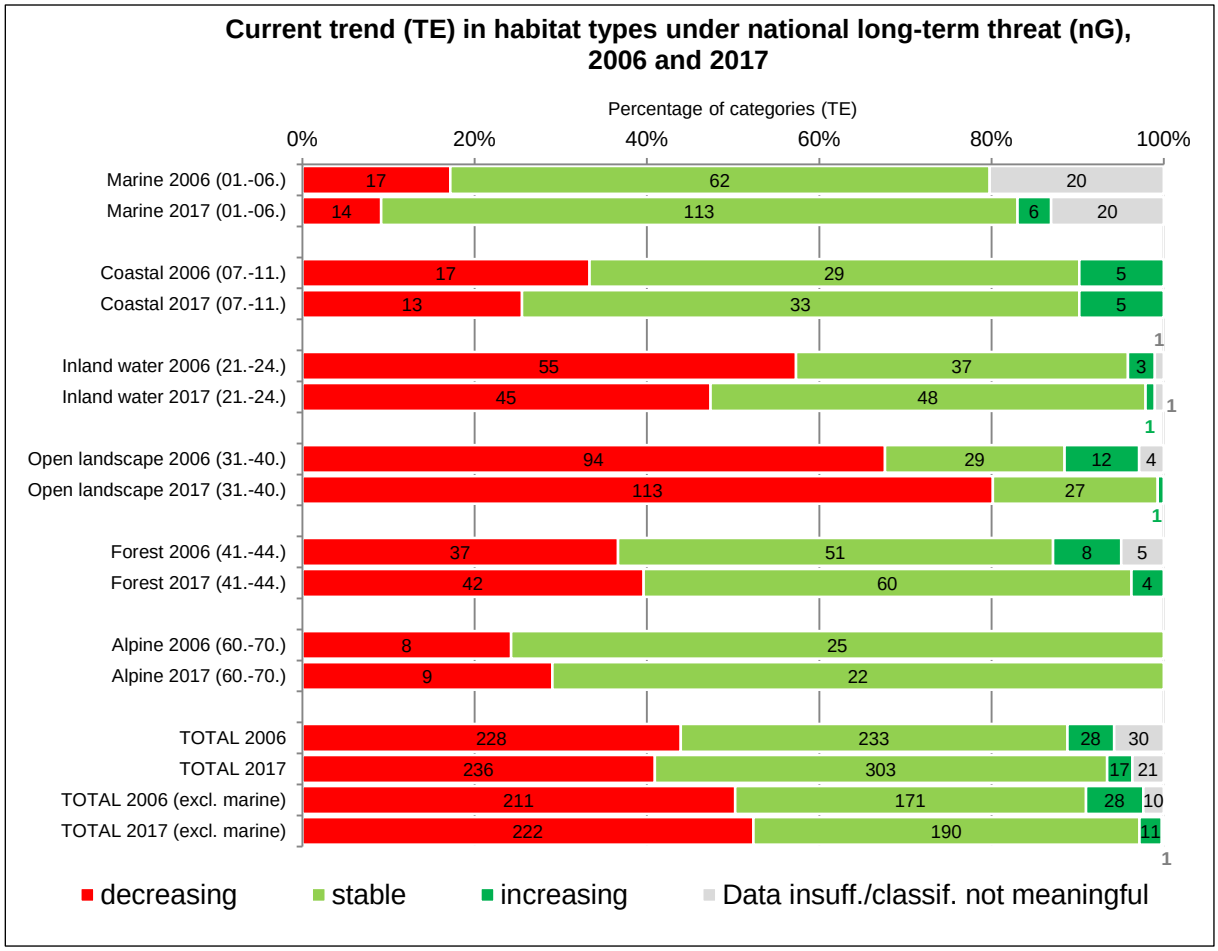


Fig. 6: Comparison of current trends (TE: reference period ±10 years) **of habitat types under national long-term threat in 2006** (upper bars) **and** 2017 (lower bars); (nG: national long-term threat; reference period 50–150 years depending on habitat type). Source: FINCK et al. (2017).

Not only is the downward trend more pronounced in open landscapes compared with other areas, but there has also been a further deterioration relative to the previous assessment in 2006. This recent trend is highly alarming. It is partly explained by the dramatic situation of some grassland habitat types (see section 2.3). It is also attributable to the fact that more extensively farmed habitat types of open landscapes especially, which are often characterised by low nutrient levels, are severely affected by airborne nutrient inputs – most of all of nitrogen, which is a key parameter for the species composition of ecosystems.

Many threatened habitat types and plant species have low tolerance to increased nutrient inputs and in particular, become more susceptible to stressors at higher nitrogen availability levels. The result is a shift in the species spectrum and loss of biodiversity (BOBBINK et al. 2010; UBA 2015a; UBA 2015b). Many oligotrophic (low-nutrient) habitat types are therefore severely threatened by excessive nutrient inputs from the atmosphere or adjacent land. At a global level, excessive nitrogen inputs are one of the five main causes of threat to biodiversity (SALA et al. 2000); this is likewise an urgent problem in Germany, and the German Advisory Council on the Environment (SRU) consequently dedicated a special report to the issue in 2015 (SRU 2015). In Germany, critical loads – which characterise the sensitivity of natural and near-natural ecosystems to airborne pollution – are exceeded, for example, in

most habitat types of open landscapes listed in the Habitats Directive. As the Habitats Directive stipulates that any deterioration of listed habitat types must be avoided, the EU member states including Germany must take action here. The increase in reactive nitrogen in the environment is in turn largely caused by agriculture and is notably a consequence of regionally excessively large livestock holdings and greater use of ammonium fertilisers.

Ongoing high volumes of nitrogen inputs in ecosystems are a threat to biodiversity.

Only one habitat type of open landscapes currently shows an improvement. It is the habitat type 'Heath on sandy soil, degenerated with woody growth'. This 'intrinsically' semi-open habitat type evolved following the abandonment of farming and through ongoing succession growth, from predominantly open heaths that are already in steep decline due to the disappearance of traditional land-use forms. The current increase in heaths with woody growth is thus more an example of the move from traditionally managed, largely open, richly structured habitat types towards woody habitat types and therefore also a sign of the loss of a richly structured, extensively farmed cultural landscape.

2.2.2 High nature value farmland

High nature value (HNV) farmland monitoring is a permanent monitoring programme established in 2009 that involves regular surveys of habitat types and landscape elements in agricultural landscapes that are distinguished by more extensive management and greater biodiversity than under common intensive farming. The surveys are currently carried out on a quarterly basis on approximately 1,300 sample plots throughout Germany. The findings are extrapolated to federal and Länder level and must be reported to the European Commission regularly. HNV farmland and landscape elements are classified into three quality levels, from I (exceptionally high nature value) to III (moderately high nature value).

The aggregate indicator value and thus high nature value farmland as a percentage of all farmland continuously decreased from about 13% to just over 11% between 2009 and 2015. This represents a decline in farmland important to biodiversity of nearly 13% in just six years.

Species-rich grassland is the largest individual component of HNV farmland, making up 40% of the total, and also accounts for the largest portion of the absolute losses in quantitative terms (see section 2.3). However, the largest relative losses in the analysis period are in arable and fallow land. In contrast, the proportion of landscape elements such as trees, hedges, copses, ditches, etc., which represents about one third of HNV farmland, remained stable over the period. Splitting the data out by quality levels (see Fig. 7) shows that the decline does not primarily relate to farmland of quality levels I and II, most of which are subject to qualitatively more ambitious agri-environmental or contract-based nature conservation measures. Instead, the most pronounced decline is in farmland of the lowest quality level III, which just falls short of the levels of management intensity common elsewhere but is not subject to

protected status and the related funding measures (BENZLER et al. 2015).

The findings of HNV farmland monitoring show that the conservation of landscape elements is succeeding at least on a short-term scale. However, the results reveal a key weakness in current agri-environmental funding. It is evident that at the present time, approaches to sustain at least a minimum suite of farmland that hosts a minimum of biodiversity are largely unsuccessful (BENZLER et al. 2015), even though in 2013, for example, 32% of farmland came under agri-environment measures (AEMs) (UBA 2017 in conjunction with DESTATIS 2014). The fact that the above-mentioned minimum target for agricultural landscapes has still not been attained is evidence that only a small proportion of agri-environmental measures are in fact of direct relevance to biodiversity (see section 3.2).

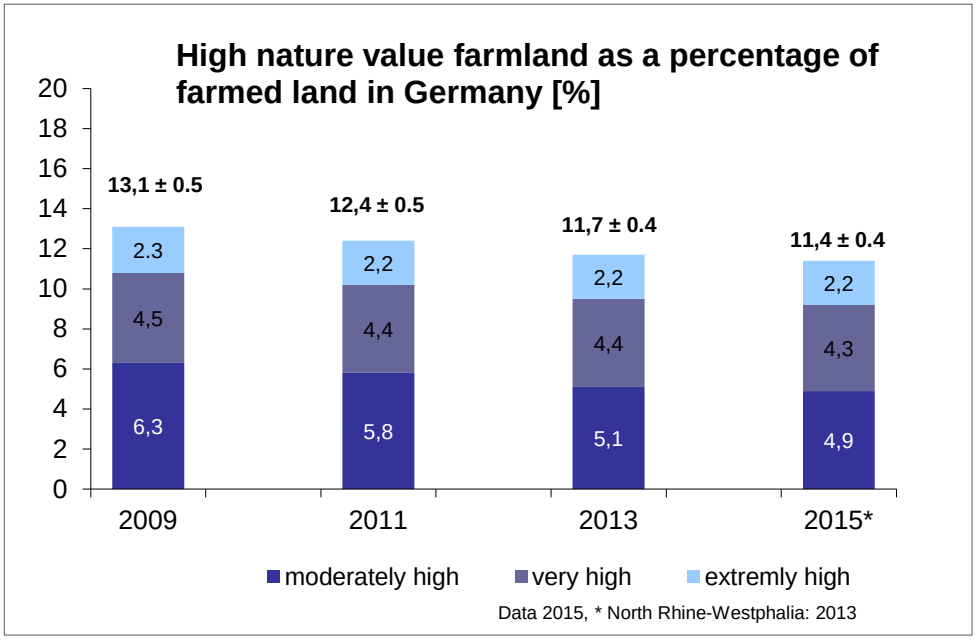


Fig. 7: Trend in the aggregate indicator value and the three HNV farmland quality levels, 2009 to 2015. Source: BFN (2016, modified).

Summary

The findings of the current German Red Data Book on Endangered Habitats and of high nature value (HNV) farmland monitoring show that biodiversity in agricultural landscapes is also in sharp decline on a large scale at ecosystem level. Increasingly, 'intermediate' farmland is coming under pressure, meaning land that is not yet managed at usual levels of intensity and does not come under any protected or funding category. Most of all, in intensively farmed regions with land scarcity and high land prices, nature conservation has increasing difficulty retaining a large-scale foothold. With the currently available funding instruments, it is not even possible in this way to sustain even a minimum level of biodiversity in agricultural landscapes.

2.3 Status of and trends in grassland

With a total area of some 5 million hectares, grassland accounts for more than one third of agricultural land in Germany. As well as being a characteristic element of agricultural landscapes due to its expanse, grassland is also incredible important to biodiversity conservation overall and for the provision of diverse ecosystem services (see also section 4.1). Over one third of all native ferns and flowering plants are predominantly found in grassland; for vulnerable fern and flowering plant species in Germany the figure is even about 40% (BFN 2009; BFN 2014a; GEROWITT 2014). Many forms of grassland that have been under extensive management for years, such as limestone grassland, are among the most species-rich habitat types in Central Europe (DIERSCHKE & BRIEMLE 2002). Finally, grassland provides a large diversity of habitats for animals, often with very close interrelationships between flora and fauna. Conserving species-rich grassland thus plays a very important role in the attainment of national, supranational and international biodiversity targets.

2.3.1 Quantitative aspects

The massive decline in the area of grassland in Germany since the turn of the millennium was already a subject of the BfN report on grassland (Grünland-Report, BFN 2014a). In contrast to the general definition of grassland as grassland subject to anthropogenic influences, land is defined in the farming sector as permanent grassland if it is used to grow grass and other herbaceous forage not part of the system of crop rotation for a minimum of five years (see LWK NIEDERSACHSEN 2016; LKSH 2017). This includes land that has been reseeded (ECJ 2014). The Federal Ministry of Food and Agriculture estimates that permanent grassland decreased by approximately 630,000 hectares between 1993 and 2013 (BMEL 2015b; see also STATISTISCHES BUNDESAMT 2013). However, depending on the land area statistics used there is variation in the data (see also Fig. 8), partly due to changes in the definition of land eligibility to direct payments leading to changes in the reported area figures that do not necessarily match with conditions on the ground (RÖDER 2017).

It is clear that permanent grassland has been lost in the past, and with it were related consequences such as the loss of

ecosystem services. However, recent surveys of permanent grassland show that it has largely stabilised since 2011 (RÖDER 2017). There are large regional differences, but the overall trend shows the area decrease to be slowing or even stopping (see also Fig. 8a).

One reason for this is that grassland was only allowed to decrease by a maximum of 5% at Länder level in the last CAP funding period and the Länder were required under EU law to legislate in order to protect permanent grassland if that limit was exceeded. In Schleswig-Holstein, for example, this resulted in an increase in the proportion of grassland (see also Fig. 8b).

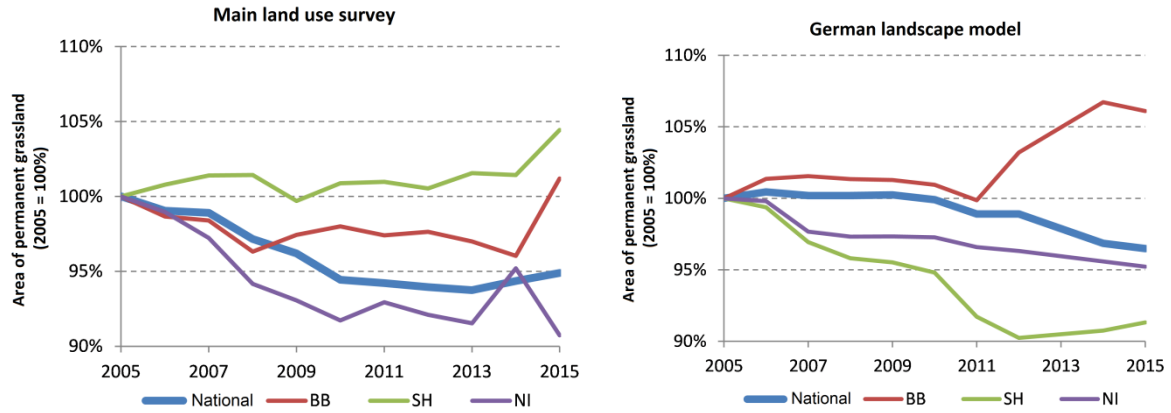


Fig. 8: Trends in permanent grassland in Germany and three selected Länder a) from the main land use survey (Bodennutzungshaupterhebung) b) from the German landscape model (Deutsches Landschaftsmodell) (BB: Brandenburg; SH: Schleswig-Holstein; NI: Lower Saxony). Source: RÖDER (2017).

Another explanation is that in the new funding period from 2014, ploughing up of permanent grassland is not only subject to approval, but such approval is in most cases granted only on condition that new grassland is created elsewhere. The net outcome is theoretically no change in the area of permanent grassland. However, newly established or newly seeded grassland does not have the same importance for climate change or species diversity as sites that have been under grassland management for many years (see, e.g., JEROMIN & HÖTKER (2016) with regard to meadow-breeding birds). Newly seeded grassland is generally species-poor, as most grassland seed mixes contain only a small selection of species geared toward mass productivity.

2.3.2 Qualitative aspects

The slowed or halted decrease in permanent grassland is in contrast to an unchecked and, in some cases, dramatic qualitative deterioration.

The inadequate to poor condition of species-rich grassland in Germany was already highlighted in the most recent national report under the Habitats Directive in 2013. Aside from a small number of exceptions in the Alpine region, not a single one of the habitat types to be assessed under the Habitats Directive has favourable conservation status in the continental or Atlantic region, and none has improved (see Fig. 9).

Status of Habitats Directive grassland habitats (Habitats Directive Report 2013)	NW German lowlands		Eastern/Southern Germany		Alps	
	Conservation status	Trend	Conservation status	Trend	Conservation status	Trend
Rupicolous calcareous or basophilic grasslands	bad	-	inadequate	-	absent	
Xeric sand calcareous grassland	bad	-	inadequate	=	absent	
Calaminarian grasslands	inadequate	?	inadequate	-	absent	
Siliceous alpine and boreal grasslands	absent		inadequate	=	inadequate	=
Alpine and subalpine calcareous grasslands	absent		absent		inadequate	=
Dry grasslands and scrubland facies on calcareous substrates*	inadequate	?	inadequate	-	inadequate	-
Species-rich Nardus grasslands	bad	-	inadequate	-	inadequate	-
Steppic grasslands	inadequate	-	inadequate	-	absent	
Molinia meadows	bad	-	bad	-	favourable	=
Hydrophilous tall herb fringe communities	bad	-	unknown	?	favourable	=
Alluvial meadows of river valleys	bad	?	bad	=	absent	
Lowland hay meadows	bad	-	bad	-	bad	-
Mountain hay meadows	absent		bad	-	inadequate	-

*partly high abundance of Orchids

Fig. 9: Conservation status and trend in grassland habitats under Annex I of the Habitats Directive. Overall trend in conservation status: = stable | + improving | – deteriorating | ? unknown. Source: BFN (2014b).

An alarming fact is that a poor conservation status is now reported not only for habitats depending on regular management such as nutrient-poor grassland and heaths, but also for floristically rich meadows such as nutrient-poor lowland and upland hay meadows that were still a widespread feature of meadow farming only a few decades ago. Both habitat types also show a deteriorating overall trend.

Similarly, in the recent German Red Data Book on Endangered Habitats (FINCK et al. 2017; see Fig. 10), only 12 of the 75 grassland habitat types listed – i.e. 16% – are classified as 'least concern'. This compares with the nearly 70% of grassland habitat types classified with a very high Red List status, with 31% even in the 'critically endangered (acute)' category. The great majority of grassland habitat types in the current Red List – a total of 83% – are thus classified as being under threat.

The number of grassland habitat types with a negative current trend has also increased in the 2017 edition compared with the 2006 Red List.

The number of grassland habitat types classified as stable, on the other hand, has decreased, and not a single grassland habitat type shows a positive trend (Fig. 11).

These trends not only affect extensively managed grassland habitat types such as dry sandy grassland and mat-grass swards. Almost all mesophilic, i.e. medium nutrient content, 'species-rich' lowland hay meadows are now in the highest threat category ('critically endangered (acute)'). This is a direct consequence of the universal move towards more intensive grassland management. Fen and wet grasslands are also not only threatened by draining, but increasingly by chemical inputs (mostly pesticides and fertilisers) as a result of more intensive management.

This trend towards more intensive management of grassland is confirmed by the high nature value farmland monitoring carried out since 2009, which shows that grassland with high levels of biodiversity in agricultural landscapes declined by 9% between 2009 and 2015 (see section 2.2.2).

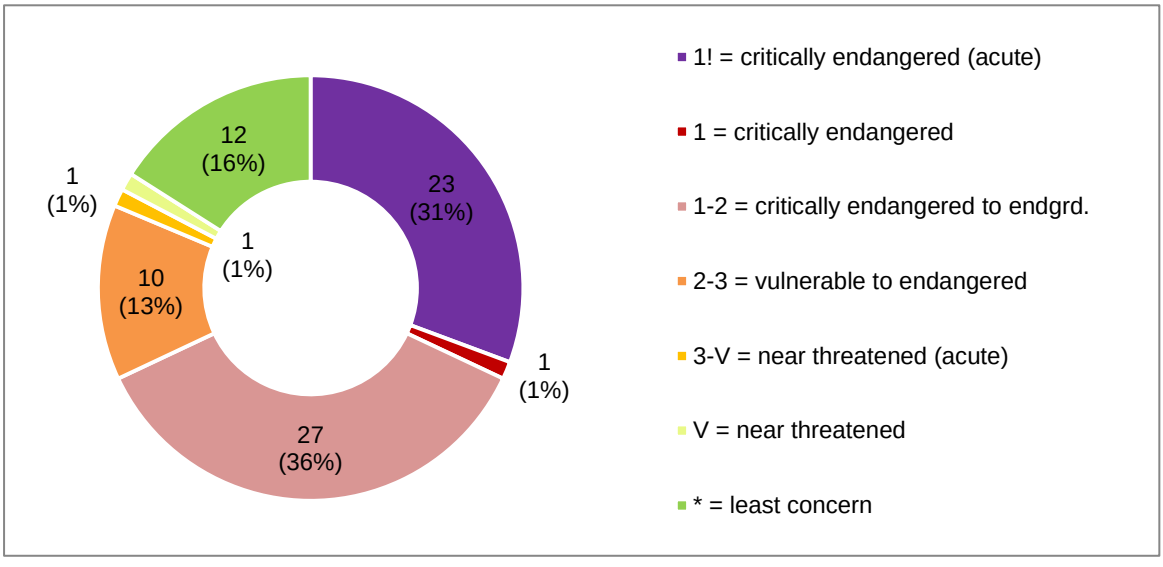


Fig. 10: Distribution of Red List categories (RLD) for grassland habitat types (Groups 34 and 35) according to the current German Red Data Book on Endangered Habitats. n = 75. No habitat types were assigned to categories 2 or 3. Data: FINCK et al. (2017).

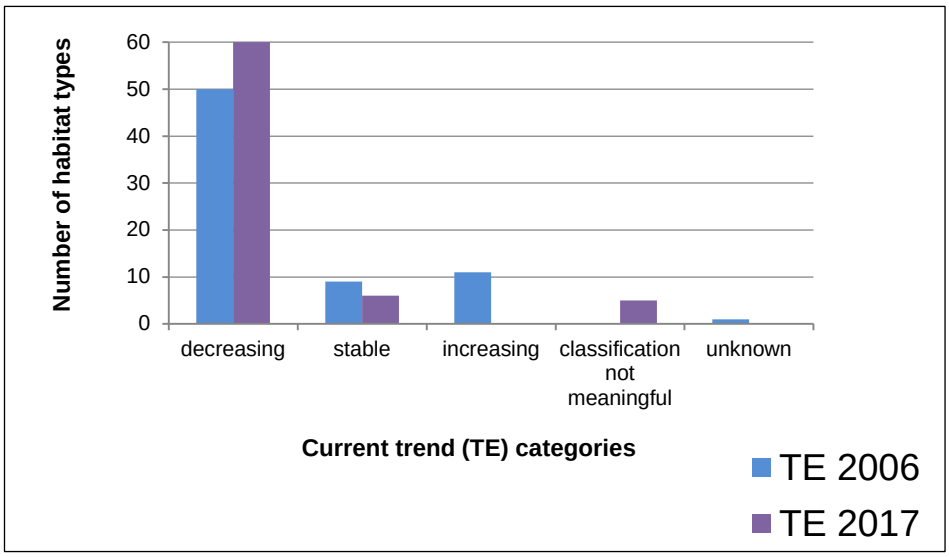


Fig. 11: Comparison of the classification of current trends (reference period ± 10 years) in grassland habitat types (Groups 34 and 35) in the 2006 and 2017 Red Lists (n = 71; excluding the four habitat types under 'species-poor grassland on moist sites', which have been reclassified). Source: FINCK et al. (2017).

Based on the facts set out above, it can be considered certain that the proportion of permanent grassland accounted for by intensively managed grassland is increasing, while vulnerable, species-rich, extensively managed grassland habitat types are currently in sharp decline, as are their characteristic flora and fauna species (cf. BFN 2015). The current trend for *all* grassland habitat types listed as being under threat in the Red List continues to be negative (RÖDER et al. 2015; BMEL 2015b; BENZLER et al. 2015; FINCK et al. 2017).

Summary

While local and regional differences persist, the quantitative decline in grassland has slowed nationally and in some Länder has even come to a halt. The main problem for biodiversity, however, proves to be increasingly widespread high-intensity grassland management and the resulting qualitative deterioration. These trends continue unchecked. An alarming sign is that not only extensively managed, but also floristically rich grassland types with medium nutrient content and management intensity are now also coming under widespread massive pressure.

2.4 Current state of target attainment under the National Strategy on Biological Diversity

The question of whether and to what extent the targets under the National Strategy on Biological Diversity are attained (see p. 6) is answered with the aid of a number of monitoring programmes and indicators (see most recently BMUB 2015a). The facts presented so far clearly show, that most of the targets formulated for the agriculture sector and agricultural landscapes have not been met, but in contrast – and notably for species and habitats – the trends that those targets relate to are even negative (see also Figs. 12 and 13).

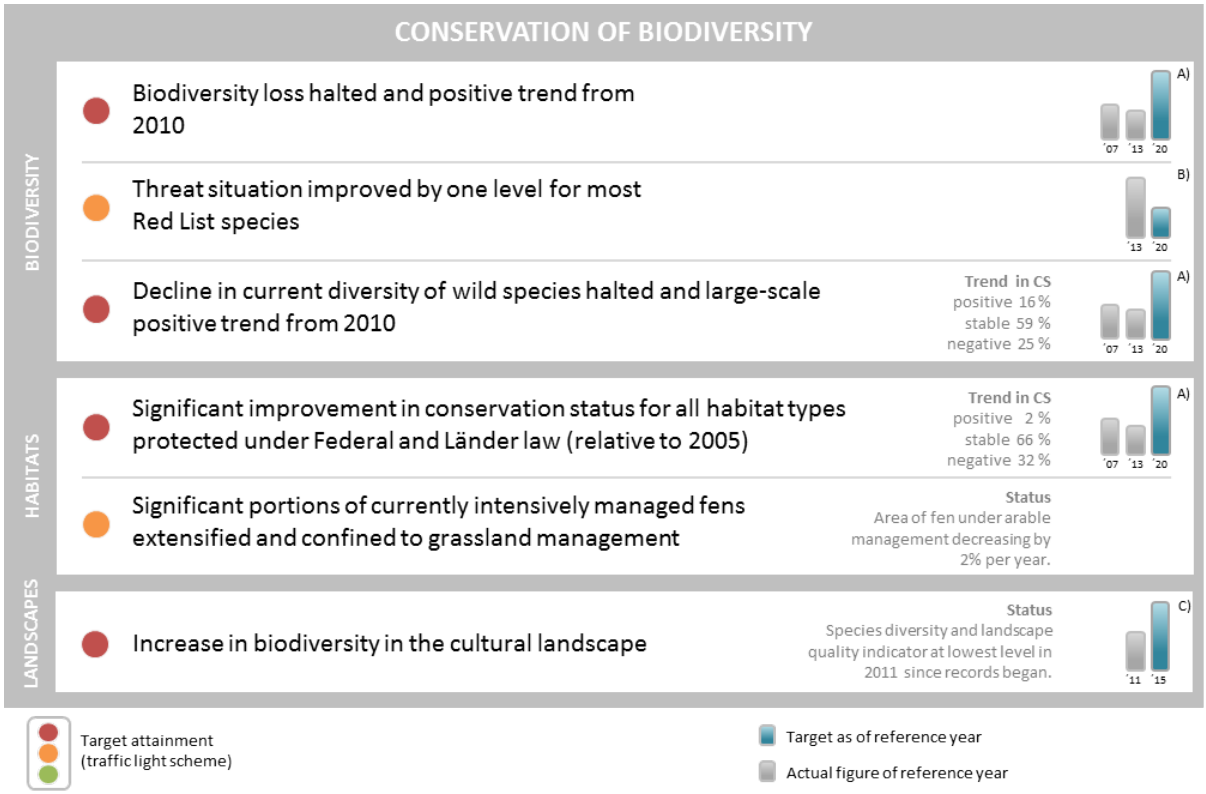


Fig. 12: Relevant NBS targets and target attainment – focus area a) Protection of biodiversity. Legend: CS: conservation status; red: target not attained by reference year or indicator shows deterioration up to more recent reference year; orange: target attainment formally impossible; green: target attained. A)-C) relate respectively to the following NBS indicators: A) Conservation status of Habitats Directive habitat types and species; B) Endangered species; C) Species diversity and landscape quality. Source: Own presentation based on data from RIECKEN et al. (2006), BMU (2007), BFN (2014a), BENZLER et al. (2015), BFN (2015), BMUB (2015a), UBA (2015a), UBA (2015b), DIE BUNDESREGIERUNG (2016), RÖDER (2017), FINCK et al. (2017).

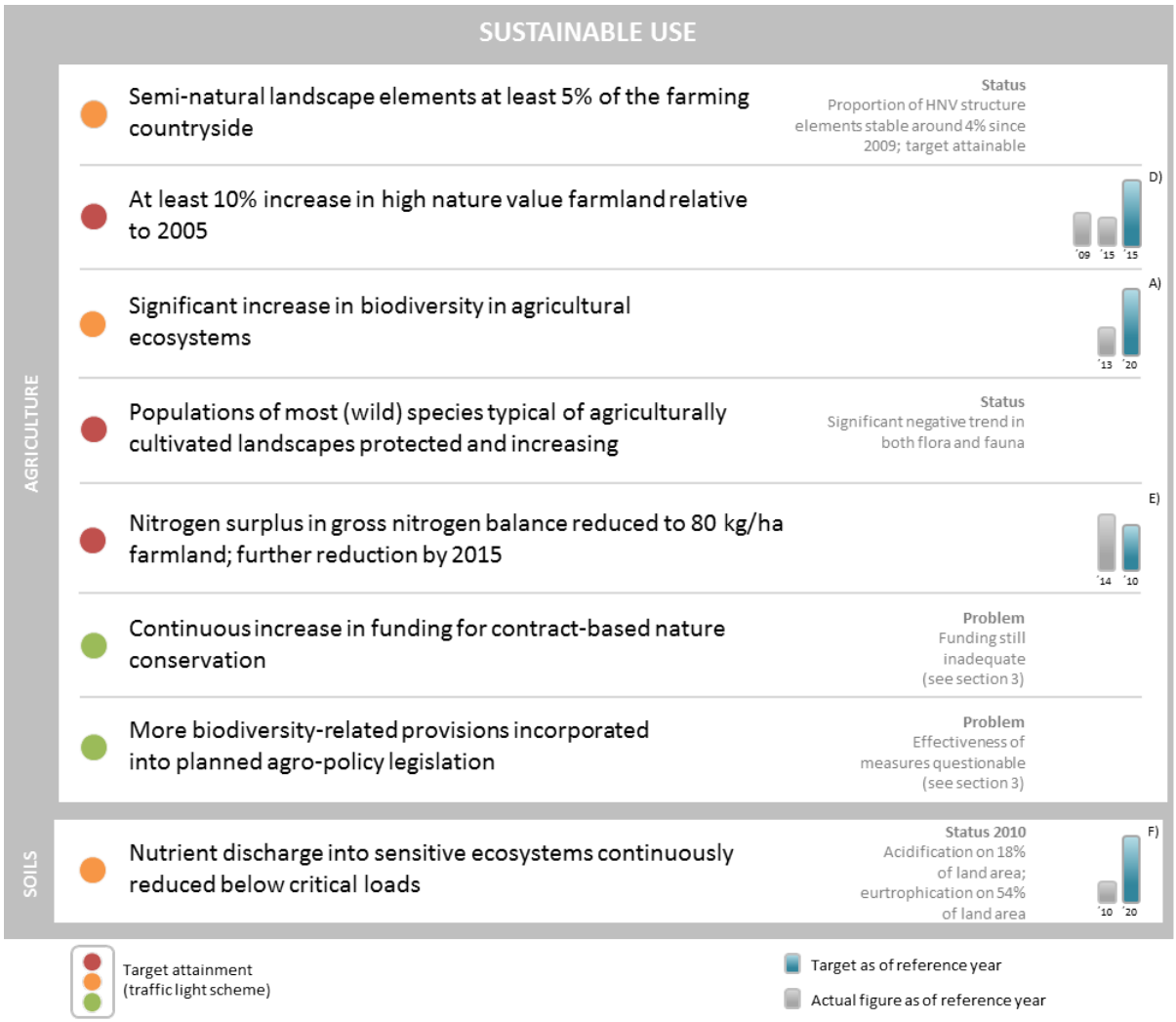


Fig. 13: Relevant NBS targets and target attainment – focus area b) Sustainable use. Legend: Red: target not attained by reference year or indicator shows deterioration up to more recent reference year; orange: target attainment formally impossible; green: target attained. A)-F) relate respectively to the following NBS indicators: A) Conservation status of Habitats Directive habitat types and species; D) High nature value farmland; E) Agricultural nitrogen surplus; F) Exceedance of critical loads for nitrogen. Source: Own presentation based on data from RIECKEN et al. (2006), BMU (2007), BFN (2014a), BENZLER et al. (2015), BFN (2015), BMUB (2015a), UBA (2015a), UBA (2015b), DIE BUNDESREGIERUNG (2016), RÖDER (2017), FINCK et al. (2017).

Given the great importance of conserving biodiversity in agricultural landscapes, it is therefore expected that the higher-level NBS targets – such as halting biodiversity loss generally, and bringing about a positive trend [from 2010] and significant improvement relative to 2005 in the conservation status of all habitat types protected nationally and under Länder law – will *not* be attainable without nature-friendly agriculture and thus a fundamental reorientation of agricultural policy.

Summary

The targets set by the Federal Government in the National Strategy on Biological Diversity (NBS) are unattainable without nature-friendly agriculture. This applies similarly for various international targets and agreements concerning biodiversity and agriculture of which the NBS is a part. Currently, the trends on which improvements in the attainment of most NBS targets depend are in fact negative.

To attain the targets under the National Strategy on Biological Diversity, species-rich habitats in particular must be better protected and the negative impacts of agriculture on nature must be minimised.

3 Effectiveness of the (new) CAP instruments

Against the backdrop of ongoing biodiversity loss and the resulting failure to meet targets in biodiversity conservation (and also environment protection), a major objective in the most recent, 2013 reform of the Common Agricultural Policy was a 'greening' of the CAP.

Previously, environmental concerns were primarily taken into account via incentives to provide environment-friendly goods and services in the second pillar (for the development of the CAP see, e.g., BALDOCK 2017; FEINDT et al. 2017). Now the main focus is on the first pillar. As the changes brought by the new funding period entered into force in 2015, in addition to the existing, slightly modified cross-compliance (CC) rules, just under one third of direct payments in the first pillar are tied to greening. The aim of this is to generate positive effects for biodiversity conservation and for the protection of water, the climate and soils throughout agricultural landscapes. How far that has actually been achieved is examined below.

The 2013 reform did not alter the general principles underpinning the Rural Development Policy, which was introduced as the second pillar of the CAP as part of Agenda 2000 and, since 2007, has been funded by the European Agricultural Fund for Rural Development (EAFRD) (e.g. RAGONNAUD 2017). This is the most important EU instrument for targeted promotion of biodiversity in agricultural landscapes, especially as it contains measures that allow the problems and needs involved in implementing nature conservation objectives to be specifically addressed (similarly OSTERBURG et al. 2014). There is room for improvement, however, in the effectiveness and efficiency of the past and present measures (e.g. KLEIJN & SUTHERLAND 2003; EURH 2011; PE'ER et al. 2014). The EAFRD is at the same time – under the integrated approach pursued by the EU (COM 2004; COM 2011b) – the most important instrument in funding Natura 2000.

The major reasons for the non-attainment of the biodiversity targets include the negative impacts of the CAP on biodiversity in agricultural landscapes, but also inadequate funding of nature conservation in the second pillar (e.g., SRU & WBW 2017; COM 2017b; BMUB 2017). Taking this into consideration, critical reflection is also needed with regard to the possibilities and limits of nature conservation funding through the EAFRD.

Both aspects – greening in the first pillar and the funding of nature conservation measures in the second – are looked at in closer detail in the next section.

3.1 The greening component in the first pillar of the CAP

There are three elements to the environmental obligations in greening: crop diversification, maintenance of permanent grassland, and the establishment of ecological focus areas (EFAs) on 5% of arable land. Organic farms, holdings that come under the small farmers scheme and farms with specific ratios of area under cultivation are exempt from greening (for the specific stipulations of greening see, e.g., BMEL 2015c). At least one greening obligation is in fact implemented on over 90% of farmland in Germany (COM 2016a).

The following assessment of the three elements of greening are based on studies carried out for BfN and the findings of other studies.

3.1.1 Crop diversification

The majority of farms have been able to implement crop diversification (COM 2016b, BAUM et al., *in preparation*). As predicted in advance (see THÜNEN-INSTITUT 2013), this did not add to the

heterogeneity of agricultural landscapes in Germany. This is partly because the farms, that were required to change their crop rotation regime, frequently chose crops that were similar in structure and management to those grown before. The result has been no significant change to the landscape or land use, and therefore no substantial impact is to be expected, either for biodiversity or for soil quality.

PE'ER et al. (2014) additionally stated in an EU-wide analysis that the minimum requirement of cultivating just three crops on a large scale may even be counterproductive as it can also result in a homogenization of agricultural landscapes.

Permanent grassland can still be ploughed up.

3.1.2 Maintenance of permanent grassland

Recipients of direct payments have faced a uniform authorisation system for the ploughing up of permanent grassland since the 1st of January 2015. Under this system, any conversion of permanent grassland is subject to authorisation and, depending on the location and age of the permanent grassland may only possible if new permanent grassland is established elsewhere. It must be kept in mind, however, that in terms of species diversity and ecological services (such as climate change mitigation), newly seeded grassland is not equivalent to land managed as grassland for many years (see also section 2.3.1).

Grassland managed by organic farms (about 560,000 hectares or about 12% of Germany's permanent grassland), or to farms that do not receive any agricultural subsidies (or direct payments), does not come under the greening requirements. As a result, such grassland will only be protected in the future if their maintenance is regulated by other mechanisms such as the designation of protected areas or Länder-specific stipulations (see also BFN 2014a).

Germany has made only limited use of the possibility to designate environmentally sensitive permanent grassland, which is subject to a strict ban on conversion. Only permanent grassland in Habitats Directive sites is defined as environmentally sensitive. The area of grassland within the Habitats Directive sites is approximately 666,000 ha, corresponding to just over 14% of the total area of grassland in Germany (SCHMIDT et al. 2014). Special Protected Areas (SPAs) under the Birds Directive and other areas of grassland relevant to nature conservation and climate change mitigation, such as peatlands, floodplains and erosion risk areas, do not count as environmentally sensitive areas in Germany even though the EU Regulation provides this possibility. The possibility of ploughing up grassland in SPAs is particularly worrying. This accounts for a good 17% of German grassland (SCHMIDT et al. 2014). This is expected to increase the pressure on already declining populations of meadow-breeding birds such as the northern lapwing and the curlew (see section 2.1.2).

To meet the greening requirements, in each of the German Länder, the percentage of grassland relative to the area of arable land must not decrease by more than 5% compared with the reference year 2012. Ultimately, this leaves scope for more grassland to be ploughed up, even though a number of

Länder already reached their limit for grassland loss in the previous funding period. Some Länder already have a strict ban on ploughing up grassland. It remains to be seen, however, whether they retain these bans or make use of the greater leeway now available.

Species-rich upland hay meadows only have limited protection.

Permanent grassland was given a broader definition in Regulation (EU) No 1307/2013. member states are given the power to additionally include, for the purposes of first pillar funding, land which can be grazed and which forms part of established local practices where grasses and other herbaceous forage are traditionally not predominant in grazing areas. Initial findings of a BfN research project, however, show a mixed picture with the Länder interpreting this definition differently and in some cases further extending it (LUICK et al. 2017). The outcome is that, depending on the location in Germany, high conservation value grassland may just fall short of eligibility for direct payments and hence may be deprived of the grassland 'protection' provided by greening.

With a view to the key role of grassland for nature conservation and climate change mitigation, the new arrangements under the CAP are inadequate overall. It is possible that the 5% grassland loss allowed in the course of the funding period may be used up by exemptions. Protection of valuable permanent grassland also remains insufficient. While the decline in the area of grassland has slowed significantly and in parts halted altogether, the qualitative deterioration of grassland continues unchecked. (see section 2.3).

3.1.3 Ecological focus areas

The primary aim of ecological focus areas (EFAs) according to Regulation (EU) No 1307/2013 is "in particular, in order to safeguard and improve biodiversity on farms". The question of whether they achieve this in reality was the subject to a recently completed BfN research project. Based on botanical, faunistic and landscape ecology field studies, analysis of data from the Integrated Administration and Control System from five Länder, and questionnaire-based surveys of farmers, administrative staff and consultants, the study performed an initial evaluation of EFAs from the perspective of nature conservation (NITSCH et al. 2017; see also PE'ER et al. 2016).

The picture regarding the nature conservation value of the various EFA types is as follows:

- Flower pasture and strip elements have the greatest added value for nature conservation, followed by fallow land. These EFA types are characterised by greater structural diversity, a greater diversity of herbaceous plant species, greater floristic diversity and greater floristic richness, greater and more diverse arthropod fauna, and larger numbers of beneficial organisms.

- A large proportion of these EFA types in a region has a positive impact on the numbers of breeding and passing migrant birds and on the population density of selected farmland bird species. The hare population also increases.

- By contrast, no significant added value for nature conservation was identified with regard to legumes and in particular large-grain legumes. Catch crops/undersowing likewise had

only relatively small positive effects on biodiversity.

It may be assumed that on a weighted land area basis, over 50% of EFA obligations (corresponding to an actual land area of 80%) are accounted for by catch crops/undersowing and legumes, the two EFA types that are relatively ineffective for nature conservation (see 'Abb. 14' [Fig. 14] in NITSCH et al. 2017).

This confirms the trend shown in existing data at national level (e.g. BMEL 2015a, DIE BUNDESREGIERUNG 2016b) and analyses at EU level (COM 2017c). Among the EFA types beneficial to biodiversity, fallow land accounts for the largest proportion of EFA obligations (13% unweighted, 27% weighted). Buffer strips are also established, but with less than 1% in 2015 (2% weighted) they do not account for a significant share of the total area (NITSCH et al. 2017). Farmers shy away from establishing buffer strips due to the complex and inflexible requirements and the risk of penalties (DBV 2016a; NITSCH et al. 2016; LAKNER, *in preparation*).

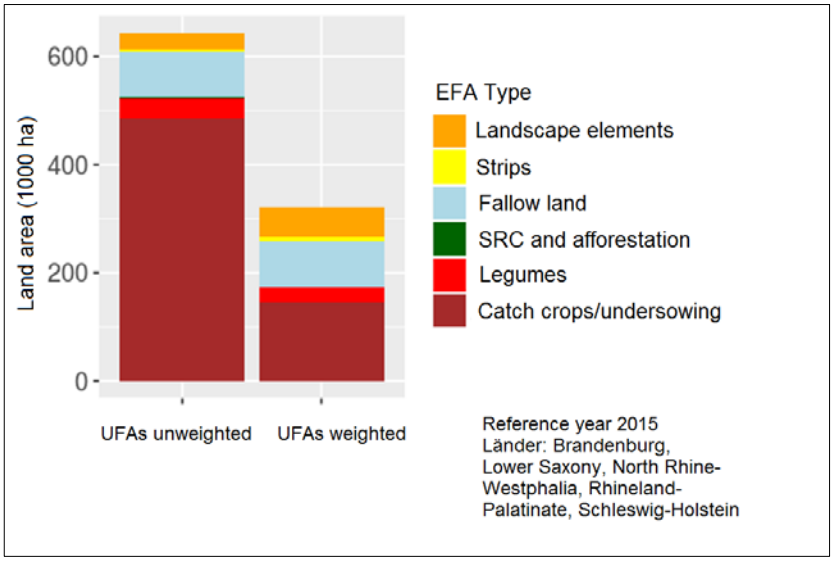


Fig. 14: Land area (unweighted, weighted) of EFA types. Source: NITSCH et al. 2017, slightly modified.

Overall, the fallow land and buffer strips that are particularly valuable in nature conservation terms are concentrated in locations that are already of high nature conservation value, such as Habitats Directive sites and nature conservation areas. Fallow land is mainly declared where there is plenty of land available and land leases are lower (LAKNER, *in preparation*) or hard-to-farm locations such as marginal areas and very steeply sloping land. In intensive farming areas especially fallow land is important in providing habitats for animal and plant species, whereas in extensively farmed regions it has relatively little benefit for species diversity (BATARY et al. 2011).

A substantial portion of the land of nature conservation value already existed prior to the introduction of greening. This notably relates to landscape elements that mostly have been declared where they already existed, and also to fallow land (NITSCH et al. 2017). The EFA obligations have thus caused the proportion of arable land of nature conservation value to increase by only a little under 1% (NITSCH et al. 2017).

In summary, the effect of introducing a 5% EFA quota on arable land has so far resulted in little change in land use. On average, farms have in fact exceeded the requirement by declaring close to 7% of their arable land as EFAs. Most of these EFAs are related to catch crops which are of minor value in nature conservation terms. As the number of declared EFA types per farm was small and the land of nature conservation value as a proportion of arable land hardly increased as a result of introducing EFAs, it is fair to assume that EFAs have had no great added value from an agro-ecological point of view (NITSCH et al. 2017). Acknowledging the importance of GAP, the EU Biodiversity Strategy 2020 (COM 2011a) laid down as its target 3A: “By 2020, maximise areas under agriculture […] that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity […].” This target will not be attained by the CAP as a whole or by

Catch crops (top), fallow land (middle) and legumes (bottom) are among the more popular ecological focus areas in practice.

greening in particular. A study covering multiple EU member states by PE'ER et al. (2016) comes to a similar conclusion.

There are also widespread complaints about excessively high administrative, operational and monitoring effort and expense associated with EFAs (e.g. PE'ER et al. 2016; NITSCH et al. 2017; ZINNGREBE et al. 2017). To improve acceptance and reduce costs, this effort and expense must be minimised and be set off against corresponding benefits.

Summary

The data and study findings compiled by BfN overall support the hypothesis that greening has very little ecological effect and will scarcely affect the condition of biodiversity in agricultural landscapes as a result. Set against this is an annual expenditure of about €1.5 billion, which is budgeted until 2020 for greening payments to farmers in Germany (WEINGARTEN et al. 2014). Therefore, Greening must be considered a largely ineffective and over-expensive attempt.

3.2 The EAFRD as a funding instrument to reward the biodiversity services of agriculture

As mentioned earlier, the second pillar of the CAP is currently the most important instrument for the funding of nature conservation measures in agricultural landscapes and for implementation of European nature conservation requirements in Germany (BMU & BFN 2013; COM 2016c; BMUB 2017). Studies already showed in the last funding period with respect to the size of budgeted (GÜTHLER & ORLICH 2009) and actual (FREESE 2012) *biodiversity-related* expenditure under the EAFRD, that the proportion of expenditure accounted for by 'dark green' measures is relatively low, even within the 'environment-related' EAFRD measures. Such measures also directly compete with others, some of which are (potentially) counterproductive (such as field consolidation, construction of livestock housing and road laying). In area-related agri-environmental measures, for example – the most important environment-related funding instrument – an average of only about 31% of expenditure in the years 2009 to 2013 was for measures of direct relevance to biodiversity (BFN 2016 on the basis of information from FREESE 2015). The land area this related to was even smaller, at approximately 13% of the total area under agri-environmental measures. As this shows, 'true' nature conservation measures are far more 'costly' due to more demanding management requirements than less demanding 'light green' measures that are mainly directed at abiotic resource conservation and require farmers to make only minor adjustments (see also SRU 2002). Relatively high funding needs have thus contrasted with a disproportionately small expenditure volume.

In the current funding period, due to the redistribution of payments, EAFRD funding in Germany increased slightly by 4.5% to approximately €9.45 billion (€1.45 billion p.a.); however, no use was made of this opportunity to substantially increase the funding (OSTERBURG et al. 2014) or to go up to the 15% permitted by the EU. This compares with an annual €4.85 billion under the first pillar. Together with national

co-financing and top-ups, the total budget available for the second pillar is €16.89 billion.

EAFRD funding is available for a diverse range of purposes, from simple grassland extensification and the creation of flower strips to tolerating nordic guest birds and specific species conservation. But what proportion of the funding is biodiversity-related?

An attempt was made in a BfN research and development project to identify the proportion of budgeted biodiversity-related expenditure in Länder-level Rural Development Programmes (SCHRAMEK et al. 2017). The figures are still subject to a degree of uncertainty however, because certain (sub-)measures and plans do not prove to be biodiversity-relevant (or not) until project execution. Based on the provisional findings subject to further validation, approximately €2.3 billion over the current funding period is mostly or entirely dedicated to funding nature conservation measures (PABST et al. 2017) – an average of approximately €330 million a year. These figures again relate to EU funding, national co-financing and top-ups for area-related, investment-oriented and other accompanying measures. This portion of funding is thus slightly greater than in the last funding period. FREESE (2017) calculated a total of approximately €323 million on average for the years 2009 to 2013.

Current estimates of the funding needs for the implementation of Natura 2000 *alone* come to €1.4 billion per year (LANA 2016; BMUB 2017). Of this, €528 million relates to the ongoing management of habitat types of open landscapes (grassland, heaths and dunes) and a further €200 million to investment-oriented measures, while €204 million is needed for arable extensification (LANA 2016). These figures do not include measures that have, or potentially have, a positive impact on biodiversity but do not explicitly serve the attainment of specific nature conservation objectives such as promotion of organic farming. The two expenditure categories – average budgeted nature conservation expenditure under the second pillar and the funding needed for Natura 2000 – are not quite fully comparable. Nonetheless, comparison of the two figures is more than enough to highlight the considerable funding deficit for the attainment of nature conservation objectives. It must also be taken into account that the above figures on EAFRD-funded nature conservation expenditure are budget figures in the Länder programmes and certain requirements imposed by the Commission frequently prevent funds from actually being disbursed, most of all in relation to investment-oriented measures. Thus the deficit could be even bigger than shown here. The European Court of Auditors (ECR 2017) recently pointed to the inadequate funding for Natura 2000 (likewise COM 2017c). Against this backdrop, it is highly unlikely that nature conservation will be able to maintain a minimum area of land in agricultural landscapes that hosts higher levels of biodiversity (see section 2.2).

Any attempt to determine the expenditure for ‘dark green’ measures in the new funding period faces huge difficulties. The different nature conservation measures in the Länder are programmed for in a huge variety of different ways and it is almost impossible to separate out the funding for ‘nature conservation measures’ as such because they often form a (mostly small) part of other measures and sub-measures.

The reporting required by the Commission does not allow biodiversity-related types of measures to be accurately quantified. By contrast, use of the biodiversity tracking approach (cf. MEDAROVA-BERGSTROM et al. 2015), in which the biodiversity relevance of measures is 'rated' solely by formal criteria, results as a rule in substantial over-estimation of nature conservation-related funding (PABST et al. 2016) – with correspondingly devastating consequences for the credibility of calls for better funding in the public discourse.

The proven inadequacy of funding is further aggravated by the control requirements under EU regulations and Commission guidelines, which are a severe complicating factor for implementation and also make for decreasing acceptance among users. As policies under the second pillar of the CAP have long ceased to receive a statement of assurance from the European Court of Auditors – see, e.g. WEINGARTEN et al. (2015) – it is the express aim of the Commission's Directorate-General for Agriculture and Rural Development to enforce strict control and sanction requirements down the line for verifiability and controllability of expenditures. In fact, compared with the previous funding period – see, e.g., Rechnungshof Baden-Württemberg (2015) – the requirements for member states have become even more demanding as a result of additional controls and detailed stipulations. In some cases, the cost of controls was found to be 59 times the monetary value of the infringement in question (ibid.).

The latent risk of penalties results in easily implemented, standardised, 'light green' funding measures being favoured over the necessarily more ambitious substantive requirements (cf. also FÄHRMANN & GRAJEWSKI 2012) attached to 'dark green' measures by nature conservation administrations. This stands in the way of high-quality nature conservation measures that rarely lend themselves to standardisation. The focus on controllability also leads to an abundance preponderance of less effective measures that matches the generally higher administrative effort and expense of implementing nature conservation measures and makes the use of the EAFRD for funding them increasingly unattractive for the Länder. Therefore, a number of the Länder have already ceased to use EAFRD funding (such as Hamburg) or have cut back on it (such as Bavaria and Hesse).

Summary

The EAFRD remains the most important instrument for financing nature conservation in agricultural landscapes and specifically Natura 2000. However, there is a substantial funding gap in relation to the funding needs for implementing Natura 2000 alone. The great administrative effort, expense and massive control requirements also make the use of the EAFRD for nature conservation purposes increasingly unattractive for the Länder and the measures also face decreasing acceptance among farmers due to the high risk of penalties.

4 The case for nature-friendly agricultural policy

A radical shift to nature-friendly agricultural policy is not only due for nature conservation reasons, it also has societal legitimacy. This includes the macroeconomic costs and benefits of nature-friendly agriculture and its public acceptance.

4.1 Macroeconomic costs and benefits of nature-friendly agriculture

Agriculture does not just produce food and resources, it also delivers a wide variety of benefits for nature and society. Many of these public services are not traded on any market. The concept of ecosystem services makes it possible to appraise and put a value on them. Ecosystem services are natural services that benefit humankind. They were conceptualised in the MILLENNIUM ECOSYSTEM ASSESSMENT (2005) with the aim of giving greater visibility to the economic importance of natural resources.

Ecosystem services are divided into four categories: basic or supporting services, provisioning, regulating and cultural services. They include air, water and soil purification, climate change mitigation and adaptation, regulation of water runoff and flood control, erosion reduction and soil fertility maintenance, pollination by insects, and providing an aesthetically attractive landscape of recreational value. Ecosystem services in agricultural landscapes are thus the basis and outcome of agricultural land use. Measures to promote biodiversity such as maintaining species-rich grassland, establishing flower strips, preserving and laying hedges and restoring river floodplains and peatland all have a positive effect on the ecosystem services just mentioned. In many cases, this means they are not only important to the protection of biodiversity, but also have a positive economic impact.

The examples described in the following section serve primarily to highlight the social cost of farming practices that are unsustainable – i.e. harmful to nature and the environment – or conversely to illustrate the necessity of adequately rewarding the provision of ecosystem services as a component of nature-friendly agricultural policy. An in-depth discussion of ecosystem services in rural regions is provided in V. HAAREN & ALBERT (2016).

4.1.1 Example: pollination services

Over 70% of the 87 globally most important food crops depend on animal pollination (KLEIN et al. 2007; see section 2.1.4) and approximately 84% of all crop plants are at least partly dependent on animal pollinators (WILLIAMS 1994). Pollinators thus affect approximately 35% of global food production (TSCHARNTKE et al. 2012). Among wild plants, an estimated 78% to 94% of species globally are dependent on biological pollinators for reproduction (OLLERTON et al. 2011; TSCHARNTKE et al. 2012). In Germany, a failure of pollination services would notably affect fruit and vegetable cultivation and also large-scale arable crops such as oilseed rape, sunflowers and field beans. Without the pollination services of insects, harvests would collapse. There are a large number of individual studies on the role of wild pollinators and the effects of their disappearance (for a compilation, see IPBES 2016), but combined analysis to quantify those affects is lacking. Using the example of the honey bee, Fig. 15 demonstrates the percentages of harvests that would be lost in the absence of the honey bee pollination.

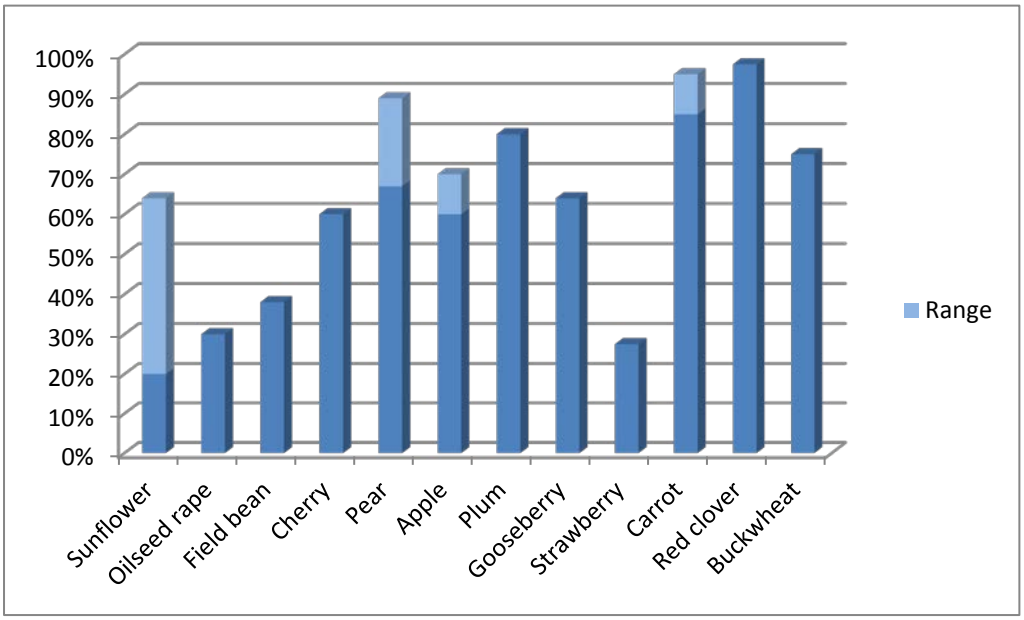


Fig. 15: Loss in yield in the absence of pollination by honey bees. Pale blue segments indicate where there is a range between an upper and a lower estimate for the yield loss. Source: Own chart based on data from BIENEFELD (2011), RADTKE (2013) and DEUTSCHER IMKERBUND (2017).

The economic value of produce that is dependent on pollination services is estimated globally at US$235–577 billion in 2015. This is equivalent to between 5% and 8% of the global annual agricultural output (IPBES 2016). For Germany, the value of pollination-dependent production is estimated at €1.13 billion (LEONHARDT et al. 2013), compared with a total value of agricultural, forestry and fisheries production of €52 billion in 2015 (DBV 2016b).

The situation and trend in pollinators is very worrying indeed, this includes most of all pollinating insects among which wild bees are the main group. As mentioned in section 2.1.4, according to the Red List, 41% of wild bee species in Germany are now listed as endangered (WESTRICH et al. 2011). The situation for the honey bee is different as it is a managed agricultural species that is also very versatile in the use of available resources. Globally, while the number of honey bee colonies is increasing, there are also growing problems, mostly in North America and European countries, involving seasonal colony losses due to various causes (see below) (IPBES 2016). In Germany, the relatively stable population declined in the beginning of the early 1990s by about 40%, from just under 1 million colonies to approximately 600,000 in 2009. The population has since increased again to approximately 750,000 colonies in 2016. Importantly, some crop plants are only suited to pollination by wild bees and others are better suited to wild bees than to honey bees. As a rule, a mix of wild bees, other pollinators and honey bees – due to the greater variation in behaviours, resource use and activity times – is considered best to stabilise crop yields and quality at a higher level than the use of honey bees alone (HOEHN et al. 2008; GARIBALDI et al. 2013).

Aside from an ageing population of apiarists and notably hobby beekeepers and the severe effects of bee pests such as the Varroa mite, the main cause of the decline in honey bees in Germany, as for solitary bees, is the intensification of

agriculture (e.g. HOLMGEIRSSON & SCHADE 2016). The main factors here are the floristic poverty of modern intensive agriculture and the use of potent plant protection products such as neonicotinoids. The latter are also considered to be the main cause for the decline in wild bees (cf., e.g., WOODCOCK et al. 2016; cf. also section 2.1.4).

The negative trend could be countered, most of all with regard to wild bees and other important insect pollinators such as butterflies and hoverflies, by small-field crop rotation, maintaining or establishing species-rich grassland, hedges, flower strips and sufficiently wide field margins kept free of herbicides and insecticides, and also the use of floristically rich crop mixes with native species in energy crop cultivation (RADTKE 2013; GARIBALDI et al. 2014; BMEL 2014; RUNDLÖF et al. 2015; SCHEPER et al. 2015; DIETERICH et al. 2016). Conversely, the figures cited highlight the economic risks expected from further intensification and the decline in species and floristically rich habitats in agricultural landscapes as a result of loss of pollination services.

4.1.2 Example: agricultural use of peatlands

Over 95% of Germany's peatlands have been drained and a large proportion are farmed. Once drained, peatlands turn in the medium term into good farmland and are mostly used as grassland for dairy farming and sometimes as arable land for crops such as maize (in many cases as a biogas substrate). Draining peatlands, however, results in the peat becoming aerated and thus releasing stored carbon in the form of the greenhouse gas carbon dioxide (CO_2), as well as in ongoing peat loss. Any land use based on draining must therefore be considered unsustainable. Over 4% of total CO_2 emissions in Germany are from drained peatlands. Although only about 6% of the agricultural land area consists of peatlands, emissions from using peatlands not adapted to local conditions account for around 54% of farmland greenhouse gas emissions. Growing maize on peatlands also results in considerable quantities of nitrate and phosphorus being leached into groundwater and surface waters.

Flower strips remain useful beyond the flowering season, as they provide important habitats for numerous insects.

The benefit to farmers can be contrasted against the cost of avoiding nitrate contamination and emissions, and the cost per kilogram of CO_2 emitted or avoided. Adding these costs together and setting them off against the gains from the various uses of peatland, including rewetting options, shows that the two drainage-based options of arable farming for biogas and dairy farming each have a deeply negative cost-benefit relationship (see Fig. 16).

The only option that is economically neutral is the rewetting of peatlands. This can be done either to restore peatlands for species and habitat conservation or for paludiculture – wet, peatland-friendly forms of management, for example to grow reeds or alder. In the rewetting options, the CO_2 avoidance costs are economical compared with other, primarily technical means of CO_2 avoidance (DRÖSLER et al. 2012).

Paludiculture is currently still very hard to implement on a large scale, however, due to competing funding measures and a lack of specific funding.

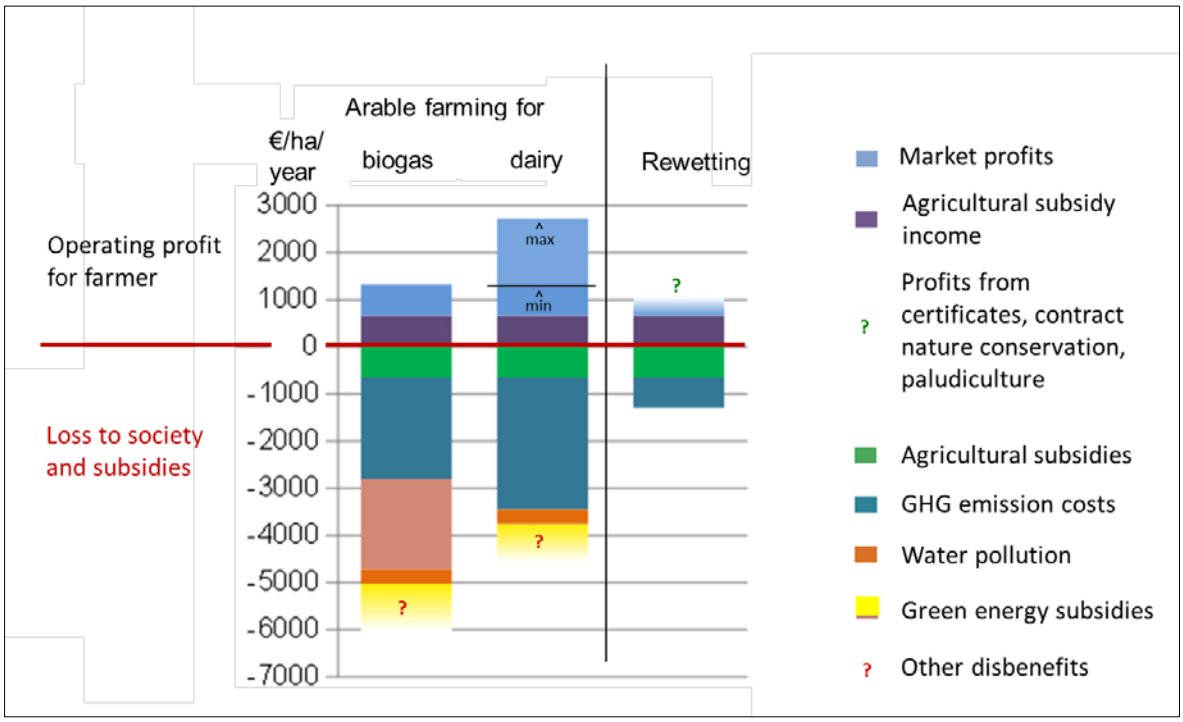


Fig. 16: Alternative uses of peatlands. Source: TEEB DE (2015), slightly modified.

4.1.3 Example: ploughing up of grassland

The observed deterioration in the state of grassland (see section 2.3) has negative consequences for the conservation of biodiversity and numerous ecosystem services. Ploughing up grassland removes its ability to sequester greenhouse gases as well as its important role in keeping groundwater pure and as a habitat for numerous wild plant and animal species. Putting a value on these services and looking at them together shows the considerable social benefit associated with conserving grassland. That benefit is far greater than the revenue to be gained from ploughing up grassland and growing other crops on it. OSTERBURG et al. (2007, cited in TEEB DE 2016) estimate that, depending on the local conditions, a farmer can generate revenue of between €370 and €600 per hectare of grassland turned over to arable cultivation (see Fig. 17).

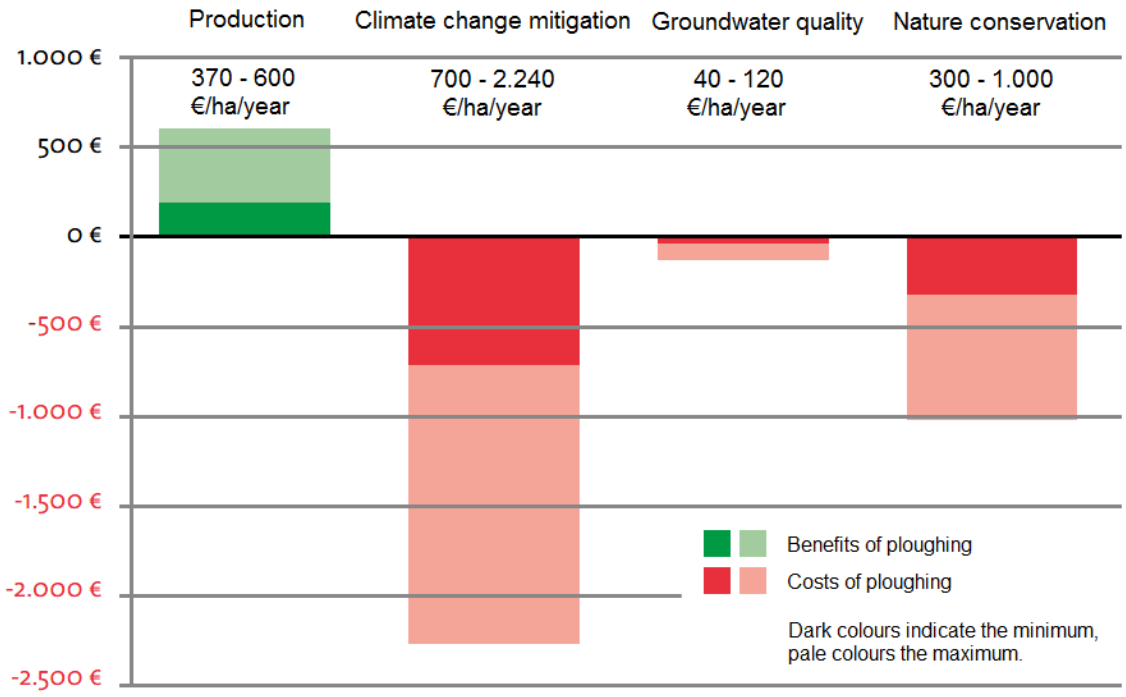
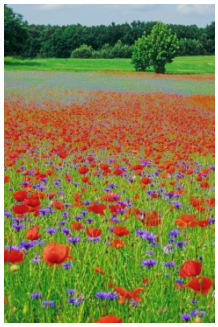


Fig. 17: Social benefits and costs of ploughing up grassland of nature conservation value. Source: TEEB DE (2016).

Based on this, depending on the type of grassland and certain valuation assumptions, the net social benefit from conserving grassland is between €440 and €2,990 per hectare per year. Particularly large economic benefits can be obtained by conserving grassland in high nature value locations, locations with sensitive soil conditions such as low storage and buffering capacity for nutrients and pollutants, and locations at risk of erosion, which are frequently not very viable as arable land (TEEB DE 2016).



Examples of the many different ecosystem services include aesthetically appealing cultural landscapes, the provision of clean water and pollination of crops.

Summary

Agriculture produces food and other resources and must maintain the natural conditions for production over the long term. It also provides a wide variety of services for nature and society. From a **macroeconomic perspective**, agriculture that is not adapted to local conditions and is not nature-friendly can have huge costs. In line with the principle of, and with calls for, 'public money for public goods, it is now time to develop, advocate and, where necessary, provide funding for a form of agricultural production that avoids negative impacts on ecosystems and delivers a win-win situation with other ecosystem services needed by society.

4.2 Public support for nature-friendly agriculture and agricultural policy

From 2014 to 2020, farmers who receive direct payments under the first pillar of the CAP will obtain a total of €313 billion from the EU budget, i.e. out of taxpayers' money. Agricultural policy still accounts for nearly 40% of the entire EU budget. The large sums of money paid to farmers, primarily by the EU, create strong pressure for public justification. So what do the general public think about nature-friendly farming and for policies to encourage it? Information on this question is provided by the 2015 BfN Nature Awareness Study, a representative national survey of the German population (BMUB & BFN 2016)

When asked about their approval of specific agricultural policy measures, the public showed strong support – second only to animal welfare – for the statement that agricultural decision-making should consider impacts on nature ('very important': 64% of respondents; 'somewhat important': 28%; see Fig. 18).

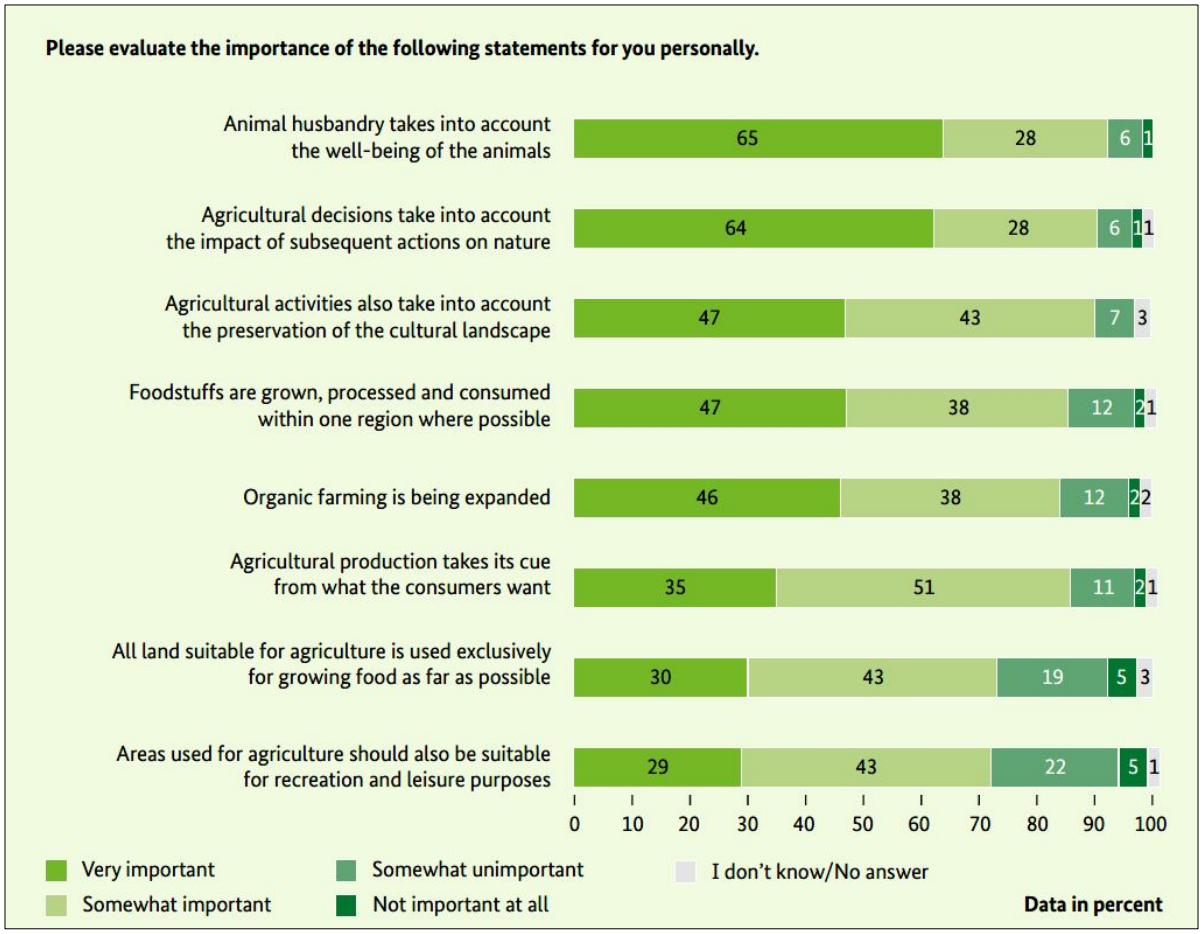


Fig. 18: Approval for agricultural policy demands. Source: BMUB & BFN (2016).

There was also strong support for statements that agricultural activities should take the preservation of the cultural landscape into account, that foodstuffs should be grown, processed and consumed in the same region where possible and that organic farming should be expanded.

Two-thirds of Germans believe that nature conservation makes food more expensive, and this cost argument was brought up again when asking about policy measures needed to promote nature conservation in agriculture. There is nonetheless strong public support for such measures. People favour a two-track strategy with a blend of funding and regulatory instruments (see Fig. 19).

This is seen in the approval among the great majority of respondents for stricter nature conservation rules and regulations (strongly agree: 45%; somewhat agree: 38%) and for financial support of more nature-friendly farming out of public money (strongly agree: 30%; somewhat agree: 44%).

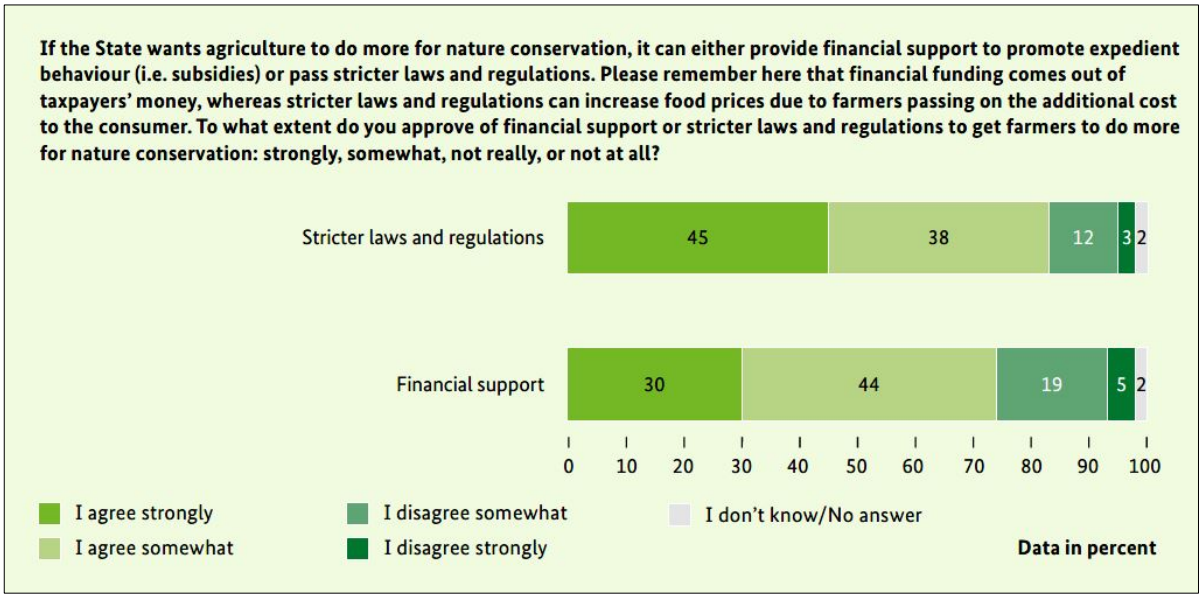


Fig. 19: Attitudes on agricultural policy measures for nature conservation. Source: BMUB & BFN (2016).

The great majority (78%) of respondents in a recent Forsa survey (FORSA 2017) likewise spoke in favour of coupling subsidies for farmers to their contribution towards public interest services, although top priority was given to environment-friendly production and animal welfare in livestock farming.

Summary

Nature-friendly farming generally has a strong support within the population. There is also strong acceptance for financially supporting and suitably rewarding the services provided by agriculture in the public interest. This provides a sound basis of legitimation for systematically shaping and implementing corresponding agricultural policy measures.

5 Demands for nature-friendly agricultural policy

The evidence is clear: the loss of biodiversity – both species and habitat diversity – continues unchecked in agricultural landscapes. Key ecosystem services are severely impaired as a result. This underscores an urgent need for agricultural policy action at both a national and EU level, as all past attempts to exert control through agricultural policy have clearly failed to effectively counter the dramatic decline in species, the loss of valuable habitats and ecosystems, and the monotonisation of the landscape (see also, e.g., most recently BIRDLIFE & EEB 2017).

Based on the current evidence, early expectations that the greening of direct payments would substantially improve the environmental performance of the Common Agricultural Policy have not been fulfilled. As too few ecological focus areas are EFA types with an ecological impact, the qualitative effect of EFAs on biodiversity is far too small. It is clear that their selection was not driven by the need to maximise the positive biodiversity impact on the land available. The measure is also highly inefficient. Protection for permanent grassland in particular is still inadequate. The provisions on crop diversification are irrelevant to biodiversity and, in some cases, even counterproductive. In addition, if biodiversity and related ecosystem services are to be safeguarded on a large scale, the relevant mechanisms and instruments must be designed so that they also gain widespread adoption in prime farming regions.

The few changes in the second pillar of notable importance to species and habitat conservation and to implementation of the European Natura 2000 network have led neither to substantive progress nor to better allocation of funding. Instead, the second pillar increasingly finds itself in a 'bureaucratic dead end' (SMUL 2016), with negative implications most of all for nature conservation.

The findings so far show that the problems observed can only be effectively addressed with a radical reorientation of the CAP and of national agricultural policy. In the short term, however, such a fundamental reorientation is neither possible nor advisable in terms of risk and acceptance. The decision to set it in motion must nonetheless be made now. In parallel, during the current funding period, everything must be done under the prevailing structural conditions to use all available policy options to relieve pressure on biodiversity.

5.1 Action needs in the current funding period up to 2020

Within the available time window – some of the changes possible under EU law must be decided at national level by the 31st of July 2017 – all options must therefore be exhausted for more effectively coupling the first pillar of the CAP with nature conservation and environment protection services, and to make better-targeted, more efficient and most of all, more extensive use of the second pillar to conserve and promote biodiversity. While greening is not the right tool for combating biodiversity loss in agricultural landscapes in the medium to long term, the current situation means that use must be made of every possibility for change. At the same time, farms should also be aided in the transition to the sustainable agricultural policy model to be developed in the time ahead.

BfN identifies the following ten key points for this purpose:

Ecological focus areas (EFAs):

1. **Adjustment of EFA categories:** in order for the greening element to generate added value for biodiversity in agricultural landscapes on a widespread scale, priority focus must be given to EFA types that have maximum effect in this regard. The weighting factors for the various EFA categories must therefore be made to better reflect their contribution to biodiversity conservation. Ecologically less effective options such as catch crops and (large-grain) legumes should no longer be permitted as EFAs or should only be recognised in certain circumstances. There should also be a ban on the use of plant protection products in all EFAs. Additional ecologically effective EFA types should also be recognised, notably in connection with extensive arable farming (e.g. in-field patches and perennial mixed flowering crops for use in biogas plants, with adapted fertilisation).

2. It is vital to **raise the proportion of (effective, as defined above) ecological focus areas from 5% to 7%** in order to increase the area covered by EFAs and to converge on the target, based on numerous studies, of bringing at least 10% of land in agricultural landscapes close to a natural state (OPPERMANN et al. 2013). However, only areas that offer the required added value should be recognised as EFAs.

3. It is also necessary to **extend the reference area to include permanent crops** and **introduce an EFA requirement for grassland**. Increasingly intensive grassland management and the related ongoing qualitative deterioration of grassland mean that ecological focus areas should also be introduced for grassland farms.

4. To minimise the penalty risk for farms and so increase the attractiveness of declaring ecologically valuable strips and landscape elements as EFAs, it is necessary to resolve the problems with regard to determining the size of these EFA types. More flexible management requirements are needed for strip elements and fallow land in order to make these elements unreservedly more attractive for farmers. **Administration and control effort** must be reduced and criteria and requirements standardised for field margins, buffer strips and woodland margins.

5. **Recognition of equivalent measures in connection with agri-environment-climate measures (AECMs) or contract-based nature conservation** is also desirable from a nature conservation perspective in Germany. This would also add to the options open to farmers and make such measures more attractive. The options for combining with AECMs to enhance the ecological value of EFAs must be further expanded, as must interdisciplinary whole-farm biodiversity consulting.

Maintenance of permanent grassland

6. To better protect grassland and in particular to prevent valuable permanent grassland from being ploughed up, **the definition of 'environmentally sensitive' permanent grassland must be made substantially broader**. It must encompass at minimum the entire Natura 2000 site range – including Special Protected Areas under the Birds Directive – organic soils, all threatened and legally protected grassland habitat types, and high nature value grassland.

7. To make sure that high nature conservation value grassland qualifies for direct payments and thus create incentives to maintain it, the **definition of grassland must be widened in line with nature conservation objectives** and the NBS targets.

8. It is also necessary to work towards a complete national ban on ploughing up grassland, as BfN has repeatedly called for (see BFN 2014a). Where exceptions are allowed, the creation of new grassland elsewhere must be made a mandatory requirement.

Redistribution from the first pillar to the second and use of additional funding options:

9. Given the pronounced competition for funding within the second pillar and the dramatic funding deficit identified in nature conservation, it is urgently necessary to **increase the redistribution from the first to the second pillar of the CAP to the 15 percent permitted under EU law**. Disbursement of this funding must also be more strongly focused on the conservation of biodiversity, ecosystems and landscapes.

10. The Länder should embrace and make use of the **new scope for funding nature conservation measures in Germany under the Joint Task for the Improvement of Agricultural Structures and Coastal Protection (GAK)**. Funding for non-productive, investment-oriented nature conservation measures was incorporated in the master plan for 2017. Contract-based nature conservation in open landscapes and forest must follow in the near future.

5.2 Key points of a reform of the Common Agricultural Policy from 2020

After 2020, nature conservation must in no circumstances be content with further cosmetic improvements to an inadequate and increasingly complicated system. There must be a full reorientation of agricultural policy to take effective account of biodiversity conservation goals. Any postponement of true reform – as has already been suggested in the form of a rollover – must be fully rejected.

Various options for such a reorientation are currently under debate, most with the aim of abolishing first pillar direct payments from 2020 (BMUB 2015b; HOLST & V. CRAMON-TAUBADEL 2014) and coupling funding for agriculture to the provision of public interest services (e.g. OPPERMANN et al. 2016; WIRTZ et al. 2017; DVL 2017; EURONATUR & ABL 2017; BUCKWELL et al. 2017; FEINDT et al. 2017). Various models for a new funding architecture are being discussed in detail (modular systems, point value methods, etc.), although strength and weakness analysis is still pending. In particular, under the heading of "Improved financing for nature conservation in Europe after 2020" – the title of a statement by SRU & WBW (2017) – there are calls for a new, independent EU funding programme for nature conservation ('nature conservation fund') under the responsibility of DG Environment (similarly, e.g., NABU 2015; BMUB 2015b; BBN 2016; LANA 2016; BMUB 2017, NABU *in preparation*). The scope and necessity for linkage with other CAP instruments are still under debate.

Irrespective of the details of the new funding architecture, priority must be given to the following basic premises against which a reorientation of the CAP from 2020 will be assessed:

Payments consistently aligned with the common interest following the rule of public money for public goods:

It is not only the structure of the CAP that needs to change. A shift in perspective is also required with regard to the role of the agricultural systems as a whole. The purpose of agricultural policy must be consistently thought of as coupling sustainable production with the conservation of biodiversity and diverse ecosystem services. This involves putting a fair value on the wide variety of ecosystem services and services to society provided by agriculture, and rewarding agricultural production that avoids negative externalities while promoting ecosystem services needed by society. That would also promote public acceptance of agriculture and of expenditure on agriculture.

Creation of incentives for nature-friendly farming

In this connection, it is necessary to create a broad set of effective measures together with funding and remuneration options that are not only adequate but also provide farmers with sufficient operational flexibility and choices. Overall, the agricultural subsidies system must create effective incentives so that attaining the societal objectives is made attractive at farm level. This fundamentally also includes the provision of financial resources in the volume needed to close the funding gap in nature conservation. At the same time, administrative effort must be significantly reduced and control rules simplified relative to the current situation, with a reasonable cost-benefit ratio in both administration and control.

Halting biodiversity decline in agricultural landscapes on a broad front and conserving resources:

For some time now, there has been a trend towards segmenting the cultural landscape into what may be called 'conservation compartments' with a large proportion of protected areas and areas of nature conservation value and 'cultivation compartments', meaning intensively farmed agricultural landscapes where even minimum standards of nature conservation no longer play a material role. Under the Federal Nature Conservation Act (Bundesnaturschutzgesetz), nature conservation applies everywhere, yet it has become increasingly hard to enforce that applicability in the intensive farming regions. To ensure nature-friendly farming with intact resources on a broad front and to halt biodiversity loss in agricultural landscapes, as well as creating incentive systems, it is also necessary to secure certain minimum standards, including the obligatory provision of certain basic services on the part of agriculture (see FEINDT et al. 2017). This also requires an improved and effectively implemented regulatory framework.

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