Institute for European Environmental Policy

14 December 2017

Pollinator Initiatives in EU Member States: Success Factors and Gaps

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Funded by

European Commission

Report under contract for provision of technical support related to Target 2 of the EU Biodiversity Strategy to 2020 – maintaining and restoring ecosystems and their services in collaboration with

IUCN Trinomics UNEP WCMC

Disclaimer: It should be noted that this report does not represent the views of the Commission or of the interviewed stakeholders, and the key successes and gaps were identified by the authors unless attributed. The authors acknowledge that the work was funded by the European Commission.

The report should be cited as follows: Underwood, E., Darwin, G. and Gerritsen, E. (2017) Pollinator initiatives in EU Member States: Success factors and gaps. Report for European Commission under contract for provision of technical support related to Target 2 of the EU Biodiversity Strategy to 2020 – maintaining and restoring ecosystems and their services ENV.B.2/SER/2016/0018. Institute for European Environmental Policy, Brussels.

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Acknowledgements:
We thank the stakeholders in each Member State who responded to the requests for information.

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1 Introduction

Pollinators, which are economically, ecologically and socially important, are increasingly under threat from human activities, including climate change and habitat loss, as concluded by the global assessment of the International Panel on Biodiversity and Ecosystem Services (IPBES) in 2016 (IPBES, 2016). The assessment highlights that a high diversity of wild pollinators (wild bees, hoverflies and other flies, butterflies and moths, and more) is critical to pollination even when managed bees are present in high numbers. The European Red List of Bees published in 2014 concluded that at the EU-27 level, 9.1% of bee species are threatened with extinction and a further 5.4% of bees are considered Near Threatened, whilst for 55.6% of species we do not know their EU status at all (Nieto et al, 2014). At the COP13 on Biological Diversity in December 2016, Decision XIII/15[1] was passed encouraging Parties, other organisations and stakeholders to use the IPBES recommendations to help guide their efforts to improve conservation and management of pollinators, address drivers of pollinator declines, and work towards sustainable food production systems and agriculture.

At the CBD COP13, representatives of ten EU Member States and other countries signed the Declaration on the Coalition of the Willing on Pollinators[2], committing to take national action to protect pollinators and their habitats, and to develop, facilitate and implement pollinator strategies, consistent with the IPBES Assessment. Rural Development Programmes under the Common Agricultural Policy provide some funding for farmers to carry out farming with reduced or no pesticide use or to preserve or create flower rich areas or habitats providing food resources for wild pollinators. Other initiatives at the EU level are already promoting joint action, knowledge sharing and awareness-raising on pollinators. However, the COP13 Decision and the European Parliament resolution on the Action Plan for Nature, People and Economy passed on 15 November 2017 (European Parliament, 2017) emphasise that stronger action is needed.

The Commission have now announced the development of an EU Pollinators Initiative[3]. The roadmap published on 1 December 2017 presents the problem, the aim of the initiative and possible options how to achieve the aim, with the objectives of improving knowledge on pollinators, tackling the causes of the decline of pollinators, and raising awareness and improving collaboration and knowledge sharing.

Aim of the report

Here we report on current national and regional initiatives in ten EU Member States as of October 2017, outlining strategies, successes and gaps. Our aim is to provide useful information for the development of an EU initiative on pollinators and to inform stakeholders about current initiatives and sources of further information. The report focuses

[1] https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-15-en.pdf

[2] Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Slovenia, Spain, the Netherlands, UK, see https://promotepollinators.org

[3] See http://ec.europa.eu/environment/nature/conservation/species/pollinators/index_en.htm

on most of the Member States in the Coalition of the Willing (although no information was available from Finland and Luxembourg), plus Ireland who also have a pollinator strategy in place.

It should be noted that this report does not represent the views of the Commission or of the interviewed stakeholders, and the key successes and gaps were identified by the authors unless attributed.

2 Pollinator initiatives: successes and gaps

This section seeks to highlight commonalities among existing national and regional initiatives that are benefiting wild pollinators in order to point to what could be amplified or scaled up at the EU level, identify remaining gaps, and assess what added value EU level coordination could bring.

A number of initiatives have already carried out similar and more wide ranging exercises and discussions, which we have drawn on, notably:

- overview of strategic responses to risks and opportunities associated with pollinators and pollination provided by the recent IPBES assessment, based on their evidence review (IPBES, 2016);
- policy workshop on 3 March 2015 by SUPER-B COST action project[4];
- reports by the EU-funded STEP project (2010-2015)[5];
- high priority knowledge needs with regard to wild pollinators identified by an EU expert group in the UK (Dicks et al, 2013);
- UK Insect Pollinators Initiative (Vanbergen et al, 2014; Vanbergen and Insect Pollinators Initiative, 2013).

2.1 Governance of initiatives and targeted funding

There are at least six national or regional strategies or action plans addressing wild pollinator conservation in EU Member States and a number of others are preparing strategies or action plans, as listed in Table 2.1. Some, but not all, the strategies are associated with some dedicated government funding. The Dutch government is providing political leadership by convening the Coalition of the Willing on Pollinators, which is bringing together representatives of Member State governments which either already have or are in the process of developing national pollinator strategies.

Table 2.1: current situation of pollinator initiatives in selected EU Member States

Member State / region	Pollinator initiative or strategy, launch year and focus	Significant funding or national resources
Austria	No national or regional strategies identified; national biodiversity target to increase number of honeybee colonies by 2020	Support for beekeeping and research; large agri-environment programme
Belgium	Federal Bee Plan (2017-2019) – focused on honeybees though overall aim includes wild pollinators	Federally funded research project on wild bee populations; two EU-funded projects
Denmark	No national strategy	Nature Package grant scheme for habitat creation
France	National action plan for bees and wild pollinators (2017) - addresses all pollinator types	Nationally funded pollination research project; small amount of government funding for national action plan

[4] Report available at http://superb-project.eu/documents/3/

[5] Ründlof et al 2011 at http://www.step-project.net/files/DOWNLOAD2/STEP_D4%201.pdf and the final brochure at http://www.besnet.world/status-and-trends-european-pollinators-key-findings-step-project

Germany	No national plan; NGO-developed proposal for a national action plan on wild pollinators	National funding for pollinator projects; foundation-funded project in cities
Ireland and UK Northern Ireland	All-Ireland Pollinator Plan (2015) – addresses all pollinator types, including solitary bees and hoverflies	Plan was developed as bottom-up initiative but now has a small government-funded budget
The Netherlands	National pollination strategy expected in January 2018 – addresses wild pollinators	Netherlands Buzz cluster of national projects
Slovenia	National Environmental Protection Programme will include wild pollinator targets to 2030	Funding expected under the national programme
Spain	National plan in preparation	
UK	Healthy Bees Plan (2009) implemented by National Bee Unit - honeybees	Government-funded pollinator monitoring programme (England, Scotland, Wales);
UK - England	National Pollinator Strategy (2014-2024) – addresses all pollinators	Small government budget for regional/local groups & projects
UK - Wales	Action Plan for Pollinators in Wales (2013) – addresses all pollinators	No direct government funding but ties Welsh government to some actions
UK - Scotland	Pollinator Strategy for Scotland (2017-2027) – addresses all pollinators	Currently no funding allocated but resource assessment is being carried out

2.2 Research and monitoring

There is little information about trends in pollinator abundance in the EU, but losses are probably significant (see Box 2.2a). There are still important gaps in our knowledge of pollinator species distributions and how these are changing in response to climate change and land use change. The European Red List of Bees published in 2014 gathered evidence on 1,965 bee species and assessed 55.6% of species as data deficient, particularly Mediterranean species (Nieto et al, 2014). On the European Red List of Bees, Researcher networks, such as the SUPER-B cost action project, the Atlas Hymenoptera initiative, and the Observatoire des Abeilles, are compiling national species check lists and informing national red lists. More efforts are also needed to mobilise data on non-bee pollinator groups. For example, the IUCN is setting up a species Specialist Group on hoverflies (Syrphidae) to gather information on trends and distribution.

Box 2.2a Knowledge of pollinator population trends

A few studies indicate that losses of flying insects in the last four decades have been very significant, although as they used different trapping methods they are not directly comparable. Recent findings from Germany found a more than 75% decrease in flying insect biomass since 1989 (Hallmann et al, 2017). In Sweden, a long-term comparison of bumblebee abundance on red clover between now and the 1940s found dramatic decreases in four species (Bommarco et al, 2011), and a similar study in Denmark found large abundance declines of 5 bumblebee species out of 12 since the 1940s (Dupont, Damgaard and Simonsen, 2011). Long-term monitoring in southern England of the average annual abundance of six invertebrate groups found a biomass decline of 35% since 1970, with two groups continuing to decline whilst three groups have started increasing in abundance over the last decade (Ewald et al, 2016). Butterfly abundance data from monitoring in 17 EU countries indicates declines of 8 out of 17 species, particularly on grassland in Northwestern Europe (EEA, 2013).

There is currently no systematic monitoring of wild bees or hoverflies in any EU country but there are butterfly monitoring schemes in 17 EU countries[6]. A systematic wild bee and

[6] BE, EE, FI, FR, DE, IE, LT, LU, NT, PT, SI, ES, SE, UK as described in (EEA, 2013)

hoverfly monitoring scheme has just been set up in the UK (Great Britain only), which could be replicated (see Box 2.2b).

Box 2.2b UK pollinator monitoring scheme approach

The UK scheme combines three approaches to gathering information[7]:

1) systematic sampling of pollinator diversity and abundance in 75 1km2 grid squares, varying in % of farm and semi-natural land cover, using a 1-person 1-day protocol comprising pan trapping, flower-insect timed counts, floral abundance counts and rapid habitat classification, targeting 4 visits per site per year;
2) flower-insect timed counts carried out by volunteers in any urban or countryside location who observe insect flower visitation for a standard amount of time with online submission using the iRecord platform;
3) support to ongoing non-systematic collection of pollinator occurrence by volunteer expert taxonomists belonging to biological recording societies, with refinement and development of statistical models by scientists/statisticians to extract trend estimates and develop indices from these long-term data sets.

Monitoring schemes require experts who validate and coordinate the information gathered, even if they rely on volunteers to gather data. There is a deficit of skilled bee and hoverfly identifiers to support research projects in most countries and many of the expert bee taxonomists in the EU are elderly. Several initiatives are addressing this issue by providing training courses in bee identification, some aimed at beginners, some at competent naturalists who wish to become experts, for example the SUPER-B network, BienABest in Germany, and the Bumblebee Conservation Trust in the UK. Pilot projects with innovative recording applications have demonstrated that website applications can, for example combined with picture-identification, increase the contribution to monitoring by non-experts especially for common species, by increasing the ease, timeliness and accuracy of field observations and enabling joint validation and quality control within a large community of observers.

A wide range of taxa can potentially play a role as pollinators of flowers, but in most situations, the most effective pollinators are bees, whilst flies and moths are important for some flower types (see Box 2.2c). There is however a need for better understanding of the functional roles and status of different pollinator taxa groups for different flowering species.

Box 2.2c Functional roles and status of different pollinator taxa

Pollinator efficacy depends on 1) their abundance in the flowering patch, 2) the propensity of the animal to touch anthers, carry pollen, and contact stigmas, 3) whether or not the animal will move to a flower of the same species and the distance it travels (Ollerton, 2017).

Honeybees (*Apis mellifera*) are the most prolific pollinators of open flowers where they are present because of their high numbers and requirement for large quantities of nectar and pollen. They will regularly fly up to 3km from the hive to patches with high flower density thereby transferring pollen over long distances, but pollen transfer is low as most pollen is bound up in the pollen baskets.

Bumblebees (*Bombus* spp.) are relatively long tongued (although species differ), and fly for longer in the day and on colder days than honeybees, and so can access more different types of flowers. They are large and furry and so carry pollen well. The long-tongued species are the main pollinators of day-flowering tubular flowers including legumes.

Solitary bees range from oligolectic species that only visit one or few flower types to polylectic species that will visit a range of flower types. The larger species can travel 1 km or more from their nest site but the smaller

[7] Vanbergen, A.J. (2017) A potential EU framework for pollinator monitoring? Presentation at KIP-INCA workshop 23 October, DG Environment, Brussels

species are likely to remain within a few hundred metres of their nest (Zurbuchen et al, 2010). The larger polylectic species that carry pollen on their whole bodies can be better pollinators than honeybees and bumblebees e.g. for apple and plum flowers.
Hoverflies (Syrphidae) are important pollinators as adults of many species are completely dependent on nectar and pollen. Unlike solitary bees, the adults are not bound to a particular place and can range widely through the landscape in search of food resources. Other flies can be important pollinators of open flowers, particularly the larger and hairy species, but their roles are still relatively unknown (Orford, Vaughan and Memmott, 2015).
Butterflies only visit flowers for nectar, but they can carry some pollen on face and mouthparts, and their adaptation to very deep flowers makes them key pollinators of a few plant species. Moths are likely to be important pollinators of night-flowering plants but their role is relatively unknown (Ollerton, 2017).
Hairy flower-visiting beetles (e.g. chafers) can act as pollinators, but often in fact damage the flower by eating stamens and stigma, so that no fruit or seed is formed.
Mammals (particularly bats and flying foxes), birds (e.g. hummingbirds), or lizards, are important pollinators of certain flowers in subtropical and tropical environments, but they are generally regarded as playing a marginal role in European environments, although they might be locally important (Ollerton, 2017).

Research groups across Europe are currently investigating crop pollination and ways to increase and embed pollination services in agricultural practices. Added value could come from standardising and quantifying pollination deficit measurements across crops or regions, and from developing evidence-supported recommendations for different stakeholder groups[8].

It is important to distinguish between measures that are narrowly aimed at increasing the volume of crop pollination, which often relies on increased use of managed pollinators, and measures that aim to promote a diverse wild pollinator community in order to provide resilient sustainable long-term pollination, and in order to increase the quality of pollination (Kleijn et al, 2015; Senapathi et al, 2015). The SUPER-B expert network has set itself the research goal of finding out what makes a 'healthy' or resilient bee community in different European countries[9].

There is a need to better understand the relative roles of honeybees versus wild pollinators in relation to crop pollination but also in the context of nature conservation. For example, an important question that is often raised is whether honeybee keeping in protected areas and semi-natural habitats is benefiting biodiversity conservation by promoting pollination of wild plants, or is in fact damaging the wild pollinator communities (see Box 2.2c).

Box 2.2c Competition or synergy between honeybees and wild pollinators?
Promoting beekeeping and bee hives in protected areas raises questions about whether the honeybees are increasing pollination by synergy with wild pollinators, due to their different foraging behaviours and flight temperatures (Brittain et al, 2013), or whether they are potentially damaging the wild pollinator community through competition (Lindström et al, 2016) or disease transfer (Fürst et al, 2014). A recent review concludes that additional research is needed (Mallinger, Gaines-Day and Gratton, 2017). Evidence that honeybee hives result in lower wild bee densities or fewer nesting bee species comes from protected areas with heathland (Hudewenz and Klein, 2013) and scrubland (Torné-Noguera et al, 2016) and from oilseed rape fields (Lindström et al, 2016), though a study that compared different landscapes only found competition in the homogenous landscapes (Herbertsson et al, 2016).

[8] See SUPER-B policy workshop report.
[9] See report from workshop 'Policies for sustainable pollination in Europe' at http://superb-project.eu/documents/3/

Research findings indicate that a complex interplay between pressures (e.g. lack of food sources, diseases, and pesticides) and biological processes (e.g. species dispersal and interactions) at a range of scales (from genes to ecosystems) underpins the general decline in insect-pollinator populations, and therefore interdisciplinary research on the nature and impacts of these interactions is needed to find the most effective measures to tackle pressures (Vanbergen and Insect Pollinators Initiative, 2013). National reviews of the state of knowledge have been published in the UK (Vanbergen et al, 2014) and Denmark (Strandberg et al, 2011), amongst others.

2.3 Raising awareness and improving collaboration

There is rapidly increasing public attention to pollinator issues, reflected by its increasing media presence, but there is still little awareness of the role of wild pollinators and of the need to conserve pollinator diversity to ensure resilient pollination services. Many awareness raising initiatives still focus exclusively on honeybees.

Farmers who are informed about the importance of pollination and pollinators to fruit quality are more likely to take up measures to benefit pollinator populations and reduce pesticide impacts. For example, apple fruit quality and economic value is enhanced by insect pollination (Garratt et al, 2014) and fruit set is highly dependent on wild pollinators (Földesi et al, 2016; Mallinger and Gratton, 2014) as well as honeybees.

This report shows many examples of awareness raising activities by NGOs, citizen groups, foundations, protected areas, and beekeepers. Urban areas have become more important as refuges for pollinators as their abundance in agricultural area has declined (e.g. Baldock et al, 2015). Urban initiatives are also important for the numbers of people they can reach with awareness raising activities, for example influencing private garden and public space management and consumer choices. Some good practices are to include pollinator needs in certifications or standards for public green spaces, set up award schemes or other public recognition of community initiatives that benefit pollinators, and incorporate pollinators and habitat creation in school programmes.

This report shows some examples of public-private partnerships benefiting pollinators (see Box 2.3). Potential partners to engage include: gardening shops and businesses, protected areas, beekeeper associations, large landowners such as water companies, food and drink businesses such as breweries and fruit producers, schools and churches. The Pollinators Network initiative[10] set up by the European Landowners Organisation together with Syngenta has the aim of supporting farmers and landowners to create and maintain field borders such as flowering field margin strips and hedges for pollinators and other biodiversity benefits.

Box 2.3 Examples of public-private partnerships for pollinators mentioned in this report

In Austria, an NGO has set up a partnership with a supermarket chain to fund small projects for pollinators, such as on-farm research into ways to increase the role of pollinators in squash production.

In Flanders in Belgium, an EU-funded project is bringing together fruit farmers with public municipalities and water boards who manage land around the farms to increase flower resources and nesting habitats for wild pollinators that could pollinate the fruits.

[10] http://www.europeanlandowners.org/projects/pollinators-network-iniatitive-pni

In the Netherlands province Zuid-Holland, a public-private partnership between beer brewer Heineken, Wageningen Environmental Research and the provincial government launched a project to build knowledge and practice of bee-friendly landscape management on public and private land.

Road-, railway- and waterway edges representing ecologically important linear elements through intensively used urban areas and agricultural land, and public green spaces in urban areas, can be increasingly important as pollinator refuges as the rural landscape has become impoverished. In particular in places where competent authorities and their contractors adopt more ecologically-sound management practices, roadsides can hold a remarkable biodiversity. There are initiatives and strategies at regional and local levels that could be scaled up through networking and trans-border collaborations (see Box 2.4). These are in line with the trend in Europe towards more flexible and networked governance arrangements and self-governance of urban green spaces with more involvement of citizen groups (Buijs et al, 2016).

Box 2.4 Pollinator-friendly management of public green space and infrastructure networks

- Initiatives are providing training for local authority green space managers, and changing procurement policies for green space management to include pollinator actions. In the Netherlands, a project is working with all the Dutch municipalities to improve green area management for wild bees.
- Local councils across Northern Ireland in the UK and in Vorarlberg in Austria are coordinating their actions to create and restore flower-rich habitats.
- In Flanders in Belgium, which has the densest transport network in Europe, the government agency for road transport has conducted a successful pilot of pollinator-friendly roadside management, underpinned by the regional law that sets out rules for ecologically-friendly roadside management.
- Under the England pollinator strategy, large landowners both public and private have initiated land management for pollinators.

2.4 Tackling causes of pollinators decline

Agriculture is a major driver of wild pollinator decline, as stated by the IPBES assessment. The Common Agricultural Policy and particularly rural development programmes can support measures that benefit wild pollinator populations because they:

- *Create and maintain uncultivated patches of vegetation such as field margins with extended flowering periods; plant and maintain hedges, trees and scrub patches that provide flowers, nesting and hibernation habitat*
- *Change and extensify management of grasslands to increase flower abundance*
- *Support diversified farming systems and crop rotations, support organic farming*

There are currently large differences between what Member States' rural development programmes offer in terms of measures and funding that could benefit pollinators. In some regions, there is a strong uptake of support for such measures, for example in Austria, whilst support options and uptake in other regions appears to be low, for example Denmark. Creation of new species rich grasslands and small biotopes and restoration of abandoned or intensified semi-natural grasslands can provide both nesting habitat and foraging for wild pollinators. In arable areas, wild pollinators are likely to benefit most from long-term unploughed fallow that develops a diverse flowering weed cover or from legume crops or other flowering plants that are allowed to flower over a long growing period, and are grown with low inputs, no pesticide use, and are surrounded by permanent field margin habitats that provide suitable nesting and hibernation sites.

A recent meta-analysis of the impacts of agri-environment measures on pollinator taxa (Scheper et al, 2013) concluded that small-scale habitat creation practices enhanced pollinator richness, but their effectiveness varied with (1) the magnitude of increase in flowering plant cover resulting from the practices, (2) farmland type, and (3) landscape context, as they were more positive in structurally simple (but not completely cleared) landscapes (1-20% semi-natural habitat) than in landscapes with over 20% semi-natural habitat. The quality and persistence of the flowering plant cover depends on successful establishment and management, and farmer experience and training has a strong positive effect on the quality of pollen and nectar habitat produced (McCracken et al, 2015). There is now substantial expertise and guidance available amongst and for farmers, that could be replicated (e.g. Nowakowski and Pywell, 2016).

EU-level action could stimulate and synthesise assessments of the impacts of CAP-funded measures on wild pollinators, as well as of the measures targeted at apiculture. For example, the BINATS 2 project in Austria will assess the impact of selected agri-environment measures on wild bee diversity using field surveys. More information and evidence is needed on which actions create a long-term pollinator population increase rather than simply shifting pollinators around in the landscape. There is also a need to test at what spatial scale action is needed – for example, does it require farmers to collaborate across a farming landscape?

A recent Commission review of Member State policies to encourage the sustainable use of pesticides (DG SANTE, 2017) concludes that implementation of IPM is certainly insufficient to achieve the environmental and health improvements that are the aim of the Directive. Techniques to reduce pollinator exposure could be promoted more, such as low drift spray nozzles or the DroplegUL application technique to apply pesticides in flowering crops below the level of the flowers[11]. There is also substantial scope for measures that support and advise farmers to adopt non-chemical farming practices, including insurance schemes (Underwood and Mole, 2016). Some cities and regions are pro-actively banning the use of pesticides in public green spaces, which will reduce exposure of pollinators to insecticides and fungicides in urban areas.

There is increasing scientific evidence that wild bees are negatively affected by certain insecticides and fungicides, particularly neonicotinoids, through persistent sublethal effects that are not being picked up by current environmental risk assessments of pesticides (e.g. Rundlöf et al, 2015; Sgolastra et al, 2017; Stanley and Raine, 2016; Woodcock et al, 2017). Wild bees are exposed to mixtures of pesticides that might have more pronounced effects in combination (Botías et al, 2017; Sgolastra et al, 2017). The EFSA risk assessment guidance on bees has not been officially adopted by Member State representatives in the Standing Committee on Plants, Animals, Food and Feed, so application in Member States varies. Current approaches to risk assessment in bees do not take into account co-exposures from multiple stressors. Research is ongoing to develop and implement more rigorous environmental risk assessment methods for impacts of pesticides on honeybees and wild bees, and EFSA is calling for collaborative action at the EU level to establish a common and

[11] ELO at http://www.europeanlandowners.org/images/Bee_Award/European_Bee_Award_CS_171.pdf

open access database on bee risk assessment methods to serve multiple purposes and different stakeholders (Rortais et al, 2017). The Bee Life European Beekeeping Coordination[12] is a non-profit organisation set up by beekeepers to bring together policy, science and field expertise on bee health and toxicology. They issue regular statements and reports criticizing the influence of the pesticide industry on pesticide risk assessment for bees.

The European Commission are proposing a permanent ban on the use of the neonicotinoids imidacloprid, clothianidin and thiamethoxam for all uses except crops in permanent greenhouses, based on EFSA assessments of the weight of evidence of their likely negative impacts on wild bees[13]. However, a number of Member States are currently using emergency authorisations to allow the continued use of the banned neonicotinoids.

Most Member States have improved their provision of advice and information to beekeepers, and increased research and surveillance of honeybee pests and diseases in response to the reports of increased honeybee colony losses. However, some are still developing their systems and do not yet have effective controls in place, and more could be done to encourage effective implementation of the EU requirements and recommendations on bee health[14]. The EU ALARM and BEEDOC projects developed useful tools and methods. It is likely that honeybee pests and diseases are having negative impacts on wild bees (Tehel, Brown and Paxton, 2016), so improvements in honeybee health will also benefit wild pollinators. Member States also need to develop effective surveillance and rapid eradication plans for the invasive alien species most likely to damage honeybees (and also wild bees), notably the Asian Hornet and the Small Hive Beetle. For example, the UK is promoting its rapid eradication plans and an id app for reporting citizen sightings.

Honeybee colonies make up the majority of managed and traded pollinators, but the bumble bee species *Bombus terrestris* (including the sub-species *audax* and *canariensis*), and the solitary bee *Osmia rufa*, and to a limited extent *Osmia cornuta*, are also commercially reared in Europe to provide crop pollination. It is likely that the trade in commercially produced honey bees and bumblebees has increased parasites in wild bumblebees (Graystock, Goulson and Hughes, 2014). The risk of new pests and pathogens being introduced is addressed by three EU regulations[15].

The EU Bee Partnership is expected to be up and running in 2018 as a platform run by stakeholders for the benefit of stakeholders to ensure that honeybees, and eventually other pollinators, can thrive and prosper in Europe. The European Food Safety Authority has set up a stakeholder discussion group on bees which will establish the terms of reference for the partnership[16].

[12] https://www.bee-life.eu/
[13] The overall assessment is to be published in November 2017.
[14] See for example the Opinion of the Committee on the Environment, Public Health and Food Safety of the European Parliament on prospects and challenges for the EU apiculture sector dated 24.10.2017 available at http://www.europarl.europa.eu/committees/en/envi/opinions.html
[15] Council Directive 92/65/EEC, Commission Decision 2006/855/EC, Commission Regulation (EU) 206/2010
[16] See http://www.efsa.europa.eu/en/press/news/170920

2.5 Key opportunities and gaps at the EU level

There is now a much higher level of public awareness and scientific and practical knowledge of the significance and situation of wild pollinators in rural and urban areas of Europe than when the EU Biodiversity Strategy 2020 was launched, and a willingness to engage. Coordinated national strategizing and action planning can bring the advantages of the exchange of best-practice; to increase awareness of action on other regions, increase inspiration, and reuse successful strategies. Better EU coordination can ensure an exchange of best-practice and map opportunities for cost-effective approaches across key policies, including the shift from potential incoherencies and conflicts towards synergies. A strong integrated approach would facilitate coherent and focussed EU action for addressing pollinator declines.

3 Austria

3.1 Description of initiative and funding sources

No national or regional pollinator strategies were identified. At national level, the ministry of land, forestry and environment (BMLFUW) is responsible for the Austrian biodiversity strategy to 2020[17], the state forest area, and the rural development funding programme, whilst the federal states have responsibility for nature conservation policy implementation. Honeybee health is within the responsibility of the government agency for health and food safety (AGES[18]). The Austrian Biodiversity Strategy 2020+ sets a national target of increasing the number of honeybee colonies to 400,000 by 2020, but does not set any targets for wild pollinators.

Numerous NGO and local authority–run projects raise awareness of the value of wild pollinators and promote the creation of more flowering areas in urban and rural regions.

3.2 Research and monitoring

Monitoring

- The citizen science platform Naturbeobachtung.at[19] provides a bumblebee identification service and collects bumblebee species reports. The occurrence records are georeferenced and the photos validated by experts, which makes the data useful for monitoring[20].
- The Austrian state forests, which include a tenth of the total forest area, carried out identifications of the wild bee fauna at various sampling sites in 2016, and are now developing recommendations for forest managers[21].

Research

A number of Austrian universities are carrying out research into land use/ land management and its impact on wild pollinators, including:

- A 3-year research project surveying biodiversity in the agricultural landscape (habitat features, vascular plants, grasshoppers, butterflies, wild bees)[22]. It will assess the effectiveness of selected agri-environment measures on wild bee diversity.
- Projects on biodiversity-based ecosystem services in vineyards[23], global change in the alps and pollination[24], plant-pollinator functional responses to altitude and climate change[25], grassland re-establishment and wild pollinators[26].

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[17] Biodiversitäts-Strategie Österreich 2020+ at http://www.umweltbundesamt.at/umweltsituation/naturschutz/biolat/biodivstrat_2020/

[18] Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH

[19] Naturbeobachtung.at at http://www.naturbeobachtung.at/platform/mo/nabeat/bombus/home.do;jsessionid=F40F8D80930B8D534CACEE93A55DD11B

[20] For example, in 2013 over 5000 occurrence records were submitted, of which at least 4000 are valid records. Personal communication 18 Oct 2017, Johann Neumayer, Naturbeobachtung.at

[21] Personal communication 18 Oct 2017, Johann Neumayer, Naturbeobachtung.at and Dr. Bärbel Pachinger, Universität für Bodenkultur

[22] BINATS 2 project at https://forschung.boku.ac.at/fis/suchen.projekt_uebersicht?sprache_in=en&menue_id_in=300&id_in=11362

A 3 year research project on honeybee health[27] carried out by Graz University with AGES is researching the causes of honeybee deaths. AGES is monitoring and researching honeybee exposure to neonicotinoid insecticides[28] [29] and the occurrence of bee losses in maize and rapeseed and possible connections with bee diseases and the use of plant protection products[30]. The Austrian beekeepers association promotes research into new methods to reduce honeybee diseases[31].

3.3 Raising awareness and improving collaboration

- A project run by the NGO Naturschutzbund[32] is encouraging the creation and maintenance of flowering margins and fields, and citizens have recorded nearly 800 ha in an online database up to this time. They also organise events, a meadow competition, training days for local authorities, land managers and gardeners, and training for farmers and other land managers, funded by the Bienenschutzfonds. Projects with schoolchildren involve for example planting early spring flowers. They run wild pollinator identification courses and courses targeted at squash growers in how to promote and rear bumblebees for crop pollination.
- The network flowering landscapes in the federal state Vorarlberg[33], a collaboration between the regional government, NGO and beekeepers, is carrying out awareness raising activities (presentations, events, website, media releases) and training and information materials for use by the network partners and other local groups. It is also building up a network of local expertise e.g. in businesses selling native and local seeds, farm advisors, and other land managers.
- An EU-Interreg funded project[34] has financed the establishment of two wild pollinator visitor centres in protected areas in the federal state Salzburg, which now offer week-long wild pollinator identification courses for specialists and 1 or 2 day courses for the interested public. A state-sponsored nature excursions programme in the federal state Oberösterreich offers wild bee excursions[35].

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[23] VINEDIVERS at https://forschung.boku.ac.at/fis/suchen.projekt_uebersicht?sprache_in=en&menue_id_in=300&id_in=10428

[24] ILEN (Healthy Alps) project at https://forschung.boku.ac.at/fis/suchen.projekt_uebersicht?sprache_in=en&menue_id_in=300&id_in=10470

[25] At https://www.uni-salzburg.at/index.php?id=41115

[26] At https://forschung.boku.ac.at/fis/suchen.projekt_uebersicht?sprache_in=en&menue_id_in=300&id_in=10471

[27] Zukunft Biene at http://www.zukunft-biene.at/

[28] CIFT-HOBIENEXPO at https://www.ages.at/download/0/0/2acb00e8e0f7c6477a511b052482ab4985d771fb/fileadmin/AGES2015/Themen/Umwelt_Bilder/Bienen/Monitoringprojekt_Bienen_Abschlussbericht_2012.pdf

[29] Bienexpo 13 at https://www.ages.at/fileadmin/_migrated/content_uploads/v1-Abschlussbericht_Bienenexposition-Ueberwachungsprogramm_2013__Bienexpo_13_.pdf

[30] MELISSA project at https://www.slideshare.net/agesnews/ages-project-melissa-bee-losses-bee-diseasespesticides

[31] Biene Österreich at https://www.biene-oesterreich.at/startseite+2500++1000242

[32] Natur Verbindet at https://www.naturverbindet.at/Home/Index/Start

[33] Netzwerk Blühendes Vorarlberg at www.bluehendes-vorarlberg.at

[34] Wild und Kultiviert at www.wildundkultiviert.at

[35] Veranstaltungsreihe Naturschauspiel Oberösterreich at http://naturschauspiel.at/naturschauspiele/item/441-mission-wildbiene-638113

- The Bienenschutzfonds funds small projects for pollinators, financed by the supermarket chain Hofer and the NGO Naturschutzbund[36]. It supports research into the role of pollinators in squash production (used to make pumpkin seed oil), including on-farm trials of reared bumblebee nests and flowering plant strips.
- Footpaths are being signposted as bee learning paths in many areas, usually on the initiative of beekeepers and focused on honeybees, but a few also inform about wild pollinators[37]. A number of businesses promote beekeeping and wild bee hotels[38], and supermarkets in Austria promote honeybees and organic honey as consumers are sensitive to the quality of honey and the value of bees[39].
- Within the national biodiversity campaign "vielfaltleben", beekeepers cooperate with stakeholders, for example placing beehives in prominent urban locations to raise awareness[40].
- A project executed by "ARCHE AUSTRIA" with support from BMLFUW aims to protect the "Ur-Biene Braunelle", a regional honeybee variety (*Apis mellifera mellifera*), through education and awareness raising among beekeepers and the preservation and sharing of traditional knowledge[41].

3.4 Tackling causes of pollinators decline

- The agri-environment-climate scheme „Environmentally sound and biodiversity-promoting management" (UBB) funds the obligatory creation of biodiversity areas with seed mixtures of at least 4 insect-pollinated plant species kept for at least 1.5 years with no fertiliser or pesticide use and mown annually, and/ or flowering crops on arable land and/or grassland, on at least 5% of the farm area[42]. This has created nearly 70,000 ha of flowering fallows offering food and habitat for pollinators, 3,000 ha of flowering crops such as legumes and medicinal /aromatic plants, and around 3,300 ha under crop rotation with at least 5 flowering crops (an option developed with beekeepers)[43]. Many farmers are also using the option to comply with greening. All farmers in this scheme must attend training on environmental priorities including biodiversity.
- The agri-environment-climate scheme for nature conservation funded extensive or near-natural management of a total of 72,000 ha of grassland in 2016[44].

[36] Hover and Naturschutzbund Bienenschutzfonds at https://www.projekt2020.at/leuchtturmprojekte/bienenprojekt/neues-vom-bienenschutzfonds.html

[37] For example, the bee learning walk in Seeham at http://naturschauspiel.at/naturschauspiele/item/441-mission-wildbiene-638113

[38] For example, Porr Group at https://www.porr-group.com/konzern/initiativen/beeporr-porr-baut-bienen-ein-zuhause/

[39] For example Spar at https://www.spar.at/de_AT/index/nachhaltigkeit/nachhaltige_produkte/tierwohl/bienenschutz.html

[40] Personal communication 23 October 2017, Gabriele Obermayr, BMLFUW

[41] http://www.arche-austria.at/index.php?id=73

[42] The whole-farm agri-environmental measure „Environmentally sound and biodiversity-promoting management" (Umweltgerechte und Biodiversitätsfördernde Bewirtschaftung von Acker und Grünland) at https://ktn.lko.at/biodiversit%C3%A4tsfl%C3%A4chen-gr%C3%BCnland-fragen-und-antworten+2500+2291153 NB farmers can use the scheme to comply with greening.

[43] Status in 2016. Personal communication 23 October, Elisabeth Süßenbacher, BMLFUW

[44] Status in 2016. Personal communication 23 October, Elisabeth Süßenbacher, BMLFUW

- A group of 18 local authorities in the federal state Vorarlberg have created or restored around 20 ha of flowering areas and are monitoring wild bees on the areas[45]. The network flowering landscapes Vorarlberg is also leading pilot projects to create pollinator habitats in schools and nurseries, orchards, on road edges and along waterways.
- The national railway network has set up a pollinator initiative to maintain bee-friendly areas and set up wild bee hotels[46].
- The Austrian apiculture programme offers technical assistance and training to beekeepers and beekeeper's organisations on combating honeybee pests and diseases, particularly varroasis, and organising transhumance.

3.5 Key successes

- The Austrian agri-environmental programme ÖPUL 2015 is considered to be making a vital contribution to the implementation and maintenance of site-specific and environmentally compatible systems of agricultural management[47]. Around 80% of Austrian farmers are participating in the ÖPUL programme in at least one scheme. The obligatory training associated with the UBB scheme is fostering knowledge and awareness about the importance of agrobiodiversity including pollinators.
- Organic farming is considered to make an important contribution to the conservation of pollinators due to the diverse crop rotations and lack of chemical pesticide use, as well as support for organic beekeeping[48]. Nearly 22% of Austria's agricultural land (approx. 570,000 ha) was managed organically in 2016.
- There is a relatively high public awareness of the value of bees in Austria, which is associated with a high level of citizen engagement in local initiatives. There is also quite strong support for beekeeping with an increasing number of beekeepers[49].
- Businesses and NGOs are collaborating to provide funding for small-scale wild pollinator projects.

3.6 Key gaps

- The Austrian biodiversity strategy does not adequately address wild bees and other native pollinators, and there are no other national or regional strategies addressing wild pollinators.
- Although there is an up to date national check list of wild bee species in Austria[50], and a tradition of publications by hobby entomologists, there is no red list of bees and there has been no systematic scientific analysis of historic changes in the bee fauna, particularly for the unique alpine and pannonic fauna[51].

[45] Wildbieneprojekt with EU funding at https://www.lustenau.at/de/lustenau-bei-wildbienenprojekt-erfolgreich
[46] ÖBB at https://konzern.oebb.at/de/nachhaltigkeit/umwelt/bluehende-landschaften
[47] Personal communication 27 October 2017, Gabriele Obermayr, BMLFUW
[48] Personal communication 27 October 2017, Gabriele Obermayr, BMLFUW
[49] See https://www.parlament.gv.at/PAKT/VHG/XXV/AB/AB_11468/imfname_631269.pdf
[50] Checkliste der Fauna Osterreichs 6 at https://verlag.oeaw.ac.at/Checklisten-der-Fauna-Oesterreichs-No.-6
[51] Personal communication 18 October 2017, Johann Neumayer, Naturbeobachtung.at and Dr. Bärbel Pachinger, Universität für Bodenkultur

- Most awareness raising projects are focused on honeybees, and only a few raise awareness of the significance of wild pollinators, even less of wild pollinators other than bees.
- The draft national action plan on sustainable use of pesticides 2017-2021 (currently in consultation) could be more effective for pollinators by including pollinator impacts in obligatory pesticide user training, digital records and monitoring of pesticide use, and a pollinator impact indicator with monitoring[52].

[52] Biene Österreich position paper at https://cdn.netletter.at/imkerbund/media/download/2017.08.29/1504004417153992.pdf?d=Stellungnahme_zum_Entwurf_NAP_2017-2021__N.pdf&dc=1504004417

4 Belgium

4.1 Description of initiatives and funding sources

The Belgian Federal Bee Plan 2017-2019[53] is aimed at halting the loss of both wild and domesticated pollinators, but its actions are focused on honeybees. The previous plan (2012-2014) did not aim to improve conditions for wild pollinators. Policy competence on most areas of relevance to support wild pollinator conservation in Belgium sits with the regional governments, but there are currently no regional strategies focused on wild pollinators.

A federal task force has been set up to bring together the federal experts responsible for pesticide and biocide regulation, honeybee health, and the promotion of sustainable and pollinator-friendly consumer products[54]. A Bee Working Group has also been set up, made up of scientific experts, civil society organisations, government administrations, universities and associations, to provide the government with expertise on national, European or international research and policy on bees and ecosystem services provided by pollinators[55].

4.2 Research and monitoring

Monitoring

- Red lists of bees in Belgium, Flanders, Wallonia and Brussels are being prepared for publication in spring 2018[56]. A national check list of bees for Belgium has recently been published by the Atlas Hymenoptera team[57].
- There is a butterfly monitoring network in Flanders coordinated by the Flemish government's Institute for Nature and Forest Research (INBO).
- The NGO Natuurpunt and its wild bee and wasp working group *Aculea* have undertaken a number of monitoring studies in Flanders for specific habitats, species and geographic locations[58].
- An explorative study is being undertaken on possible cost-effective methods to improve region-wide monitoring for bees, with financial support from the Flemish ministry for Environment, Nature & Energy.

[53] Le Plan fédéral Abeilles 2017-2019 at https://www.health.belgium.be/fr/le-plan-federal-abeilles-2017-2019

[54] FPS Health, Food Chain Safety and Environment belonging to the DG Environment and the DG Animals, Plants and Foodstuffs, along with the Federal Agency for the Safety of the Food Chain and the Federal Agency for Medicines and Health Products

[55] Groupe de Travail Abeilles coordinated by the Institut royal des Sciences naturelles de Belgique

[56] Natuurpunt Beleidsdossier Bijen - https://www.natuurpunt.be/files/dossieractievoorbijenpdf-0/download?token=qIECFqEU

[57] Rasmont P, Genoud D, Gadoum S, Aubert M, Dufrène E, Le Goff G, Mahé G, Michez D & Pauly P. 2017. Hymenoptera Apoidea Gallica: liste des abeilles sauvages de Belgique, France, Luxembourg et Suisse. Atlas Hymenoptera, Université de Mons, Mons, Belgium, at https://www.dropbox.com/s/4jljx4b2bzppe6h/Rasmont_et_al_2017_Hymenoptera_Apoidea_Gallica_2017_02_16.xlsx?dl=0

[58] http://aculea.be/informatie/voor%20u%20gelezen/np%20rapporten.html

- The federal government is currently working on how to organise a monitoring programme on honeybee health.

Research

- A federally funded research project (2014-2018)[59] is collecting and analysing data on recent changes in wild bee populations in Belgium, in order to assess the different drivers behind the decline and to identify combinations of actions needed to restore pollination service in agro-ecosystems.
- The Atlas Hymenoptera[60] is a biogeographic data base of Hymenoptera in Western Europe, compiled by researchers in Belgium, France, Spain, and Turkey, and maintained by a Professor in Belgium. It contains species accounts, illustrations, bibliography and distribution maps for over 100 genera at the European and global scales.
- A scientific study on selecting honeybees for genetic tolerance or resistance against varroosis is being carried out with government funding until 2018[61].

4.3 Raising awareness and improving collaboration

The bee plan initiated collaboration between the DG Environment, the FPS Health, Food Chain Safety and Environment and the Royal Belgian Institute of Natural Sciences (IRScNB-KBIN) to create awareness tools and training courses to highlight ecosystem services and the role of bees as pollinators. Flyers have been distributed on the risks of biocides for pollinators, gardening for wild bees, and the importance of bee diversity[62].

The Flemish government department of Environment, Nature & Energy organises the 'Week of the Bee' targeting both wild and domestic bees since 2015. The week aims to 1) raise awareness for the problems of the bee and the environment; 2) inspire different societal stakeholders to organise a richer and more diverse environment for humans and bees; and 3) encourage action and behavioural change in favour of bees[63]. The department hold a competition with the Flemish association for public green spaces (VVOG) to reward the most bee-friendly municipality[64].

The Flemish NGOs Natuurpunt and Velt launched a campaign in April 2015 targeted at private gardens, giving away 1000 bee hotels in cooperation with the largest newspaper in Flanders[65].

[59] BELBEES (Multidisciplinary assessment of BELgian wild BEE decline to adapt mitigation management policy) project at http://www.belbees.be/
[60] ATLAS HYMENOPTERA at www.atlashymenoptera.net
[61] VARRESIST project at http://www.honeybeevalley.eu/projectportfolios/bijenpathologie-en-gezondheid/varroa-tolerantie-bij-honingbijen-in-belgi%C3%AB
[62] «La biodiversité en Belgique - Zzzoom sur les abeilles»,
[63] http://www.weekvandebij.be/
[64] https://www.lne.be/beveren-bijenvriendelijkste-gemeente-van-vlaanderen
[65] https://www.natuurpunt.be/nieuws/natuurpunt-en-velt-willen-meer-leven-vlaamse-tuinen-20150413#.Wfrvl2CWytU

Under the previous Bee Plan, various civil society initiatives received funding for awareness raising activities, including the NGOs Loupiote, Natagora and Natuurpunt, trade unions Arbeid & Milieu and RISE & BRISE, and PC Bijen[66].

The projects below also include awareness-raising and collaboration activities.

4.4 Tackling causes of pollinators decline

The Flemish roadside 'network' comprises almost 25000 ha, nearly the size of its protected nature areas, and the Flemish 'roadside act' 1984 sets regional rules for more ecologically-friendly management such as delayed mowing regimes. The Flemish government agency for road transport conducted a successful pilot with pollinator-friendly roadside management.

The Federal Pesticide Reduction Programme (2013-2017) set up a coordinated monitoring of the effects of pesticides on bees[67]. All three regions of Belgium are planning to ban pesticides in public areas, with different timeframes. The Walloon Region aims to have zero pesticide use in amenity areas by 2019 with a gradual phase in of legal restrictions from 2014, building on existing legal restrictions on the use of pesticides in public areas with the exception of certain areas such as cemeteries, railway lines and paved or gravel covered areas[68]. In Flanders pesticide use is prohibited as of 1 January 2015 in places offering a public service to vulnerable groups, including schools, childcare services, hospitals, healthcare institutions, churches[69]. Many towns in the Flanders region have already either gone pesticide free or made significant reductions in the use of pesticides.

Two significant projects are creating pollinator habitat on farms and on public land:

- More nature for strong fruit (Meer natuur voor pittig fruit)[70] is a 1.3 million project, of which 50% co-funded through EU Interreg V (ERDF), is a partnership between 5 (mostly government-funded) regional landscape/nature organisations (3 Flemish, 2 Dutch), the Flemish Province of Vlaams-Brabant and an international research institute for fruit farming based in Belgium. The project, which started in January 2016, focuses on increasing wild bee populations in the border region between Belgium and The Netherlands. The project will work with more than 100 fruit farmers in the region, and land- and water managers around their farms such as municipalities and water boards, to both improve wild bee populations as well as species supportive in pest control such as bats, birds of prey and martens. Moreover

[66] Assessment of the Federal Bee Plan 2012-2014 at http://www.afsca.be/professionnals/publications/assessment-federal-bee-plan/_documents/2015-03-25_plan-abeille-uk_internet.pdf

[67] Le programme fédéral de réduction des pesticides pour la période 2013-2017 at https://www.health.belgium.be/en/sustainable-use

[68] Arrêté du Gouvernement wallon du 11/07/2013 relatif à une application des pesticides compatible avec le développement durable et modifiant le Livre II du Code de l'Environnement, contenant le Code de l'Eau et l'arrêté de l'Exécutif régional wallon du 5 novembre 1987 relatif à l'établissement d'un rapport sur l'état de l'environnement wallon (M.B. 05.09.2013) at http://environnement.wallonie.be/legis/general/dev016.htm

[69] Decision of the Flemish Government of 15 March 2013 laying down detailed rules on the sustainable use of pesticides for non-agricultural and horticultural activities in the Flemish Region. At http://www.zonderisgezonder.be/openbarediensten/Definities_Openbare%20dienst_commerciele%20activiteit_Zorginstellingen_kinderopvang_versie_2014_12_11.pdf

[70] http://www.grensregio.eu/projecten/meer-natuur-voor-pittig-fruit

the project will work on awareness-raising among citizens and encourage them to have bee-friendly gardens. Foreseen measures on farms include placement of >5000 'bee hotels' and natural nesting opportunities in soil, the development of >10ha wild flower fields/rows and almost 15km of flower-rich hedgerows.

- The EU Interreg-funded SAPOLL project[71] is developing a joint initiative for wild pollinators (bees, hoverflies and butterflies) in the border region of France, Wallonia and Flanders. The project is co-funded by the Wallonia regional government, and includes the Provinces of West and East Flanders, all of which manage areas of public land. The project also includes awareness raising activities such as a newsletter, exhibitions and events, and is building up a trans-border network of volunteer pollinator observers. Researchers are carrying out systematic monitoring and evaluation of pollinator populations and pollination services.

4.5 Key successes

- Awareness of wild-pollinators in Belgium has significantly grown in recent years in particular since 2015 with impetus from both public and NGO initiatives and campaigns. Bee hotels have become a common sight and pollinator news finds its way to media and parliament. Citizens and local governments are prepared to act and take their own initiatives.
- On the back of this awareness and the 2015 federal moratorium, local governments are paying significant attention to pesticide-free green area management. This is expected to have a significant positive impact as (small) public green spaces represent a large land use in densely populated Belgium.

4.6 Key gaps

- Despite growing public interest, very few initiatives have been monitored and evaluated for their effectiveness. For example, 44 municipalities committed to at least one local action as part of a bee campaign in Limburg Province[72] but only a few of them used the toolkit of habitat management recommendations to design measures, so only a few of the actions are expected to have significantly benefitted wild bees[73]. It is a challenge to ensure implementation of regional and local plans by the contracting parties[74].
- Agricultural policy and funding opportunities mostly target honeybees and their uptake is low. In Flanders, agri-environment subsidies are available for flower strips, however only 7 ha of the target 1000 ha in the last programming period were realized. Moreover, farmers use standard seed mixes designed for honey bees, whereas wild pollinators require flowering early in the season[75].
- There are best practice examples supporting pollinator-friendly agricultural practices; private gardening choices and management of habitats along linear infrastructures such as roads, rail and waterways, but upscaling is a key challenge.

[71] SAPOLL project at http://sapoll.eu/
[72] At http://www.provinciaalnatuurcentrum.be/wildvanbijen
[73] Personal communication 27 October 2017, J D'Haeseleer - Natuurpunt
[74] Personal communication 27 October 2017, J D'Haeseleer - Natuurpunt
[75] Personal communication 27 October 2017, J D'Haeseleer - Natuurpunt

5 Denmark

5.1 Description of initiative and funding sources

Activities related to pollinators including wild pollinators and managed bees are administered by three government agencies under the Ministry of Environment and Food. The **Danish Environmental Protection Agency (MST)** 'Nature Package'[76] funds initiatives related to nature and biodiversity conservation. The **Nature Agency** is responsible for the management of Danish state land. The **Agency for Agriculture** is responsible for managed bees and beekeeping. The Danish Beekeeping Strategy (2016-2019)[77] aims to help future-proof Danish beekeeping and pollination, including education of the bee industry and beekeepers, communication and research. The focus is honey bees although it recognizes that improving food resources for honeybees will also benefit wild pollinators. It provides the framework for the Danish national beekeeping support programme launched in 2017. An advisory board under Ministry of the Environment and Food provides advice on bee management and beekeeping issues.

5.2 Research and monitoring

- The national checklist of wild bees now includes 286 bee species, but more species will probably be found in the future, as the wild bee fauna in Denmark has never been thoroughly investigated[78].
- An assessment of the threat status of all Danish bees using the IUCN criteria and guidelines is being carried out, based on expert judgements[79]. Danish red lists of bumblebees and butterflies have been published[80]. Researchers in the STEP project documented the long-term decline in certain bumblebee species on the island of Funen since the 1930s (Dupont, Damgaard and Simonsen, 2011).
- A report published in 2011 (Strandberg et al, 2011) assembled the available knowledge on the status of wild pollinators in Denmark and the pollination need of wild plants. The report concluded that, despite many years of research of both pollinating insects and pollinator biology, the knowledge about the status and development of wild pollinators in Denmark, as well as the pollination need of wild Danish plants, is still very limited. Existing research has focused on more exotic species or evolution studies.
- The Agency for Agriculture carries out surveillance of honey bee health, including controls by skilled beekeepers of hives that are being moved or changing owner,

[76] 'Naturpakke' with a total budget of 363.5 million DKK (about €49,000) between 2016 and 2019 at http://mfvm.dk/natur/naturpakke/

[77] 'Biavlsstrategi (2016-2019)' at http://lbst.dk/fileadmin/user_upload/NaturErhverv/Filer/Landbrug/Genetiske_ressourcer/Biavl/Biavlsstrategi_2016-2019.pdf

[78] Madsen et al (2015) Tre nye arter af bier for den danske fauna (Hymenoptera, Apoidea). Ent. Meddr. 83: 21-29.

[79] Personal communication 23 October 2017, Mette Gervin Damsgaard, SVANA (Danish Environmental Protection Agency)

[80] At http://bios.au.dk/videnudveksling/til-jagt-og-vildtinteresserede/redlistframe/artsgrupper/

checks of apiaries around detected outbreaks, and an active surveillance programme for the small hive beetle[81].

5.3 Raising awareness and improving collaboration

- A joint collaboration between the beekeeping sector and the agricultural and horticultural sectors is developing a pollination portal to improve communication between beekeepers and farmers and fruit growers who need pollination services.

5.4 Tackling causes of pollinators decline

- The Nature Package includes a nationally funded grant scheme[82] for landowners since 2017 which will support the creation of hedgerows for shelter and valuable habitats and ecological corridors enhancing biodiversity in open agricultural areas and their management for 5 years. The scheme will include requirements of 25% coverage of flowering plants and bushes valuable to pollinators, types of flowering crops, and installation of wild flower strips.
- The Danish hunting regulation defines habitat improvement requirements on farm estates that seek to release high densities of partridges or pheasants, and since 2017 these include voluntary habitat improvements targeting pollinators, although the actions will remain primarily focused on game birds[83].
- The Danish Nature Agency is carrying out projects to protect pollinators and improve pollinator habitats in Danish state forest[84].
- MST and the national railway (Banedanmark) have entered into a partnership[85] to protect and manage habitats around train stations and tracks in the city of Copenhagen to increase plant species relevant to pollinators as well as wider biodiversity benefits.
- A Danish executive order protects the genetically distinct native brown honeybee variety (*Apis mellifera mellifera*) on the island of Læsø and prohibits beekeeping with any other subspecies.

5.5 Key successes

- As organic production does not use synthetic pesticides it is considered to be more beneficial to pollinators[86]. The Danish Organic Action Plan[87] sets a target to double the organically cultivated area by 2020, which is currently 6% of the farmed area[88].

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[81] American foulbrood (*Paenibacillus* larvae), European foulbrood (*Mellisococcus plutonius*), Small hive beetles (*Aethina tumida*), Tropilaelaps mites (*Tropilaelaps* spp.), and Stonebrood (*Aspergillus* spp.)

[82] Læhegn og småbeplantninger at https://mst.dk/natur-vand/natur/tilskud-til-skov-og-naturprojekter/laehegn-og-smaabeplantninger/

[83] Biotopplaner at https://mst.dk/friluftsliv/jagt/udsaetning-og-indfangning/biotopplaner/

[84] Press release at http://naturstyrelsen.dk/drift-og-pleje/groenne-hensyn/

[85] Part of "natur i byen" project under Naturpakken at http://mfvm.dk/nyheder/nyhed/nyhed/insektsafari-med-miljoe-og-foedevareministeren-og-morten-dd-hansen/

[86] Personal communication 23 October 2017, Mette Gervin Damsgaard, MST (Danish Environmental Protection Agency)

[87] Danish Organic Action Plan at http://en.fvm.dk/fileadmin/user_upload/FVM.dk/Dokumenter/Landbrug/Indsatser/Oekologi/7348_FVM_OEkologiplanDanmark_A5_PIXI_English_Web.pdf

[88] Eurostat organic farming statistics 2015 at http://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics

The Danish Rural Development Programme 2014-2020[89] provides support for organic farming.

- The new hedge creation scheme will benefit pollinators, but the hedges have no legal protection beyond the end of the funding contract[90].

5.6 Key gaps

- No significant awareness raising or communication initiatives were found that address wild pollinators.
- There is a very small number of wild bee experts in Denmark and a significant lack of knowledge on species abundance, distribution and trends.
- Agriculture is by far the dominant land use in Denmark and consequently also the biggest threat to wild bees. Other than the support for organic farming, there are currently few incentives for farmers to create more pollinator habitat.
- The scientific community report that more knowledge is needed about how bees are influenced by human management of the landscape (agriculture, for example), climate change and natural stress factors (diseases, predation and parasitism), and more knowledge about the genetic differences in bee species across Europe is also needed[91].

[89] Landdistriktsprogrammet 2014-2020 at http://lbst.dk/tvaergaaende/eu-reformer/landbrugsreformen-2014-2020/landdistriktsprogrammet-2014-2020/

[90] Personal communication 23 October 2017, Thyge Nygaard, Danish Society for Nature Conservation

[91] Personal communication 23 October 2017, Mette Gervin Damsgaard, MST (Danish Environmental Protection Agency)

6 France

6.1 Description of initiative and funding sources

The national action plan 'France Terre de pollinisateurs pour la préservation des abeilles et des insectes pollinisateurs sauvages'[92] (PNA FTP) was published in 2016 after a public consultation and started in 2017. The plan explicitly targets pollinators as a functional group, including their interdependency with plant communities and other wildlife. The environment ministry is leading the implementation of the plan and provides some funding. A National Committee of stakeholder representatives is supervising the plan implementation[93]. A review of actions for pollinators in France up to 2016 is available (Fondation pour la Recherche sur la Biodiversité, 2016).

Certain bumblebee species are legally protected in the region Île-de-France. Protection areas which allow only the European Dark Honeybee subspecies (*Apis mellifera mellifera*) have been created in several regions[94].

The Plan de developpement durable de l'apiculture (February 2013 to end 2018) aims to improve honeybee health with measures to reduce the impact of pesticides, diseases and non-native species; promote pollinator habitats (notably through the creation of Ecological Focus Areas under Pillar 1 of the CAP); train and facilitate the setting up of new beekeepers; and support research which will assist in the development and re-structuring of French honey production. It is implemented by the agriculture ministry.

6.2 Research and monitoring

- A national check list of wild bees in France has recently been published by the Atlas Hymenoptera team (Rasmont et al, 2017). Check lists of wild bees in Bretagne, Pays-de-la-Loire and Basse-Normandie are also available[95]. A Red List of wild bee species is planned for 2019.
- The Bee Observatory[96] is an association for the observation and protection of wild bees. Since 2016 they have an agreement with the French government[97] to develop a national inventory of wild bee species in France, including a system to accept and verify species records, together with Wallonian universities in Belgium, and an atlas of distribution for all mainland regions (départements). They will also develop internet resources (website and information), an academic journal, and training and awareness raising events aimed at the research community.
- The NGO Opie and the Bee Observatory have elaborated a list of the wild bee species, butterflies and *Zygaena* moth species used to define natural areas of

[92] Available at http://www.insectes.org/opie/pdf/3993_pagesdynadocs570e1d6156925.pdf
[93] With representatives of the environment ministry, agriculture ministry, farming associations, protected area managers, regional and local public administrations, and other civil society groups
[94] e.g. Conservatoire de l'Abeille noire d'Île-de-France (Canif), Conservatoire Pyrénéen de l'Abeille Noire, Conservatoire de l'Abeille noire en Ardèche, en Val de Loire
[95] Available at https://oabeilles.net/listes-departementales-des-abeilles-sauvages-du-bassin-armoricain
[96] Observatoire des Abeilles at https://oabeilles.net/lassociation
[97] Service National du Patrimoine Naturel

ecological, faunal and floristic interest[98] in the Île-de-France region. An atlas of the bumblebees of Nord-Pas-de-Calais[99] is in preparation.

- The national parks collect and publish data on pollinators, for example the National Park of Cévennes monitors butterfly species. Opie have produced wild bee inventories of several protected areas.
- The Spipoll program is a citizen science monitoring scheme of plant pollinator interactions across France[100]. Since its start in 2010 more than 300,000 plant-pollinator interactions have been observed thanks to more than 1300 volunteers[101]. A new website will facilitate collaborative data validation as well as data queries and result presentation for the participants.
- The Observatory of Garden Biodiversity gathers citizen science data on butterflies and on bumblebees[102].
- The Bee Observatory group published a report in 2015 that synthesised the available research on the interactions between domestic and wild bees[103].
- FlorAbeilles[104] project maintains the FlorApis database of photographic documentations of honeybee-flower interactions, submitted by observers and validated by registered experts. Another database is being compiled of published scientific observations of wild bee-flower interactions. In June 2016 data were available on flower interactions of 180 bee species.
- The Pollinéaire project[105] run by the national agriculture research institute INRA with national research funding is developing management strategies to increase the value of linear green spaces associated with transport networks for pollinators.
- The INRA bee pollination and ecology group[106] is researching honeybee pollination of crops, honeybee diseases and pests, disease resistance and genetic diversity, and the impact of pesticides on honeybees and honey.

6.3 Raising awareness and improving collaboration

The first volume of the French assessment of ecosystems and ecosystem services, published in late 2016, was dedicated to pollination[107]. It drew attention to the dependence of French agriculture on pollination, and the monetary value this represents.

[98] ZNIEFF: Zones naturelles d'intérêt écologique, faunistique et floristique

[99] To be published soon by EPF, SENF, GON, CEN, Opie, STB-Matériaux

[100] Initiative of the Muséum national d'Histoire naturelle and the Office Pour les Insectes et leur Environnement with the Fondation Nature & Découvertes and Fondation Nicolas Hulot pour la Nature et l'Homme at http://www.spipoll.org/

[101] Publications of data available at http://www.spipoll.org/publications-scientifiques

[102] At http://obj.mnhn.fr/content/observatoire-de-la-biodiversit%C3%A9-des-jardins

[103] Available at https://oabeilles.net/bibliographie/interactions-abeilles-sauvages-et-abeille-domestique

[104] Initiative of the INRA research group Pollinisation et Ecologie des abeilles at http://www.florabeilles.org/

[105] Potentiel des dépendances vertes d'ITT pour la Préservation et la Dispersion des Pollinisateurs Sauvages, project funded by IFSSTAR under the ITTECOP programme at http://www.ittecop.fr/index.php/recherches-cat/47-recherches-2014/130-pollineaire

[106] INRA research group Pollinisation et Ecologie des abeilles at https://www6.paca.inra.fr/abeilles-et-environnement/Projets/Nationaux

[107] Available at https://www.ecologique-solidaire.gouv.fr/sites/default/files/Th%C3%A9ma%20-%20Efese%20-%20Le%20service%20de%20pollinisation%20-%20Analyse.pdf

Some examples of awareness raising and collaboration initiatives:

- A national flower meadow competition held since 2010, steered by the permanent assembly of chambers of agriculture and partners, awards meadows across France that have notable species richness and also provide high quality agricultural products[108].
- The Agrifaune programme trains and raises awareness among farmers for more environment-friendly practices including for pollinators. The programme is run by the regional committees of agriculture, the national hunting and wildlife agency, and the national hunter federation.
- The Bee Observatory Apiformes network integrates learning on pollinators and their requirements into 25 agricultural high schools[109]. Opie run workshops for the agriculture academy. The ministry of agriculture technology network pollination working group is developing management practices and agricultural systems that benefit pollinators[110].
- The LIFE-funded project URBANBEES (2010-2015)[111] developed an action plan for wild bees in urban areas, and tested and adapted it in the urban region of Lyon. It included abundance monitoring of wild bees in the urban environment (Fortel et al, 2014), the testing of nesting devices (Fortel et al, 2016), changes to the conventional management of parks and other green spaces to favour the return of native local plants and animals, and methods to tackle invasive alien species. The project produced a management guide for how to conserve wild pollinators and other nature in towns and cities[112], and a touring exhibition.
- The NGO Opie runs a professional training programme on wild pollinator identification (Hymenoptera, Lepidoptera, Syrphidae) and regularly gives seminars to university students on wild pollinators and pollination and the national action plan. Opie have run workshops on the national action plan for national protected area managers.
- Recommendations on sourcing planting material of wild native species of local origin were published by the national federation of botanical gardens in 2017[113]. However, a list of 200 horticultural plants attractive to pollinators produced in the framework of the national apiculture plan and the agroforestry development plan in 2017 failed to get endorsement from the ministry of ecology because of the inclusion of invasive alien species.
- A number of private companies have environmental committees who work on the topic of pollination and raise awareness of employees on site or off site, for example in schools[114].

[108] See http://www.concours-agricole.com/concours/les-prairies-fleuries/
[109] See https://oabeilles.net/projets/reseau-apiformes
[110] See http://www.rmt-biodiversite-agriculture.fr/moodle/course/view.php?id=13
[111] LIFE08 NAT/F/000478 available at http://www.urbanbees.eu/
[112] Available at http://www.urbanbees.eu/sites/default/files/ressources/guide_bonnesPratiques.pdf
[113] Prescriptions techniques sur l'achat de végétaux sauvages d'origine locale. Guide de recommandations at http://www.fcbn.fr/sites/fcbn.fr/files/ressource_telechargeable/guiderecoachatvegetauxsauvages.pdf
[114] Personal communication, Agnes Halloserie, Foundation de Recherche sur la Biodiversité, 9 December 2017

6.4 Tackling causes of pollinators decline

Protected areas, including the Natura 2000 network, cover over 17% of the terrestrial area in France (Underwood et al, 2014), and contribute to the preservation of wild pollinators through the protection of natural habitats and traditional land management practices. National and regional parks, along with the nature conservatories, have a mission to raise awareness on nature issues, and most of them work on the topic of pollinators. The national scale green and blue network of green infrastructure includes habitats which contribute to pollinator conservation. The French rural development programmes offer support for the maintenance of semi-natural flower-rich hay meadows. The national plan for the development of agroforestry is also expected to increase habitats and food resources for wild pollinators on agricultural land.

The national Ecophyto II plan aims to find non-chemical alternatives to pesticides, including funding for research on integrated pest management. The French rural development programmes offer funding for farmers to reduce or stop herbicide use. The agriculture ministry supports conversion from conventional to organic farming, which is currently carried out on 22% of the farmed area in France.

Some national and regional initiatives:

- A regime of late mowing of road verges and green spaces was adopted on the national road network in 2016. This was the principal recommendation of a national study on management techniques for supporting pollinators on road verges (Chagué and Bagnis, 2014).
- The national union of aggregates producers (UNPG) have produced a guide to managing sand quarries to benefit solitary bees[115].
- The national electricity grid[116] is integrating pollinator insects into its guidance and training.
- The Centre for Studies and Expertise on Risks, Environment, Mobility and Development[117] will integrate pollinator insects into its guidance and training for public services by the end of 2018.
- The Departement of Nord-Pas-de-Calais and the Conservatoire d'éspaces naturels Nord-Pas-de-Calais are taking part in the EU-funded SAPOLL project to improve management of public land for pollinators, with co-funding from the Region Hauts-de-France (see Belgium description for more details). The Nord – Pas-de-Calais public land office[118] has adopted a set of good practices for managing urban brownfield sites for pollinators (Guillaume, 2016).

6.5 Key successes

- The Ecophyto II target of reducing pesticide use by 25% by 2020 (measured in weight) is expected to drive reductions in herbicide use in the next years. From 2017

[115] Les carrière de sable: une opportunité pour les abeilles solitaires at http://www.unpg.fr/wp-content/uploads/les-carrieres-de-sables-une-opportunite-pour-les-abeilles-solitaires.pdf
[116] Réseau de Transport d'Electricité RTE
[117] CEREMA: Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement
[118] Etablissement Public Foncier

onwards, pesticide use will be progressively banned in all publicly accessible green spaces.

- French stakeholders, including businesses and public authorities (protected area managers, cities or administrative units), are performing well in promoting pollinator friendly habitats, especially through the maintenance of flowering meadows, flowering field edges and implementing rotational mowing to increase food and nesting resources for pollinators. Pollinator-friendly habitats are also being promoted in urban areas.
- Several national and regional parks have adopted specific measures to promote pollinators, such as habitat restoration, and defined requirements for honeybee hive siting to avoid competition pressure between managed and wild bees.
- Local versions of the national action plan for wild pollinators are being implemented or are envisaged in the regions of Nouvelle Aquitaine, Centre Val de Loire, Pays de la Loire, Alsace, Grand Est/Lorraine, Haute-Loire, and Auvergne.

6.6 Key gaps

- Pesticide use in France is still at a high level. The second Ecophyto plan was launched in 2015 with revised pesticide use reduction targets, as the first Ecophyto plan was not likely to be on track by the 2018 target.
- National government funding is not considered to be sufficient to achieve the goals of the national action plan on wild pollinators[119].
- There are still many knowledge gaps about wild bee species and their food and nesting habits, for example the impact of tillage on ground-nesting bees. Pollinators in the French overseas territories are poorly studied.
- Forest managers could improve their management practices for wild pollinators, to increase flower richness in edges and rides and dead wood for nesting (wild bees) or breeding habitat (hoverflies)[120].
- The status of the native honeybee subspecies in France is under threat from the Varroa mite and invasive species such as the Asian hornet.

[119] Personal communication, Serge Gadoum, Opie, 7 December 2017
[120] Personal communication, Agnes Halloserie, Foundation de Recherche sur la Biodiversité, 9 December 2017

7 Germany

7.1 Description of initiatives and funding sources

The German government's Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and Federal Ministry of Food and Agriculture (BMEL) are running awareness campaigns and funding pollinator initiatives as part of the national biodiversity strategy.[121] The BMEL and the Federal Office for Agriculture and Food (BLE) have funded 22 R&D projects for pollinators so far totaling around €15 million.[122] Other key initiatives have been set up and driven by private foundations and NGOs. Wild bee nest sites are the subject of legal protection in Germany, although the law is not applied to most construction or maintenance activities[123].

The NGO BUND (Friends of the Earth Germany), in collaboration with the Aurelia Foundation, have drawn up and funded a 'National Action Plan for Bees' which they aim to present to the German government. The main aims of the action plan are to protect pollinators from pesticides, to protect, restore, and create habitats for pollinators, to remodel agricultural policy so that it works with nature, to reform the approval procedure for pesticides, and to intensify further education and research about pollinators.[124]

7.2 Research and monitoring

The latest German red list of bees, published February 2011[125], indicates that nearly 50% of the 557 assessed bee species are endangered whilst 2.5% are too data deficient to be categorised. The Stuttgart Entomological Society expert work group Wildbienen-Kataster[126] has created and maintains a database and checklist of all wild bee species in Germany.

Butterfly monitoring is carried out by volunteers coordinated by the Helmholtz Centre for Environmental Research (UFZ) together with the Society for Butterfly Conservation (GfS) since 2005, with publications of species trends since 2012.[127]

Several initiatives are working to improve knowledge of wild bees in Germany and to establish systematic wild pollinator monitoring programmes:

- The BienABest wild bee protection initiative[128] is developing a method of live identification of as many wild bee species as possible, standardised according to

[121] 'Strategy on Conservation and Sustainable Use of Biodiversity for Nutrition, Agriculture, Forestry and Fisheries' at https://genres.de/3/agrobiodiversity/regulatory-framework/

[122] Personal communication, 06/10/17, Björn Ingendahl, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

[123] Gesetz über Naturschutz und Landschaftspflege (Bundesnaturschutzgesetz – BNatSchG) at http://www.wildbienen.de/wbs-gese.htm

[124] https://www.bund.net/umweltgifte/pestizide/bienen-und-pestizide/bienenaktionsplan/

[125] Rote Liste und Gesamtartenliste der Bienen (Hymenoptera, Apidae) Deutschlands at http://www.wildbienen.info/rote_listen/rote_liste_d1.php

[126] http://www.wildbienen-kataster.de/. NB The database (Arteninfo) works best on Internet Explorer.

[127] 'Tagfalter-Monitoring Deutschland' at http://tagfalter-monitoring.de/

national guidelines, and training young scientists to apply these methods. The project is coordinated by the Association of German Engineers (VDI) and Ulm University, and funded by the government through the Federal Agency for Nature Conservation (BfN) from May 2017 to 2023.

- Wild bee population monitoring in Hamburg started in 2016 and will continue to 2020 supported by the University of Hamburg. The data will be used to create the first Red List of wild bees in Hamburg.[129]
- The Institute for Bee Protection was set up by BMEL in 2016 to investigate risks to honeybees and wild bees including pesticides, as well as how the design of agricultural and urban landscapes affect bee health and productivity.[130] The German government hosted an EU workshop to discuss the risks of neonicotinoids to bees.[131]
- The government-supported National Reference Laboratory of Bee Diseases is responsible for the coordination of bee disease diagnosis standards and methods.[132] One scheme is monitoring honeybee disease frequencies in beehives and building a database.[133]

7.3 Raising awareness and improving collaboration

- Deutschland summt! – Wir tun was für Bienen[134] is an initiative active in 17 cities supported by a foundation with various partners. The Bavarian State Ministry for Environment and Consumer Protection are now funding Bayern summt! The aims of this initiative are to increase awareness of bees and people's dependence on them for a functioning ecosystem, and to make city habitats more suitable for honeybees and wild bees. Awareness-raising is mostly aimed at inhabitants of towns and cities and includes websites with information on honeybees and wild bees, an information pack for schools and nurseries[135], a national plant competition[136] to encourage the planting of bee-friendly plants, and wild bee show gardens and information stands at public events[137].
- The BienABest project is promoting the benefits of wild bee biodiversity and raising awareness of actions for their protection among the general public, including on social media to reach young people.

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[128] 'BienABest: Standardised monitoring of wild bees for the evaluation of their potential as pollinators in the agricultural landscape' at http://www.bienabest.de/index.php?id=59035

[129] Funded by Deutsche Wildtier Stiftung at https://www.deutschewildtierstiftung.de/aktuelles/erste-volkszaehlung-unter-wildbienen-in-einer-metropole

[130] At https://www.julius-kuehn.de/bienenschutz/

[131] Personal communication, 06/10/17, Björn Ingendahl, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

[132] At https://www.fli.de/de/institute/institut-fuer-infektionsmedizin-imed/referenzlabore/oie-und-nrls-fuer-bienenkrankheiten/

[133] 'DeBiMo: Deutsches Bienenmonitoring' at https://bienenmonitoring.uni-hohenheim.de/startseite

[134] Deutschland summt! – Wir tun was für Bienen at http://www.deutschland-summt.de/

[135] 'Bienenkoffer' at http://www.bienenkoffer.de/

[136] 'Wir tun was für Bienen' at https://wir-tun-was-fuer-bienen.de/home.html

[137] At http://www.deutschland-summt.de/events.html

- The NGO BUND is running an initiative which includes information leaflets on bees and provision of flower seeds to create 'bee oases', and an appeal to the public to ask politicians to support the proposed National Bee Action Plan.[138]
- The work group Wildbienen-Kataster runs the 'Wild Bee of the Year' campaign, public excursions and a citizen science project mapping the Violet Carpenter Bee (*Xylocopa violacea*) and the Large Scabious Mining Bee (*Andrena hattorfiana*).[139] With the city of Crailsheim it promotes the creation of bee habitats in private gardens.[140]
- The work group Projekt Wildbienenschutz is an initiative to increase awareness of wild bees, bumble bees and hornets via the project website, talks and exhibitions.[141]
- The German ministry BMEL has launched an awareness campaign with German garden centre businesses to raise awareness of bee-friendly balcony and garden plants, focused on honeybees.[142]

7.4 Tackling causes of pollinators decline

Many awareness campaigns (see above) encourage bee-friendly planting in urban areas. A number of the German agri-environment schemes include options for annual flowering plant strips. Projects creating pollinator-friendly habitats with farmers include:

- The Netzwerk Blühende Landschaft network[143], set up by the Mellifera e. V. beekeeper association, has acquired funding for numerous model projects to create pollinator-friendly habitats with farmers, local authorities and beekeepers. The network and two research institutes assessed the Baden-Württemberg federal state agri-environment programme in 2010 for pollinator benefits, and proposed improvements.[144]
- An initiative in the Rhine valley region ('Summendes Rheinland') run by a foundation since 2013 is encouraging farmers to improve pollinator habitats by planting summer cover crops as nectar and pollen sources.[145]
- BienABest will create wild bee foraging and nesting habitats in agricultural landscapes.[146]

[138] 'A Place to Bee' at https://aktion.bund.net/a-place-to-bee

[139] Personal communication, 02/10.17, Hans Schwenninger, Wildbienen-Kataster

[140] 'Stadtbienen-Projekt Förderung von Wildbienen' at http://www.wildbienen-kataster.de/login/downloads/Arbeitsblatt_Wildbienenschutz.pdf

[141] 'Projekt Wildbienenschutz' with funding from the online nature protection shop 'Naturschutzcenter' at https://www.wildbienenschutz.de/

[142] 'Jetzt Bienen füttern!' at https://www.bienenfuettern.de/

[143] Netzwerk Blühende Landschaft at http://www.bluehende-landschaft.de/nbl/nbl.2/index.html

[144] http://www.bluehende-landschaft.de/nbl/nbl.2/nbl.2.2/index.html

[145] 'Summendes Rheinland – Landwirte für Ackervielfalt' run by Stiftung Rheinische Kulturlandschaft as a subproject of 'Lebendige Agrarlandschaften – Landwirte gestalten Vielfalt!' at http://www.rheinische-kulturlandschaft.de/themen-projekte/kulturlandschaft-erhalten-und-foerdern/summendes-rheinland-landwirte-fuer-ackervielfalt/

[146] At http://www.bienabest.de/index.php?id=59035

7.5 Key successes

- The Summendes Rheinland pollinator habitat creation initiative is locally restricted but recognised as an exemplary project.[147]
- Standardised wild bee identification methods are being developed under BienABest and the Wildbienen-Kataster provides a publicly available database of all wild bee species in Germany.
- Campaigns such as Deutschland summt! and Projekt Wildbienenschutz are keeping up the German public's interest in pollinators.

7.6 Key gaps

- Most initiatives have an emphasis on honey bees rather than wild pollinators.
- As there is currently no national population monitoring of pollinators, it is not possible to say whether initiatives are playing a role in increasing pollinator populations.
- The National Bee Action Plan is awaiting a response from government and it is unknown when, if or to what extent it would be implemented.
- There is a shortage of wild bee experts in Germany, though this could be addressed through BienABest training courses.

[147] http://www.rheinische-kulturlandschaft.de/themen-projekte/kulturlandschaft-erhalten-und-foerdern/summendes-rheinland-landwirte-fuer-ackervielfalt/

8 Ireland and UK Northern Ireland

8.1 Description of initiative and funding sources

The All-Ireland Pollinator Plan[148] (AIPP) was initiated by a multi-stakeholder steering group and published by the National Biodiversity Data Centre (NBDC). It was supported by 68 governmental and non-governmental organisations from the Republic of Ireland and the UK region of Northern Ireland and launched in September 2015. The Pollinator Plan identifies 81 actions under 5 main objectives:

- Making farmland, public land and private land in Ireland pollinator friendly
- Raising awareness of pollinators and how to protect them
- Managed pollinators – supporting beekeepers and growers
- Expanding our knowledge on pollinators and pollination service
- Collecting evidence to track change and measure success.

This is a partnership initiative developed by the Steering Group without funding and implementation is coordinated by the NBDC. Partner organisations have signed up voluntarily, acknowledging the lack of public funding. Since 2016, the Heritage Council and Bord Bia (Irish Food Board) have funded a full-time project officer position and the Department of Agriculture, Food and the Marine has provided a small budget for the development of resources.[149]

The Irish government's National Biodiversity Action Plan 2017-2021[150] aims to implement the All-Ireland Pollinator Action Plan and supports its business and farm guidelines as part of objectives 1 and 4.[151] The Plan has been incorporated into the Biodiversity Strategy for Northern Ireland to 2020.[152]

8.2 Research and monitoring

The Regional Red List of Irish Bees produced in 2006 identified 30 threatened bee species, 3 regionally extinct species, and 16 data deficient species out of a total of 99 assessed species on the island of Ireland.[153]

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[148] At http://www.biodiversityireland.ie/projects/irish-pollinator-initiative/all-ireland-pollinator-plan/

[149] At http://www.biodiversityireland.ie/wordpress/wp-content/uploads/All-Ireland-Pollinator-Plan_progress-report-year-1_Dec-2016.pdf

[150] At https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

[151] Objective 1: Mainstream biodiversity into decision-making across all sectors; Objective 4: Conserve and restore biodiversity and ecosystem services in the wider countryside, as part of the National Biodiversity Action Plan 2017-2021 at https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

[152] At https://www.daera-ni.gov.uk/sites/default/files/publications/doe/natural-policy-biodiversity-strategy-to-2020-2015.pdf

[153] At https://www.npws.ie/sites/default/files/publications/pdf/Fitzpatrick_et_al_2006_Bee_Red_List.pdf

The NBDC established the All-Ireland Bumblebee Monitoring Scheme[154] in 2011 as the main component of its Irish Pollinator Initiative and in coordination with the Bumblebee Conservation Trust in Northern Ireland (Box 8.1). The NBDC has also established a solitary bee monitoring scheme which asks participants to register sites with group nesting species and count the number of active nest holes once a year.[155] The NBDC hosts a website where members of the public can record sightings of pollinator species including bumblebees, hoverflies and solitary bees[156].

Box 8.1 All-Ireland Bumblebee Monitoring Scheme

Bumblebee populations are monitored on over 100 sites by a network of volunteers across the island of Ireland. Volunteers record observed bumblebees once a month from March to October on a 1-2km transect which they select themselves. Coordinated by the National Biodiversity Data Centre. This scheme is run in parallel to the BeeWalk programme run by the Bumblebee Conservation Trust in England, Wales and Scotland.

Research examples:

- Recent research has found that many Irish honeybees are the genetically pure subspecies *Apis mellifera mellifera*, which was believed to have been extinct in Ireland.[157]
- Collaboration between Maynooth University, NUI Galway, Trinity College Dublin and Dublin City University has led to the establishment of a Pollinator Research Network for Ireland.[158] Scientists at Trinity College Dublin have researched the drivers and consequences of pollinator decline in Ireland since 2004.[159]

8.3 Raising awareness and improving collaboration

The AIPP has 3 targets with 11 actions to raise awareness of pollinators and their importance. The targets are supported by the following initiatives:

- An annual public meeting that rotates around the four provinces, to raise awareness, discuss progress and plan for future action. The first was held in Ulster in February 2017, focused on the role of local authorities and of the general public[160].
- The NBDC website has published action guidelines aimed at gardeners, local communities, schools, businesses and councils, and has developed a mapping tool where people across different sectors can log their location and pollinator friendly actions they have taken.[161].

[154] At http://www.biodiversityireland.ie/record-biodiversity/surveys/bumblebee-monitoring-scheme/

[155] At http://www.biodiversityireland.ie/projects/irish-pollinator-initiative/get-involved/solitary-bee-monitoring-scheme/

[156] Ireland's Citizen Science Portal at http://records.biodiversityireland.ie/

[157] Irish Times article at http://www.irishtimes.com/news/environment/the-native-irish-honeybee-is-not-extinct-after-all-1.3243037

[158] At http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Dr-Jim-Carolan_Maynooth-University-Pollinator-research-network-for-Ireland.pdf

[159] Research group of Dr Jane Stout at https://www.tcd.ie/Botany/staff/stout/index.php

[160] At http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Feb_2017-Pollinator-Plan-Event-Programme.pdf

[161] 'Actions for Pollinators' at https://pollinators.biodiversityireland.ie/

- The Tidy Town initiative hosted pollinator awards in 2016 and 2017 to encourage pollinator-friendly actions in towns and villages.[162] Through the Tidy Towns pollinator award, more than 70 local communities in 2017 made their local area more pollinator friendly in line with evidence-based advice from the AIPP.[163]
- In 2017 the Green Flag Awards introduced an award for parks that have especially supported local pollinator populations or promoted their importance.[164]
- A Junior Pollinator Plan[165] for children was published to coincide with an educational pollinator show.[166]
- Laois and Offaly County Councils with support from Creative Ireland launched a project in 2017 to explore Irish pollinators through art[167] and have commissioned a piece of music that includes recordings of Irish pollinators.[168]
- The AIPP in collaboration with Origin Green[169] (the Irish national food sustainability programme) published 'Farmland: actions to help pollinators'[170] in September 2017 aimed at farmers who wish to support pollinators. It has distributed the AIPP business guidelines to all of its 500 participating companies and plans to distribute the farmland guidelines to all Origin Green participating farms.[171]

8.4 Tackling causes of pollinators decline

The AIPP has 10 targets with 42 actions to make Ireland pollinator friendly. These encourage stakeholders responsible for private land, public land and farmland to increase pollinator habitats and nesting and feeding opportunities, for example through the following initiatives:

- In County Fermanagh, Ulster Wildlife is leading an initiative to protect and restore wildflower meadows and grasslands which has already enhanced 32 ha of lowland meadows.[172]
- An Taisce (The National Trust for Ireland) is incorporating pollinators into Green-Schools and Green-Campus initiatives to encourage the pollinator-friendly management of educational properties.[173] [174]

[162] 'Let's Get Buzzing' Local Authority Pollinator Award at http://www.tidytowns.ie/special-award-lets-get-buzzing-local-authority-pollinator-award/
[163] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group
[164] 'The Pollinator Project Award' at http://www.greenflagaward.org/news/increasing-numbers-of-irish-parks-achieve-the-green-flag-award/
[165] http://www.biodiversityireland.ie/projects/irish-pollinator-initiative/all-ireland-pollinator-plan/schools/
[166] 'BEES! A Musical' at http://ark.ie/news/post/junior-pollinator-plan-inspiring-children-to-help-save-bees.
[167] 'National Pollinator Public Art Project' at http://www.laois.ie/wp-content/uploads/Pollinator-art-project-brief-FINAL.pdf
[168] Irish Times article at https://www.irishtimes.com/sponsored/creative-ireland/creating-a-buzz-about-pollination-through-music-1.3182387
[169] https://www.origingreen.ie/for-you/
[170] http://www.biodiversityireland.ie/projects/irish-pollinator-initiative/all-ireland-pollinator-plan/farmland/
[171] Origin Green at https://www.origingreen.ie/sreport2016/Sustainability_Report_2016.pdf
[172] 'Save our Magnificent Meadows' at http://www.magnificentmeadows.org.uk/conserve-restore/county-fermanagh5
[173] http://greenschoolsireland.org/
[174] http://www.greencampusireland.org/

- Causeway Coast and Glens Borough Council (NI) are leading a project which focuses on conserving semi-natural grasslands, especially the management on road verges to make them pollinator-friendly.[175]
- South & East Cork Area Development launched an initiative to create a blueprint for communities on how to create more pollinator-friendly areas.[176]
- Origin Green is working with the AIPP to ensure that evidence-based pollinator actions for farmland contribute towards their sustainability criteria.[177]

Many local authorities are incorporating actions published by the AIPP into their own County Development Plans and are developing their own pollinator plans.[178] Independent local authority initiatives include:

- Wexford County Council launched a campaign in 2014 under the Wexford County Biodiversity Action Plan 2013-218 to encourage planting pollinator-friendly gardens and wildflower meadows[179], and a pilot project to enhance biodiversity along road verges, including wildflowers and associated pollinators.[180]
- A partnership of eight councils across Northern Ireland gained Heritage Lottery Fund support to restore flower-rich habitats to increase food and shelter availability for pollinators.[181] In 2017 the project organised events throughout Northern Ireland to raise awareness of pollinators.[182]
- Waterford City and County Council is developing a Pollinator Plan for a recently opened 46km walking and cycling route across the county.[183] [184]

In agricultural areas:

- The Republic of Ireland Green Low Carbon Agri-Environment Scheme (GLAS) offers two actions to support solitary bees (bee boxes and sand habitats), and other options which have indirect benefits for pollinator nesting and foraging habitats[185].
- The Northern Ireland agri-environment-climate scheme offers an option for sowing 10m wide pollen and nectar margins, as well as wider habitat management options.

8.5 Key successes

- The AIPP addresses all types of pollinators, including solitary bees and hoverflies.

[175] 'Don't mow, let it grow' at http://dontmowletitgrow.com/
[176] 'Wild work' at http://www.wildwork.ie/project/the-pollinator-project/
[177] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group
[178] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group
[179] 'Let's Bee Friendly' at http://www.wexfordtidytowns.com/biodiversity/bees/
[180] 'Life Lives on the Edge' at https://www.wexfordcoco.ie/environment/biodiversity-community-and-schools/life-lives-on-the-edge
[181] 'Bee-licious' at http://biodiversityni.com/bee-licious-helping-our-pollinators
[182] http://biodiversityni.com/wp-content/uploads/2017/04/pollinator-homes-evetns-2017.pdf
[183] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group
[184] http://www.waterfordcouncil.ie/media/press-releases/2017/march/PR-GreenwayOpening.pdf
[185] E.g. arable margins, grey partridge margins, riparian margins, low input permanent pasture, fallow land, wild bird cover and other habitat improving actions

- There are many awareness raising initiatives and these are aimed at different sectors leading to a high public awareness of pollinators. Since publication of the AIPP, the number of partner organisation has risen from 68 to over 80 and participant numbers within each targeted sector are also growing.[186] The Origin Green network has enabled a high dissemination among farmers.
- Strong branding and good coordination between relevant stakeholders of the AIPP has provided structure and avoided confusion. The AIPP has been used as a model for national pollinator plan development in Norway and the Netherlands.[187]
- AIPP sectoral guidelines have evidence-based, clear, low-cost actions, with many options, which can be reported on annually, allowing tracking of implementation over time and recognition of efforts. After one year, 84% of these actions were in train or completed as agreed during 2016.[188]

8.6 Key gaps

- A lack of funding means that the AIPP is unable, with its current human resources, to take full advantage of the momentum and interest that it has generated, and that it is not possible to carry out periodic random systematic national surveys of solitary bees and hoverflies.[189]
- There is scope for more research to develop and expand the range of options offered to farmers and/or improve existing agricultural measures beneficial for pollinators, which could then be supported under rural development programmes in future. There is also a need to increase farmer awareness of the importance of wild pollinators and what actions they can take to benefit them, for example by increasing the abundance of flowering plants on grassland.

[186] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group

[187] http://www.biodiversityireland.ie/wordpress/wp-content/uploads/All-Ireland-Pollinator-Plan_progress-report-year-1_Dec-2016.pdf

[188] Personal communication with Dr Úna Fitzpatrick, 23/10/17, Project co-ordinator: All-Ireland Pollinator Plan

[189] Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group

9 The Netherlands

9.1 Description of initiatives and funding sources

The Netherlands national pollination strategy is expected to be published in January 2018. The strategy focusses on wild bee species, and has been developed together with stakeholders, such as farmers, industry, landscape managing organisations, NGOs, bee-keepers, government bodies, communities and Water Boards. The stakeholders develop their own initiatives that contribute to the quantitative and qualitative goals of the strategy. The main goal is to sustainably stimulate and conserve pollination and pollinators by 2030, with three sub-goals:

- Stimulate biodiversity by citizens, businesses, and government bodies;
- Improve exchange between agriculture and nature and improve habitats for bee species;
- Improve honeybee management practices.

The Dutch 'Action Programme Bee Health'[190] published in November 2013 aims to reduce honey bee mortality and sets targets to 1) reduce impacts of plant protection products; 2) reduce bee diseases and pests; 3) address (insufficient) food supply and biodiversity; 4) improve bee keeping practice. The plan was informed by stakeholder contributions to a public debate in April 2013 on bee decline organised by the Dutch Ministry of Economic Affairs. The programme primarily targets honey bees, but recognizes that reducing pesticide impacts and increasing food supply will have co-benefits for wild pollinators.

The Dutch Nature Conservation Act 2017[191] governs species protection, and the updated list of nationally protected species includes a number of butterflies and dragonflies, but no bees or hoverflies[192]. The Act delegates power for nature conservation to the twelve Provinces, several of which have taken targeted action for pollinators.

Initiatives for wild pollinators are also being taken by stakeholders such as municipalities, NGOs, farming organisations and concerned citizens.

9.2 Research and monitoring

The Dutch Red List for wild bees adopted in 2004 identified 187 of the approximately 360 wild bee species occurring in the Netherlands as threatened[193]. An updated Red List for wild bees is expected to be published in spring 2018, in which again 40-50% of Dutch species will

[190] Actieprogramma Bijengezondheid available at https://www.rijksoverheid.nl/documenten/brieven/2013/11/11/actieprogramma-bijengezondheid

[191] Wet Natuurbescherming available at http://wetten.overheid.nl/BWBR0037552/2017-09-01

[192] http://wetten.overheid.nl/BWBR0037552/2017-09-01

[193] LNV (2004). Besluit van de Minister van Landbouw, Natuur en Voedselkwaliteit van 4 november 2004, nr. TRCJZ/2004/5727, houdende vaststelling van Rode lijsten flora en fauna. Staatscourant 218 (2004). [zoogdieren, vogels, reptielen, amfibieën, vissen, bijen, dagvlinders, kokerjuffers, sprinkhanen en krekels, steenvliegen, libellen, haften, land- en zoetwaterweekdieren, platwormen, vaatplanten, mossen, korstmossen en paddestoelen (macrofungi)]

be listed as threatened. Species distribution data from the Red List process are available on an open access internet platform[194] to inform planning and permitting.

Monitoring: The Netherlands have a relatively dense availability of species occurrence data both from professional as well as citizen observations[195]. The National Monitoring Network Butterflies has monitored population trends of butterflies since 1990 and night active moths since 2012, coordinated by the NGO Dutch Butterfly Conservation together with the Central Bureau of Statistics[196]. There is no monitoring network for wild bees and hoverflies but detailed data on both species groups has been collected for over 10 years.

Research: To inform the National Pollinator Strategy, the Ministry of Economic Affairs contracted Wageningen University & Research to support knowledge development, knowledge exchange and increasing awareness on pollination. Wageningen is setting up networks of practice to exchange knowledge, implementation experiences and joint learning. Research is focussing on 1) opportunities and barriers to initiatives in support of pollinators; 2) formulating concrete tools and conditions for efficient design and management of new pollinator habitat, and 3) habitat use by rare pollinator species[197].

In addition:

- The independent Dutch Knowledge Centre EIS, hosted by Naturalis in Leiden, brings together and coordinates research on insects and other invertebrates and is leading most of the Dutch research on wild pollinators (other than butterflies) including the new Dutch Red List on Bees and other targeted studies[198].
- Naturalis[199] chairs the EU-wide SuperB COST project (2014-2018) and led the pollinator decline package of the EU-funded STEP FP7 project in 2010-2014[200].
- The Dutch Centre for Bee Research (NCB) researches causes of honey bee dieback in the Netherlands and coordinates an annual monitoring of honey bee mortality with beekeepers. It researches conservation of the Dutch populations of the European dark honeybee variety (*Apis mellifera mellifera*) on the island of Texel[201].

9.3 Raising awareness and improving collaboration

A preliminary assessment for the '*Nederland Zoemt*' project found hundreds of local and regional pollinator initiatives throughout the Netherlands[202], including municipalities such as Amsterdam and Rotterdam[203]. Some significant initiatives:

[194] Het Natuurloket platform available at https://www.ndff.nl/
[195] As recognized in the IPBES report at https://www.ipbes.net/sites/default/files/downloads/pdf/individual_chapters_pollination_20170305.pdf
[196] Landelijk Meetnet Vlinders
[197] http://www.wur.nl/nl/project/Investeringsimpuls-bestuivers-1.htm
[198] For an overview, see http://www.eis-nederland.nl/rapporten
[199] https://science.naturalis.nl/en/people/scientists/koos-biesmeijer/
[200] http://www.step-project.net/
[201] http://www.bijenonderzoek.nl/
[202] Personal communication 20/10/2017, Dhr Biesmeijer, Naturalis
[203] Some examples of pollinator initiatives by municipalities (in Dutch) at http://www.bestuivers.nl/bescherming/bestuivers-en-overheid

- EIS, with financial support from a foundation, runs the website www.bestuivers.nl which brings together ecological information on pollinating species (with a focus on wild bees and hoverflies), their importance to society, threats, conservation solutions, projects, publications and produces a newsletter.
- Nature conservation NGOs such as Dutch Butterfly Conservation, Greenpeace and Natuur & Milieu have run campaigns in recent years to increase public awareness on wild pollinators. In 2012 the KNNV, Bijenstichting, NBV, EIS Nederland and IVN cooperated on the 'Year of the Bee' campaign, a joint awareness-raising campaign targeted at gardeners, schools and local governments.

'*The Netherlands Buzz*' ('Nederland Zoemt') launched in summer 2017 is a cooperation between two national projects, both financially supported by the Dutch postal code lottery (together 3.2 million euro):

- The *Wild Beeline initiative*, coordinated by 'De Landschappen' (a nature managing NGO with branches in each of the 12 provinces) in partnership with 5 other NGO and scientific partners, aims to connect new and existing bee habitat and increase awareness on the indispensable role of wild bees in the Dutch ecosystem. The project will establish 300 new wild bee spots with food and nesting opportunities that connect isolated bee populations. The partners will increase bee-friendly management of linear infrastructures such as dikes and railways. In spring 2018, the project will organise a Bee Happy Day on which people will be encouraged to make their own spaces more bee-friendly. The project will scale-up the Dutch Bee Radar, a citizen science project aimed at mapping wild bee behaviour, including use of an application to identify the most common bees in the Netherlands through photos.
- The '*Wild Bee in the Lead Role'* project coordinated by NGO Natuur & Milieu in partnership with the Dutch independent Institute for Nature and Sustainability Education (IVN) and the Dutch branch organisation for park management is working with all Dutch municipalities to improve their green area management for wild bees. It will upscale existing successful initiatives and improve procurement policy for long-term green space management contracts to ensure they deliver for wild pollinators.
- The Dutch Beekeepers Association (NBV) and the Dutch Federation of Agriculture and Horticulture (LTO) launched the website 'BijenkennisNET' for experts, farmers and beekeepers with a platform for exchange and online resources on honeybees, with financial support from the Ministry of Economic Affairs [204].

9.4 Tackling causes of pollinators decline

The publication of the European Red List of Bees in 2014 inspired a number of Provinces to include targeted pollinator/bee actions in their strategies. Two best-practice examples:

- Zuid-Holland: a public-private partnership between beer brewer Heineken, Wageningen Environmental Research (formerly Alterra) and the Province of Zuid-Holland started the project Bee Landscape in March 2016[205]. The project aims to reduce the decline of bumblebees and wild bees, as well as honeybees, by building a self-steering network of practice which is exchanging knowledge on bee-friendly landscape management,

[204] http://bijenkennisnet.nl/
[205] Bijenlandschap at http://www.bijenlandschap.nl/

integrating evidence in practical management, and building citizen buy-in and communication. It has also set up monitoring. The project received strong support from municipalities, private landscape managers, farmers, a business area, schools, a drinking water company, and the national implementing authority for infrastructure works.

- Noord-Brabant: The Province of Noord-Brabant has set up a 4 year programme 'Bee impulse for Brabant 2015 – 2018' in cooperation between 10 organisations including landowners, farmers, bee-keepers, environment and nature conservation NGOs, an institute for higher agronomic education and the water board (regional water manager)[206]. In 2016 the Province published an in-depth assessment of its bee fauna, with information on species status, priority species and practical management recommendations.

Two Dutch supermarket chains representing over half of the Dutch market signed agreements with the NGOs Greenpeace and Natuur & Milieu in summer 2016 to commit by 2020 to: 1) significantly reduce pesticides by increasing the share of products certified under the Dutch integrated environmental 'Milieukeur' label[207]; 2) pay farmers a better price for more sustainable production, 3) increase the share of organic products by 2-3 fold and 4) raise the share of sold plants and flowers grown under strict environmental standards up to 50%[208]. As a significant share of fruits and vegetables are sourced domestically, this is expected to benefit pollinators and biodiversity more generally. However, the Dutch Federation of Agriculture and Horticulture (LTO) complained that they were not consulted on the agreements and expressed concerns about the economic impact of setting different standards for domestic and imported products[209].

9.5 Key successes

- Wild pollinator conservation is currently high on the agenda of a large range of stakeholders, both in rural and urban communities due partly to the efforts of NGOs and Naturalis to grow public awareness on pollinators.
- The mostly bottom-up and multi-stakeholder approaches have brought in public and private partners such as beer brewers, road builders, mayors of municipalities and drinking water companies.
- The development of the national strategy, although still on-going, has supported increased exchange and awareness between key stakeholders, clarified key barriers and opportunities and directed funding to research priorities.

9.6 Key gaps

- The main barrier to recovery of most wild pollinator species in the Netherlands is agricultural practice, affecting species health through agro-chemical use, loss of habitat for reproduction through intensive land use practices as well as a poor

[206] Vlinders en Bijen at https://www.brabant.nl/dossiers/dossiers-op-thema/natuur-en-landschap/natuur/biodiversiteit/vlinders-en-bijen.aspx

[207] The Milieukeur label has dedicated certification schemes for fruit, indoor and outdoor agriculture each including specific criteria on the use of plant protection measures including 18 substances specifically listed for pollinating insects. See http://www.milieukeur.nl/19/home.html

[208] http://www.greenpeace.nl/2016/Nieuwsberichten/Landbouw/Supermarkten-op-de-bres-voor-de-bij/

[209] https://nos.nl/artikel/2122705-lto-boos-over-bijenplan-milieuclubs-en-supermarkten.html

availability and diversity of food. The Dutch Rural Development Programme currently has a low effectiveness for pollinator recovery in the Netherlands.

- Many of the current Dutch initiatives focus on honey bees and beekeeping, rather than wild pollinators. Although research has found that wild pollinators play an important role in the pollination of key economic crops in the Netherlands, it also found that only a small number of common species deliver most of the service (Kleijn et al, 2015), which does not provide an effective argument for conserving wild pollinator diversity.
- Although declines in pollinator abundance have been researched in the Netherlands (Biesmeijer et al, 2006), there are still many open questions regarding both the scale and drivers of change. A better-resourced and structural monitoring could improve this, and could also improve the mapping of pollination as an ecosystem service.

10 Slovenia

10.1 Description of initiative and funding sources

Pollinators in Slovenia are primarily protected by conservation of their habitats. Currently, Natura 2000 sites cover 37%[210] of Slovenia and other nationally protected areas cover 13%.[211] The Carniolan honeybee subspecies (*Apis mellifera carnica)* has been protected since 2014 under the Livestock Breeding Act.[212]

The Slovenian Ministry of the Environment and Spatial Planning has drawn up a National Environmental Protection Programme (NEPP) to 2030 which will be introduced at the end of 2017 and will establish long-term goals for environmental protection.[213] This will include pollinator initiatives such as the integration of the protection of wild pollinators into strategic and programme documents, as well as nature protection measures.

10.2 Research and monitoring

The National Institute of Biology (NIB) in Slovenia is a leading partner of a research project on the significance of wild pollinators[214] and is preparing a monitoring protocol for pollinators.

10.3 Raising awareness and improving collaboration

The National Beekeepers' Association in Slovenia launched the World Bee Day initiative in 2006[215]. It is now supported by the Slovenian Ministry of Agriculture, Forest and Food, and its aim is to raise aware of the importance of bees and other pollinators for food security and biodiversity amongst the general public. It is expected that it will be confirmed by the Food and Agriculture Organization of the United Nations in December 2017.[216]

Members of the National Beekeepers' Association launched a book called 'No bees, no life' to promote World Bee Day, which includes information on bees, beekeeping and threats they are currently facing. It is available in Slovenian and English and has input from 66 authors from 32 countries.[217]

[210] http://www.natura2000.si/?L=1
[211] Personal communication, 19/09/17, Robert Bolješić, Slovenian Ministry of the Environment and Spatial Planning
[212] http://www.genska-banka.si/fileadmin/uploads/Strokovni_svet/Livestock_Breeding_Act.pdf
[213] http://www.mop.gov.si/si/priprava_nacionalnega_programa_varstva_okolja_2030/
[214] 'The importance of wild pollinators for crop pollination and sustainable management in agriculture to ensure reliable pollination' at http://www.nib.si/projektinib?view=project&id=263
[215] http://www.mkgp.gov.si/en/world_bee_day_initiative/
[216] http://www.sloveniacandidateapimondia2021.si/fao-conference-about-proclamation-of-world-bee-day/
[217] https://beebooks.si/en/knjiga/

The NIB is at the forefront of activities to promote pollinator diversity and the importance of the role of pollinators in providing ecosystem services[218], and has issued several publications on wild pollinators such as bumblebees and solitary bees[219][220]. In 2015 the NIB organised the first Slovenian expert conference on wild pollinators and their importance[221], which was attended by key stakeholders such as the Ministry of Agriculture, Ministry of the Environment, Institute for Nature Conservation, Food Safety Authority and representatives from the veterinary and plant protection sectors.[222]

10.4 Tackling causes of pollinators decline

The National Environmental Protection Programme to 2030 is expected to include actions to reduce the possible problems of importing bees, mainly bumble bees, used for pollination in food production and horticulture.[223]

The Slovenian Rural Development Programme includes an optional requirement to sow summer crops that provide flowering resources for bees throughout the season, and thereby increase their resilience over winter.[224]

10.5 Key successes

- Some pollinator habitats are protected in the extensive Natura 2000 network and national protected areas.
- Awareness-raising through World Bee Day means the public is aware of the importance of honeybees and other pollinators for food security and the threats to them.
- A pollinator monitoring protocol is being initiated, although the establishment of monitoring will depend on whether sufficient government funding is allocated under the planned environment programme.

10.6 Key gaps

- Awareness-raising, protection initiatives and research are very focused on honeybees and the Carniolan honeybee subspecies, with little attention to wild pollinators.
- Slovenia is a small country so despite having more than 500 wild bee species and very high biodiversity there are not many pollinator experts. The Slovenia national red list of bees is now 20 years old and needs to be updated.
- Apart from habitat protection, there are no protection targets for specific wild pollinator species.

[218]Personal communication, 13/10/17, Danilo Bevk, National Institute of Biology in Slovenia
[219]http://www.nib.si/eng/index.php/search?searchword=pollinators&searchphrase=all
[220]http://www.nib.si/images/stories/novice/oprasevalci-bevk.pdf
[221]http://www.nib.si/aktualno/novice/872-strokovni-posvet-cmrlji-in-cebele-samotarke-prezrti-oprasevalci
[222]Personal communication, 13/10/17, Danilo Bevk, National Institute of Biology in Slovenia
[223]Personal communication, 17/10/17, Robert Bolješić, Slovenian Ministry of the Environment and Spatial Planning
[224]Slovenian Rural Development Programme 2014-2020 at https://www.program-podezelja.si/en/rural-development-programme-2014-2020

11 Spain

11.1 Description of initiatives and funding sources

Spain is preparing a nationally coordinated initiative for wild pollinators.

No examples were found of government-led action in the autonomous regions, except the protection of the Canary Island honeybee race. Several research and awareness raising initiatives are being carried out by research institutes with private and public funding from regional, national and EU sources.

11.2 Research and monitoring

The national biodiversity database[225] contains species records of threatened pollinator species on the Spanish Red List, and the Spanish National Council for Research (CSIC) is currently updating the atlas of bee fauna of Spain. Butterfly abundances have been monitored in Catalunya since 1994[226].

A number of research institutes are working on pollinator projects, for example:

- The Poll-Ole-GI[227] project is researching the impact of habitat creation and arable crop management on the pollinators of two major Mediterranean crops that depend on pollinators to increase yield and product quality: oilseed rape and sunflower. It aims to identify and recommend effective methods to increase pollinator communities in arable farmland. It is funded by the European Fund for Regional Development INTERREG from 2016 to 2019 in three pilot regions in Spain (Burgos and Cuenca) and France (Poitou-Charentes).
- The Estación Biológica de Doñana (EBD-CSIC) in Andalucía is carrying out research into the ecology of plant-pollinator networks in Mediterranean natural habitats (matorral) within the EU-funded project BeeFun since 2015[228]. The project aims to expand scientific understanding of how extreme climatic events will affect wild pollinators and natural vegetation communities.
- A project funded by the Spanish government for 3 years (2014-2017) to evaluate the risk factors to bees in Spain is producing a series of research findings on the impacts of pesticides and parasites on honeybees[229]. Although it also aims to cover wild pollinators, no research results on wild species have been published yet.

[225] Base de Datos EIDOS in the Banco de Datos de la Naturaleza of the Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente, available at http://www.mapama.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/Eidos_acceso.aspx

[226] Catalan Butterfly Monitoring Scheme http://www.catalanbms.org/

[227] Partner organisations are Universidad de Burgos, Centre Nationale de la Recherche Scientifique (CNRS), Universidad Autónoma de Madrid, Universidade de Coimbra, Institut National de la Recherche Agronomique (INRA) Entomologie. See http://pollolegi.eu/es/

[228] BEEFUN project 'Pollinator responses to global change and its implications for ecosystem function' funded by the EU FP7 programme. See https://bartomeuslab.com/beefun/

[229] Coordinated by the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA) with 7 universities and research centres. See http://p-rta2013-00042-c10-00.agripa.org/entidades-participativas

- CREAF in Catalunya is conducting research on spatial distribution of pollinator communities and plant-pollinator networks to understand how spatial heterogeneity affects plant-pollinator interactions and the effects on pollination function and fruit/seed production[230]. CREAF is conducting research on pollination services in apple orchards within a European project to evaluate the effects of agri-environmental schemes (local floral resources, organic *versus* conventional management) and landscape factors on pollinator communities, pollination levels and fruit production[231]. CREAF is also about to start a project in 2018 to assess the yield benefits of releasing managed populations of the solitary bee pollinator *Osmia cornuta* in orchard crops[232].

11.3 Raising awareness and improving collaboration

Various local initiatives are raising awareness and improving collaboration including:

- SOS Polinizadores[233] – an educational and citizen science project by the Royal Botanical Garden and CSIC in Madrid funded by FECYT[234]. Students monitor wild pollinators in their green spaces in Madrid and post observations on the Natusfera[235] citizen science platform. The project has developed the PolinizAPP game to raise awareness of the pollination process and threats to bees.
- GEPEC-EdC NGO in Catalunya is organizing a series of talks on pollinator awareness for producers, gardeners, land managers and the general public[236].
- Divulgare[237] blog and video shorts produced by Luis Navarro and other scientists in Vigo University to raise awareness about pollination and plant evolution amongst other issues.
- A field guide to the pollinators of Spain has recently been published[238].

The APOLO pollinator observatory[239] initiative ceased activities in 2012 after building a network of research and nature conservation organisations and businesses raising awareness of pollinators, financed by the Biodiversity Foundation. The network made efforts to promote a concept for a national pollinator monitoring programme.

[230] SPALINK project funded by the Spanish Ministry of Science and Innovation at http://www.creaf.cat/recerca/biodiversitat/interaccions-entre-espe%CC%80cies/spatial-heterogeneity-plant-pollinator-communities-effects-interaction-networks-and-consequences

[231] European Biodiversa/FACCE-JPI project ECOFRUIT at https://www.nature.uni-freiburg.de/forschung/Laufende%20Projekte/EU-BiodivErsa%20Projekt

[232] Demonstration project in commercial orchards (almonds, cherries, pears) funded by Catalan Department of Agriculture, personal communication 2 October 2017, Jordi Bosch, CREAF

[233] Coordinated by Real Jardín Botánico (Madrid) and Consejo Superior de Investigaciones Cientificas (CSIC). See http://www.rjb.csic.es/jardinbotanico/jardin/index.php?Cab=6&SubCab=587&len=es&Pag=697

[234] Fundación Española para la Ciencia y la Tecnología (national science and technology foundation)

[235] http://natusfera.gbif.es/

[236] https://gepec.cat/informat_fauna_flora.php

[237] http://www.divulgare.net/

[238] Aguado Martín et al 2015. *Guía de campo de los polinizadores de España*. Ediciones Mundi-Prensa, Madrid.

[239] Coordinated by Asociación española de Entomología, Jardín Botánico Atlántico, CIBIO. See http://apolo.entomologica.es/

11.4 Tackling causes of pollinators decline

Spanish rural development programmes can provide funding for farmers to carry out farming practices or create habitats and food resources for wild pollinators, though no information was available to quantify the impact. Some of the Spanish rural development programmes specifically support apiculture in areas of extensive agriculture in preference to irrigated areas[240], which helps to maintain beehives in the region throughout the year including the fallow season.

Some other initiatives:

- The Syngenta-funded Operation Pollinator project funded the creation of flowering plant strips on around 100 farms with permanent and arable crops in 2016-17[241], partly through collaboration with food companies, agricultural cooperatives and universities[242]. The monitoring does not however include a scientific control or any information on pesticide use on the crops[243].
- The Catalan Regional Government is developing guidelines for road edge management to create pollinator-friendly plantings and habitats suitable for local bioclimatic zones, which road contractors will implement[244].
- The Canary Islands Region has established regional laws and special measures to control the conservation, recuperation and selection of the Canary black honeybee race (*Apis mellifera iberica*) since 2001, including establishment of a natural mating area favoured by the topography that allows its saturation with local drones, and distribution of local honeybee queens among beekeepers (De la Rúa et al, 2009).

11.5 Key successes

- Researchers, NGOs and other civil society groups are initiating and running projects that are increasing scientific understanding and public awareness of the ecological and economic importance of wild pollinators (e.g. in Madrid, Catalunya and Andalucía).

11.6 Key gaps

- There is currently no government coordination or support for pollinator initiatives either at national or regional level according to the interviewed stakeholders, although a national plan is in preparation[245]. The lack of a policy framework, funding and knowledge is hindering the small but successful research and awareness-raising

[240] E.g. the Extremadura RDP supports apiculture in order to benefit biodiversity in fragile (non-irrigated) areas, by maintaining a proportion of hives within the region during the dry season (rather than being moved to other regions), as it is assumed that without honeybee pollination, the vegetation cover would diminish increasing soil erosion and desertification. See http://www.juntaex.es/filescms/ddgg002/uploaded_files/fondos_europeos/FondosEuropeos2014_2020/FEADER/Programa_Desarrollo_Rural_2014.pdf

[241] This represents around 0.01% of the total number of farm holdings in Spain.

[242] Personal communication 2 October 2017, Francisco García Verde, Syngenta Spain

[243] Unpublished project reports as communicated by Francisco García Verde, Syngenta Spain

[244] With advice from CREAF, personal communication 2 October 2017, Jordi Bosch, CREAF

[245] Personal communications: 22 September 2017, Ignasi Bartomeus, Estación Biológica de Doñana (EBD-CSIC); 28 Sept 2017, Jorge Rodríguez López, MAGRAMA, Spanish Government; 2 October 2017, Jordi Bosch, CREAF

initiatives from being replicated in other areas of Spain or from expanding their scope and impact.

- There is an urgent need for more research and awareness-raising of the importance of wild pollinators in Spain. Spain is very rich in wild pollinator species, including at least 1105 wild bee species (Ortiz-Sánchez, 2011), but the European Red List of Bees revealed large gaps in knowledge about Spanish bee species (Nieto et al, 2014). The lack of knowledge about other wild pollinator groups such as hoverflies (Syrphidae) is likely to be greater still. At the same time, Spain produces a large proportion of the EU's crops that depend on pollinators, and that may already be suffering from a pollination deficit, which will be exacerbated by climate change (Breeze et al, 2014).

12 UK

12.1 Description of initiative and funding sources

The UK has devolved governance of nature conservation to the regions England, Scotland, Wales and Northern Ireland, and each region has its own pollinator strategies. Joint UK or Great Britain wide initiatives carried out by the UK Department of Farming Food and Rural Affairs (Defra) or its agencies in the Joint Nature Conservation Committee (JNCC)[246] or by NGO or community groups are described below.

12.2 Research and monitoring

The regional pollinator strategies have been informed by a government-funded review of research on the status and value of pollinators and pollination in the UK, the main drivers and pressures on the different groups and locations (Vanbergen et al, 2014). The research provided baselines for the key parameters associated with the status of UK pollinators and the pollination services they provide and projections of how the status of pollinators or pollination services many change to 2025 if no additional actions were undertaken.

A pollinator monitoring programme in England, Scotland and Wales has just started, run by the Centre for Ecology & Hydrology (CEH) and funded to 2019 by Defra, Welsh Government, Scottish Government, JNCC and project partners (Box 12.1). The UK Pollinator Monitoring and Research Partnership liaises with Northern Ireland and the Republic of Ireland through the steering group. Butterfly abundances have been monitored in the UK since 1976[247].

Box 12.1 England, Scotland and Wales pollinator monitoring programme 2017-2020

The monitoring scheme will show how the status of insect pollinator populations and communities change over time in both agricultural landscapes and the wider environment, and also how pollination services to agriculture and horticultural crops are changing over could provide statistical sufficient power (>80%) to detect a 30-50% change over 10 years for widespread time (Carvell et al, 2016). The standardised protocol will monitor pollinators in the wider environment at the broad group level (bumblebees, solitary bees, hoverflies) and will also monitor a short list of species that are common widespread effective pollinators of crops in the UK (the proposed list includes honeybee, 6 bumblebees, 13 solitary bees, and 17 hoverflies). The authors estimate that between 20 and 75 sites across Great Britain, common species or groups (e.g. change in the summed abundance of bumblebees) with annual counts of 10 or more individuals per site.

In addition, the BeeWalk bumblebee monitoring programme run by the Bumblebee Conservation Trust has generated population trend data since 2008 (Box 12.2).

Box 12.2 Volunteer bumblebee monitoring in England, Scotland and Wales

The Bumblebee Conservation Trust Beewalk is a well-designed bumblebee monitoring programme run by an NGO using volunteers in England, Scotland and Wales[248]. It produces high quality scientific data as it requires training and a high level of knowledge from volunteers and verification of data is relatively good[249].

[246] The Joint Nature Conservation Committee (JNCC) is the UK government advisor on nature conservation and coordinator for the regional nature conservation agencies Natural England, Natural Resources Wales, Scottish Natural Heritage and the Council for Nature Conservation and the Countryside Northern Ireland

[247] UK Butterfly Monitoring Scheme and Wider Countryside Butterfly Survey http://www.ukbms.org/

[248] https://bumblebeeconservation.org/get-involved/surveys/beewalk/

JNCC, CEH, and the National Biodiversity Network partnership have worked to improve standards of data collection, management and analysis in volunteer recording schemes, and this has resulted in the publication of a national indicator of pollinator population change (see Box 12.3).

Box 12.3 UK national indicator status of pollinating insects[250]

The indicator illustrates changes in pollinator distribution (bees and hoverflies) in the UK. The indicator is based on 389 species (147 species of bee and 242 species of hoverfly) of pollinator, and measures change in the number of 1km grid squares across the UK in which they were recorded in any given year – this is referred to as the 'occupancy index'. In 2014, the indicator had declined by 13% compared to the value in 1980. There was a noticeable decline in bees from 2007-2010.

UK universities are leading research into wild pollinators, including University of Reading, University of Sussex, Cambridge Conservation Initiative, and University of Leeds.

12.3 Raising awareness and improving collaboration

A range of NGO and community-led projects are raising awareness and improving collaboration across the UK (Box 12.4).

Box 12.4 UK wide awareness and collaboration initiatives (examples)

A pollinator award has been included in the Green Flag Award scheme, which is a quality standard for publicly accessible green spaces in the UK[251]. It provides important public recognition to UK local authorities of their park management

The NGOs Buglife and Friends of the Earth England Wales & N Ireland (FoE) have produced guidance for local authorities on how to develop a local pollinator action plan or strategy.

B-Lines project run by Buglife creates networks of wildflower-rich habitat stepping stones in urban areas with conservation partners, land managers, businesses and local authorities.

UrbanBuzz project run by Buglife is signing up city councils to produce 'buzzing hotspots' of habitat creation and community engagements.

In the FoE Great British Bee Count the public spot easily identified bees and post their observations online.

The Polli:Nation project, funded by the National Lottery, has recruited 260 schools and a growing number of community groups and individuals to survey bees, manage their green spaces for pollinators and run educational and awareness raising activities.

12.4 Tackling causes of pollinators decline

The National Bee Unit at the **Animal and Plant Health Agency** provides guidance for beekeepers in the UK. The Healthy Bees Plan[252] published by Defra and the Welsh Government in March 2009 sets out a plan of actions threats for government, beekeepers and other stakeholders in England and Wales to ensure beekeeper training and effective responses to pest and disease threats to honeybees. The **Food and Environment Research Agency** is responsible for implementing the Plan on behalf of Defra and the Welsh Assembly Government. Some actions are being taken by the UK government on pesticide use and bee pests and diseases (Box 12.5).

[249] Other NGO campaigns also encourage public reporting of pollinator sightings but these do not result in data of high scientific quality so are of little use for informing research and monitoring.

[250] See http://jncc.defra.gov.uk/page-6851

[251] http://www.greenflagaward.org.uk/

[252] National Bee Unit Healthy Bees Plan. http://www.nationalbeeunit.com/index.cfm?sectionid=41

Box 12.5 UK wide government action on pesticide impacts and pests and diseases of pollinators

Pesticide use: Research was commissioned by Defra and funded by the pesticide industry and government research funds[253] to determine the effects of neonicotinoids on wild and managed pollinators in field conditions, published in 2017[254]. Defra also funds research on neonicotinoid levels in pollen and nectar of crop field margin and hedgerow flowers favoured by bumblebees.

Pests and diseases: The UK government has produced new rapid eradication plans for the invasive alien honeybee pests Small Hive Beetle and Asian Hornet, and an Asian Hornet id app for citizens to report sightings. Recent government-funded research has modelled the risk of Asian Hornet invasion in Britain (Keeling et al, 2017). The National Bee Unit carries out regular honeybee disease and pest monitoring in England and Wales, and the SASA in Scotland does the same[255].

[253] Natural Environment Research Council

[254] https://www.ceh.ac.uk/news-and-media/news/neonicotinoid-pesticides-harm-honeybees-wild-bees-first-pan-european-field-study

[255] Science and Advice for Scottish Agriculture at https://www.sasa.gov.uk/wildlife-environment/bee-health

13 UK – England

13.1 Description of initiative and funding sources

The National Pollinator Strategy for England was launched in November 2014 by the UK **Department of Farming Food and Rural Affairs** (Defra) with five key outcomes and action areas to 2024. The strategy explicitly addresses all species of wild bees and other pollinators such as hoverflies, beetles, flies, butterflies and moths, as well as honeybees. The Implementation Plan[256] published in November 2015 sets out 23 policy and 11 evidence actions. A small amount of funding is provided to five Local Nature Partnerships, and Defra has awarded £85,000 through the Landscapes for Wild Pollinators Initiative. The recently published progress report details achievements so far[257].

A number of local initiatives have also arisen, driven by local authorities and/or citizen groups and in part funded and enabled by the Strategy, such as the Greater Bristol pollinator strategy 2015-2020.

13.2 Research and monitoring

The CEH-led pollinator monitoring programme and the Bumblebee Conservation Trust BeeWalk provide monitoring data for England (Box 12.1 and Box 12.2).

The Strategy key area '*Improving evidence on the status of pollinators and the service they provide*' includes the following evidence actions:

- Taxonomy research to develop new rapid methods of species identification, such as DNA sequencing, at the Natural History Museum in London, funded by Defra and Natural Environment Research Council (NERC).
- Knowledge exchange events with researchers coordinated by Cambridge and Bristol universities.

13.3 Raising awareness and improving collaboration

The Strategy key area '*Raising awareness of what pollinators need to survive and thrive*' includes:

- Bees' Needs website, set up by the Wildlife Trusts NGO and funded by Defra, provides information sheets on creating habitats for pollinators in different environments, targeted at land managers[258].
- The PASG Communications advisory group coordinates communications including social media campaigning, seasonal actions targeted at gardeners, apps for logging actions, logos, posters and signage.
- Pollinator Awareness Week is an annual week of activities, events and social media organised by Defra and PASG and aimed at the general public. The annual Champion

[256] Available at https://www.gov.uk/government/publications/national-pollinator-strategy-2014-to-2024-implementation-plan

[257] As above

[258] There are currently information sheets for farms, transport corridors, industrial sites, gardens, and woodlands, and sheets are being developed for urban, orchards, horticultural field crops, and sports grounds.

of Champions Award recognises bee-friendly initiatives by youth groups, schools, local authorities, farming, construction and community groups.

The NGOs Bumblebee Conservation Trust, BugLife and others carry out a range of awareness-raising and capacity building projects with urban and rural populations (Box 12.4).

13.4 Tackling causes of pollinators decline

The Strategy key area '*Supporting pollinators on farmland*' includes:

- The Wild Pollinator and Farm Wildlife package targets 6 wild bee species and has been included in the 2014-2020 agri-environment programme. A training package for farming advisors is being prepared. Other agri-environment options fund pollinator margins, extensive grassland management and habitat management.
- The Campaign for the Farmed Environment NGO is producing guidance, promoting and subsidising pollinator seed mixes, and running events and training for farm advisors funded by Defra.
- The Code of Practice for Pesticide Users is currently being updated to include integrated pest management and sector organisations are promoting IPM[259].
- Buglife NGO and the government body Natural England have partnered with the agricultural business FarmCare to create pollinator habitat in Kent and Sussex, with government funding from the Landscapes for Wild Pollinators Initiative. The project will create pollinator habitat on FarmCare-run farms.
- B-Lines project run by Buglife NGO is restoring and mapping wild flower habitat networks in the north, east and southeast of England[260], with government funding from the Landscapes for Wild Pollinators Initiative.

The Strategy key area '*Supporting pollinators across towns, cities and the countryside*' includes:

- Large-scale landowners agreements with Defra to take action to manage their habitats and green spaces for pollinators.
- Retailers, DIY outlets and garden centres have been targeted to promote pollinator-friendly displays and information in spring and autumn.
- information on pollinators has been included in government planning guidance under 'Biodiversity, ecosystems and green infrastructure.'

The Strategy key area '*Enhancing the response to pest and disease risks*' includes UK wide actions (Box 12.5).

Notable local initiatives include:

- Burnley County Council has re-organised its road verge management to benefit pollinators. Management includes topsoil stripping and sowing of wild flowers, less frequent cutting and removal of cuttings to reduce fertility. This has shown significant cost savings, increased public awareness, and improves the Council's climate change adaptation as grass growth is increasing.
- Oxford Pollinator Action Plan sets out what the city council's parks and green spaces team is doing for pollinators.

[259] Agriculture and Horticulture Development Board and the pesticide industry-sponsored Voluntary Initiative
[260] See https://www.buglife.org.uk/b-lines-hub

- Making a Buzz for the Coast by the Bumblebee Conservation Trust NGO is restoring and creating habitat for wild bees along the Kent region coastline, especially the Shrill Carder Bee (*Bombus sylvarum*).
- The Bumblebee Conservation Trust NGO has reintroduced the extinct Short-Haired Bumblebee (*Bombus subterraneus*) in Kent and is monitoring population development and advising farmers to create wild flower meadow habitat.
- Community-led action to create wildflower sites and wildflower-friendly habitats in Leighton Buzzard (praised by the UK government)[261].

13.5 Key successes of the strategy

- The strategy has triggered or supported many actions for pollinators. In particular, large-scale landowners have developed plans and committed to actions, including Network Rail, Ministry of Defence, Ministry of Justice, Church of England, Highways England, and National Trust.
- The Strategy and Plan implementation is steered by the Pollinator Advisory Steering Group, with members from sector associations, NGOs, civil society groups, business and research. The group played a key role in developing the strategy and plan[262].
- Research on the impacts of neonicotinoids was carried out by independent researchers with the support of the pesticide industry, although the industry is still disputing the significance and interpretation of the results[263].
- The Bees' Needs website was praised by local actors for the clarity and relevance of the information (produced by NGOs), and NGO initiatives have raised funds to create pollinator habitat and engage communities in many cities, regions, and schools[264].
- The new agri-environment programme Wild Pollinator & Farm Wildlife package including actions targeted at wild bees is reported as having increasing farmer sign up, but no government figures were available.

13.6 Key gaps

- The strategy provides a framework and policy boost that adds to the wealth of voluntary initiatives in England by environmental NGOs, social organisations such as the Women's Institutes, and local groups. But some participants in these groups question whether the strategy is relying too much on disparate voluntary efforts. The funding going to local partnerships is small, and they have had to find most of the funding themselves.
- The NGO Friends of the Earth question how far the UK government beyond the environment ministry Defra is contributing to changing conditions for pollinators, notably the Department for Communities and Local Government (CLG) responsible

[261] http://www.leightonbuzzardonline.co.uk/news/leighton-creates-a-buzz-as-government-launches-pollination-plan-1-6397084

[262] https://www.gov.uk/government/groups/pollinators-expert-advisory-group

[263] Richard Comont, Bumblebee Conservation Trust, https://bumblebeeconservation.org/news/anthonys-blog/a-closer-look-at-the-recent-centre-for-ecology-hydrology-pan-european-neoni

[264] Participants and presentations at UK Bee Summit April 2017 at https://www.foe.co.uk/page/third-uk-bee-summit

for land use planning policy and planning and delivery of new housing and other infrastructure[265].

- According to UK NGOs, action to reduce pesticide impacts in the UK relies heavily on voluntary initiatives by the industry and users and there is no strategy for Integrated Pest Management that clearly aims to avoid or significantly reduces pesticide use[266].

[265] Personal communication, 8 September 2017, Paul de Zylva, Friends of the Earth England, Wales and N Ireland

[266] For example Pesticide Action Network UK at http://www.pan-uk.org/uk-policy-options-reduce-environmental-risks-pesticides/

14 UK – Wales

14.1 Description of initiative and funding sources

The Action Plan for Pollinators in Wales (APP)[267] was launched in July 2013 and sets out four key outcomes:

- Wales has joined up policy, governance and a sound evidence base for action for pollinators
- Wales provides diverse and connected flower rich habitats to support our pollinators
- Wales' pollinator populations are healthy
- Wales' citizens are better informed and aware of the importance and management of pollinators.

The APP was developed by a wide range of stakeholders from public, private and voluntary sectors, represented in the **Pollinators Taskforce**, and it has been recognised as an exemplar of co-design and co-production in the UK. It is not a Welsh Government Action Plan, and there is no direct funding from the Welsh Government on pollinators; the stakeholders remain jointly responsible for its delivery. The Pollinator Taskforce currently meets three times a year and updates of stakeholder pollinator activity from all stakeholders are given at the meetings. The Pollinator Task Force has recently established a Task and Finish group which will compile evidence on the achievements of the APP to-date. An important element of the stocktake will be co-designing the future direction of the APP for the benefit of pollinators in Wales.

The action plan commits the **Welsh Government** to take account of pollinators during relevant biodiversity audits internally, and of Local Authorities, including ensuring any funding criteria includes biodiversity and pollinators, and to review key regulations and designations which impact on pollinators to ensure they are fit for purpose. Section 6 of the Environment (Wales) Act 2016 obliges Local Authorities to seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions. The management of roadside verges for pollinators is also a key in meeting the statutory goals of the Well-being of Future Generations (Wales) Act 2015.

14.2 Research and monitoring

Pollinator monitoring in Wales is part of the new Great Britain programme funded by Defra and run by CEH (see Box 12.1). In addition, CEH ran a scheme to monitor the impact of agri-environment (Glas Tir) funding in Wales in 2012-2016 and is preparing monitoring for 2018-2022 (see Box 14.1). The Bumblebee Conservation Trust BeeWalk bumblebee monitoring is also carried out in Wales (Box 12.2). Bumblebee Conservation Trust Bee Wild West Wales project is training a network of citizen scientists to record and monitor bumblebee populations, through identification training and use of mobile phone and internet tools.

[267] http://gov.wales/topics/environmentcountryside/consmanagement/conservationbiodiversity/action-plan-for-pollinators/?lang=en

Box 14.1 Glastir Monitoring and Evaluation Programme pollinator monitoring

GMEP surveys all butterflies (Lepidoptera: Rhopalocera), bees (Hymenoptera: Apoidea) and hoverflies (Diptera: Syrphidae) on a 4-year cycle on 150 random sites and 150 targeted squares chosen to capture Glastir effects because they contain a high proportion of farms with Glastir contracts (Emmett et al, 2017). Butterflies are recorded to species level, whilst bees and hoverflies are recorded as groups based on broad differences in morphological features associated with ecological differences. There is more intense monitoring of the populations of two bumblebee species targeted by Glastir options.

14.3 Raising awareness and improving collaboration

The action plan commits to creating a central information site as part of the Wales Biodiversity Partnership website, promoting best practice guidance to Local Authorities, land managers and the public, raising awareness of best practice with farmers and land managers, and improving information and facilities in schools on pollinators and their importance.

- Natural Resources Wales have published guidance on managing the grounds of public buildings for pollinators 'Healthy for Bees: Healthy for People. Managing the grounds of public buildings for pollinators'.
- The Eco Schools Programme promotes opportunities for pollinators in their resources for schools.
- The Welsh Government Farming Connect programme has produced 'Managing Farmland for Pollinators', a guidance document for landowners.

Initiatives that are having an impact include:

- Caru Gwenyn / Bee Friendly[268] is a bee friendly standard for communities and community groups, schools, public bodies, community councils, businesses, universities and colleges, places of worship and other organisations in Wales. It is managed by the Pollinator Task Force.
- Keep Wales Tidy - Natural Buzz Project[269] aims to maximise multiple ecosystem services of currently undervalued green spaces – mowed areas on industrial estates, school and hospital grounds, business parks and roadside verges - by planting wild flowers.
- Bumblebee Conservation Trust Bee Wild West Wales project[270] is carrying out educational activities in schools, engaging local communities in pollinator-friendly green spaces and creating a Buzzing Communities toolkit to inspire further action.

Other UK wide initiatives for pollinators are also active in Wales (Box 12.4).

14.4 Tackling causes of pollinators decline

The action plan commits to improving outcomes for biodiversity and pollinators from the current Wales Rural Development Plan (2014-2020) and ensuring that the next has the potential to deliver for pollinators. The Glastir agri-environment-climate programme 2014-2020 includes an option for farmers to improve food resources for the rare bumblebee species Shrill Carder Bee (*Bombus sylvarum*) and Brown-banded Carder Bee (*Bombus*

[268] https://www.biodiversitywales.org.uk/Wales-Action-Plan-for-Pollinators
[269] https://www.keepwalestidy.cymru/naturalbuzz
[270] https://bumblebeeconservation.org/about-us/our-projects/bee-wild-west-wales/

humilis) by sowing Red Clover (*Trifolium pratense*) in whole fields. The Glastir Small Grants Scheme recently offered a 'Landscape and Pollinators' application window offering funding for activities that contribute to restoring landscape features and providing habitat for pollinator species.

The action plan also commits to government support for community led projects and an Urban Pollinators Initiative. The Welsh Government organised two seminars in 2017 for Local Authorities in Wales to help promote best practice in the management of roadside verges for biodiversity whilst still meeting road safety requirements. Notable local government actions include:

- Conwy County Council and Monmouthshire County Councils have successfully attained Bee Friendly status. Monmouthshire has a Green Infrastructure Plan for Pollinators and has produced a series of guidance booklets for highway managers; green space managers; head teachers; and public estates managers.
- Torfaen County Borough Council - Pollinators for Life Project - aims to undertake a range of initiatives to promote long term sustainable land management and to improve habitats and conditions for all pollinating species across the South Wales Valleys.

The Welsh Government supports the National Bee Unit to deliver the Bee Health Programme in Wales to achieve a sustainable and healthy population of honey bees for pollination and honey production in the UK. See UK section 12.4 for details.

14.5 Key successes

- The Wales Pollinator Task Force is a key driving force for delivering the objectives of the Action Plan. It is open to any organisation which contributes to the Wales action plan and meets twice a year.
- Caru Gwenyn / Bee Friendly is the first co-ordinated national scheme of its kind and has making Wales a Pollinator-Friendly country at its heart. A total of twenty-four organisations across Wales have so far attained Bee Friendly status and are undertaking positive activities for pollinators[271].

14.6 Key gaps

- Current actions focus largely on community engagement in urban settings, and there are further opportunities to be developed with stakeholders and land managers in the promotion of pollinators in the wider countryside and the more rural areas of Wales, including from Wales' agri-environment scheme.

[271] Personal communication 17 October 2017, Simon Bilsborough, Welsh Government

15 UK – Scotland

15.1 Description of initiative and funding sources

The Pollinator Strategy for Scotland 2017 – 2027[272] was launched in July 2017. It has five objectives with seven underlying key targets for 2027, which are:

- 'action to support pollinators will be firmly embedded in relevant strategies, policies and practices across Government and the public sector';
- 'our understanding of pollinator ecology, status and trends is improved to allow policies and practices to be informed by the best evidence';
- 'regulation of honey bee and bumble bee importation will minimise the risks of introducing new pests and diseases';
- 'local bee-based industries will be better supported';
- 'we will have a wide understanding of the value of Scotland's pollinating insects and strong public support to restore populations and habitats, monitor populations and research pollinator biodiversity';
- 'there will be a strong network of good-quality pollinator habitats in place';
- 'it can be demonstrated that Scotland's pollinators are thriving.'

The Strategy is accompanied by an Implementation Plan for Pollinators setting out over 40 high level measures to meet the Objectives of the Strategy with time scales, either short- (up to 5 years), medium- (5-10 years) or long-term (10 years or more). A detailed Action plan to support this is in preparation.

The plan was prepared by **Scottish Natural Heritage** in collaboration with **Scottish Government** and advice from an editorial board comprising beekeepers (Bee Farmers Association), conservation NGOs (Scottish Environment LINK, Buglife, Plantlife, and Bumblebee Conservation Trust), researchers (Centre for Ecology & Hydrology), and farmer and landowner representatives (National Farmers Union Scotland, and Scottish Lands & Estates).

Work is underway to develop and monitor progress of the Implementation Plan. A workshop was held in mid-November with the main stakeholders to gather information on existing activities and gaps in provision with a view to putting together a detailed action plan. There is currently no specific government funding associated with the pollinator strategy, however various government agencies and departments already contribute directly or in-directly through their work. The action plan will be reviewed at least every three years and updated with new priorities and actions as necessary.

The Pollinator Strategy for Scotland and the Honey Bee Health Strategy for Scotland have some limited overlap but the pollinator strategy's main focus is on wild pollinators. The Honey Bee Health Strategy for Scotland 2010-2020[273]sets objectives to support and sustain a healthy honey bee population and beekeeping industry and is implemented by the

[272] http://www.biodiversityscotland.gov.uk/news-and-events/news/
[273] http://www.gov.scot/Publications/2010/06/23102211/0

Scottish Government with the Scottish Beekeeping Association and the Bee Farmers Association.

15.2 Research and monitoring

The objective to *monitor and evaluate whether Scotland's pollinators are thriving* will be achieved by mapping the current extent of pollinator-friendly habitats through existing data sets, identifying gaps between these areas, and ways to address this. Regular updates will be published on the status of pollinators and their habitats to support wider common understanding of the need for action.

Pollinator monitoring in Scotland is part of the new Great Britain CEH pollinator monitoring programme (Box 12.1). The Bumblebee Conservation Trust BeeWalk bumblebee monitoring is also carried out in Scotland (Box 12.2), and the plan promises to support recording schemes involving volunteers and citizen scientists.

The objective to *improve our understanding of pollinators and their pollination service* will be achieved by actions that:

- Improve knowledge of plan-pollinator interactions, including relationships between wild pollinators and habitat size, quality, type and connectedness.
- Support research on plant protection products that raise productivity and enhance sustainability whilst ensuring the maintenance of the nutrition benefits of wildflower abundance for both wild and managed pollinators.
- Support research on land management methods and crop compositions that benefit pollinator and habitat diversity at farm- and landscape-scales, identifying those that provide multiple benefits, e.g. both pest control and pollination. Encourage research to evaluate climate-associated shifts in the phenology of plant-pollinator systems and actions to support adaptation to climate change.

15.3 Raising awareness and improving collaboration

The objectives to *make Scotland more pollinator-friendly, halting and reversing the decline in pollinator populations* and to *raise awareness and encourage action across sectors* will be achieved by actions that review or develop habitat management advice packages for farmers, local authorities, schools, health and private land holdings, gardeners and developers, develop demonstration sites on public land, including parkland, woodland and National Nature Reserves, and contribute to the Scotland's Rural University College initiative Farming for a Better Climate (up to 5 years). A Communications Plan will be developed to gather together the existing initiatives and produce tailored guidance for a range of audiences on practical action to help pollinators. An information and advice resources document was published together with the pollinator strategy.[274]

Part of the strategy is also to encourage the production and implementation of local pollinator plans, such as the plan prepared by Aberdeenshire Council.

Other UK wide initiatives for pollinators are active in Scotland (Box 12.4).

[274] http://www.snh.gov.uk/docs/A2360105.pdf

15.4 Tackling causes of pollinators decline

The objective to *make Scotland more pollinator-friendly, halting and reversing the decline in pollinator populations* will be achieved in conjunction with existing policies including the rural development programme, Land Use Strategy, Scottish Forestry Strategy, Scottish Planning Policy and National Planning Framework 3, amongst others, and by actions to:

- Work in partnership with road and transport industry to develop and implement pollinator-friendly management policies (up to 5 years).
- Support the management of flower-rich gardens and amenity areas to help sustain pollinators in urban areas, and boost pollinator numbers in areas adjacent to farmland (5-10 years).
- Encourage land managers to connect pollinator-friendly habitats at a landscape scale by targeting land-use and management incentives in areas where there will be greatest benefit and minimal impacts on pollinator habitats (5-10 years).
- Support policy initiatives from Planning Authorities and developers that include pollinators in the planning system, e.g. development proposals, management of public land, road verges, railway embankments and power way-leaves (5-10 years).
- Encourage Scottish growers to complete an IPM plan and encourage local authorities to apply the principles of IPM in ground maintenance and management (5-10 years).

Risks to managed bees will be addressed through the Honey Bee Health Strategy for Scotland, the UK wide Asian Hornet contingency plan and associated guidance (Box 12.5), and by action to review the pathways by which commercially produced pollinators enter Scotland and identify actions required to minimise the risks of managed bees (imported and locally produced) to native pollinator species. It is planned to disseminate practical advice.

15.5 Key successes

- As the plan has only recently been launched, key successes cannot be identified yet. There is already a great deal of ongoing and proposed action both directly targeted at pollinator species and habitats, and of indirect benefit for pollinators through projects/action/initiatives targeting other aspects of biodiversity. The outputs of the workshop in November 2017 will be used to help develop a detailed action plan to support the high-level actions of Pollinator Strategy Implementation Plan.

15.6 Key gaps

- The outputs of the November workshop will be used to identify gaps in the planned activities, and to help develop targeted actions to address them.

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Annex: Swedish wild bee species action plans

Swedish action plans for solitary bees and moths in semi-natural dry grasslands

The action plans for solitary bees and moths in semi-natural grasslands are guiding (but not legally binding) documents for the conservation of the species in Sweden during the period 2011–2016[275]. They mainly serve as a guideline for authorities and organizations, and the County Administrative Board of Östergötland is coordinator of the action plan.

The action plans concern species of solitary bees and moths which occur in dry and warm grasslands with high abundance of their main pollen source plants in the part of Sweden south of middle Dalecarlia. Almost all the species are classified as Critically Endangered (CR), Endangered (EN), or Vulnerable (VN) in the Swedish red list 2010, and are also red-listed in some other European country. The species declined sharply during the last century and now have fragmented distributions mainly due to a steep decline of suitable habitats. About 170 other red-listed species are assumed to be favoured by the action plans.

The action plans aim to restore suitable management that maintains the flowering plant phenology that suits the bees. The Swedish rural development programme and managers of important habitats such as railway and road verges, gravel pits, military training fields and power lines play key roles in the management of the species. The County Administrative Boards' roles are to inform and coordinate, and complete with management measures where there is not possible to use other means. The costs for the action plans were estimated to be 382 000 Euro. However, the national yearly budget for the work with the national actions plans for threatened species is very low and covers only about a fifth of the money that it would take to carry out all the proposed actions[276].

The first action plan concerns ten species of solitary bees: *Andrena humilis* (EN), *Andrena marginata* (VU), *Biastes truncates* (VU), *Dufourea inermis* (EN), *Halictus quadricinctus* (CR), *Melitta melanura* (CR), *Nomada argentata* (CR), *Nomada armata* (EN), *Nomada facilis* and *Nomada integra*.

The second action plan concerns ten species of solitary bees: *Andrena gelriae* (EN), *Andrena labialis* (VU), *Dufourea halictula* (VU), *Halictus leucaheneus* (EN), *Melitta tricincta* (VU), *Nomada fuscicornis* (EN), *Nomada similis* (EN), *Nomada stigma* (VU), *Panurgus banksianus* (VU), *Sphecodes cristatus* (CR), and three species of moths: *Coleophora scrabida* (VU), *Conisania leineri* (CR) and *Eublemma minutata* (EN).

[275] http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6441-9.pdf?pid=3749
[276] Personal communication, Jonas Hedin, Unit for Nature Protection Coordinator, Threatened Species Action Plans, County Administrative Board of Kalmar, 27 July 2017