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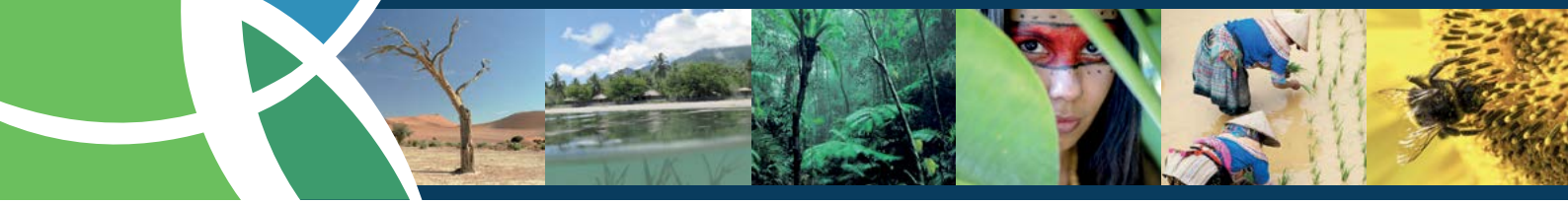
Biodiversity and Ecosystem Services Network



BES-Net Trialogue on Pollinators, Food Security and Rural Development

Background document

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The United Nations Development Programme works in nearly 170 countries and territories, helping to achieve the eradication of poverty, and the reduction of inequalities and exclusion. We help countries to develop policies, leadership skills, partnering abilities, institutional capabilities and build resilience in order to sustain development results. The Nairobi-based Global Policy Centre on Resilient Ecosystems and Desertification (GC-RED) is one of UNDP's Global Policy Centres. GC-RED is responsible for advancing global thinking and knowledge sharing on inclusive and sustainable development in drylands and other fragile ecosystems.

BESNet
Biodiversity and Ecosystem Services Network

The Biodiversity and Ecosystem Services Network (BES-Net) is a capacity sharing "network of networks" that promotes dialogue among science, policy and practice for more effective management of biodiversity and ecosystems, contributing to long-term human well-being and sustainable development. The Network is supported by face-to-face capacity building activities (the BES-Net Trialogues), a matchmaking facility, and a cutting-edge web portal – with all components mutually reinforcing. BES-Net is hosted by UNDP GC-RED.

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KEY MESSAGES

Why are pollinators important?

- Globally, nearly 90 per cent of wild flowering plant species depend, at least in part, on the transfer of pollen by animals. Plants are critical for the continued functioning of ecosystems as they provide food, form habitats and provide other resources for a wide range of other species (IPBES, 2016a).

- Pollinator-dependent crops rely on animal pollination for yield and/or quality to varying degrees. It is estimated that between 5-8 per cent of current global crop production, with an annual market value of $235 billion-$577 billion (in 2015, United States dollars) worldwide, is directly attributable to animal pollination (IPBES, 2016a).

- Pollinator-dependent food products are important contributors to healthy human diets and nutrition. Pollinator-dependent species encompass many fruit, vegetable, seed, nut and oil crops, which supply major proportions of micronutrients, vitamins and minerals in the human diet (IPBES, 2016a).

- In the words of José Graziano da Silva, FAO' s General Director in 2016:

  > *"Pollinators services are an 'agricultural input' that ensure the production of crops. All farmers, especially family farmers and smallholders around the world, benefit from these services. Improving pollinator density and diversity has a direct positive impact on crop yields, consequently promoting food and nutrition security. Hence, enhancing pollinator services is important for achieving the Sustainable Development Goals, as well as for helping family farmers' adaptation to climate change (FAO, 2016)".*

- Finally, pollinators provide multiple benefits beyond food production. Their value has as well an important cultural and social component. Many livelihoods and cultural practices depend on pollinators, their products and multiple benefits such as medicine, fibres, materials for musical instruments, source of inspirations for arts, literature to name a few (IPBES, 2016a).

What is the problem?

- Globally, there is a well-documented decline in some species of wild pollinators, and an important lack of data on the status of most wild species. Concerning managed species, honey bee numbers are generally increasing with local declines and important seasonal colony loss registered in several countries. As a result, there are losses of genetic diversity and local adaptations in honey bee populations. Populations of pollinators face multiple threats and there is a wide range of response options drawing from Indigenous and local knowledge and science (IPBES, 2016a).

- The vast majority of pollinator species are wild, including more than 20 000 species of bees, some species of flies, butterflies, moths, wasps, beetles, thrips, birds, bats and other vertebrates. A few species of bees are widely managed around the globe, including the western honey bee (*Apis mellifera spp.*), the eastern honey bee (*Apis cerana*), some bumblebees, some stingless bees and a few solitary bees. The western honey bee is the most widespread managed pollinator in the world, and globally there are about 81 million hives producing an estimated 1.6 million tonnes of honey annually (IPBES, 2016a).

- Multiple causes are linked to the decline in pollinators such as land use change, intensive agricultural management, risks associated with pesticides and particular inputs (insecticides and herbicides) associated with Genetically Modified (GM) crops, pathogens, pests and predators, climate change, invasive alien species and the various interactions among these threats.

What is the problem in the region?

- In Central and Eastern Europe, where Moldova, Albania, Bosnia and Herzegovina (BiH), Georgia and Montenegro are located, there is little documentation of the biodiversity, economic, social and cultural values of most wild (bumblebees, solitary bees and hover flies such as: *Bombus lapidarius, Anthidium manicatum, Helophilus pendulus* among others (IPBES, 2016a)) and managed (*Apis mellifera spp*. and *Bombus terrestris* (IPBES, 2016a)) pollinators besides some estimations of the economic and social value of honey bees in some of those countries (UNDP, 2017a).

- Pollinator decline and its link to food security is not seen as a priority topic. It seems that little attention has been given to the overall topic (beside honey bees excessive mortality) and the role that pollination and pollinators play in agriculture and ecosystem services has been underestimated among different public and private agencies in the region (UNDP, 2017a).

- The region experiences continuous land-use changes, including land abandonment, disparate forest cover changes, and the rapid expansion of urban and semi-urban areas resulting from increasing rural-to-urban migration (Alix-Garcia et al., 2016). The majority of rural smallholdings have unclear property rights and individually, they contribute to a low percentage of their country's GDP.

- National/international prioritisation of agricultural reforms and harmonisation with a move towards aggregation of small-holdings to create larger-scale, competitive farming is still not prominent in the region although it could be a potential future threat to pollinators due to changes in the landscape and creation of large scale monocultures.

- The level of use of inputs (pesticides, fertilizers and their adjuvants) by small landholders is unclear.

- Overall, the regional context reveals the following specific features of the problem in these five countries. In the region, it seems that:

    1. There is little documentation of values of most wild and managed pollinators besides honey bees;
    2. Pollinator decline is not a priority topic and this is mainly due to data availability or complexity for understanding the direct link between specific threats and pollinators decline;
    3. There is limited information about the status and trends of pollinators in the region;
    4. There is limited in-house capacity to tackle the problem at different levels;
    5. All 5 countries have similar drivers for pollinator decline such as land use change, inadequately integrated management of ecosystem services in general and share a similar political context including the alignment of agriculture, land and rural development policies to EU standards and trade agreements which could change the local landscape in the future; and
    6. their position on the two highly contentious and political issues raised by the IPBES global assessment: pesticides and Genetically Modified Crops, varies from country to country and in some of them it is unclear.

What do we know (and not know) about viable options to address the problem?

There is a wide range of globally recognised response options to address the threats linked to pollinators decline. The ambition and timescale of these options range from immediate, relatively straightforward, responses that reduce or avoid risks to relatively large-scale and long-term responses that aim to transform agriculture or society's relationship with nature (IPBES, 2016b).

Some of the options suggested include (Dicks et al. 2017, IPBES, 2016b):

Adapted from Table SPM1 (IPBES, 2016b)

TABLE SPM. 1

Overview of strategic responses to risks and opportunities associated with pollinators and pollination. Examples of specific responses are provided, selected from chapters 5 and 6 of the assessment report to illustrate the scope of each proposed strategy. This is not a comprehensive list of available responses and represents around half of the available options covered in the assessment report. Not all the responses shown for "improving current conditions" will benefit pollinators in the long term, and those with potential adverse, as well as positive, effects are marked with an asterisk. All the responses from chapter 6 that are already being implemented somewhere in the world and have well established evidence of direct (rather than assumed or indirect) benefits to pollinators are included in the table and are highlighted in bold.

IMPROVING CURRENT CONDITIONS FOR POLLINATORS AND/OR MAINTAINING POLLINATION	**MANAGE IMMEDIATE RISKS**	**Create uncultivated patches of vegetation such as field margins with extended flowering periods**
		Manage blooming of mass-flowering crops*
		Change management of grasslands
		Reward farmers for pollinator-friendly practices
		Inform farmers about pollination requirements
		Raise standards of pesticide and genetically-modified organism (GMO) risk assessment
		Develop and promote the use of technologies that reduce pesticide drift and agricultural practices that reduce exposure to pesticides
		Prevent infections and treat deseases of managed pollinators; regulate trade in managed pollinators
		Reduce pesticide use (includes integrated Pest Management, IPM)
	UTILIZE IMMEDIATE OPPORTUNITIES	Support product certification and livelihood approaches
		Improve managed bee husbandry
		Develop alternative managed pollinators*
		Quantify the benefits of managed pollinators
		Manage road verges*
		Manage rights of way and vacant land in cities to support pollinators

AMBITION	STRATEGY	EXAMPLES OF RESPONSES
TRANSFORMING AGRICULTURAL LANDSCAPES	ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	**Support diversified farming systems**
		Promote no-till agriculture
		Adapt farming to climate change
		Encourage farmers to work together to plan landscapes; engage communities (participatory management)
		Promote integrated Pest Management (IPM)
		Monitor and evaluate pollination on farms
		Establish payment for pollination services schemes
		Develop and build markets for alternative managed pollinators
		Support traditional practices for managing habitat patchiness, crop rotation and co-productionof knowledge between indigenous and local knowledge holders, scientists and stakeholders
	STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	**Support organic farming systems: diversified farming systems; and food security**, including the ability to determine one's own agricultural and food policies, resilience and ecological intensification
		Support "biocultural diversity" conservation approaches through recognition of rights, tenure and strengthening of indigenousand local knowledge and traditional governance that supports pollinators
	INVEST IN ECOLOGICAL INFRASTRUCTURE	**Restore natural habitats** (also in urban areas)
		Protect heritage sites and practices
		Increase connectivity between habitat patches
		Support large-scale land-use planning and traditional practices that manage habitat patchiness and "biocultural diversity"

AMBITION	STRATEGY	EXAMPLES OF RESPONSES
TRANSFORMING SOCIETY'S RELATIONSHIP WITH NATURE	INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Translate pollinator research into agricultural practices
		Support knowledge co-production and exchange among indigenous and local knowledge holders, scientists and stakeholders
		Strengthen indigenous and local knowledge that fosters pollinators and pollination, and knowledge exchange among researchers and stakeholders
		Support innovative pollinator activities that engage stakeholders with attachments to the multiple socio-cultural values of pollinators
	LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE, CROSS SECTORAL APPROACHES	Monitor pollinators (collaboration between farmers, the broader community and pollinator experts)
		Increase taxonomic expertise through education, training and technology
		Education and outreach programmes
		Manage urban spaces for pollinators and collaborative pathways
		Support high-level pollination initiatives and strategies

What implementation considerations need to be borne in mind?

- Many actions to support wild and managed pollinators and pollination could be implemented more effectively with improved governance (IPBES, 2016b).
- Coordinated, collaborative action and knowledge sharing that builds links across sectors (e.g., agriculture and nature conservation), across jurisdictions (e.g., private, Government, not-for-profit), and among levels (e.g., local, national, global) could lead to long-term changes that benefit pollinators (IPBES, 2016b).

I. INTRODUCTION

The following background document will support the first BES-Net Trialogue to be held in Sarajevo, Bosnia and Herzegovina on 18-20 October 2017. The BES-Net Trialogues are multi-stakeholder dialogues among the three communities of policy, science and practice that focus on specific policy questions at the national and regional levels. The discussions in Sarajevo aim to support the uptake of the findings of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessment[1]. The Trialogue will discuss key questions on how best to protect pollinators in order to ensure sustained agricultural and food production.

The IPBES assessment on pollinators, pollination and food production represents the state of knowledge on this issue (IPBES, 2016). It provides a critical assessment of the evidence on the value, status, trends and threats to pollinators and pollination. It exposes the risks associated with these threats and provides some policy and management response options for each of them. It concludes that there is a well-documented decline in some species of wild pollinators, an important lack of data on the status of most wild species, and local declines and important seasonal colony loss affecting managed pollinators, which are economically and socially important. Populations of pollinators face multiple threats and there is a wide range of response options (solutions) for pollinator conservation and pollination services management drawing from Indigenous and local knowledge and science (IPBES, 2016a). However, there is still a lack of adoption due to limited awareness and incentives as well as data gaps on the status and trends of pollinators needed to drive policy change.

[1] IPBES (2016). The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo, (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 552 pages.

The Pollinators, Pollination and Food Production assessment describes the following six features of the topic:

i. **Biodiversity:** it reviews the diversity of pollinators and pollination systems and their relationship with food production, human well-being and biodiversity. The report concludes that pollinators are diverse. Most pollinators are wild species and only around 20 species are actively managed. Pollinators are directly linked to food production and plant diversity. Crop dependency varies but generally higher production of food is linked to higher diversity of pollinators.
ii. **Drivers of change:** it assesses the drivers of change of pollinators. In this regard it concludes that multiple threats are linked to pollinators decline including: land use change, intensive agricultural management (including pollinator management), pesticides, Genetically Modified (GM) crops, pathogens and pests, climate change, invasive alien species and the various interactions among these threats.
iii. **Ecosystem services:** It assesses the state of and trends in pollinators, pollination networks and pollination as keystone ecological process and service in both human managed and natural terrestrial ecosystems. In this regard it concludes that the dependency of food security and human wellbeing is high.
iv. **Economic valuation:** It reviews the economic methodologies for determining the value of pollination for food production and the economic impacts of declines in food-relevant pollinator populations. In this regards it concludes that between US$235 billion and US$577 billion worth of annual global food production relies on direct contributions by pollinators.
v. **Non-economic valuation:** it focuses on non-economic valuation, with special emphasis on the experience of indigenous and local communities, of impacts of the decline of diversity and/or populations of pollinators. In this regard it concludes that pollinators have a strong holistic and cultural value globally and that Indigenous and Local Knowledge (ILK) that promote the survival of pollinators, are an important part of the global response to pollinators under threat.
vi. **Response options (solutions):** It assesses responses to risks associated with the degradation of pollination and opportunities to restore and strengthen those services (IPBES, 2016a).

The present background document will use the findings of the assessment report described above, in addition to a set of 10 semi-structured interviews with key stakeholder from the science, policy and practice community to look into the key features of the topic in Eastern Europe as well as policy gaps and policy opportunities tailored to five countries in the region: Albania, Bosnia and Herzegovina, Montenegro, Georgia and Moldova.

The Background Document also identifies the importance of incorporating the gender dimension into the analysis of risks and response options. Although the IPBES assessment does not explicitly focus on the gender dimension, gender equality and women's empowerment is central to achievement of the SDG on food security, as seen by FAO's focus on "achieving gender equality for food security, nutrition and sustainable agriculture" (FAO, 2017). Most of the response options identified by the IPBES assessment deal with land-use change and improvements to agricultural practice. Ensuring gender equality in these areas response options depends on the recognition of female land ownership, as laid out in SDG target 5a): "Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws"[2]. As part of the Western Balkan regional initiative on land and gender, sex-disaggregated data was produced by each country and indicated low levels of female ownership. Governments within the region were surprised to learn that female ownership in some places was as low as 3%, and not more than 30% in most cases.

The structure of the document is a combination of: 1) an adapted version of Moat et al., 2014 and Lavis et al., 2009's approach to the elaboration of documents to support evidence-informed policymaking and 2) the recommendations from Pippa Heylings, Global Facilitator, and from the BES-Net team.

[2] FAO is the custodian agency for this indicator, working in partnership with the contributing agencies and partners.

II. DESCRIPTION OF THE ISSUE AT GLOBAL AND REGIONAL LEVEL

Values of pollinators and pollination

Pollinators and pollination have multiple globally recognized economic, environmental and socio-cultural values (IPBES, 2016a).

Environmentally, pollinators are critical to biodiversity and ecosystem services maintenance. Nearly 90 per cent of wild flowering plant species depend, at least in part, on the transfer of pollen by animals, and plants are critical for the overall functioning of socio-environmental systems (IPBES, 2016a).

Economically, it is estimated that 5-8 per cent of production that is pollinator-dependent values $235 billion-$577 billion (in 2015, United States dollars) in the market (IPBES, 2016a).

Socio-culturally, pollinators provide multiple benefits beyond food production and nutrition. Their value has as well an important cultural and social component. Many livelihoods and cultural practices depend on pollinators, their products and multiple benefits such as medicine, fibres, materials for musical instruments, source of inspirations for arts, literature to name a few (IPBES, 2016a).

Situation in Central- Eastern Europe:

In Central and Eastern Europe, and particularly in Moldova, Albania, Bosnia and Herzegovina (BiH), Georgia and Montenegro, there is little documentation of the biodiversity, economic, social and cultural values of most wild (bumblebees, solitary bees and hover flies such as: *Bombus lapidarius, Anthidium manicatum, Helophilus pendulus* among others (IPBES, 2016a)) and managed (*Apis mellifera spp.* and *Bombus terrestris* (IPBES, 2016a)) pollinators besides some estimations of the economic and social valuation of honey bees in some of those countries (UNDP, 2017a).

Threats/Drivers of Change

Globally, there is a well-documented decline in some species of wild pollinators, and an important lack of data on the status of most wild species. Concerning managed species, honey bee numbers are generally increasing with local declines and important seasonal colony loss registered in several countries. Populations of pollinators face multiple threats and there is a wide range of response options drawing from Indigenous and local knowledge and science (IPBES, 2016a).

The consensus among scientists is that the interaction of many factors such as land use change, intensive agricultural management (including mass breeding of pollinators), pesticides, risks associated with Genetically Modified (GM) crops, pathogens and pests, climate change, invasive alien species and the various interactions among these threats are causing the decline of both managed and wild pollinators (IPBES, 2016a). In the case of pesticides, the few available field studies assessing effects of field-realistic exposure provide conflicting evidence (Godfray et al., 2015). It is currently unresolved how sub-lethal effects of pesticide exposure recorded for individual insects affect colonies and populations of managed bees and wild pollinators, especially over the longer term. Recent research focusing on neonicotinoid insecticides shows evidence of lethal and sub-lethal effects on bees and some evidence of impacts on the pollination they provide. There is evidence from a recent study that shows impacts of neonicotinoids on wild pollinator survival and reproduction at actual field exposure (Rundlöf et al. 2015). The European Food Safety Authority (EFSA) is currently reviewing the risk assessment to bees of three neonicotinoids used as seed treatments and granules. The outcome of this review is expected by the end of the year 2017.

For each of these threats, the IPBES assessment outlines the associated risks and globally accepted response options, drawing from Indigenous and local knowledge and science (IPBES, 2016a). The response options could be used as a starting point for the Trialogue discussions and could be prioritized and tailored to the region. This document uses the assessment's approach to describe the issue globally and in the region.

Risks and Response Options:

i) Land use change

Risks: Globally, the risks associated with Land use change (agricultural, natural and urban areas) include the reduction in food, nesting and other resources for pollinators, as well as for the loss of habitat, fragmentation and degradation. It also causes loss of practices based on indigenous and local knowledge.

Response options: To address these threats it is possible to improve the consideration of biodiversity and ecosystem services in spatial planning processes by preserving natural and making use of converted habitats wherever possible; provide food and nesting resources for pollinators; manage or restore native habitat patches; establish a network of protected areas including different types of natural habitats; increase habitat heterogeneity and favouring diversity in gardens and landscapes.

Situation in Central-Eastern Europe: many land use changes, including land abandonment, disparate forest cover changes, and the rapid expansion of urban areas resulting from large rural-to-urban migration. In the region, the inherent political, socioeconomic, and institutional differences have created divergent transition paths across countries with subsequent variation in land use change (Alix-Garcia et al., 2016). The area under protected areas varies among countries but is still limited.

In terms of gender equality in female land ownership, there are regional examples of good practice. Spousal consent is mandatory for any transaction involving matrimonial property in Albania. Property acquired during the duration of a consensual/non-marital union is considered co-ownership or joint ownership in Bosnia and Herzegovina. There is a Strategic Plan for the Development of Agriculture and Rural Areas of the Republic of Srpska in Bosnia and Herzegovina that provides a financial incentive of 5% if a woman is a farm holder (FAO, 2017).

ii) Intensive agricultural management

Risks: The risks associated with intensive agricultural management include: the loss of non-cultivated habitat patches, large field sizes and monocultures, high use of chemical inputs, intensive grazing.

Response options: Some options to address these threats are: create patches of flower rich habitats, support organic farming, and strengthen existing diversified farming systems, reward farmers for good practices.

Situation in Eastern Europe: national/international prioritisation of agricultural reform and harmonisation to large aggregated land for larger farming is not a major driver for land use change at the moment in the region. However, this could be a potential driver in the future when associated with changes in technology and promotion of monocultures as part of EU accession or free trade agreements.

iii) Pesticides

Risks: The risks associated with the use of pesticides include a broad range of lethal and sub-lethal effects. The impacts vary depending on compound(s) toxicity, (co) exposure levels in time and space, location and pollinator species sensitivity and traits. To illustrate this last point, in the case of honey bees, there could be potential differences at the subspecies level. The risk increases if labelling is insufficient or not respected, if the application equipment faulty or not fit for purpose and when there is no risk assessment or regulation is insufficient. The use of neonicotinoids has shown evidence of lethal and sub-lethal effects on bees and impacts on pollination (IPBES, 2016a). Conversely, a field realistic exposure and the potential synergistic and long term effects of pesticides (and their mixtures), remain unresolved. This negative evidence has led to the prohibition of certain uses of three neonicotinoid products by the European Union. Due to this prohibition, landowners could have substituted the use of neonicotinoids for other pesticides with potentially harmful effects as well.

Response options: Some options to address these threats are: raise standards of risk assessment and regulations of pesticide use. Reduce usage, seek alternative forms for pest control (Integrated Pest Management), train farmers and land managers in best practices. Adopt technologies to reduce spray drift and dust emission.

Situation in Eastern Europe: the level of pesticide use is unclear. It seems that unregistered pesticides and other agricultural inputs are imported and used in Eastern European countries without control and proper manipulation. At the country level, Moldova receives EU/WB assistance in disposing of obsolete pesticides, and in Bosnia and Herzegovina, training farmers in the proper use and storage of pesticides is regarded as a key intervention (IPBES, 2017a).

iv) Genetically Modified (GM) crops

Risks: The risks associated with the use of genetically modified crops are twofold: 1) Herbicide Tolerant (HT) crops may reduce pollination forage and 2) Insect Resistant (IR) crops have sub-lethal effects largely unknown.

Response options: Some options to address these threats are: raise standards of risk assessment for approval of GM crops and quantify the indirect and sub lethal effects of GM crops on pollinators

Situation in Eastern Europe: According to the 2015 report on the Global Status of Commercialized Biotech / GM crops of the International Service for the Acquisition of Agri-Biotech Applications (ISAAA), 28 countries around the world planted biotech crops in 2015 (ISAAA, 2015). Of those, none belonged to the five participant countries from Central and Eastern Europe. Furthermore, on a hectare basis, of the 28 countries that planted biotech crops in 2015, less than of 1% of the hectares was in Europe.

Bosnia and Herzegovina (BiH) law on GMOs is harmonized with EU legislation. In 2009, BiH joined countries that have developed a legislative framework, which addresses all aspects of GMO pertaining food security. Georgia has banned the use of GMOs at the highest political level, introducing a law[3]. No information is available for the other three participant countries.

v) Pathogens and pests

Risks: Managed pollinators are highly affected by viruses, pathogens, bacteria, predators etc… Trade, mass breeding and transport of commercial bees increase the risk of pathogen spread within and between managed and wild species and invasion and competition with wild pollinators.

Response options: Some options to address these threats are: improve managed bee husbandry by respecting the principles of Good beekeeping practices, and regulations for prevention, treatment and eradication of diseases; better disease detection and management; breeding programmes for disease resistance; improve regulations for trade and mass breeding (nationally and internationally); establishment of a public information system on species, pathogen pathways, and available databases and maps on their distribution.

Situation in Eastern Europe: Beekeeping sector infrastructure is currently in a very bad condition in Moldova, Bosnia and Herzegovina and Georgia (UNDP, 2017a). However, there are important capacity building activities and technical assistance projects aiming at adjusting beekeeping practices to the requirements and standards of the EU happening in the region (Srb-Hib, 2017).

vi) Climate change

Risks: The risks associated with climate change (according to the IPCC report) for some pollinators are: range changes, altered abundance, shifts in seasonal activities, risk of disruption of future crop pollination, appearance of new invasive alien species. Overall, climate shifts across landscapes may exceed species dispersal abilities. There is as well evidence that climate change could negatively impact honey bee diseases and ecotypes (Le Conte & Navajas, 2008).

Response options: options to address these threats are largely untested and include: targeted habitat creation or restoration to manage refuges, conservation of natural habitat and connectivity and increase crop diversity.

Situation in Eastern Europe: Rasmont et al. (2015) projected future climatically suitable conditions for bumble bees in Europe using climate change scenarios. The study concludes that climate change could negatively affects the number of bees and their dispersal abilities due to loss of their suitable areas. Another study shows that bumble bees in Europe have not shifted northward and are experiencing shrinking distributions in the southern ends of their range (Kerr et al, 2015).

vii) Invasive alien species

Risks: The risks associated with invasive alien species include negative impacts for plants, pollinators, predators and disease control. Some examples include: varroa, small hive beetle (for honey bees) and Asian hornet (which has impacts on all bees but mostly affects honey bee colonies).

Response options: options to address these threats are twofold. On the one hand, the options for those invasive alien species not yet arrived are: policies and practices to prevent new invasions. On the other hand, the option to limit the expansion of those which have already entered, include: eradication and control, although this is rarely successful and very costly.

Situation in Eastern Europe: invasive alien species affect farmers in BiH and the impacts of managed pollinators on wild population remain unknown in the region.

[3] https://matsne.gov.ge/en/document/download/2516880/1/en/pdf

III. DESCRIPTION OF THE ISSUE AT NATIONAL LEVEL

ALBANIA

Value of pollinators and pollination: Limited information about pollination and pollinators valuation available in English.

Trends of Threats: Agriculture represents one of the most important sectors of the Albanian's economy, contributing to approximately 21 % of the country's Gross Domestic Product (GDP) and to the employment of 48 % of the country's population living in the rural areas. The agriculture sector plays a very important role in: food production; biodiversity management; rural economy; in-situ conservation of local species; varieties and domestic animals. The development of this sector is oriented to regional diversification of crops (GOA, 2015) and at the moment it is not increasing the risks for pollinators.

Response options: The Strategic Policies for the Protection of Biodiversity set by the Government of Albania (GOA, 2015), include objectives that might help mitigate the pollination / pollinators issues such as: agricultural variability/ diversification, organic agriculture, biological control and banning of pesticides with long-term impacts (GOA, 2015). The reasoning behind this objective is to promote agricultural diversity, benefit biodiversity, and promote conservation of local agro biodiversity, including traditional varieties (GOA, 2015).

BOSNIA AND HERZEGOVINA

Value of pollinators and pollination: honey production was recognized as an important economic value of protected areas in the country, as well as its direct link to improvement of local economy. Besides honey production, it seems pollination it is not widely recognized as a regulatory ecosystem service related to food production (WWF, 2016). However, fruit and vegetables- many of which are pollinator dependent- are important for food security and nutrition for the population, as a vast majority of rural households have vegetable plots and fruit trees in their gardens for self- consumption (FAO, 2012b). During the field visit of the Global Facilitator and BES-NET team, pollination was mentioned as crucial for cherry and pear production for export.

Trends of Threats: Agriculture is an important and strategic sector for BiH. It ensures food security and employs 20.6% of the population (MoFTER, 2012), The country recognizes the importance of ecosystem services derived from agri-biological diversity, specially food production, however there are important aspects of the sector that could put pollinators at risk. There are important problems with landownership, property issues and lack of agro-environmental data (e.g. consumption and composition of fertilizers, pesticides, nitrogen ratios, eco-efficiency, energy use, etc.) (State of the Environment Report in BiH, 2012), complicated procedures and bureaucracy due to the governance in place. Domestic migration is also a challenge and a potential threat to pollinators. 61 % of the population lives in rural areas (MoFTER, 2012), and rural-urban migration is increasing.

Response options: BiH has more than half of its surface area (63%) covered with forest and forestland (WWF, 2016), and 106.300 ha or 2.7% of the country's territory under protected areas (UNEP Bosnia and Herzegovina, 2017). These areas are important due to traditional agriculture activities including grazing, honey production and more recently tourism. Tourism is seen as a big opportunity for recovering economy of the country and is an important development driver.

In the agricultural sector, the production of organic food has been promoted since 2000 and is increasing (MoFTER, 2012). However, there is no law at the moment related to organic production in the FBiH and the BD.

MONTENEGRO

Value of pollinators and pollination: Local people in Montenegro use and recognize the value of wild plants, medicinal plants, honey, and other wild materials that are pollinator-dependent. Their economic value is evident and many of the stakeholder groups benefit from trade and processing of natural food and materials. The total number of beehives in Montenegro is estimated to be 50000. Three national parks (Biogradska gora, Prokletije and Skadar Lake) combined have over 10000 beehives, or more than 20 percent of all beehives in Montenegro. More than 950 tons of blackberries are collected every year in area of Prokletije, Bjelasica and Komovi mountain region. National Park Prokletije, National Park Biogradska gora and park of nature Komovi are important source for blackberries and herbs collection. These activities generate more than 1,4 million EUR every year. These activities are particularly important for rural mountainous areas where other business opportunities for local residents are scarce (WWF, 2017).

Trends of Threats: The economy of Montenegro largely relies on tourism. Close to 11% of the country's GDP comes from this activity. Montenegro is strategically oriented towards sustainable tourism development including inland areas in addition to the coastal areas. This development trend in combination with the decline of agriculture in past decades, mainly due to the common phenomena of depopulation in rural mountainous areas across the Balkans could benefit pollinators' protection.

Legislation on species protection is not fully developed in the country. This causes difficulties in Protected areas management and sustainable use of medicinal plants, berries (WWF, 2017) and its associated pollinators.

Response options: The country has 160,392.89 ha or 11,613% of the territory of the country is under protected areas and it is widely recognized the importance for local economies and communities. However, local people, as well as the public, do not recognize and understand the full array of ecosystem services that protected areas provide. Regulating and supporting ecosystem services (not direct services) are weakly recognized, and not included in economic considerations.

GEORGIA

Value of pollinators and pollination: The increase of attention to bees and pollination in Georgia has been increased with the opportunity of honey export to EU. Beekeepers in Georgia receive help and financing in various forms from the government and international or foreign organizations. There is no available valuation of pollinators and pollinations.

Trends of Threats: The third main principle of the country's vision of development is based on rational use of natural resources, ensuring environmental safety and sustainability and avoiding natural disasters during the process of economic development. This could benefit pollinators protection in the long run. Georgias' foreign and internal policy is oriented towards the integration in the European Union (GoG, 2013) which could be consider a threat an opportunity for pollinators.

Response options: The National Biodiversity Strategy and Action Plan of Georgia 2014 – 2020 (GOG, 2014) states as an objective to "Develop programs aimed at promoting sustainable management practices, certification and labelling schemes such as Best Agricultural Practices, organic farming and sustainable harvesting of wild plants". Within this objective, the Government of Georgia aims to implement pilot projects on organic farming and at least four pilot projects on sustainable harvest schemes for wildgrowing plants.

In the same strategy, Georgia set the objective of "Assessig the status of Georgia's agricultural ecosystems (including soils and ecosystem services provided) and natural grasslands", which includes the assessment of the status of pollinators and entomophagous insects and from there develop recommendations for their conservation.
At the moment, there is no policy available on pollinators from the Ministry of environment beside a strong regulation around pesticides and the Law of Georgia on Living Genetically Modified Organisms (GoG, 2014) that bans GMOs in the country from the Ministry of Agriculture (Karchava comm pers, 2017).

MOLDOVA

Value of pollinators and pollination: In the Republic of Moldova, pastures and agricultural ecosystems provide services estimated at 3,900 million US dollars in 2011. And Sustainable ecosystem management in agriculture can add over 1,883.33 million US dollars to the national economy in the next 25 years (GRM, 2015). Indigenous knowledge of honey-producing bees is important, and has a long and rich tradition.

Trends of Threats: the Republic of Moldova has several strategies to maintain the sustainability on agricultural practices which shows the direction of the country's agricultural development. Some of those strategies include (GRM, 2015):

a) Develop and promote the draft law on agricultural land protection belts;
b) Promote elements of green agriculture and environmentally friendly practices;
c) Conduct studies on the impact of alien invasive species;
d) Promote good agricultural practices to stop degradation;
e) Encourage activities aimed at the maintenance of the domestic genetic fund of breeding stock;
f) Develop farmers' good practices guidebooks on conservation and sustainable use of biodiversity;
g) Draft a program for genetic improvement of honey-bees; and
h) Promote valuable genotypes of plants in order to establish industrial plantations.

Response options: The export of honey from Moldova to EU favoured the increased attention to beekeeping and pollination. The government of Moldova adopted the law on beekeeping, whose main purpose is to create conditions to increase the number and improve the quality of bee products (UNDP, 2017a). Besides the attention given to honey production, Moldova has made important efforts that could help pollinators protection such as: sustainable management of pastures and agricultural ecosystems by extending and diversifying eco-agricultural products (GRM, 2015).

IV. SUMMARY OF FEATURES OF THE PROBLEM IN THE EASTERN EUROPEAN REGION

Countries located in Central and Eastern Europe, such as Moldova, Albania, Bosnia and Herzegovina, Georgia and Montenegro vary broadly in terms of their geography, natural resources, population size, ethnic groups, languages, religious affiliations and political systems. The differences in socio-economic conditions and human development are also broad (IUCN, 2016).

In this region, pollination decline and its link to food security is not a priority topic. However, pollinator health is a precondition for at least two important development priorities; the production of apiary products and of pollination-dependent plants (UNDP, 2017a). It seems there is a lack of attention and underestimation of pollination for agriculture among different public and private agencies in the region (UNDP, 2017a).

The limited attention and underestimation of pollination's role in agriculture among different public and private agencies in the region is reflected in the gap in statistics and legislation, contributing to beekeeping development. As a consequence, the beekeeping sector infrastructure is currently in poor conditions in Moldova, BiH and Georgia (UNDP, 2017a).

Important to notice in the region that Gender disaggregated data in the Western Balkans shows that although women and men have equal status in law in relation to property as well as equal access to information, local customs, cultural norms, and traditions prevail over laws in some places and amongst certain groups. It is therefore not rare that women lose their entitlements to male relatives (FAO, 2012).

Important features of the national context include the economic importance of pollinators in each of the 5 countries and local practices and cultural significance of pollinators. Important efforts have been made around ecosystem services valuation and non-economic valuation in protected Areas in some of the countries of the region (WWF, 2017).

Taking into consideration the global IPBES assessment, the national contexts described above and information obtained through key stakeholders interviews, we can organize the most important features of the problem in Central and Eastern Europe in six main categories:

1. There is little documentation of values of most wild and managed pollinators besides honey bees
2. Pollinator decline is not a priority topic and this is mainly due to data availability or complexity for understanding the direct link between specific threats and pollinators decline;
3. There is limited information about the status and trends of pollinators in the region
4. There is limited in-house capacity to tackle the problem at different levels;
5. All 5 countries have similar drivers for pollinator decline such as land use change and inadequately integrated management of ecosystem services in general; they share a similar political context including the ongoing alignment of agriculture, land and rural development policies to EU standards and trade agreements which could change the local landscape in the future; and
6. Their position on the two highly contentious and political issues raised by the IPBES global assessment: pesticides and Genetically Modified Crops, varies from country to country and in some of them it is unclear.

(i) The lethal and sub-lethal effects of pesticides, including neonicotinoids, on wild and managed bees: Pesticides, particularly insecticides, have been demonstrated to have a broad range of lethal and sub-lethal effects on pollinators under controlled experimental conditions . Recent evidence shows negative impacts of neonicotinoids on wild pollinator survival and reproduction at actual field exposure, but evidence of the effects on managed honey bee colonies is conflicting.

(ii) The direct and indirect effects of genetically modified crops on a range of pollinators (IPBES, 2016): more research is needed to assess the impact of genetically modified crops on pollinators.

V. OPTIONS FOR ADDRESSING THE PROBLEM IN THE EASTERN EUROPEAN REGION

This section provides a description of the options for addressing the problem in the region (in terms of policy mainly but also in highlighting scientific needs and actions that can be put in place now by practitioners) based on the IPBES assessments, systematic reviews and relevant local studies that provide viable options to address the problem.

Policies, regulations and processes in place and available tools

This section describes different policy processes in place that could help address the key features of the pollinators, pollination and food security issue in the region.

i) International policy processes

IPBES: The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body that provides policymakers with objective scientific assessments about the state of knowledge regarding the planet's biodiversity, ecosystems and the benefits they provide to people, as well as the tools and methods to protect and sustainably use these vital natural assets (IPBES, 2017). The IPBES offers a catalogue of policy support tools and methodologies to support the suggestions of policy options as part of the Trialogue and other processes.

CBD: CBD has considered the implications of the IPBES assessment on pollinators, pollination and food production for the work of the Convention and, at its thirteenth meeting in 2016, adopted Decision XIII/15 "To integrate consideration of issues related to the conservation and sustainable use of pollinators in agriculture and forestry policies, national biodiversity strategies and action plans, national adaptation plans for climate change, national action programmes for combating desertification and other relevant national policies plans, and programmes, taking into account the values of pollinators and pollination, inter alia, to promote the implementation of actions to improve the management of pollinators, to address drivers of pollinator declines and to reduce the crop yield gaps due to pollination deficit".

Sustainable Development Goals: The global 2030 Agenda for Sustainable Development will permeate in most countries' development plans and most actors and funding will be realigned towards the achievement of these goals. SDG2: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and SDG15: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" (UNDP, 2016) are explicit about biodiversity and ecosystem services and could facilitate the creation of regulations to protect pollinators.

The Nagoya Protocol: The Nagoya Protocol explicitly recognizes the interdependence of all countries with regard to genetic resources for food and agriculture as well as their special nature and importance for achieving food security worldwide and for sustainable development of agriculture in the context of poverty alleviation and climate change. The Protocol pays special attention to food security and states that signatory parties should pay due regard to cases of present or imminent emergencies that threaten or damage human, animal or plant health, as determined nationally or internationally (CBD, 2011). Out of the five countries, only Albania and Montenegro are signatories of the Protocol of Nagoya (CBD, 2017a).

Paris Agreement and ecosystem based adaptation: After, the Paris Agreement, nations will address climate change by implementing their National Determined Contributions (NDCs). Each nation's NDCs contain concrete actions to mitigate and adapt to climate change. Accordingly, it is expected that all state and non-state actors would align their strategies to contribute with the goals. Ecosystem-based Adaptation (EbA) is one of the recommended approaches to climate change adaptation. It integrates the use of biodiversity and ecosystem services into an overall strategy to help people adapt to the adverse impacts of climate change. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to both current climate variability, and climate change. Healthy ecosystems have a greater potential to adapt to climate change themselves, and recover more easily from extreme weather events.

Ecosystem-based Adaptation involves activities that may alleviate the pollination/pollinator issues including:

- Sustainable water management, to provide water storage and flood regulation services;
- Establishment of diverse agricultural systems, where using indigenous knowledge of specific crop and livestock varieties, maintaining genetic diversity of crops and livestock, and conserving diverse agricultural landscapes secures food provision in changing local climatic conditions
- The protection, restoration, and management of key ecosystems by safeguarding and enhancing protected areas and fragile ecosystems. It also involves restoration of fragmented or degraded ecosystems, or simulation of missing ecosystem processes such as migration or pollination.
- Ecosystem-based Adaptation strategies also promote carbon sequestration which can complement and enhance climate change mitigation.

International Pollinators Initiative-IPI: in 2000 the Convention Biological Diversity established the IPI (FAO, 2008). It is the result of effort, achievements and initiatives of people committed to the conservation and sustainable use of pollinators, around the world. The aim is to promote coordinated action worldwide to: 1) monitor pollinator decline, its causes and its impact on pollination services; 2) address the lack of taxonomic information on pollinators; 3) assess the economic value of pollination and the economic impact of the decline of pollination services; and 4) promote the conservation, restoration and sustainable use of pollinator diversity in agriculture and related ecosystems (FAO, 2008).

ALARM project has produced an integrated database of European bees which draws together all the fragmented literature and many of the existing databases. The centralized European Bee Database includes species-specific information for a broad range of traits including information on floral preferences, nesting sites, flight seasons and habitat use (FAO, 2008).

Coalition of the Willing on Pollinators: the key messages of IPBES assessment were recognized by the Convention on Biological Diversity in a decision (CBD/COP/DEC/XIII/15) at its 13th meeting in Cancun, México, 2016. This stimulated a limited number of countries to form a "coalition of the willing" to work on some of the key problems identified in the assessment. It is committed to take action to protect pollinators and their habitats by developing and implementing national pollinator strategies; share experience and lessons learnt in developing and implementing national pollinator strategies, especially knowledge on new approaches, innovations and best practices; reach out to seek collaboration with a broad spectrum of stakeholders – countries as well as businesses, NGO's, farmers, local communities; develop research on pollinator conservation; Mutually support and collaborate with each other – and those parties that are willing to join the coalition (Schmeller et al., 2017).

ii) Regional Policy processes and regulations

The EU Common Agriculture Policy (CAP) and EU's Instrument for Pre-Accession Assistance in Rural Development (IPARD) are important drivers for change in these countries. They guide and lend countries support in adopting the EU regulatory framework and in developing their rural economies.

Market trends: Increase in EU self-sufficiency in honey due to Central and Eastern European countries. Following Asia, the EU is the second major global producer of honey producing 23% of the global production. The increase of EU production is mainly due to the accession of countries from Central- and Eastern-Europe between 2000 and 2010, such as Moldova.

Relevance for GMO and pesticide regulations for Central and Eastern Europe

Imports are regularly subject to bans from the EU. For example: Chinese honey was banned from 2002 to 2004 because chloramphenicol was found in the honey; in 2011, Chinese, Argentinean and Chilean honey were temporally banned because GMO pollen were found in the honey; in 2007, a ban was imposed on honey from Brazil because no agreement could be made on testing procedures and standards. These bans have huge impacts on international trade and prices.

European ban on neonicotinoids: The use of neonicotinoids has shown evidence of lethal and sub-lethal effects on bees and impacts on pollination (IPBES, 2016a) which has led to the prohibition of some uses of three neonicotinoids products by the European Union. However, a field realistic exposure and the potential synergistic and long term effects of pesticides (and their mixtures), remain unresolved.

European pollinator initiatives: The European Pollinator Initiative (EPI) is part of the International Pollinator Initiative launched at the Fifth Conference of Parties of the Convention on Biological Diversity. EPI aims to integrate and coordinate local, national and international activities relating to pollination into a cohesive network in order to safeguard the services provided by pollinators across the continent (BES-NET, 2017).

The International Code of Conduct on Pesticide Management of the Food and Agriculture Organization and the World Health Organization of the United Nations provides a set of voluntary actions for Government and industry to reduce risks for human health and environment (IPBES, 2016b).

OECD Guidelines for the Testing of Chemicals: The OECD Guidelines are a unique tool for assessing the potential effects of chemicals on human health and the environment. Accepted internationally as standard methods for safety testing, the Guidelines are used by professionals in industry, academia and government involved in the testing and assessment of chemicals (industrial chemicals, pesticides, personal care products, etc.) (OECD, 2017).

EFSA Guidance Document on the risk assessment of plant protection products on bees (Apis mellifera, Bombus spp. and solitary bees): This Guidance Document is intended to provide guidance for notifiers and authorities in the context of the review of plant protection products (PPPs) and their active substances (EFSA, 2013).

Indigenous Pollinators Network and the Sentimiel Program, aim to construct a network of cooperative initiatives, traditional beekeepers and honey harvesters, farmers, and indigenous and local people together to strengthen knowledge concerning pollination by sharing and engaging with the scientific community, hence strengthening anthropogenic assets and institutional arrangements that contribute to bees' diverse benefits to people (IPBES, 2016a)

Other established Initiatives include: African Pollinator Initiative (API); Brazilian Pollinator Initiative (BPI); Canadian Pollination Initiative (CANPOLIN); England's National Pollinator Strategy (NPS); French National Action Plan; Insect Pollinators Initiative (IPI); International Commission for Pollinator Plant Relationships (ICCPR); Irish Pollinator Initiative; North American Pollinator Protection Campaign (NAPPC); Oceania Pollinator Initiative (OPI); Pollinator Partnership; Prevention of honey bee Colony Losses (COLOSS); Status and Trends of European Pollinators (STEP); Sustainable pollination in Europe – joint research on bees and other pollinators (SUPER-B); Wales Action Plan for Pollinators; White House – Pollinator Research Action Plan. There are also other initiatives being developed or planned. (IPBES, 2016a), EFSA's MUST-B project assessing co-exposures from multiple stressors (biological, chemical end environmental) in bees; and others.

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