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SUBSIDIARY BODY ON SCIENTIFIC,
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Agenda item 11

RECOMMENDATION ADOPTED BY THE SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE

22/9. Conservation and sustainable use of pollinators

The Subsidiary Body on Scientific, Technical and Technological Advice

1. *Welcomes* the draft plan of action 2018-2030 for the International Initiative for the Conservation and Sustainable Use of Pollinators as contained in annex I to the present recommendation;

2. *Takes note* of the summary of information on the relevance of pollinators and pollination to the conservation and sustainable use of biodiversity in all ecosystems beyond their role in agriculture and food production provided in annex II to the present recommendation;

3. *Also takes note* of the draft full report on the relevance of pollinators and pollination to the conservation and sustainable use of biodiversity in all ecosystems beyond their role in agriculture and food production,[1] and *requests* the Executive Secretary, subject to the availability of resources, to finalize the report, taking into account peer review comments, and make it available for the fourteenth meeting of the Conference of the Parties;

4. *Recommends* that the Conference of the Parties at its fourteenth meeting adopt a decision along the following lines:

The Conference of the Parties,

Recalling decision III/11, annex III, decision V/5, decision VI/5, and decision XIII/15,

Noting the importance of pollinators and pollination for all ecosystems, including those beyond agricultural and food production systems, particularly to the livelihoods and culture of indigenous peoples and local communities, and *recognizing* the important contribution of activities to promote the conservation and sustainable use of pollinators and pollination functions and services in achieving the Aichi Biodiversity Targets as well as the Sustainable Development Goals,

Recognizing that activities to promote the conservation and sustainable use of pollinators and pollination functions and services are key elements in the transition towards the achievement of more sustainable food systems by fostering the adoption of more sustainable practices among agricultural sectors and across sectors,

1. *Adopts* the Plan of Action 2018-2030 for the International Initiative for the Conservation and Sustainable Use of Pollinators as contained in annex I to the present decision, for implementation according to national circumstances;

[1] CBD/SBSTTA/22/INF/21.

2. *[Welcomes/Takes notes* of][2] the summary of information on the relevance of pollinators and pollination to the conservation and sustainable use of biodiversity in all ecosystems beyond their role in agriculture and food production contained in annex II to the present decision;

3. *Encourages* Parties, other Governments and relevant organizations and networks to support and implement relevant activities of the International Initiative on the Conservation and Sustainable Use of Pollinators through, among other things, the integration of appropriate measures into the implementation of national biodiversity strategies and action plans, as well as subnational and local biodiversity strategies and actions plans, as appropriate, and relevant policies, legislation, and programmes;

4. *Urges* Parties and *invites* other Governments to address the drivers of wild and managed pollinator decline in all ecosystems, including the most vulnerable biomes and agricultural systems, and, as identified in annex II to the present decision, paying especially close attention at both the local and regional scales to the risk of introducing invasive alien species (plants, pollinators, predators, pests and pathogens) that are harmful to pollinators and to the plant resources on which they depend, and to avoiding or reversing land degradation and to restoring lost pollinator habitats, in addition to addressing the drivers identified in decision XIII/15;

5. *Encourages* Parties and *invites* other Governments to integrate the conservation and sustainable use of wild and managed pollinators and their habitats into land management and protected areas and other effective area-based conservation policies;

6. *Encourages* Parties and *invites* other Governments:

(a) To encourage the private sector to take into consideration the activities listed in the Plan of Action and to work towards the achievement of more sustainable production and consumption systems;

(b) To encourage academic and research bodies, and relevant national, regional and international organizations and networks, to conduct further research to address gaps[3] identified in the Plan of Action and to synthesize and communicate information through appropriate channels to support implementation;

(c) To encourage farmers, beekeepers, land managers, urban communities, indigenous people and local communities and other stakeholders to adopt pollinator-friendly practices and address direct and indirect drivers of pollinator decline at the field and local level;

(d) To develop and deploy monitoring of wild and managed pollinators in order to assess the magnitude of the decline and to evaluate the impact of deployed mitigation actions;

7. *Encourages* the Global Environment Facility and other donors and funding agencies to provide financial assistance for national and regional projects that address the implementation of the Plan of Action for the sustainable use and conservation of pollinators;

8. *Requests* the Executive Secretary to bring the present recommendation to the attention of the Food and Agriculture Organization of the United Nations and its Committee on Forestry, the Committee on Agriculture, the Commission on Genetic Resources for Food and Agriculture, the Committee on World Food Security, and the Secretariats of the International Plant Protection Convention and the International Treaty on Plant Genetic Resources for Food and Agriculture as well as the Secretariat of the Basel, Rotterdam and Stockholm Conventions;

[2] Pending finalization of the draft full report on the relevance of pollinators and pollination to the conservation and sustainable use of biodiversity in all ecosystems beyond their role in agriculture and food production, in line with paragraph 3 of recommendation 22/9 of the Subsidiary Body on Scientific, Technical and Technological Advice.

[3] Gaps identified in the Element 4 of the Plan of Action 2018-2030 presented in annex I.

9. *Invites* the Food and Agriculture Organization of the United Nations to facilitate the implementation of the Plan of Action, following the successful approach of the previous plan involving ministries of agriculture and environment at the national level;

10. *Also requests* the Executive Secretary, subject to the availability of resources, and in collaboration with the Food and Agriculture Organization of the United Nations, the Secretariat of the Basel, Rotterdam and Stockholm Conventions and other relevant stakeholders, to develop guidelines and best practices in relevant areas, determined in accordance with the level of priority for the implementation of the Plan of Action, such as, among others, the use of chemicals in agriculture, protection programmes for native pollinators in natural ecosystems, promotion of biodiverse production systems, crop rotation, monitoring of native pollinators, and environmental education;

11. *Requests* the Executive Secretary to consider the conservation and sustainable use of wild and managed pollinators in preparations for the post 2020-global biodiversity framework;

12. *Invites* Parties, other Governments, research institutions and organizations that are in a position to do so to support countries that need (a) to increase taxonomic capacity in order to improve knowledge about pollinators, their status and trends, (b) to identify drivers of change in their populations, and (c) to develop appropriate solutions to enable effective adoption and implementation of the proposed action plan.

Annex I

UPDATED PLAN OF ACTION 2018-2030 FOR THE INTERNATIONAL INITIATIVE ON THE CONSERVATION AND SUSTAINABLE USE OF POLLINATORS

INTRODUCTION

1. At its third meeting, in 1996, the Conference of the Parties to the Convention on Biological Diversity recognized the importance of pollinators, and the need to address the causes of their decline (decision III/11). By decision V/5, the Conference of the Parties decided to establish an International Initiative for the Conservation and Sustainable Use of Pollinators as a cross-cutting initiative within the programme of work on agricultural biodiversity to promote coordinated action worldwide and, subsequently, by decision VI/5, adopted a plan of action. The Food and Agriculture Organization of the United Nations (FAO) has been leading and facilitating the implementation of the Plan of Action.

2. The present Plan of Action has been prepared jointly by FAO and the Secretariat of the Convention on Biological Diversity, in consultation with other partners and relevant experts, pursuant to decision XIII/15 (para. 10).

I. OBJECTIVES, PURPOSE AND SCOPE

3. The overall objective of this Plan of Action is to promote coordinated action worldwide to safeguard wild and managed pollinators and promote the sustainable use of pollination functions and services, which is a recognized vital ecosystem service for agriculture and for the functioning and health of ecosystems.

4. The purpose of this Plan of Action is to help Parties, other Governments, indigenous peoples and local communities, relevant organizations and initiatives to implement decision XIII/15, in alignment with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets and the 2050 Vision for Biodiversity, the FAO Strategic Framework 2010-2019, and relevant successor frameworks, and the 2030 Agenda for Sustainable Development, including the Sustainable Development Goals.

5. The operational objectives of this Plan of Action are to support Parties, other Governments, indigenous peoples and local communities, relevant organizations and initiatives:

(a) In implementing coherent and comprehensive policies for the conservation and sustainable use of pollinators at the local, subnational, national, regional and global levels, and promoting their integration into sectoral and cross-sectoral plans, programmes and strategies;

(b) In reinforcing and implementing management practices that maintain healthy pollinator communities, and enable farmers, beekeepers, foresters, land managers and urban communities to harness the benefits of pollination for their productivity and livelihoods;

(c) In promoting education and awareness in the public and private sectors of the multiple values of pollinators and their habitats, in improving the tools for decision-making, and in providing practical actions to reduce and prevent pollinator decline;

(d) In monitoring and assessing the status and trends of pollinators, pollination and their habitats in all regions and to address gaps in knowledge, including by fostering relevant research.

6. The Plan of Action is aimed at facilitating the implementation of actions to safeguard and promote pollinators and pollination functions and services across agricultural landscapes and related ecosystems, including forests, grasslands, croplands, wetlands, savannas, coastal areas and urban environments. The activities can be applied at the regional, national, subnational and local levels.

II. CONTEXT AND OVERALL RATIONALE

7. Animal-mediated pollination is a regulating ecosystem service of vital importance for nature, agriculture, and human well-being. This service is provided by pollinators, namely by managed bees, wild bees, and other insects, such as flies, butterflies and beetles, as well as vertebrates, such as bats, birds and some primates. The assessment report on pollinators, pollination, and food production published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)[4] underscores the role of pollinators in multiple respects. Nearly 90 per cent of the world's wild flowering plant species depend, entirely or at least in part, on animal pollination. These plants are essential for the functioning of ecosystems by providing other species with food, habitats and other resources. In addition, some self-pollinating crops, such as soybean, can also benefit from enhanced productivity by animal pollinators.

8. Strong declines of some pollinator taxa over the last few decades have been observed, although data on the status and trends of wild pollinators is limited, and largely restricted to some regions of Europe and the Americas. Risk assessments of the status of wild insect pollinators, such as wild bees and butterflies, are similarly geographically restricted but indicate high threat levels, with proportions of threatened species often exceeding 40 per cent.

9. At the same time, as global agriculture has become increasingly pollinator-dependent, much of this dependence is linked to wild pollinators.[5] Beyond marketable products and health benefits stemming from diverse and nutritious diets enabled by pollination, pollinators provide non-monetary benefits for human well-being as sources of inspiration for arts and crafts, religion, traditions or recreational activities.

10. Many of the main direct drivers of pollinator loss have remained the same as originally identified by the Convention on Biological Diversity in its first decision on pollinators:[6] habitat fragmentation and land use change, agricultural and industrial chemicals, parasites and diseases, and invasive alien species. In addition, the importance of other direct drivers, such as climate change, has emerged, and greater attention has been focused on drivers linked to intensive agricultural practices, such as monoculture, use of pesticides, and some [living modified organisms], with increased evidence of both lethal and sublethal effects of pesticides on bees, and the understanding that the combination of different drivers can increase the overall pressure on pollinators.

11. In the broader context, pollinators can be considered an important link for agriculture, forestry, biodiversity, health, food security, food safety and nutrition. Pollinator-friendly measures have the potential to increase productivity and sustainability and contribute to the long-term viability and profitability of food production systems. Their wider use could be a transformative agent by fostering sustainable practices among agricultural sectors.

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[4] IPBES (2016). *Assessment Report on Pollinators, Pollination and Food Production*.

[5] Ibid.

[6] Decision VI/5 on agricultural biological diversity, annex II.

12. The first phase of the International Pollinators Initiative (2000-2017) facilitated the identification of main threats and the causes of pollinator decline, as well as the impacts of pollination functions and services and reductions on food production. In addition, taxonomic information on pollinators, the assessment of their economic value in various countries and crops were important steps not only to reinforce research and monitoring, but also to promote the conservation, restoration and sustainable use of pollinators. A number of relevant tools were developed, and many studies were carried out, including the IPBES assessment and complementary studies.

13. The essential role of pollinators in food production, and the importance of their diversity and abundance in agricultural landscapes and related ecosystems are now well recognized. The updated Plan of Action builds on the first phase, and taking into account decision XIII/15, orients the emphasis towards mainstreaming pollination concerns into policy, developing and implementing measures on the ground to support the conservation and sustainable use of pollinators, addressing risks, building capacity and sharing knowledge on multiple levels to integrate pollination considerations into farming, land use and other management decisions, and focusing collaborative research on emerging issues and prevailing needs.

III. ELEMENTS

Element 1: Enabling policies and strategies

Operational objective

To support the implementation of coherent and comprehensive policies for the conservation and sustainable use of pollinators at the local, subnational, national, regional and global levels, and to promote their integration into sectoral and cross-sectoral plans, programmes and strategies.

Rationale

Appropriate national policies are needed in order to provide an effective enabling environment to support activities by farmers, land managers, beekeepers, the private sector and civil society. Pollination concerns are often a cross-cutting issue, and policies should be designed to integrate pollinator and pollination considerations not only into the context of sustainable agricultural transitions, but also across sectors (for example forestry and health).

Activities

A1.1 Develop and implement coherent and comprehensive policies that enable and foster activities to safeguard and promote wild and managed pollinators, to be integrated into the broader policy agendas for sustainable development

A.1.1.1 Promote coherent policies across sectors and cross-cutting issues (e.g. biodiversity, food security, chemicals and pollution, poverty reduction, climate change, disaster risk reduction and combat desertification);

A.1.1.2 Address linkages between pollinators and human health, nutritious diets and pesticide exposure;

A.1.1.3 Address linkages between pollinators and the provision of ecosystem functions and services, beyond food production;

A.1.1.4 Recognize pollinators and pollination as part of holistic farming systems and as an important agricultural input;

A.1.1.5 Recognize pollinators and pollination as an essential part of the of ecosystem integrity and its maintenance;

A.1.1.6 Apply nature-based solutions and reinforce positive interactions (e.g. integrated pest management, on-farm diversification, ecological intensification, restoration to increase landscape connectivity);

A.1.1.7 Support access to data and use of decision support tools, including land use planning and zoning, to enhance the extent and connectivity of pollinator habitats[7] in the landscape, with the participation of farmers and local communities;

A.1.1.8 Support the development of capacity to provide guidance on pollinator and pollination best management practices by supporting the incorporation of nature-based solutions into extension services, farmer-to-farmer sharing, and farmer researcher networks;

A.1.1.9 Develop and implement incentives, consistent and in harmony with international obligations, for farmers and food suppliers to encourage the adoption of pollinator-friendly practices (e.g. carbon sequestration measures that increase pollinator habitats; conservation of uncultivated areas for pollinator forage) and remove or reduce perverse incentives that are harmful to pollinators and their habitats (e.g. pesticides subsidies; incentives for pesticide use as credit requirements from banks), taking into consideration the needs of farmers, urban and rural beekeepers, land managers, indigenous people and local communities and other stakeholders;

A.1.1.10 Promote recognition of pollinator-friendly practices and consequences on pollination functions and services in existing certification schemes;

A.1.1.11 Protect and conserve the threatened pollinator species as well as their natural environment.

A1.2 Implement effective pesticide regulation[8]

A.1.2.1 Reduce the use of and gradually phase out existing pesticides, including cosmetic pesticides and agricultural chemicals, that are harmful to or that present an unacceptable risk to pollinators, and avoid the registration of those that are harmful or present an unacceptable risk to pollinators;

A.1.2.2 Develop, enhance and implement on a regular basis risk assessment procedures (considering field-realistic exposures and longer-term effects) for pesticides, pesticide-coated seeds and [living modified organisms] to take into account possible impacts and cumulative effects, including sublethal and indirect effects, on wild and managed pollinators (including eggs, larva, pupa and adult stages), as well as other non-target species;

A.1.2.3 Work with regulators to implement tools such as the FAO Pesticide Registration Toolkit;

A.1.2.4 Strengthen pesticide regulation authorities in their capacity to protect pollinators from chemicals;

A.1.2.5 Develop and promote guidance and training on best practices for pesticide use (e.g. techniques, technology, timing, non-flowering crops, weather conditions) based on the International Code of Conduct on Pesticide Management of FAO and the World Health Organization;

A.1.2.6 Develop and implement national and regional pesticide risk reduction strategies and promote alternative approaches (e.g. integrated pest management practices and biocontrol) to reduce or eliminate exposure of pollinators to harmful pesticides.

A.1.2.7 Develop and implement, as appropriate, national monitoring, surveillance and registration programmes for pesticides and their transformation products.

A1.3 Protect and promote indigenous and traditional knowledge

A.1.3.1 Protect and promote indigenous and traditional knowledge, innovations and practices related to pollinators and pollination (e.g. hive design; stewardship of pollinator resources; traditional ways of understanding of parasite impacts) and support participatory approaches to the identification of diagnostic characteristics for new species and monitoring;

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[7] Pollinator habitats: areas that provide forage, nesting sites and other conditions for the completion of the life cycles of different pollinator species.

[8] Taking note of the IUCN CEM/SSC Task Force on Systemic Pesticides publication “An update of the Worldwide Integrated Assessment (WIA) on systemic insecticides”.

A.1.3.2 Protect established land rights and tenure for the conservation and sustainable use of pollinators.

A1.4 Control the trade and movement of managed pollinators, and other trade-related impacts

A.1.4.1 Monitor the movement and trade of managed pollinator species, sub-species and breeds among countries and within countries;

A.1.4.2 Develop and promote mechanisms to limit the spread of parasites and pathogens to managed and wild pollinator populations;

A.1.4.3 Prevent and minimize the risk of introducing invasive alien species (plants, pollinators, predators, pests and pathogens) that present an unacceptable risk to pollinators and to plant resources on which they depend, and monitor the dispersion risk of those already introduced (for example, *Bombus terrestris*).

Element 2: Field-level implementation

Operational objective

To reinforce and implement management practices that maintain healthy pollinator communities, and enable farmers, beekeepers, foresters, land managers and urban communities to harness the benefits of pollination functions and services for their productivity and livelihoods.

Rationale

In order to secure pollinator-friendly habitats and promote sustainable agroecosystems and pollinator husbandry, the direct and indirect drivers of pollinator decline need to be addressed in the field. Attention is needed at the farm level and across entire ecosystems. Landscape-level measures address connectivity and the value of managing across landscapes and sectors. Improved management measures for pollinators include attention to bee husbandry for honey bees and other pollinators.

Activities

A2.1 Co-design (with farmers, urban and rural beekeepers, land managers and indigenous peoples and local communities) and implement pollinator-friendly practices in farms and grasslands and in urban areas

A.2.1.1 Create uncultivated patches of vegetation and enhance floral diversity using mainly native species, as appropriate, and extended flowering periods, to ensure diverse, abundant and continuous floral resources for pollinators;

A.2.1.2 Manage blooming of mass-flowering crops to benefit pollinators;

A.2.1.3 Foster networks for exchanges of native seeds;

A.2.1.4 Promote genetic diversity and its conservation within populations of managed pollinators;

A.2.1.5 Promote extension services, farmer-to-farmer sharing approaches and farmer field schools to exchange knowledge and provide hands-on education and empowerment of local farming communities;

A.2.1.6 Diversify farming systems and the resulting food resources and habitats of pollinators through home gardens and agroecological approaches, such as crop rotations, intercropping, agroforestry, integrated pest management, organic agriculture, and ecological intensification;

A.2.1.7 Promote awareness, training and adoption of best practices for integrated pest management (for example, including weed management strategies and biocontrol) and, if necessary, pesticide usage in the context of on-farm pollinator management (for example, pesticide application timing, weather conditions, equipment calibration in order to reduce spray drift to off-field areas), and to avoid or minimize any synergistic effects of pesticides with other drivers that have been proven to pose serious or irreversible harm to pollinators;

A.2.1.8 Promote best practices for climate-resilient agriculture with benefits for pollinators;

A.2.1.9 Incorporate pollinator-friendly practices in existing practices in the relevant sectors, including agriculture and food production certification schemes.

A2.2 Address pollinator-friendly management and pollinator needs in forestry

A.2.2.1 Avoid or minimize deforestation, harmful forest management practices and other threats that impact negatively on wild pollinators and on traditional bee keeping;

A.2.2.2 Provide and promote measures to capture, safeguard and transport beehives found inside wooden logs;

A.2.2.3 Promote agroforestry and forestry systems to ensure heterogeneous habitats formed by native species, which offer diversified floral and nesting resources for pollinators;

A.2.2.4 Include considerations regarding pollinators in the rules for sustainable forest management certification systems.

A2.3 Promote connectivity, conservation, management and restoration of pollinator habitats

A.2.3.1 Preserve or restore pollinators and habitats distributed in natural areas, including forests, grasslands and agricultural lands, urban areas and natural corridors, to enhance the availability of floral resources and nesting sites over time and space;

A.2.3.2 Identify priority areas and measures, on the global, regional, national and local levels for the conservation of rare and endangered pollinator species;

A.2.3.3 Foster the establishment and pollinator-friendly management of nature protection areas and semi-natural areas, as well as other in-site options, such as the FAO Globally Important Agricultural Heritage Systems;

A.2.3.4 Promote initiatives in urban areas and service land along roads and railways to create and maintain green areas and vacant lands that offer floral and nesting resources to pollinators, and improve the relationship between people and pollinators by raising public awareness of the importance of pollinators for their daily lives;

A.2.3.5 Manage the use of fire and fire control measures to reduce the negative impacts of fires on pollinators and relevant ecosystems.

A2.4 Promote sustainable beekeeping and bee health

A.2.4.1 Reduce the dependence of managed pollinators on nectar and pollen substitutes by promoting better availability and husbandry of floral resources, therefore improving pollinator nutrition and immunity to pests and diseases;

A.2.4.2 Minimize the risks of infections and spread of pathogens, diseases and invasive alien species and minimize the stress on managed pollinators associated with the transportation of bee hives;

A.2.4.3 Regulate markets for managed pollinators;

A.2.4.4 Develop measures to conserve genetic diversity in managed pollinators;

A.2.4.5 Promote local and traditional knowledge related to innovative practices in management of honeybees, stingless bees and other managed pollinators.

Element 3: Civil society and private sector engagement

Operational objective

To promote education and awareness in the public and private sectors of the multiple values of pollinators and their habitats, improve the tools for decision-making, and implement practical actions to reduce and prevent pollinator decline.

Rationale

Global agriculture has become increasingly pollinator-dependent, and much of this dependence is linked to wild pollinators. The general public and the private sector, including the food and cosmetics industries and supply chain managers, are increasingly showing an interest in protecting pollinators. Building on this, targeted actions on conservation of pollinators and their habitats need to be elaborated for civil society and for the private sector. Greater understanding of the vulnerability to pollination services losses and the value of these functions and services will help to drive such initiatives.

Activities

A3.1 General public awareness-raising

A.3.1.1 Engage in awareness raising with targeted key stakeholder groups, including farmers, extension workers, beekeepers, non-governmental organizations, schools, the mass media, and consumer organizations on the value of pollinators and pollination for health, wellbeing and livelihoods;

A.3.1.2 Raise the awareness of the private sector, including food companies, cosmetics manufacturers and supply chain managers, of the risks posed by the decline of pollination functions and services to their business and the value of protecting pollinators;

A.3.1.3 Promote use of technology and build taxonomic capacity for the general public, including farmers and beekeepers, to identify and differentiate pollinators from pests, eventually contributing to data collection on pollinators;

A.3.1.4 Support campaigns and activities to engage stakeholders in the conservation and sustainable use of pollinators, including celebrations on 20 May of World Bee Day, which was established by the United Nations General Assembly.[9]

A3.2 General public actions

A.3.2.1 Promote educational activities with children and students on the importance of pollinators and ecosystem functions and services in their daily lives and propose ways to contribute to the protection of pollinators;

A.3.2.2 Integrate pollinators and ecosystem functions and services subjects into the curriculum of agriculture, environment and economics courses;

A.3.2.3 Support citizen science projects for generating data on pollinators and pollination and raising appreciation among civil society organizations for the role of pollinators;

A.3.2.4 Encourage network-building activities, including through conferences,[10] dissemination of information on pollinators and pollination through public databases, web portals, social media and information networks that facilitate access to all relevant stakeholders.

A3.3 Business and supply chain engagement

A.3.3.1 Provide decision-making tools to assist different stakeholders in assigning values to pollinators and pollination, including non-monetary values;

A.3.3.2 Develop modalities to incorporate pollinators and pollination in true cost accounting of agriculture and food production;

A.3.3.3 Improve understanding within the private sector of the links between commercial products and the dependency of commodities (crop yields and quality) on respective type of pollinators;

[9] See General Assembly resolution 72/238 of 20 December 2017 on agriculture development, food security and nutrition.

[10] For example, a regular conference for the initiative (possibly linked to the International Federation of Beekeepers Associations (http://www.apimondia.com/)).

A.3.3.4 Share evidence of pollination deficit and the economic impacts, and impacts on livelihoods, to support business in identifying potential risks, developing vulnerability assessments, and adopting pollinator-friendly measures;

A.3.3.5 Develop and share pollinator-friendly business cases for action;

A.3.3.6 Promote the use of ecolabels, standards and the importance of choices for consumers that may benefit pollinators.

Element 4: Monitoring, research and assessment

Operational objective

To monitor and assess the status and trends of pollinators, pollination and their habitats in all regions and to address gaps in knowledge, including by fostering relevant research.

Rationale

Monitoring and assessment of the status and trends of pollinators and pollination functions and services, of measures for the conservation and sustainable use of pollinators, and of the outcomes of such measures, is necessary to inform adaptive management. Academic and research bodies, and relevant international organizations and networks should be encouraged to undertake further research, taking into consideration traditional knowledge, to address gaps in knowledge and to expand research to cover a wider variety of pollinators and to support coordinated global, regional, national, subnational and local monitoring efforts and build relevant capacity, especially in developing countries, where there have been fewer research and monitoring efforts to date.

Activities

A4.1 Monitoring

A.4.1.1 Monitor the status and trends of pollinators, with particular focus on those regions currently lacking data;

A.4.1.2 Quantify pollination deficits in crops and in the natural ecosystems, with particular focus on those regions and farming systems currently lacking data, where feasible, and apply consistent and comparable protocols to identify the most effective intervention measures;

A.4.1.3 Monitor the drivers and threats to pollinators in tandem with their status and trends in order to identify the likely causes of pollinator declines;

A.4.1.4 Monitor the effectiveness of interventions in protecting pollinators and managing pollination functions and services;

A.4.1.5 Support the use of technology and the development of user-friendly tools, such as mobile apps, to promote pollinators monitoring through citizen science;

A.4.1.6 Promote the use of pollinators and pollination as indicators for the status of biodiversity, ecosystem health, agriculture productivity and sustainable development;

A.4.1.7 Promote the development of methodologies for systematic monitoring of pollinators in natural ecosystems, especially in protected areas or sites of importance for conservation and productive ecosystems in such a way as to facilitate the development of detailed visual maps at the local level and then subsequent decision-making.

A4.2 Research

A.4.2.1 Promote research on non-bee taxa and other wild species of pollinators in natural ecosystems and the ecosystem functions and services provided by them in order to design appropriate management policies and protection measures;

A.4.2.2 Undertake research, including participatory research, on the socioeconomic as well as environmental implications of pollinator decline in the agricultural sector and related businesses;

A.4.2.3 Facilitate the harmonization of protocols for research, data collection, management and analysis, storage and curation of pollinator samples, including modalities for collaborative research;

A.4.2.4 Promote and share further research to address gaps in knowledge, including the effects of partial loss of pollinators on crop production, the potential impacts of pesticides considering their possible cumulative effects, and of living modified organisms, under field conditions, including differential impacts on managed and wild pollinators, and on social versus solitary pollinators, and the impacts on pollination of crop and non-crop plants over the short and long term, and under different climatic conditions, as well as the impact of pollinator loss, on ecosystem integrity and its maintenance;

A.4.2.5 Promote further research to identify ways to integrate pollinator-friendly practices into farming systems as part of efforts to improve yield quantity and quality and mainstreaming of biodiversity into agricultural systems;

A.4.2.6 Promote further research to identify risks to pollination under climate change and potential adaption measures and mitigation tools, including the potential loss of keystone species and their habitats, as well as the role of pollination in wider ecosystem resilience and restoration;

A.4.2.7 Promote further research and analysis on pest management as it interacts with pollination functions and services, taking into account the impact of drivers of pollinator decline, to support the development of more feasible and sustainable alternatives;

A.4.2.8 Promote further research and analysis to identify ways to integrate the provision of ecosystem functions and services and pollinator conservation, beyond food production;

A.4.2.9 Translate pollinator research and findings into recommendations and best practices tailored for a wide range of stakeholder groups;

A.4.2.10 Strengthen the synergies between scientific evidence, conservation practices and farmer-researcher community practices, and traditional knowledge to better support actions.

A4.3 Assessment

A.4.3.1 Generate data sets through a permanent pollinator monitoring process that allows the creation of regional/national/subnational and local visual maps to indicate the status and trends of pollinators and pollination and crop-specific vulnerability to support decision-making;

A.4.3.2 Assess the benefits of pollinators and pollination, taking into account the economic and other values to agriculture and the private sector, including food companies, cosmetics manufacturers and supply chains;

A.4.3.3 Assess the benefits of pollinator-friendly practices, including the conservation of uncultivated areas of farmlands, and propose alternatives to deforestation;

A.4.3.4 Increase understanding of the consequences of pollinator decline in specific crops, agroecosystems and natural environments;

A.4.3.5 Support the identification of pollinators in natural and managed areas, such as forestry and agricultural systems, as well as the interactions between pollinators and plants, and the impacts of anthropogenic activities in ecosystems;

A.4.3.6 Address taxonomic assessment needs in different regions and design targeted strategies to fill the existing gaps;

A.4.3.7 Increase taxonomic capacity to improve knowledge about pollinators, their status and trends, identify drivers of changes in their populations, and develop appropriate solutions;

A.4.3.8 Promote regular assessments of the conservation status of pollinator species from different taxonomic groups, update national, regional and global red data books and red lists regularly and elaborate plans of action for the conservation and restoration of threatened pollinator species.

Actors

This Plan of Action is addressed to all relevant stakeholders, including Parties to the Rio Conventions and other multilateral environmental agreements, national, subnational and municipal governments, donor agencies, including the Global Environment Facility, the World Bank and regional and national development banks and banks with a significant portfolio of loans for rural development, private and corporate donors, as well as other relevant bodies and organizations, land owners and land managers, farmers, beekeepers, indigenous peoples and local communities, the private sector and civil society.

FAO will facilitate the implementation of the Plan of Action, following the successful approach of the previous plan. This new phase is also intended to align the activities on pollination and pollinators more closely with FAO regional and country offices in order to create synergies and provide broader support. The full implementation of the second phase of the Plan of Action at the national and regional levels will depend on the availability of resources.

IV. SUPPORTING GUIDANCE AND TOOLS

A list of supporting guidance and tools is provided in an information note (CBD/SBSTTA/22/INF/20).

Annex II

SUMMARY - REVIEW OF THE RELEVANCE OF POLLINATORS AND POLLINATION TO THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN ALL ECOSYSTEMS, BEYOND THEIR ROLE IN AGRICULTURE AND FOOD PRODUCTION

A. Introduction

1. The full report[11] and the present summary have been prepared pursuant to decision XIII/15. The report draws on the contributions of many researchers and partners around the world.[12]

B. Roles and values of pollinators and pollinator dependent plants beyond agriculture

2. There is a wide diversity of values linked to pollinators and pollination beyond agriculture and food production, which includes ecological, cultural, financial, health, human and social values.

3 Pollinators enhance the reproduction and genetic diversity of the great majority (c. 87.5%). of plant species. About half of plant species are completely dependent on animal-mediated pollination. Animal-mediated pollination usually leads to some degree of cross-pollination and thus promotes and maintains genetic variation in populations, which, in turn, allows plant species to adapt to new and changing environments. Cross-pollination also results in higher seed production. By ensuring a supply of seed propagules and promoting genetic variation, pollinators are considered to be of fundamental importance for the maintenance of plant diversity and ecosystem functioning.

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[11] *The relevance of pollinators and pollination to the conservation and sustainable use of biodiversity in all ecosystems beyond their role in agriculture and food production,* based on CBD/SBSTTA/22/INF/21 which will be finalized in line with paragraph 3 of recommendation 22/9 of the Subsidiary Body on Scientific, Technical and Technological Advice.

[12] The main authors of the report are Marcelo Aizen, Pathiba Basu, Damayanti Buchori, Lynn Dicks, Vera Lucia Imperatriz Fonseca, Leonardo Galetto, Lucas Garibaldi, Brad Howlett, Stephen Johnson, Monica Kobayashi, Michael Lattorff, Phil Lyver, Hien Ngo, Simon Potts, Deepa Senapathi, Colleen Seymour and Adam Vanbergen. The report was edited by Barbara Gemmill-Herren and Monica Kobayashi. A workshop convened from 27 to 29 November 2017 in collaboration with IPBES, the University of Reading, and the Convention on Biological Diversity brought together regional experts on pollinators to discuss and assess the role of pollinators and pollination services in supporting ecosystems beyond agricultural systems and in supporting ecosystem services beyond food production.

4. Plants and pollinators are critical for the continued functioning of ecosystems, contributing to climate regulation, provision of wild meat, fruits and seeds that support many other species, regulation of malaria and other diseases, among other functions and services. Tropical forests, which contain a high proportion of dioecious species, are particularly dependent on pollination. Another example is mangroves, dominated by obligate outbreeder plants, which provide important functions and services, such as preventing coastal erosion, protecting from flood and salt intrusion, providing wood fuel and timber, and supporting fisheries, as well as habitat and food provision for bees and many other species.

5. The mutualisms between plants and their floral visitors sustain not only plant diversity but also the diversity of an estimated 350,000 animal species. While there is strong evidence of local extirpation of pollinator populations due to a lack of floral resources, there is no report on animal species extinction due to a lack of floral resources. However, given the extent of habitat fragmentation, the large number of plant species that have become extinct or nearly so in the past 100 years and the paucity of knowledge about host plant usage by flower-visiting animals, the possibility that this is occurring without being documented is very real. Data on population changes in wild flower-visiting animals are notoriously difficult to obtain and the causes of these changes even more difficult to establish.

6. Pollinators, pollinator habitats and pollinator products are sources of inspiration for art, education, literature, music, religion, traditions and technology. Honey-hunting and beekeeping practices based on indigenous and traditional knowledge have been documented in more than 50 countries. Bees have inspired imagery and texts in religions all over the world, and other pollinators, such as hummingbirds, contribute to the national identity of such countries as Jamaica and Singapore. Pollinators and pollinator-dependent plants support advances in technology and knowledge through inspiration and application of their biology to human innovations, such as the visually guided flight of robots.

7. Bee products contribute to the income of beekeepers around the globe. Beekeeping can potentially be an effective tool for reducing poverty, empowering youth and creating opportunities to the conservation of biodiversity by adopting bee-friendly actions.

8. There is a range of economically important plants outside crops that depend on animal pollinators, which include several medicinal plant species. Other pollinator-dependent plants can provide valuable functions and services, such as ornamentals, biofuels, fibres, construction materials, musical instruments, arts, crafts and recreation activities. Pollinator-dependent plants also recycle CO_2, regulate climate, and improve air and water quality. Furthermore, several micronutrients, including vitamins A and C, calcium, fluoride and folic acid are obtained primarily from pollinator-dependent plants. Additionally, pollinator products are employed for improving health, such as antibacterial, anti-fungal and anti-diabetic agents. Pollinator insects, including the larvae of bees, beetles and palm weevils, constitute a significant proportion of the approximately 2,000 insect species consumed globally, being high in protein, vitamins, and minerals.

C. Status and trends of pollinators and pollinator-dependent plants in all ecosystems

9. Many insect pollinators (e.g. wild bees, butterflies, wasps and beetles) as well as vertebrate pollinators (e.g. birds, marsupial, rodents and bats) have been declining in abundance, occurrence and diversity at the local and regional levels. The number of plant species that rely on pollinators is declining when compared to self-compatible or wind-pollinated plants.

10. For all regions, land use change is reported as the main driver of pollinator decline. In Africa, deforestation continues to occur as a result of the conversion of land for agriculture and the use of timber for construction and fuel. In Latin America and Asia and the Pacific, increasing soybean cultivation and oil palm plantations respectively has impacted many important biomes.

11. Wild bee nests in nature are in danger of depletion as a result of logging practices. In Malaysia and Brazil, it has been shown that logging reduces the number of wild bee nests and, as a consequence, pollinators, which has implications for forest recovery or restoration. Logging also reduces the forest habitat that contains suitable, unoccupied nesting sites. The loss of pollinators occurs even if the current rules for certified wood management are taken into account.

12. Additionally, in Africa, the frequency and intensity of fires, which, in turn, affect the reseeding and re-sprouting of plants, affect different ecosystems due to a high degree of pollinator-plant specialization. Such specialization suggests a marked susceptibility to pollinator loss, and reliance on a single species of pollinator is potentially risky in the face of global changes. Climate change models suggest that fires might increase in frequency, as the length of the fire weather season will increase.

13. In Latin America, alien bee invasions are reported as the second driver of local bee decline. Introduced bee species are also a concern, for instance, in Japan, where there is a potential for disruption of the native pollination network. In Asia, the erosion of traditional knowledge, including the management of local bees, may contribute to local pollinator declines. For Europe, Canada and the United States, Australia and New Zealand, the risk to pollinators from pesticides and the transmission of pathogens and parasites is an important concern.

14. A lack of spatial and temporal changes in wild pollinators in many regions, combined with little known taxonomy, hampers assessment of the status and trends of pollinators. In addition, a lack of global Red List assessments specifically for insect pollinators and, in most parts of the world, the lack of long-term population data or benchmark data to compare the present status of wild pollinator populations make it difficult to discern any temporal trend.

15. The habitats and biomes identified as most vulnerable to pollinator declines per region are:

(a) *Africa*: Tropical forest, dry deciduous forest, subtropical forest, Mediterranean, mountain grasslands, tropical and subtropical savannas and grasslands, drylands and deserts, wetlands and dambos, urban and peri-urban, coastal areas;

(b) *Asia and the Pacific*: Tropical dry evergreen forests;

(c) *Latin America*: Andes, Mesoamerican Mountains and regions of high altitude, the subtropical Chaco forest, the Cerrado savannah, the Pantanal wetland, the Amazonian forest, and the Atlantic Forest;

(d) *Europe, Canada, the United States, Australia and New Zealand*: mires and bogs, grasslands, heathland, and scrub.

16. The Atlantic forest is a biome rich in plant-pollinator mutualisms which, with only 29 per cent of its original forest cover,[13] is highly threatened through habitat loss and fragmentation. The extreme fragmentation of this biome has implied a differential loss of plant species with relatively specialized pollination and sexual systems that only survive in the interior of large remnants. In the Chaco Dry Forest, it has been suggested that an increase in selfing (self-pollination) could be associated with the invasion of Africanized honey bees.

17. Climate change is considered a significant potential threat in Europe and North America. Bumble bees are failing to track warming by colonizing new habitats north of their historic range. Simultaneously, they are disappearing from the southern portions of their range. Some species have declined severely.

18. Meliponiculture – beekeeping with stingless bees (Meliponini) – is widely undertaken by indigenous peoples and local communities with knowledge passed orally through generations. Stingless bees are useful pollinators for crops and wild fruits, and most of them produce honey, which is used for medicinal purposes. While meliponiculture is an economic opportunity for tropical countries, the large-scale rearing of stingless bees may have negative impacts and is considered a current challenge.

19. The introduction of honeybee (*Apis*) species in mangroves has been explored in many countries, such as China, Cuba, India and the United States, and is also increasing in Thailand and Brazil. This activity may have the potential to contribute to the conservation of the mangrove systems, but the impacts need to be further assessed. Management of colonies, including artificial reproduction and queen rearing, needs to be advanced in order to use natural resources in a sustainable way.

[13] Official data: http://www.mma.gov.br/biomas/mata-atl%C3%A2ntica_emdesenvolvimento

20. Regarding the impact of pesticides on non-target species, a recent meta-analysis showed that, when compared to honeybees, stingless bees are more sensitive to various pesticides. Experimental studies performed with other pollinators, such as the great fruit-eating bat (*Artibeus lituratus*) from Brazil, indicate that the chronic exposure of fruit bats to relevant concentrations of endosulfan can lead to significant bioaccumulation, which may affect the health of this important seed disperser in neotropical forests. Similarly, analysis of long-term butterfly population data from Northern California revealed a negative association between butterfly populations and increasing neonicotinoid application. A controlled landscape experiment implemented across three countries (Hungary, Germany and the United Kingdom) that employed oilseed rape (canola) treated with neonicotinoids (clothianidin or thiamethoxam) showed that wild bee reproduction (*B. terrestris* and *Osmia bicornis*) was negatively correlated with neonicotinoid residues in the bee nests.

21. [Genetically modified crops that carry traits for herbicide tolerance or insect resistance may threaten pollinators by lethal or sublethal effects on adult insects or larvae. However, recent reviews showed no clear negative effects of genetically modified organisms on honeybees]. [With regard to potential lethal or sublethal effects on pollinators by genetically modified crops carrying traits for herbicide tolerance or insect resistance, even though some recent reviews show no clear negative effects of genetically modified organisms on honeybees, it is premature to reach a conclusion on such effects. Therefore, more studies are needed on more pollinator species and circumstances.]

22. Latin America hosts the wild germplasm of many food crops[14] that directly or indirectly depend on pollinators for high yield. Germplasm of these, and perhaps of hundreds of wild species with agricultural potential, persists in remnants of natural and seminatural habitats and under the management of local indigenous communities in this region. Therefore, diverse pollinator assemblages are important to ensure not only the reproduction of wild plants in general but also the persistence of this germplasm. Yet, perhaps with a few exceptions, the occurrence and diversity of this germplasm and its current conservation status are unknown.

D. Response options for the conservation and sustainable use of pollinators and their habitats

23. Many of the activities identified in the IPBES assessment and reflected in decision XIII/15, will contribute to the conservation and sustainable use of pollinators and their habitats and thereby help to sustain pollination functions in ecosystems beyond agricultural systems and food production.

24. A landscape-wide approach is particularly relevant for the conservation and sustainable use of pollinators and their habitats to sustain pollination functions in ecosystems beyond agricultural systems and food production. This includes the maintenance of natural vegetation corridors, restoration of degraded lands, and the use of pollination-friendly farming. Special attention is needed to reduce deforestation and habitat loss and degradation in all biomes. Fire management regimes should take into account impacts on pollinators and related vegetation. Restoration can increase the connectivity of pollinator-friendly habitats and support species dispersal and gene flow. These measures can also contribute to climate change adaptation and mitigation and disaster risk reduction.

25. The following actions could be taken in support of a landscape approach:

(a) Areas managed by indigenous peoples and local communities are important for the conservation of biodiversity;

(b) Significant land use changes are related to deforestation caused by crops. Raising the awareness of the buyers of those commodities can increase pressure for attaining sustainable production;

(c) Data collection, maps and modelling are important tools to predict the impact of global change and to support policies for the conservation, restoration and regeneration of natural habitats;

[14] These crops include potato, tomato, pepper, cacao, strawberry, quinoa, amaranto, avocado, sweet potato, acai, palmito, Brazil nut, guarana, passion fruit and yucca.

(d) Landscape genetics is a tool to determine population characteristics of pollinators, as well as the genetic consequences of bee management in large areas, inside or outside their distribution areas.

26. There is an urgent need to set up and harmonize regulations for the trade in managed pollinators (best management practices, risk management and monitoring to prevent risks, harmonized reporting procedure, data management strategy) so that current and emerging risks and threats can be detected in near-real time and across borders, allowing for response measures.

27. Sustainable wood management and certification rules should take into account measures such as the capture, transportation and safeguard of beehives found in forestry products.

28. There is a need to improve knowledge of pollinators and pollination and their role in maintaining ecosystem health and integrity beyond agriculture and food production. The majority of existing literature focuses on specific hymenopteran groups. There is a lack of information on the impact of landscape changes or pesticides on non-bee taxa.

29. The following actions could be taken in support of improving knowledge:

(a) Improved knowledge management, including through taxonomy, volunteer recording, DNA barcoding, biodiversity informatics tools, geographical referencing for the museum specimens, standardized long-term monitoring of pollinators and pollination functions and services;

(b) Attention to traditional and experiential knowledge, noting that conventional knowledge synthesis methods are not necessarily appropriate for synthesizing other forms of knowledge, such as indigenous and local knowledge or tacit knowledge held by practitioners, such as land managers and conservationists.

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