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COMMITTEE ON AGRICULTURE

Twenty-fifth Session

Rome, 26 - 30 September 2016

Summary of the thematic assessment on pollinators, pollination and food production by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

I. INTRODUCTION

1. Responding to the requests of Governments, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) developed a work programme for 2013–2018 that includes a thematic assessment on pollinators, pollination and food production.

2. The IPBES Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, at its fourth session, presented the assessment of pollinators, pollination and food production, and approved the summary for policymakers (SPM) on the assessment. FAO contributed to the assessment, and hosted the 3rd Authors' Meeting in July 2015.

3. The pollinator and pollination assessment highlights a number of ways to effectively safeguard pollinator populations and recommends, inter alia, to promote sustainable agriculture with a view to help diversifying the agricultural landscape and making use of ecological processes as integral part of food production.

II. THE INTERNATIONAL POLLINATORS INITIATIVE

4. Pollinators and pollination services are critical for food production and to ensure food security and nutrition. Animal pollination (including insects but also birds, bats and other vertebrates) affect 35 percent of the world's crop production, increasing outputs of 87 of the leading food crops worldwide. Having recognized the decline of pollinators and its effect on agricultural production and agro-ecosystem diversity, in 2000 the Convention on Biological Diversity (CBD) established, at its fifth Conference of the Parties (COP V), the International Initiative for the Conservation and Sustainable Use of Pollinators (also known as the International Pollinator Initiative - IPI) (COP decision V/5, section II). The IPI notes, among other things, the need to identify adaptive management practices that minimize negative impacts by humans on pollinators, promote the conservation and diversity of native pollinators, and conserve and restore natural areas necessary to optimize pollinator services in agricultural and other terrestrial ecosystems.

5. FAO plays a leading role in facilitating and coordinating the International Pollinator Initiative, and has, since 2000, undertaken a range of actions to accomplish this. Some examples include establishing FAO's Global Action on Pollination Services for Sustainable Agriculture, reporting to CBD COP on progress on IPI implementation, participation in events at national and international levels, provision of support to and/or liaising with regional initiatives, developing tools and providing tools and guidance documents, and the coordination of the global-sized project "Conservation and management of pollinators for sustainable agriculture, through an ecosystem approach" supported by the Global Environment Facility (GEF)and implemented by the United Nations Environment Program (UNEP).

6. Work under the Global Action, and in particular through the GEF/UNEP/FAO Global Pollination Project, generated a body of knowledge that has been developed with and used by the seven partner countries (Brazil, Ghana, India, Kenya, Nepal, Pakistan and South Africa) and beyond. A range of tools and guidance documents were prepared including, among others, for the economic valuation of pollination services, determining the risk of pesticides to wild bees, detecting and evaluating pollination deficits in crops, the socio-economic evaluation of pollinator-friendly practices, and monitoring pollinator communities. Through a project supported by the Government of Norway (Norwegian Environment Agency), a policy analysis paper on mainstreaming was prepared[1].

7. Among its activities in support of the International Pollinators Initiative, through the GEF/UNEP/FAO project, a protocol to detect and assess pollination deficits in crops was developed and used in the seven GEF/UNEP/FAO Global Pollination Project countries - and through funding from the Government of Norway, extended to six other countries[2]. Based on this, a paper was recently published in Science that used this methodology[3]. By using the coordinated protocol across regions and crops, the authors quantified the degree to which enhancing pollinator density and richness could improve yields on 344 fields from 33 pollinator-dependent crop systems in small and large farms from Africa, Asia, and Latin America. For fields less than 2 hectares, they found that yield gaps (the difference between potential and actual productivity) could be closed by a median of 24 percent through higher flower-visitor density. For larger fields, such benefits only occurred at high flower-visitor richness. The study thus demonstrated that ecological intensification through enhancement of pollinators could contribute to food security and nutrition.

III. SUMMARY OF THE KEY FINDINGS OF THE IPBES ASSESSMENT ON POLLINATORS, POLLINATION AND FOOD PRODUCTION[4]

Values of pollinators and pollination

8. Animal pollination plays a vital role as a regulating ecosystem service in nature. Globally, nearly 90 per cent of wild flowering plant species depend, at least in part, on the transfer of pollen by animals.

9. More than three quarters of the leading types of global food crops rely to some extent on animal pollination for yield and/or quality.

10. Given that pollinator-dependent crops rely on animal pollination to varying degrees, it is estimated that 5–8 per cent of current global crop production, with an annual market value of $235 billion–$577 billion (in 2015, United States dollars[5]) worldwide, is directly attributable to animal pollination.

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[1] See http://www.fao.org/pollination/en/.
[2] http://www.fao.org/3/a-i1929e.pdf.
[3] Garibaldi et al (2016).Mutually beneficial pollinator diversity and crop yield outcomes in small and large farms. *Science*. 351 (6271) pp.388-391.
[4] IPBES/4/19
[5] Value adjusted to 2015 United States dollars taking into account inflation only

11. The importance of animal pollination varies substantially among crops, and therefore among regional crop economies.

12. Pollinator-dependent food products are important contributors to healthy human diets and nutrition.

13. 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, including the western honey bee (Apis mellifera), the eastern honey bee (Apis cerana), some bumble bees, some stingless bees and a few solitary bees. Beekeeping provides an important source of income for many rural livelihoods.

14. Both wild and managed pollinators have globally significant roles in crop pollination, although their relative contributions differ according to crop and location. Crop yield and/or quality depend on both the abundance and diversity of pollinators.

15. Pollinators are a source of multiple benefits to people, beyond food provisioning, contributing directly to medicines, biofuels, fibres, construction materials (timbers), musical instruments, arts and crafts, recreational activities and as sources of inspiration for art, music, literature, religion, traditions, technology and education.

16. A good quality of life for many people relies on ongoing roles of pollinators in globally significant heritage, as symbols of identity, as aesthetically significant landscapes and animals, in social relations, for education and recreation and in governance interactions. Pollinators and pollination are critical to the implementation of the Globally Important Agricultural Heritage Systems (GIAHS) initiative.

Status and trends in pollinators and pollination

17. Wild pollinators have declined in occurrence and diversity (and abundance for certain species) at local and regional scales in North West Europe and North America.

18. The number of managed western honey bee hives has increased globally over the last five decades, even though declines have been recorded in some European countries and North America over the same period.

19. The International Union for Conservation of Nature (IUCN) Red List assessments indicate that 16.5 percent of vertebrate pollinators are threatened with global extinction (increasing to 30 per cent for island species). There are no global Red List assessments specifically for insect pollinators. However, regional and national assessments indicate high levels of threat for some bees and butterflies.

20. The volume of production of pollinator-dependent crops has increased by 300 per cent over the last five decades, making livelihoods increasingly dependent on the provision of pollination. However, overall these crops have experienced lower growth and lower stability of yield than pollinator-independent crops. Yield per hectare of pollinator-dependent crops has increased less, and varies more year to year, than yield per hectare of pollinator-independent crops. While the drivers of this trend are not clear, studies of several crops at local scales show that production declines when pollinators decline.

Drivers of change, risks and opportunities, and policy and management options

21. The abundance, diversity and health of pollinators and the provision of pollination are threatened by direct drivers that generate risks to societies and ecosystems. Threats include land use change, intensive agricultural management and pesticide use, environmental pollution, invasive alien species, pathogens and climate change.

22. Strategic responses to the risks and opportunities associated with pollinators and pollination range in ambition and timescale 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.

23. A number of features of current intensive agricultural practices threaten pollinators and pollination. Moving towards more sustainable agriculture and reversing the simplification of agricultural landscapes offer key strategic responses to risks associated with pollinator decline.

24. Practices based on indigenous and local knowledge can be a source of solutions to current challenges, in co-production with science, by supporting an abundance and diversity of pollinators.

25. The risk to pollinators from pesticides arises through a combination of toxicity and the level of exposure, which varies geographically with the compounds used and the scale of land management and habitat in the landscape. Pesticides, particularly insecticides, have been demonstrated to have a broad range of lethal and sublethal effects on pollinators under controlled experimental conditions.

26. Exposure of pollinators to pesticides can be decreased by reducing the use of pesticides, seeking alternative forms of pest control and adopting a range of specific application practices, including technologies to reduce pesticide drift. Actions to reduce pesticide use include promoting Integrated Pest Management, supported by educating farmers, organic farming and policies to reduce overall use.

27. Most agricultural genetically modified organisms (GMOs) carry traits for herbicide tolerance (HT) or insect resistance (IR). Reduced weed populations are likely to accompany most herbicide-tolerant (HT) crops, diminishing food resources for pollinators.

28. Bees suffer from a broad range of parasites, including Varroa mites in western and eastern honey bees. Emerging and re-emerging diseases are a significant threat to the health of honey bees, bumble bees and solitary bees, especially when they are managed commercially.

29. The ranges, abundances and seasonal activities of some wild pollinator species (e.g., bumble bees and butterflies) have changed in response to observed climate change over recent decades. Generally, the impacts of ongoing climate change on pollinators and pollination services to agriculture may not be fully apparent for several decades, owing to a delayed response in ecological systems. Adaptive responses to climate change include increasing crop diversity and regional farm diversity and targeted habitat conservation, management or restoration.

30. Many actions to support wild and managed pollinators and pollination could be implemented more effectively with improved governance.

IV. IMPLICATIONS FOR THE WORK OF FAO

31. The twentieth meeting of the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 20)[6] , adopted a series of recommendations to the 13th session of Conference of the Parties (COP) of the Convention on Biological Diversity (CBD)[7] related to the thematic assessment on pollinators, pollination and food production by the IPBES, that are relevant for FAO [8.] It recommended, inter alia, that COP-13:

[6] UNEP/CBD/SBSTTA/20/9
[7] UNEP/CBD/SBSTTA/20/REC/XX/9
[8] IPBES UNEP/CBD/SBSTTA/REC/XX/9 Implications of the IPBES assessment on pollinators, pollination and food production for the work of the Convention.

Reducing risk from pesticides, including herbicides

a) Develop and implement national and, as appropriate, regional pesticide risk reduction strategies and to avoid;
b) Reduce the use of pesticides harmful for pollinators, for example, by adopting Integrated Pest Management practices and biocontrol, taking into account the International Code of Conduct on Pesticide Management of the Food and Agriculture Organization of the United Nations and the World Health Organization;

Research, monitoring and assessment

a) Request the Executive Secretary of CBD, subject to the availability of resources, together with the Food and Agriculture Organization of the United Nations, and in collaboration with other partners, to review the implementation of the International Initiative on the Conservation and Sustainable Use of Pollinators and prepare a draft updated and streamlined plan of action, including capacity-building, based on the Assessment and including the most recent knowledge, for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting held prior to fourteenth meeting of the Conference of the Parties;
b) Noting that the amount of information on the status and trends of pollinators and pollination varies among regions, with significant gaps in data, and also limitations in capacity for the identification, monitoring and management of pollinators, in many developing countries, in particular the least developing countries, and small island developing States, and in countries with economies in transition, request the Executive Secretary, in cooperation with the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, the Food and Agriculture Organization of the United Nations, and other relevant organizations, subject to the availability of resources and avoiding duplication of efforts:

    - To promote, as a priority, efforts to address data gaps and capacity for monitoring the status and trends of pollinators and pollination in developing countries, in particular Africa;
    - To identify and develop proposals for strengthening capacity related to pollinators and pollination, and supplementary regional assessments, in particular for Africa, to be integrated into the updated and streamlined plan of action of the International Initiative on the Conservation and Sustainable Use of Pollinators;

V. CONCLUSION

32. Upon adoption of the CBD SBSTTA 20 recommendations to COP 13, FAO will need to consider the decision, and the expected invitation by the CBD Executive Secretary, with a view to guide the FAO's work on pollinators, pollination and food production.