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DRAFT WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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CGRFA 17

I. INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture (Commission), at its last session, welcomed FAO's work on the conservation and sustainable use of micro-organisms and invertebrates.¹ The Commission requested FAO to prepare a draft work plan for future work on the sustainable use and conservation of micro-organisms and invertebrates, taking into account the findings of *The State of the World's Biodiversity for Food and Agriculture* and any other relevant information, including inputs provided by Members and observers, for review by the Working Groups and the Commission at their next sessions.² The Commission also reiterated the importance of pollinators, in particular honey bees, of micro-organisms of relevance to ruminant digestion, food processing and agro-industrial processes, of biological control agents and of soil micro-organisms and invertebrates, and requested that these key groups be reflected in the draft work plan.³
2. In response to the Commission's request, FAO invited Members and observers to provide their views. The document *Submissions by Members and observers on the draft work plan for future work on sustainable use and conservation of micro-organism and invertebrate genetic resources*⁴ compiles the views received from Members and observers.
3. Subsequently, FAO prepared a draft work plan for micro-organism and invertebrate genetic resources for food and agriculture (MIGR), for consideration by the Commission's intergovernmental technical working groups on animal, aquatic, forest and plant genetic resources (Working Groups). The Secretary also invited the Commission's Expert Group on Micro-organism and Invertebrate Genetic Resources for Food and Agriculture (Expert Group) to review and revise the draft work plan, taking into consideration the relevant recommendations that had been put forward by the Commission's Working Groups.⁵ A more detailed summary of the consultative process conducted by the Secretariat on the draft work plan for MIGR is given in the document, *Report on the consultative process for the draft work plan for the sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture*.⁶ The Organization facilitates the implementation of international initiatives on pollinators⁷ and soil biodiversity⁸ that were established by the Conference of the Parties to the Convention on Biological Diversity. Information reports on these two initiatives are contained in the documents, *Progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Pollinators*⁹ and *Progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity*.¹⁰
4. This document briefly recapitulates the Commission's activities in the area of MIGR over the last ten years and presents a draft work plan on MIGR, as revised in the light of inputs received during the consultative process, for consideration by the Commission.

II. BACKGROUND

5. Micro-organisms and invertebrates are the most numerous and diverse groups of organisms on Earth. They play important roles at all stages of the food value chain. In 2007, at its Eleventh Regular Session, the Commission formally recognized the important contribution of micro-organisms and invertebrates to the provision of ecosystem services, sustainable agriculture and food security, and included MIGR as a work stream into its Multi-Year Programme of Work.¹¹

¹ CGRFA-16/17/Report Rev.1, paragraph 77.

² CGRFA/16/17/Report Rev.1, paragraph 78.

³ CGRFA/16/17/Report Rev.1, paragraph 79.

⁴ CGRFA-17/19/12.2/Inf.1.

⁵ CGRFA-17/19/3.2/Inf.2, paragraphs 14-18.

⁶ CGRFA-17/18/12.1.

⁷ COP 6 Decision VI/5, *Annex II*.

⁸ COP 8 Decision VIII/23.

⁹ CGRFA-17/19/12.2/Inf.2.

¹⁰ CGRFA-17/19/12.2/Inf.3.

¹¹ CGRFA-11/07/Report, *Appendix E*.

6. At its Twelfth Regular Session, the Commission considered two brief scoping studies describing the main functions and services provided by micro-organisms and invertebrates of relevance to food and agriculture.¹² The Commission emphasized the need for assessing the status and trends of micro-organisms relevant to food and agriculture. It requested FAO to prepare targeted assessments, in particular of the status and trends in the conservation and use of soil micro-organisms, biological control agents and plant pathogens, in particular of important crops.¹³ The Commission also requested FAO to prepare further analyses and studies of the role of micro-organisms in ruminant digestion, agro-industrial processes, and food processing as well as a global synthesis of the status and trends of the ecosystems services provided by invertebrates relevant to food and agriculture.¹⁴

7. At its Thirteenth Regular Session, the Commission welcomed progress made in the preparation of the targeted assessments and took note of two studies on the impact of climate change for invertebrate and micro-organism genetic resources.¹⁵ It also welcomed the inclusion of micro-organisms and invertebrates in the report on *The State of the World's Biodiversity for Food and Agriculture* (Report). The Commission agreed to consider, in the future, the preparation of global assessments of micro-organisms and invertebrates and the establishment of an intergovernmental technical working group on MIGR.¹⁶

8. At its Fourteenth Regular Session, the Commission took note of a set of comprehensive background study papers on the role of micro-organisms in food¹⁷ and agro-industrial processes¹⁸ and in ruminant digestion,¹⁹ as well as on the role of invertebrates in rice production²⁰ and root-crop based systems.²¹

9. At its Fifteenth Regular Session, the Commission reviewed its work on micro-organisms and invertebrates. It reiterated the importance of microbial and invertebrate genetic diversity, including the role of pollinators, for sustainable agriculture, food security and nutrition. It also noted that bacterial, yeast and fungal genetic resources used in food processing need to be included in the future work of the Commission.²² The Commission emphasized the need for the Report to address issues related to micro-organisms and invertebrates and appealed to all FAO Members to provide relevant information in the course of the preparation of their country reports.²³ It also requested FAO to review the planning of its work on the conservation and sustainable use of micro-organisms and invertebrates following the presentation of the Report to the Commission.²⁴ In considering the draft report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*, the Commission also referred to the draft thematic background study on *Genetic resources for microorganisms of current and potential use in aquaculture*.²⁵

III. CONSULTATIONS

10. The Working Groups²⁶ as well as the Expert Group²⁷ agreed on the need for a work plan for MIGR. There also appeared to be general consensus on the suggested approach to address various functional groups of MIGR in a stepwise manner. Maybe not surprisingly, the Working Groups'

¹² CGRFA-12/09/15.1 and CGRFA-12/09/15.2.

¹³ CGRFA-12/09/Report, paragraph 60.

¹⁴ CGRFA-12/09/Report, paragraph 63.

¹⁵ Background Study Papers No. 54 and 57.

¹⁶ CGRFA-13/11/Report, paragraphs 92 & 94.

¹⁷ Background Study Paper No. 65.

¹⁸ Background Study Paper No. 64.

¹⁹ Background Study Paper No. 61.

²⁰ Background Study Paper No. 62.

²¹ Background Study Paper No. 63.

²² CGRFA-15/15/Report, paragraph 66.

²³ CGRFA-15/15/Report, paragraph 67.

²⁴ CGRFA-15/15/Report, paragraph 69.

²⁵ Russell T. Hill, [Genetic resources for microorganisms of current and potential use in aquaculture](#). Draft (January 2017)

²⁶ CGRFA-17/19/9.1, paragraphs 45–49; CGRFA-17/19/11.1, paragraphs 21–23; CGRFA-17/19/10.1, paragraphs 30–31 and CGRFA-17/19/8.1, paragraphs 42–44.

²⁷ CGRFA-17/19/3.2/Inf.2, paragraphs 14–18.

preferences differed with regard to the sequence in which the different functional groups should be addressed and with regard to the number of functional groups the Commission would address during one session.

11. Further suggestions included additions of specific MIGR, such as:

- edible fungi, insects and algae;
- endophytes and symbionts, and pests and diseases, including invasive species; and
- holobiomes; micro-algae; aquatic micro-organisms for environmental damage remediation; micro-organisms for water purification, including in aquaculture; micro-organisms that can be used in abiotic and biotic stress conditions; micro-organisms for use by the animal and human health sectors, biostimulants and plant growth promoters and micro-organisms that can improve micro-nutrient use efficiency; and endosymbionts.

12. Further suggestions included the preparation of a global country-driven assessment of MIGR that should complement the report on *The State of the World's Biodiversity for Food and Agriculture*²⁸ as well as the future organization of the Commission's work on MIGR. The latter suggestion touches upon a more general governance question, which is addressed in more detail in the document *Progress report and review of the draft revised Strategic Plan for the Commission on Genetic Resources for Food and Agriculture (2018–2027), including the Multi-Year Programme of Work*.²⁹

IV. TOWARDS A WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

13. Taking into account all comments and inputs received, the Secretariat consolidated the draft work plan, as given in *Appendix I* to this document, for consideration by the Commission. The draft work plan falls into brief sections addressing (i) the objectives of the work plan; (ii) the work plan's focus on functional groups of MIGR; (iii) main activities covered by the work plan and (iv) strategic partnerships.

V. GUIDANCE SOUGHT

14. The Commission is invited to review and revise, as appropriate, the draft work plan for the sustainable use and conservation of micro-organisms and invertebrates, as provided in *Appendix I*, with a view to adopting it.

²⁸ CGRFA-17/19/9.1, paragraph 49.

²⁹ CGRFA-17/19/13, paragraphs 16-19.

APPENDIX I

**DRAFT WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF
MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR
FOOD AND AGRICULTURE**

1. Micro-organisms and invertebrates are the most numerous and diverse groups of organisms on Earth. They play important roles at all stages of the food value chain. Since 2007, the Commission's Multi-Year Programme of Work recognizes the important contribution of micro-organisms and invertebrates to the provision of ecosystem services, sustainable agriculture and food security.
2. Under the Commission's guidance, targeted assessments of various micro-organisms and invertebrates and of their contributions to food and agriculture have been prepared.

I. OBJECTIVES OF THE WORK PLAN

3. Micro-organism and invertebrate genetic resources form part of a number of ongoing international initiatives, programmes and activities that relate to biodiversity for food and agriculture. Through the Global Soil Partnership and the Global Action on Pollination Services for Sustainable Agriculture, FAO provides guidance and technical advice to countries and facilitates decision-making processes on soil issues and pollination. The Organization facilitates the implementation of international initiatives on pollinators³⁰ and soil biodiversity³¹ that were established by the Conference of the Parties of the Convention on Biological Diversity. Furthermore, FAO has a long tradition of working in the field of biological control through its integrated pest management programme.
4. The Fourteenth Conference of the Parties to the Convention on Biological Diversity welcomed the initiative of the Commission to develop a work plan on microbes and invertebrates, including those relevant for soil biodiversity and the sustained provision of soil-mediated ecosystem functions and services essential for sustainable agriculture.³² It further invited FAO, in collaboration with other organizations and subject to the availability of resources, to consider the preparation of a report on the state of knowledge on soil biodiversity covering current status, challenges and potentialities by 2020.³³
5. Other organizations, such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), also significantly contribute to strengthen the knowledge foundations for better policy development for the sustainable use and conservation of micro-organisms and invertebrates and of the ecosystem services they provide. IPBES' assessment report on *Pollinators, Pollination and Food Production*³⁴ has generated a wide range of follow-up products, actions and policy initiatives, including an ever-expanding list of national strategies and action plans on pollination, premised on the outcomes of the assessment.³⁵ FAO is one of the four UN collaborative partners of IPBES.
6. Since 2007, the Commission has also steadily been strengthening its work in the field of micro-organisms and invertebrates. Macroinvertebrates, which make up a significant component of aquaculture and fisheries (23 and 15 percent of global production, respectively) are covered in detail in the report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture* and will be incorporated into the follow-up priority actions. This process also covers some aquatic micro-organisms such as microalgae. In addition, the report on *The State of the World's Biodiversity for Food and Agriculture*, prepared under the Commission's guidance, addresses, *inter alia*, the use and conservation of soil micro-organisms, pollinators and biological control agents, as well as

³⁰ COP 6 Decision VI/5, *Annex II*.

³¹ COP 8 Decision VIII/23.

³² CBD/COP/DEC/14/30, paragraph 22.

³³ CBD/COP/DEC/14/30, paragraph 23.

³⁴ 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.

³⁵ More information available at: www.ipbes.net/deliverables/3a-pollination

management practices believed to be favourable to the delivery of ecosystem services by micro-organisms and invertebrates.

7. This work plan therefore aims to:

- i) consolidate the Commission's activities and processes relevant to the sustainable use and conservation of micro-organisms and invertebrates, and to plan, in a coherent and consistent manner, future activities in this area;
- ii) raise awareness and strengthen the knowledge and understanding on the importance of micro-organisms and invertebrates to ecosystem functions, resilient food production systems, food security and nutrition;
- iii) promote the uptake of micro-organisms and invertebrates in local, national, regional and international policies and policy development processes for the sustainable use and conservation of biodiversity for food and agriculture, and their sustainable management; and
- iv) strengthen the collaboration between FAO and other relevant international organizations and initiatives to mobilize expertise of relevance to the sustainable use and conservation of micro-organisms and invertebrates and identify areas of mutual interest.

II. FOCUSING ON FUNCTIONAL GROUPS OF MICRO-ORGANISMS AND INVERTEBRATES

8. Although their important role in the provision of ecosystem services and their importance to food and agriculture are widely recognized, information on the diversity, function and distribution of micro-organisms and invertebrates is uneven and in many cases, very limited and fragmentary. Moreover, as confirmed by the report on *The State of the World's Biodiversity for Food and Agriculture*, the importance of micro-organisms and invertebrates to food and agriculture is neither adequately reflected in the funds that are committed to related research, nor in relevant policies and decision-making processes.

9. The taxonomic and functional diversity of micro-organism and invertebrate species significantly contrasts with species in the plant, animal, forestry and fisheries sectors. The latter encompass relatively few species for which the taxonomy tends to be well understood. As a result of this, "sectoral" species, breeds and varieties can be managed differently and conservation strategies can, for example, be single-species based. This species-by-species approach faces serious practical difficulties in the case of micro-organisms and invertebrates given the sheer number of species, the enormous taxonomic and ecological variety of these organisms and, consequently, the human and financial resources such an approach would require.

10. Management strategies for micro-organisms and invertebrates relying on a holistic framework that focuses on ecosystem functions and services these organisms contribute to, and on management practices favouring their conservation and sustainable use, might therefore be more feasible, efficient and effective, in particular for micro-organisms and invertebrates managed within production systems, than strategies focussing on the organisms themselves.

11. This work plan therefore addresses micro-organisms and invertebrates as functional groups: pollinators, in particular honey bees; soil micro-organisms and invertebrates; biological control agents; microorganisms of relevance to ruminant digestion; and micro-organisms of relevance to food processing and agro-industrial processes.³⁶

³⁶ CGRFA/16/17/Report, paragraph 79.

12. In light of the recent activities and developments at the global level with respect to pollinators³⁷ and soil biodiversity,³⁸ the work plan addresses these groups first.

13. Moreover, the draft work plan addresses one functional group per Commission session. Aiming to address all micro-organisms and invertebrates at once might be overambitious in view of the limited human and financial resources available. It is also important to note that different functional groups require very different expertise.

14. The Commission will therefore address the following functional groups of micro-organisms and invertebrates at its forthcoming sessions, as follows:

CGRFA-18	Pollinators, in particular honey bees
CGRFA-19	Soil micro-organisms and invertebrates
CGRFA-20	Organisms used as dietary components of food/feed
CGRFA-21	Biological control agents
CGRFA-22	Food processing and agro-industrial processes
CGRFA-23	Micro-organisms of relevance to ruminant digestion

III. MAIN ACTIVITIES

15. As confirmed by the report on *The State of the World's Biodiversity for Food and Agriculture*, there is an urgent need to:

- establish national baselines, in particular for soil micro-organisms, invertebrates and pollinators;
- improve the knowledge of the services and functions of micro-organism and invertebrate species within and around production systems;
- assess the impact of management practices on the sustainable use and conservation of micro-organisms and invertebrates and on the ecosystem services they deliver, and identify and validate those practices that are found to be most conducive;
- integrate and promote the sustainable use and conservation of micro-organisms and invertebrates into existing policies and planning processes at local and national levels and incorporate these processes into national accounting and reporting systems; and
- strengthen and formalize partnerships and improve the exchange and sharing of knowledge and best practices related to the conservation and sustainable use of micro-organisms and invertebrates.

16. Under this work plan, the Commission will therefore address each of the functional groups on the basis of:

- a summary of the status and trends of their conservation and use, based on previous work of the Commission, existing literature and, as appropriate, an open survey that may also compile best practices with respect to their sustainable use and conservation;
- a mapping of regional and international organizations and other institutions most relevant for the functional group and the identification of strategic areas of possible collaboration; and

³⁷ E.g. 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.

³⁸ For example the preparation of the Global Soil Biodiversity Atlas prepared by the European Commission Joint Research Centre and the Global Soil Biodiversity Initiative; commitments of the Global Soil Partnership and its Intergovernmental Technical Panel on Soils (ITPS) to promoting soil biodiversity; strategic alliance between FAO and the Global Soil Biodiversity Initiative, including a planned international symposium in 2020.

- an analysis of the gaps and needs, and possibilities for the Commission and its Members to address them.

IV. PARTNERSHIPS

17. The draft work plan will be implemented in partnership with organizations involved in the sustainable use and conservation of micro-organisms and invertebrates. The Commission's partners as well as stakeholders should be involved in the implementation of specific activities of the work plan whenever relevant.

V. REVIEW

18. This work plan will be reviewed by the Commission as part of the review of the Commission's work on MIGR, as scheduled in the Multi-Year Programme of Work.