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CONFERENCE

Forty-first Session

Rome, 22–29 June 2019

Report of the 17th Regular Session of the Commission on Genetic Resources for Food and Agriculture (Rome, 18–22 February 2019)

Executive Summary

This document contains the report of the 17th Regular Session of the FAO Commission on Genetic Resources for Food and Agriculture (Commission), which was held from 18 to 22 February 2019.

The Commission considered, among many other topics, the first report on *The State of the World's Biodiversity for Food and Agriculture*, which it welcomed as an important milestone for the UN Decade on Biodiversity. The Commission requested the Secretariat to facilitate, including by convening an open-ended meeting, the development of a response to the report, with the motivation to have it adopted as a Global Plan of Action by the FAO Conference at its 42nd Session.

Taking note of a proofing version of *The State of the World's Aquatic Genetic Resources for Food and Agriculture*, the Commission requested FAO to prepare, upon consultation with the regions and in collaboration with the Committee on Fisheries (COFI), including its relevant subsidiary bodies, a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture for its consideration.

For the forthcoming second assessment of *The State of the World's Forest Genetic Resources* and the third assessment of *The State of the World's Plant Genetic Resources for Food and Agriculture*, the Commission invited countries to submit their reports by 30 June and 31 December 2020 respectively.

The Commission welcomed the explanatory notes prepared to complement the *Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture*, which the Conference had welcomed in 2015. It encouraged Members to make use of the ABS Elements and the explanatory notes, as appropriate.

The Commission adopted its Strategic Plan 2019–2027, including its Multi-Year Programme of Work, and a work plan for future work on micro-organism and invertebrate genetic resources.

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Suggested action by the Conference

The Conference is invited to:

- a) welcome the report on *The State of the World's Biodiversity for Food and Agriculture* as a milestone of the UN Decade on Biodiversity and request FAO to disseminate the report widely and communicate its key messages to policy-makers, relevant stakeholders and international instruments and organizations;
- b) endorse the Commission's decision to develop a response to the report on *The State of the World's Biodiversity for Food and Agriculture*, with a view to bring it to the attention of the Conference at its next session;
- c) request the Commission to agree, upon consultation with the regions and in collaboration with COFI, on a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture, for consideration by the Conference at its next session;
- d) invite countries to contribute to the preparation of the forthcoming global assessments of plant and forest genetic resources;
- e) welcome the explanatory notes prepared to complement the *Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture*, and encourage Members to make use of them, as appropriate; and
- f) endorse the Commission's Strategic Plan 2019–2027, including its Multi-Year Programme of Work, and invite countries to continue reporting on progress in the achievement of Sustainable Development Goal 2, Target 2.5.

Queries on the content of this document may be addressed to:

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**Food and Agriculture
Organization of the
United Nations**

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE

CGRFA-17/19/Report

Seventeenth Regular Session of the Commission on Genetic Resources for Food and Agriculture

Rome, 18–22 February 2019



CGRFA 17

**REPORT OF THE COMMISSION ON GENETIC RESOURCES
FOR FOOD AND AGRICULTURE**

**Seventeenth Regular Session
Rome, 18–22 February 2019**

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2019**

The documents of the Seventeenth Regular Session of the
Commission on Genetic Resources for Food and Agriculture
are to be found on the Internet at:

<http://www.fao.org/cgrfa/meetings/detail/en/c/1153541/>

They may also be obtained from:

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CONTENTS

		<i>Paragraphs</i>
I.	Opening of the session	1–8
II.	The role of genetic resources for food and agriculture for food security and nutrition	9–12
III.	Access and benefit-sharing for genetic resources for food and agriculture	13–21
IV.	“Digital sequence Information” on genetic resources for food and agriculture	22–26
V.	The role of genetic resources for food and agriculture in mitigation of and adaptation to climate change	27–31
VI.	Nutrition and genetic resources for food and agriculture	32–38
VII.	Biodiversity for food and agriculture	39–49
VIII.	Aquatic genetic resources	50–56
IX.	Plant genetic resources	57–71
X.	Forest genetic resources	72–80
XI.	Animal genetic resources	81–92
XII.	Micro-organism and invertebrate genetic resources	93–95
XIII.	Strategic Plan for the Commission on Genetic Resources for Food and Agriculture (2019–2027)	96–100
XIV.	Cooperation with international instruments and organizations	101–105
XV.	Date and place of the Commission’s Eighteenth Regular Session	106
XVI.	Election of the Chair, Vice-Chairs and <i>Rapporteur</i> and Members and Alternates of the intergovernmental technical working groups	107–108
XVII.	Closing statements	109–111

Appendices

A.	Agenda of the Seventeenth Regular Session of the Commission on Genetic Resources for Food and Agriculture	
B.	Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture – <i>with explanatory notes</i>	
C.	Biodiversity for food and agriculture – revised draft needs and possible actions	
D.	Funding Strategy for the Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources	
E.	Work plan for the sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture	
F.	Strategic Plan for the Commission on Genetic Resources for Food and Agriculture (2019–2027)	
G.	Members and Alternates of the intergovernmental technical working groups, elected at the Seventeenth Regular Session of the Commission	
H.	List of documents	
I.	Members of the Commission on Genetic Resources for Food and Agriculture	

I. OPENING OF THE SESSION

1. The Seventeenth Regular Session of the Commission on Genetic Resources for Food and Agriculture (Commission) met in Rome, Italy, from 18 to 22 February 2019. The list of delegates and observers is available on the Commission's Web site.¹
2. In accordance with its Rules of Procedure, the Commission had elected its Chair, Vice-Chairs and *Rapporteur* for the Seventeenth Regular Session at its Sixteenth Regular Session in 2017. The Chair of the Seventeenth Regular Session was Mr William Wigmore (Cook Islands). Ms Tamara Villanueva (Chile), Mr Yusral Tahir (Indonesia), Ms Deidre Januarie (Namibia), Mr François Pythoud (Switzerland), Ms Christine Dawson (United States of America) and Mr Maeen Ali Ahmed Al-Jarmouzi (Yemen) were elected Vice-Chairs. Ms Christine Dawson (United States of America) was elected *Rapporteur*. Mr Yusral Tahir was replaced by Mr Gustaf Daud Sirait (Indonesia).
3. Mr William Wigmore opened the Session and welcomed delegates and observers.
4. Ms Maria Helena Semedo, Deputy Director-General, Climate and Natural Resources, welcomed delegates and observers. She noted that the two years since the last session of the Commission had been pivotal in firmly planting biodiversity on the global agenda. The Thirteenth Meeting of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) had heralded a reinvigorated relationship with FAO, marking the beginning of a new era of synergies between agriculture and the environment. She highlighted the various steps that FAO had taken in addressing biodiversity, including the establishment of the Biodiversity Mainstreaming Platform and the current preparation of a strategy on mainstreaming biodiversity across agriculture, forestry and fisheries. She congratulated the Commission on the report on *The State of the World's Biodiversity for Food and Agriculture*, noting that the report represented a milestone in the history of FAO and the Commission, and underscored the relevance of the Commission's work to the global biodiversity agenda. She expressed her hope that the Commission would welcome the report as an authoritative assessment and benchmark for biodiversity for food and agriculture and that the report's findings would lead to a global plan of action.
5. Mr David Cooper, Deputy Executive Secretary of the CBD, acknowledged that the Commission had developed landmark reports for the plant, livestock, aquatic and forest sectors, as well as for biodiversity for food and agriculture, and relevant action plans. The report on *The State of the World's Biodiversity for Food and Agriculture* had come at an opportune time, as there was not only the challenge of conserving biodiversity by reducing the drivers of its loss, but also the opportunity to enhance the use of biodiversity in the design, or redesign, of agriculture and food systems. He invited the Commission to continue to play a catalytic role in providing sound technical and policy guidance in this regard, especially in the remaining two years of the UN Decade for Biodiversity during which action towards achieving the Aichi Biodiversity Targets needs to be accelerated, and to the development of the post-2020 global biodiversity framework.
6. Mr Kent Nnadozie, Secretary of the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty), stressed the importance of the ongoing collaboration between the Commission and the Treaty Secretariats on both technical and policy matters. He expressed the hope that, thanks to the reorganization of FAO's departments, which had brought the Secretariats of the Commission and the Treaty under the same department, the synergies between the two bodies would continue to grow and be set in the broader context of sustainable agriculture, contributing to the achievement of the Sustainable Development Goals (SDGs). While noting the progress that had so far been made under the Treaty, he stressed the importance for the Treaty Secretariat of working with countries and partners around the world to conserve and sustainably use the world's plant genetic resources, both in the form of seeds of plants that provide food and nutrition and in the vital information pertaining to seeds. Mr Nnadozie commended the finalization of *The State of the World's Biodiversity for Food and Agriculture* as a major achievement, which he believed the

¹ www.fao.org/cgrfa

Governing Body of the Treaty would very much welcome, and undertook to assist in promoting its wider dissemination and use.

7. Ms Irene Hoffmann, Secretary of the Commission, welcomed delegates and observers. She noted that the past intersessional period had been particularly busy, with the re-launch of the Commission's Web site, numerous meetings and workshops, the finalization of *The State of the World's Biodiversity for Food and Agriculture*, and the production of a "proofing" version of the report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*. She thanked all the countries, National Focal Points and experts that had contributed to these activities. Ms Hoffmann also expressed her gratitude to the Governments of Germany, Norway, Spain and Switzerland for their extrabudgetary contributions to the implementation of the Commission's work programme. She noted the increasing recognition of the Commission's work and that a recent evaluation of FAO's contribution to integrated natural resource management for sustainable agriculture had listed the Commission as an "*exemplary provider of global and strategic knowledge products*" and had embraced the conclusion of an earlier evaluation according to which "*FAO's work on genetic resources is very relevant and FAO is a respected authority on genetic resources for food and agriculture*".

8. The Commission adopted the Agenda as given in *Appendix A*.

II. THE ROLE OF GENETIC RESOURCES FOR FOOD AND AGRICULTURE FOR FOOD SECURITY AND NUTRITION

9. The Commission considered the document *Review of work on the role of genetic resources for food and agriculture and food security*² and took note of the information document *Submissions by Members on the contribution of genetic resources for food and agriculture to the four pillars of food security and to the achievement of relevant Sustainable Development Goals*.³ It welcomed FAO's activities on raising awareness of the contribution of genetic resources for food and agriculture (GRFA) to food security and the achievement of the SDGs and requested FAO to continue conducting such activities, especially with regard to family farming, smallholders, indigenous peoples, local communities and traditional knowledge. It stressed the need for additional data collection on wild foods, underutilized species and food production, including in home gardens. In addition, it noted the need for the compilation and dissemination of good practices on measuring the contributions of GRFA to the achievement of relevant SDGs across the different sectors in the different regions.

10. The Commission took note of Background Study Paper No. 69, *Biodiversity for food and agriculture and food security – An exploration of interrelationships*, and requested the Secretariat, upon further review by countries and based on additional information, to prepare a brochure, in the official UN languages, on the contribution of GRFA to food security and to the achievement of relevant SDGs.

11. The Commission invited countries to link availability and affordability of nutrient-dense foods and improved dietary diversity with the conservation and sustainable use of GRFA, and to integrate these considerations into their food security and nutrition policies.

12. It also invited countries to raise awareness of the role of GRFA in food security and to implement the *Voluntary Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition*.⁴ It highlighted the importance of resource mobilization for national awareness-raising activities.

² CGRFA-17/19/2.

³ CGRFA-17/19/2/Inf.1.

⁴ <http://www.fao.org/3/a-i5248e.pdf>

III. ACCESS AND BENEFIT-SHARING FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Report of the Fourth Session of the Team of Technical and Legal Experts on Access and Benefit-Sharing

13. The Commission considered the *Report of the Fourth Session of the Team of Technical and Legal Experts on Access and Benefit-Sharing*.⁵ The Commission thanked the Members of the Team of Technical and Legal Experts on Access and Benefit-Sharing (ABS Expert Team) for their excellent work and endorsed the report.

Distinctive features and specific practices of different subsectors of genetic resources for food and agriculture

14. The Commission considered the document *Draft explanatory notes describing, within the context of the ABS Elements, the distinctive features of the different subsectors of genetic resources for food and agriculture*⁶ and took note of other relevant information.⁷

15. The Commission welcomed the *Report of the First Meeting of the Expert Group on Micro-organism and Invertebrate Genetic Resources for Food and Agriculture*⁸ and thanked the Members of the Expert Group for their excellent work.

16. It welcomed the explanatory notes as set out in *Appendix B* to this report, including the revised list of distinctive features of GRFA, and requested FAO to disseminate the Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture (ABS Elements) with the finalized explanatory notes to all Members, regional and country offices of FAO and to the National Focal Points of the CBD and the Treaty and to other relevant national focal points. The Commission encouraged Members to consider the ABS Elements, including the explanatory notes, and, as appropriate, make use of them.

17. The Commission reaffirmed that ABS measures for the different subsectors of GRFA are relevant for achieving SDGs 2 and 15. Furthermore, it noted the complementarity between its work, the Treaty and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) with regard to access and benefit-sharing (ABS) for genetic resources.

18. It requested FAO to continue assisting countries, at their request, in developing legislative, administrative and/or policy measures for ABS for GRFA, considering the importance of GRFA and their special role for food security. In addition, the Commission recommended that countries implement ABS measures in harmony with existing frameworks and infrastructures of the different subsectors of GRFA and that agriculture, livestock, forestry and fisheries ministries be engaged in the development and implementation of ABS measures for GRFA.

19. The Commission recalled that its Multi-Year Programme of Work (MYPow) foresees a review of its work on ABS for its Eighteenth Regular Session and requested its Secretary to prepare, for review by the Commission's intergovernmental technical working groups :

- i) a review of the Commission's past work on ABS for GRFA;
- ii) an up-to-date survey of existing legislative, administrative and policy approaches, including best practices, for ABS for the different subsectors of GRFA and traditional knowledge associated with GRFA held by indigenous peoples and local communities,

⁵ CGRFA-17/19/3.1.

⁶ CGRFA-17/19/3.2.

⁷ CGRFA-17/19/3.2/Inf.1; CGRFA-17/19/3.2/Inf.2; CGRFA-17/19/3.2/Inf.3; CGRFA-17/19/3.2/Inf.4.

FAO. 2018. *Proceedings of the International Workshop on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture*. Rome (available at: <http://www.fao.org/3/CA0099EN/ca0099en.pdf>).

⁸ CGRFA-17/19/3.2/Inf.2.

with the aim of identifying typical approaches and lessons learned from their implementation, as well as challenges and possible solutions;

- iii) an overview of developments under other international agreements and instruments relevant to ABS for GRFA; and
- iv) a proposal for options for future work of the Commission on ABS for the different subsectors of GRFA.

20. The Commission requested its Secretary to invite Members and observers to provide inputs to the deliverables referenced in paragraph 19.

21. The Commission requested the ABS Expert Team, as established at its Fourteenth Regular Session, to contribute to the preparation of the document described in paragraph 19 (ii) and, after the review of the document by the Commission's intergovernmental technical working groups, to convene for the sole purpose of reviewing and providing technical and legal inputs to the revised document. The Commission requested the ABS Expert Team to work electronically and to meet once for three days, subject to the availability of funds.

IV. “DIGITAL SEQUENCE INFORMATION” ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

22. The Commission considered the document “*Digital sequence information” on genetic resources for food and agriculture and its relevance for food security*⁹ and took note of the submissions by Members and observers¹⁰ and Background Study Paper No. 68, *Exploratory fact-finding scoping study on “digital sequence information” on genetic resources for food and agriculture*.

23. The Commission agreed that there is a need for further review of “Digital Sequence Information” (“DSI”) on GRFA. It agreed to address, at its next session, the innovation opportunities “DSI” on GRFA offers, the challenges of capacity to access and make use of it and its implications for the conservation and sustainable use of GRFA and the sharing of benefits derived from GRFA. It requested its intergovernmental technical working groups to consider these matters with regard to existing subsector-specific examples related to conservation, sustainable use and development of genetic resources, food security and nutrition, food safety, and efforts to combat crop and animal pests and diseases.

24. The Commission further noted the importance of coordination with the ongoing processes under the CBD and its Nagoya Protocol and the Treaty.

25. The Commission also took note that some Members have adopted domestic measures that regulate the access to and use of “DSI” on genetic resources as part of their ABS frameworks.

26. The Commission invited countries and relevant stakeholders to provide capacity-building and funding to support access to, and the generation, analysis and sharing of, “DSI” in conservation, sustainable use and research and development of GRFA, especially in developing countries.

V. THE ROLE OF GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN MITIGATION OF AND ADAPTATION TO CLIMATE CHANGE

27. The Commission considered the document *Assessment of the role of genetic resources for food and agriculture for climate change adaptation and mitigation*¹¹ and took note of the *Submissions by countries on the implementation of the voluntary guidelines to support the integration of genetic diversity into national climate change adaptation planning*.¹²

⁹ CGRFA-17/19/4.

¹⁰ CGRFA-17/19/4/Inf.1.

¹¹ CGRFA-17/19/5.

¹² CGRFA-17/19/5/Inf.1.

28. The Commission recalled its discussions at its last session regarding the preparation of a country-driven global assessment of the role of GRFA in adaptation to and mitigation of climate change. At that time, it had also agreed to integrate its work on climate change into its MYPOW.¹³

29. The Commission requested FAO to prepare a scoping study on the role of GRFA in adaptation to and mitigation of climate change, including knowledge gaps, taking into account the forthcoming special reports on terrestrial and marine systems by the Intergovernmental Panel on Climate Change (IPCC) and other available relevant sources, including examples from different regions and subsectors. The Commission requested its Working Groups to review the study and, if a global assessment of the role of GRFA is considered pertinent, to provide guidance to the Commission on its preparation.

30. The Commission requested the Secretariat to prepare a draft work plan, including for the preparation of a global country-driven assessment, for review by its intergovernmental technical working groups at their next sessions.

31. The Commission noted that its work on climate change should be integrated into the FAO strategy on climate change and complementary to the work of other international organizations, and be brought to the attention of United Nations Framework Convention on Climate Change and other relevant instruments and organizations.

VI. NUTRITION AND GENETIC RESOURCES FOR FOOD AND AGRICULTURE

32. The Commission considered the document *Review of work on genetic resources for food and agriculture and nutrition*,¹⁴ and welcomed the work on GRFA and nutrition, including the implementation of the *Voluntary Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition*¹⁵ and the Biodiversity for Food and Nutrition project, and stressed the importance of continuing work in the field.

33. The Commission noted the importance of traditional knowledge and native and forgotten foods, including relevant initiatives, and the importance of including indigenous peoples and local communities in the formulation of policies, programmes and action plans on nutrition.

34. The Commission invited countries to raise awareness of and implement the *Voluntary Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition*, including capacity development, the incorporation of subspecies-level biodiversity considerations into national food-based dietary guidelines and strengthening biodiverse systems to improve the nutritional value of foods.

35. The Commission invited countries to develop suitable policy frameworks, including fiscal policies, in accordance with trade and other international agreements, as appropriate, and support enhanced market outlets for biodiverse and nutritious foods, as appropriate.

36. The Commission invited countries and observers to share experiences in the development and implementation of policies related to biodiversity and nutrition, including multidiversified public procurement, school feeding programmes and other approaches. It invited countries and observers to share their best practices and lessons learned in mainstreaming biodiversity into nutrition policies and programmes, and their traditional food knowledge, and requested FAO to compile these, for consideration by the Commission at its next session.

37. The Commission invited countries and requested FAO, to continue improving the scientific evidence base for biodiversity, including genetic diversity at below-species level, and nutrition, including through updating the FAO/INFOODS Food Composition Database. It further requested FAO to explore the possibility of generating new indicators for assessing the role of biodiversity in nutrition and to improve biodiversity mainstreaming into nutrition education.

¹³ CGRFA-16/17/Report Rev.1, paragraph 27.

¹⁴ CGRFA-17/19/6.

¹⁵ <http://www.fao.org/3/a-i5248e.pdf>

38. The Commission requested the Secretariat to share information on the Commission's work on GRFA for food security and nutrition with the Committee on World Food Security in order to inform its work on Voluntary Guidelines on Food Systems and Nutrition.

VII. BIODIVERSITY FOR FOOD AND AGRICULTURE

The State of the World's Biodiversity for Food and Agriculture

39. The Commission considered the document *Preparation of The State of the World's Biodiversity for Food and Agriculture*.¹⁶ It welcomed FAO's report on *The State of the World's Biodiversity for Food and Agriculture*¹⁷ as an important milestone for the Commission and the UN Decade on Biodiversity and as a valuable contribution to the discussions on the post-2020 global biodiversity framework. It noted that the report would contribute to raising awareness on the important role of crop and livestock farming, forestry and fisheries in the conservation and use of biodiversity for food and agriculture and that it would help to strengthen collaboration and enhance communication between relevant international fora and instruments. It further noted that the country-reporting process had been a good opportunity for countries to, *inter alia*, assess gaps and needs with respect to sustainable use and conservation of biodiversity for food and agriculture.

40. The Commission requested the Secretariat to:

- disseminate the report widely and communicate its key messages to relevant stakeholders, including through regional seminars, subject to the availability of funds;
- submit the report to the Executive Secretaries of the CBD and other international organizations and instruments, for dissemination;
- present the report at relevant international meetings to ensure that it informs and contributes to the global biodiversity agenda, in particular to the implementation of relevant SDGs and the development of the CBD post-2020 global biodiversity framework; and
- reflect the main findings of the report in FAO's policies, programmes and activities.

41. The Commission requested FAO to bring the report to the attention of the Conference at its next session to facilitate its broad dissemination. It also called upon governments and donors to make available the financial resources necessary to translate and disseminate the report and its in-brief version into the UN languages.

42. The Commission also invited countries to disseminate the report and its key messages at national level in order to raise awareness on the subject and to reflect them in future policies, programmes and activities, as appropriate and in accordance with their needs and capabilities. It invited donors to provide extra-budgetary resources to support Members in implementing actions for follow-up to the Report, including for data-collection initiatives and capacity development at national level.

Report of the First Meeting of the Group of National Focal Points on Biodiversity for Food and Agriculture

43. The Commission considered the *Report of the First Meeting of the Group of National Focal Points for Biodiversity for Food and Agriculture*.¹⁸ Mr Axel Diederichsen (Canada), Co-Chair of the Group of National Focal Points, introduced the report. The Commission thanked the Members of the Group of National Focal Points for their excellent work and endorsed the report.

¹⁶ CGRFA-17/19/7.1.

¹⁷ <http://www.fao.org/cgrfa/topics/biodiversity/en/>

¹⁸ CGRFA-17/19/7.2.

Needs and possible actions in response to *The State of the World' Biodiversity for Food and Agriculture*

44. The Commission considered the document *Biodiversity for food and agriculture – needs and possible actions*.¹⁹ The Commission agreed that the report on *The State of the World's Biodiversity for Food and Agriculture*, along with developments in other fora that also point to declines in biodiversity of relevance to food and agriculture, calls for a timely and clear cross-sectoral follow-up. The Commission agreed that the follow-up product should be:

- actionable at country, regional and global levels;
- complementary to, not duplicative of, and coherent with, other processes and initiatives in FAO, such as the Commission's Global Plans of Action and FAO's Biodiversity Strategy, and in other fora; and
- voluntary.

45. Furthermore, the follow-up product should clarify terminology, take into account characteristics of diverse ecosystems and production systems, consider the special needs of developing countries, contribute to the implementation of the SDGs and the post-2020 global biodiversity framework and highlight areas for partnerships with multiple stakeholders.

46. The Commission noted that the follow-up product would be based on the document *Biodiversity for food and agriculture – revised draft needs and possible actions* contained in *Appendix C* to this report, and that it could benefit from further contributions from Members and observers of the Commission, and proposed the following intersessional process for review and revision of the document.

47. The Commission requested its Secretary to invite written concrete text proposals and comments from Commission Members and observers on the document entitled *Biodiversity for food and agriculture – revised draft needs and possible actions* as presented in *Appendix C* to this report. The Secretary would make the submissions available to Commission Members and observers and consolidate the comments into a revised version of the document. The Commission requested the Secretary to convene, subject to the availability of the necessary extra-budgetary resources, an open-ended meeting of the Group of National Focal Points for Biodiversity for Food and Agriculture with a view to reviewing and revising, as appropriate, the document, for consideration by the Commission at its Eighteenth Session, with the motivation to have it adopted as a Global Plan of Action by the FAO Conference at its Forty-second Session. The relevant documents should be made available by the Secretariat at least ten weeks ahead of each meeting.

48. The Commission called upon donors to make available the necessary financial resources to support the participation of developing countries and interpretation, as appropriate.

49. The Commission recalled that, following its State of the World reports, it has prepared several global plans of action, the implementation of which is monitored by the Commission.

VIII. AQUATIC GENETIC RESOURCES

Report of the Second Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture

50. The Commission considered the *Report of the Second Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture*.²⁰ Mr Belemane Semoli (South Africa), Vice-Chair of the Working Group, introduced the report. The Commission thanked the Members of the Working Group for their excellent work and endorsed the report.

¹⁹ CGRFA-17/19/7.3.

²⁰ CGRFA-17/19/8.1.

51. The Commission decided to establish the Ad Hoc Working Group as a regular intergovernmental technical working group. It stressed the importance of continuing the valuable collaboration with the Committee on Fisheries (COFI) and relevant subsidiary bodies.

The State of the World's Aquatic Genetic Resources for Food and Agriculture

52. The Commission considered the document *Preparation of The State of the World's Aquatic Genetic Resources for Food and Agriculture*²¹ and took note of the proofing version of *The State of the World's Aquatic Genetic Resources for Food and Agriculture*.²²

53. The Commission acknowledged the progress made in the preparation of the report, representing an important milestone, and appreciated the work undertaken towards this first global assessment of aquatic genetic resources.

54. The Commission requested that FAO finalize, launch and widely distribute the report and its in-brief version in 2019.

Options for follow-up to *The State of the World's Aquatic Genetic Resources for Food and Agriculture*

55. The Commission considered the document *Options for follow-up to The State of the World's Aquatic Genetic Resources for Food and Agriculture*²³ and recognized the need to maintain momentum following the preparation of the report. It requested FAO to review the proposed objectives, overall structure and list of follow-up strategic priorities²⁴ and prepare a draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture for consideration by the Working Group and the Commission at their next sessions.

56. The Commission agreed that the Global Plan of Action should be prepared upon consultation with the regions and in collaboration with COFI and its relevant subsidiary bodies. It was noted that the Global Plan of Action should be voluntary and collaborative and be implemented in line with the needs and priorities of Members.

IX. PLANT GENETIC RESOURCES

Report of the Ninth Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture

57. The Commission considered the *Report of the Ninth Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture*.²⁵ Ms Katlyn Scholl (United States of America), Chair of the Working Group, introduced the report. The Commission thanked the Members of the Working Group for their excellent work and endorsed the report.

Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture

58. The Commission considered the document *FAO activities in support of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*²⁶ and took note of other relevant documents.²⁷

59. The Commission requested FAO to continue assisting countries in strengthening national seed systems for the delivery of quality seeds and planting materials, in particular to smallholder

²¹ CGRFA-17/19/8.2 Rev.1.

²² CGRFA-17/19/8.2/Inf.1.

²³ CGRFA-17/19/8.3.

²⁴ CGRFA-17/19/8.3, *Appendix*.

²⁵ CGRFA-17/19/9.1.

²⁶ CGRFA-17/19/9.2.

²⁷ CGRFA-17/19/9.2/Inf.1; CGRFA-17/19/9.2/Inf.2; CGRFA-17/19/9.2/Inf.3; CGRFA-17/19/9.2/Inf.4; CGRFA-17/19/9.2/Inf.5; CGRFA-17/19/9.2/Inf.6.

farmers. It requested FAO to continue supporting countries in the development and revision of their national seed policy and legislation, taking into account the Commission's *Voluntary Guide for National Seed Policy Formulation*²⁸. It requested FAO to develop methodologies for improving the coherence between responses to seed insecurity and the development of sustainable seed systems.

60. The Commission requested FAO to continue supporting countries, in close coordination with the Treaty, in strengthening their crop improvement capacity, including through the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) and the Joint Programme of FAO and the International Atomic Energy Agency (IAEA) and, in particular, in support of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA) and Article 6 of the Treaty.

61. The Commission called for extra-budgetary funds to support countries in the implementation of the Second GPA.

International symposia

62. The Commission reviewed proposals for two international symposia on: (i) *in situ* conservation of crop wild relatives and wild food plants;²⁹ and (ii) on-farm management of farmers' varieties/landraces.³⁰ It requested FAO to hold, subject to the availability of extrabudgetary resources, the symposia in cooperation with the Secretariat of the Treaty and to make the outcomes available to the Working Group, the Commission and the Governing Body of the Treaty well in advance.

63. The Commission requested that the role of stakeholders in *in situ* conservation, the complementarity between *in situ* and *ex situ* conservation, opportunities for international collaboration and the prioritization of future work should be added to the key themes proposed for the symposium on *in situ* conservation.³¹ It furthermore requested the addition of the complementarity of on-farm management and *ex situ* conservation, as well as measures supporting on-farm initiatives, including community seed banks, to the key themes proposed for the symposium on on-farm management, the title of which should be changed to "International symposium on on-farm management and development of farmers' varieties/landraces."

Draft Voluntary Guidelines for the Conservation and Sustainable Use of Farmers' Varieties and Landraces

64. The Commission endorsed the *Draft Voluntary Guidelines for the Conservation and Sustainable Use of Farmers' Varieties and Landraces*,³² and requested FAO to publish and disseminate them. It encouraged countries to use them in planning and implementing efforts to conserve and sustainably use farmers' varieties/landraces.

Implementation of the Genebank Standards for Plant Genetic Resources for Food and Agriculture

65. The Commission requested FAO to continue providing support to national genebanks in their efforts to collect, conserve, regenerate, multiply, characterize and evaluate crop germplasm. It requested FAO to prepare practical guides for the use of the Genebank Standards for Plant Genetic Resources for Food and Agriculture,³³ based on the proposed action steps,³⁴ for consideration by the Working Group and the Commission, at their next sessions.

²⁸ <http://www.fao.org/3/a-i4916e.pdf>

²⁹ CGRFA-17/19/9.2/Inf.4.

³⁰ CGRFA-17/19/9.2/Inf.3.

³¹ CGRFA-17/19/9.2/Inf.4.

³² CGRFA-17/19/9.2/Inf.1.

³³ <http://www.fao.org/3/a-i3704e.pdf>

³⁴ CGRFA-17/19/9.2/Inf.5, *Annexes 1–3*.

World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture

66. The Commission endorsed the revised reporting format proposed for monitoring the implementation of the Second GPA,³⁵ for use during the next reporting cycle. The Commission requested FAO to complete the restructuring of the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS), reflect the revised reporting format in the on-line Reporting Tool and make a comprehensive list of frequently asked questions available to facilitate its use. It invited FAO to continue elaborating, based on country reporting, the status of implementation of SDG Target 2.5 and share the results with the Working Group and the Commission. It also requested FAO to continue developing the WIEWS portal and strengthening cooperation with the Global Information System (GLIS) and Genesys to avoid duplication of efforts. In addition, it requested a report clarifying the specific roles of these databases for the next session of the Working Group to streamline country reporting to the Commission and the Treaty.

Status and trends of seed policies

67. The Commission considered the document *Status and trends of seed policies and laws*³⁶ and took note of the review³⁷ undertaken. It requested FAO to carry out, in coordination with the Treaty and in consultation with the International Union for the Protection of New Varieties of Plants (UPOV), in-depth case studies for consideration by the Working Group, at its next session. These case studies should consider the effects of seed policies, laws and regulations on: (i) on-farm diversity of plant genetic resources for food and agriculture (PGRFA); (ii) smallholders' access to sufficient, affordable, diversified and locally adapted PGRFA, including farmers' varieties/landraces; and (iii) food security and nutrition under the different seed systems. The Commission requested FAO to clarify the terms "farmers' seed systems", "informal seed systems", "formal seed systems" and "integrated seed systems", taking into account submissions by Members and observers.

Preparation of *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture*

68. The Commission considered the document *Preparing The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture*³⁸ and took note of the relevant information document.³⁹

69. The Commission endorsed the approach proposed for the preparation of *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. It requested National Focal Points to report through WIEWS between January and December 2020 on the implementation of the Second GPA for the period of July 2014 to December 2019. In addition, it invited the Focal Points to provide a summative narrative of the progress made (between January 2012 and December 2019) and the remaining gaps and constraints. In the summative narratives, National Focal Points could provide a short description of the national genebank(s) and report on efforts to achieve complementarity between the on-farm management and *in situ* conservation of PGRFA on the one side and the *ex situ* conservation on the other. Countries that provided information through the Online Reporting System of the Treaty should be able to cross-reference this information in the summative narratives to avoid duplicative reporting.

70. The Commission requested FAO to propose thematic background studies, including on the global exchange of germplasm from and to genebanks, to complement the information used for the preparation of the Third Report. It requested FAO to specify, for all thematic background studies proposed, their purpose, content and contribution to the Third Report, for consideration by the Working Group.

³⁵ CGRFA-17/19/9.2/Inf.2, *Annex I*.

³⁶ CGRFA-17/19/9.3.

³⁷ CGRFA-17/19/9.3/Inf.1.

³⁸ CGRFA-17/19/9.4.

³⁹ CGRFA-17/19/9.4/Inf.1

71. The Commission invited donors to provide the necessary extrabudgetary resources to support the preparation of the Third Report, including the preparation of thematic background studies and country reports by developing and least-developed countries.

X. FOREST GENETIC RESOURCES

Report of the Fifth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources

72. The Commission considered the *Report of the Fifth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources*.⁴⁰ Mr Czeslaw Koziol (Poland), Vice-Chair of the Working Group, introduced the report. The Commission thanked the Members of the Working Group for their excellent work and endorsed the report.

Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources

73. The Commission considered the document *Status of Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*⁴¹ and took note of relevant information documents.⁴²

74. The Commission took note of the *First Report on the implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*,⁴³ and invited countries to continue implementing the Global Plan of Action. It also encouraged them to address the findings of the report, as appropriate. The Commission further encouraged all Members to nominate a National Focal Point on forest genetic resources and to report on their countries' efforts to implement the Global Plan of Action in the future.

75. The Commission adopted the Funding Strategy for the Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources, as given in *Appendix D* to this report, and encouraged countries to actively mainstream forest genetic resources into larger and holistic actions on sustainable forest management, including agroforestry and forest strategies, and forest-based climate change adaptation and mitigation measures, as well as to identify needs for specific and strategic actions on forest genetic resources. It also endorsed the *Voluntary Guidelines for Preparing a National Strategy for Forest Genetic Resources*⁴⁴ and noted the importance of countries having a national or subnational strategy for forest genetic resources in place in view of climate change.

76. The Commission requested FAO to continue coordinating and supporting the implementation of the Global Plan of Action, in collaboration with regional networks on forest genetic resources and relevant international organizations. Moreover, it encouraged FAO to continue pursuing extrabudgetary resources to support developing countries in the implementation of the Global Plan of Action. It further encouraged donors to support the implementation of the Global Plan of Action and its Funding Strategy.

Preparation of The Second Report on the State of the World's Forest Genetic Resources

77. The Commission considered the document *Preparation of The Second Report on the State of the World's Forest Genetic Resources*⁴⁵ and took note of the *Draft guidelines for the preparation of country reports for The Second Report on the State of the World's Forest Genetic Resources*.⁴⁶

⁴⁰ CGRFA-17/19/10.1.

⁴¹ CGRFA-17/19/10.2.

⁴² CGRFA-17/19/10.2/Inf.1; CGRFA-17/19/10.2/Inf.2; CGRFA-17/19/10.2/Inf.3; CGRFA-17/19/10.2/Inf.4.

⁴³ CGRFA-17/19/10.2/Inf.1.

⁴⁴ CGRFA-17/19/10.2/Inf.3.

⁴⁵ CGRFA-17/19/10.3.

⁴⁶ CGRFA-17/19/10.3/Inf.1.

78. The Commission adopted the outline⁴⁷ and timeline⁴⁸ for the preparation of the Second Report, as well as the guidelines for preparing the country reports. It encouraged countries to initiate the collection of information and data for the preparation of their country reports and called upon them to submit their country reports for the preparation of the Second Report by 30 June 2020.

79. The Commission requested FAO to invite regional networks on forest genetic resources and relevant international organizations to contribute to the preparation of the Second Report. It further requested FAO to initiate the development of a new global information system on forest genetic resources, subject to the availability of extrabudgetary resources, simultaneously assuring that the new system will make data easily accessible and useable to all data providers. It noted that, prior to seeking funding, FAO should develop a plan and possible budget. It further noted that FAO should, while developing the information system on forest genetic resources, avoid duplicating efforts with the existing global information systems on PGRFA. It also encouraged FAO to seek synergies with the existing regional information systems on forest genetic resources to avoid increasing countries' reporting burden. The Commission further encouraged FAO to consider ways to strengthen national and regional information systems on forest genetic resources, including by offering technical and financial support.

80. The Commission took note of the extrabudgetary resources required for the preparation of the Second Report⁴⁹ and invited donors to support its preparation.

XI. ANIMAL GENETIC RESOURCES

Report of the Tenth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture

81. The Commission considered the *Report of the Tenth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture*.⁵⁰ Mr Sipke-Joost Hiemstra (Netherlands), Chair of the Working Group, introduced the report. The Commission thanked the Members of the Working Group for their excellent work and endorsed the report.

Review of implementation of the Global Plan of Action for Animal Genetic Resources

82. The Commission welcomed the document *Review of implementation of the Global Plan of Action for Animal Genetic Resources*⁵¹ and took note of other relevant documents.⁵²

83. The Commission noted the *Review of methods for identification and valuation of the ecosystem services provided by livestock breeds*⁵³ and requested FAO to continue to improve the knowledge base and scientific evidence of livestock species and breeds in the provision of ecosystem services, including by providing examples, and raise awareness on this topic.

84. The Commission endorsed the *Guidelines on Developing Sustainable Value Chains for Small-scale Livestock Producers*⁵⁴ and requested FAO to publish and distribute them widely. The importance of value chains for the marketing of animals developed by community-based breeding programmes was noted. The Commission requested FAO to continue developing and updating guidelines to facilitate the application of new scientific discoveries related to the identification, characterization and conservation of animal genetic resources.

⁴⁷ CGRFA-17/19/10.3, *Appendix I*.

⁴⁸ CGRFA-17/19/10.3, *Appendix II*.

⁴⁹ CGRFA-17/19/10.3, *Appendix III*.

⁵⁰ CGRFA-17/19/11.1.

⁵¹ CGRFA-17/19/11.2.

⁵² CGRFA-17/19/11.2/Inf.1; CGRFA-17/19/11.2/Inf.2; CGRFA-17/19/11.2/Inf.3 Rev.1; CGRFA-17/19/11.2/Inf.4; CGRFA-17/19/11.2/Inf.5; CGRFA-17/19/11.2/Inf.6.

⁵³ CGRFA-17/19/11.2/Inf.1.

⁵⁴ CGRFA-17/19/11.2/Inf.5.

85. The Commission endorsed the proposed procedure of following the reporting format that was used for the preparation of the previous synthesis reports when undertaking the next review of progress in the implementation of the Global Plan of Action for Animal Genetic Resources. It invited countries to complete the reporting process in a timely manner and submit country progress reports by 31 July 2019.

86. The Commission called upon countries to continue implementing the Global Plan of Action, in order to contribute to global food security and sustainable rural development and, in particular, to the achievement of SDGs 2 and 15; it requested FAO to strengthen partnerships with stakeholders and donors to continue technical and policy support for country implementation of the Global Plan of Action.

87. The Commission took note of the document *Funding Strategy for the Implementation of the Global Plan of Action for Animal Genetic Resources: achievements and challenges*.⁵⁵ It invited donors to contribute to the implementation of the Global Plan of Action, including to a second call for proposals under the FAO Trust Account, and requested FAO to disseminate the results of the FAO Trust Account projects in relevant fora.

88. The Commission took note of the *Report on the status of development of the Domestic Animal Diversity Information System*.⁵⁶ It stressed the importance of the Domestic Animal Diversity Information System (DAD-IS) as the international clearing-house mechanism for animal genetic resources and requested FAO to further maintain and develop DAD-IS and to continue to collaborate with managers of national and regional systems and other stakeholders to develop and refine procedures for exchange of data. The Commission further requested FAO to complete the translation of the interface, provide additional training material and investigate the possibility of implementing descriptors for ecosystem services, production systems and the geographical distributions of breeds.

89. The Commission took note of the document *Status and trends of animal genetic resources – 2018*.⁵⁷ The Commission stressed the need for countries to regularly update their national data in DAD-IS or FABIS-net and other relevant databases, including information on animal genetic resources both *in situ* and *ex situ*, and to provide information on population sizes and breed classifications, in order to ensure that decisions on the implementation of the Global Plan of Action are informed by the most up-to-date data and information available.

90. The Commission requested the Secretariat to develop an in-house analytical study on the factors influencing the reporting of unknown status for breeds. This study should contain, but not be limited to, factors involved in the reporting of unknown status and proposed solutions to reduce the portion of unknown breeds. The results of this study should be discussed at the next session of the Working Group and the recommendations presented at the next regular Session of the Commission, to propose actions to minimize the portion of breeds with unknown status.

91. The Commission requested FAO to allocate regular programme resources to the continued maintenance and development of DAD-IS and continue to provide technical support to countries on the estimation of breed population sizes and on the use of DAD-IS.

92. The Commission requested FAO to include in DAD-IS data fields for monitoring the diversity of managed honey bees of relevance for food and agriculture.

XII. MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES

93. The Commission considered the *Draft work plan for the sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture*,⁵⁸ and took note of other relevant documents.⁵⁹

⁵⁵ CGRFA-17/19/11.2/Inf.2.

⁵⁶ CGRFA-17/19/11.2/Inf.3 Rev.1.

⁵⁷ CGRFA-17/19/11.2/Inf.4.

⁵⁸ CGRFA-17/19/12.2.

⁵⁹ CGRFA-17/19/12.1; CGRFA-17/19/12.2/Inf.1 Rev.1; CGRFA-17/19/12.2/Inf.2; CGRFA-17/19/12.2/Inf.3.

94. The Commission welcomed the consultative process that had led to the development of the draft work plan for the sustainable use and conservation of micro-organism and invertebrate GRFA. The Commission noted the special features of micro-organisms and invertebrates, including the need to strengthen taxonomic research and identification activities, and the collections that support them. It emphasized the linkages between the work plan and the follow-up to *The State of the World's Biodiversity for Food and Agriculture* and the need to avoid duplication of work.

95. The Commission adopted the Work Plan for the Sustainable Use and Conservation of Micro-organism and Invertebrate Genetic Resources for Food and Agriculture, as provided in *Appendix E* to this document. With respect to the specifics of its work on micro-organism and invertebrate GRFA foreseen for its Nineteenth and Twentieth Regular Sessions, the Commission requested FAO to present options for discussion at its next session.

XIII. STRATEGIC PLAN FOR THE COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE (2019–2027)

96. The Commission considered 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*.⁶⁰ It adopted the Strategic Plan for the Commission on Genetic Resources for Food and Agriculture (2019–2027), as given in *Appendix F*.

97. The Commission requested its Secretary to prepare an options paper setting out different options (and their financial implications) for the future organization of the Commission's intersessional work, for consideration by the Working Groups and the Commission at their next sessions, to:

- (a) address in a coherent, integrated and consistent way biodiversity for food and agriculture, including micro-organism and invertebrate genetic resources; and
- (b) consider how to enhance coordination and communication among the Commission's Working Groups, to raise awareness on subsectoral issues and strengthen coherence on cross-sectoral matters to effectively address the Commission's mission and goals.

98. The Commission thanked the donors who had provided support to the MYPOW multi-donor trust fund and through bilateral funds, and encouraged other donors to follow their example.

99. The Commission requested its Secretary to transmit the Strategic Plan for the Commission on Genetic Resources for Food and Agriculture (2019–2027) to the Executive Secretary of the CBD, as an early contribution to the process of developing the post-2020 global biodiversity framework and other ongoing work of the CBD, raising awareness about the contribution of agriculture sectors to biodiversity conservation and sustainable use.

100. The Commission requested FAO to continue providing technical and policy assistance to countries on the different aspects of biodiversity for food and agriculture.

XIV. COOPERATION WITH INTERNATIONAL INSTRUMENTS AND ORGANIZATIONS

101. The Commission considered the document *Cooperation with international instruments and organizations*⁶¹ and took note of relevant information documents.⁶² It thanked the international instruments and organizations for providing information on their policies, programmes and activities relevant to the prioritized themes of this session.

⁶⁰ CGRFA-17/19/13.

⁶¹ CGRFA-17/19/14.

⁶² CGRFA-17/19/14/Inf.1; CGRFA-17/19/14/Inf.2; CGRFA-17/19/14/Inf.3; CGRFA-17/19/14/Inf.4; CGRFA-17/19/14/Inf.5; CGRFA-17/19/14/Inf.6.

102. The Commission requested its Secretary to continue seeking inputs on prioritized themes of the regular sessions from international instruments and organizations and to make them available to the Commission for its information.

103. The Commission welcomed Resolution 11/2017 of the Governing Body of the Treaty⁶³ and the joint activities of the Secretariats of the Treaty and the Commission during the past intersessional period.⁶⁴ It requested its Secretary to continue strengthening collaboration with the Secretary of the Treaty to promote coherence in the development and implementation of the respective programmes of work of the two bodies in areas of relevance to them, including:

- (a) the preparation of *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* and of a draft Third Global Plan of Action for Plant Genetic Resources for Food and Agriculture, as appropriate;
- (b) the organization of the international symposia on on-farm management and development of farmers' varieties/landraces and on *in situ* conservation of crop wild relatives and wild food plants;
- (c) the monitoring and implementation of the Second GPA;
- (d) the implementation of the Genebank Standards for Plant Genetic Resources for Food and Agriculture, including through capacity building;
- (e) ABS;
- (f) "DSI" on PGRFA;
- (g) GLIS and FAO WIEWS, targets and indicators, as well as the development of the post-2020 global biodiversity framework.

104. The Commission took note of the invitation to previous and new depositors to send seed for safety duplication to the Svalbard Global Seed Vault.

105. The Commission requested its Secretariat to continue strengthening collaboration with the Secretariat of the CBD, in particular in the context of the preparation of the post-2020 global biodiversity framework.

XV. DATE AND PLACE OF THE COMMISSION'S EIGHTEENTH REGULAR SESSION

106. The Commission agreed that its Eighteenth Regular Session would be convened in Rome, Italy, in 2021, at a suitable date before the Forty-second Session of the FAO Conference. The Secretary indicated 1 to 5 March 2021 as tentative dates for the session.

XVI. ELECTION OF CHAIR, VICE-CHAIRS AND *RAPPORTEUR* AND MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL WORKING GROUPS

107. The Commission elected its Chair and Vice-Chairs for its Eighteenth Regular Session. Mr François Pythoud (Switzerland) was elected as Chair. Mr John Mulumba (Uganda), Mr Thanawat Tiensin (Thailand), Ms Renata Negrelly Nogueira (Brazil), Mr Maeen Ali Ahmed Al-Jarmouzi (Yemen), Mr Benoît Girard (Canada) and Mr William Wigmore (Cook Islands) were elected as Vice-Chairs. Mr Tiensin was elected *Rapporteur*.

108. The Commission elected the Members of its Working Groups, as given in *Appendix G*, and requested the Working Groups to meet before the next regular Session of the Commission.

⁶³ IT/GB-7/17/Report, *Appendix A.11*. The resolution is also available in FR, ES, ZH, AR and RU.

⁶⁴ CGRFA-17/19/14/Inf.5; CGRFA-17/19/14/Inf.6.

XVII. CLOSING STATEMENTS

109. Mr René Castro Salazar, Assistant Director-General, Climate, Biodiversity, Land and Water Department, congratulated the Chair, Vice-Chairs and delegates on having made the Seventeenth Regular Session of the Commission a fruitful meeting. He thanked delegates for their high level of engagement and for the confidence they had shown in FAO and the Commission. In closing, he reminded delegates of the need to make additional funds available to implement the activities agreed upon by the Commission at this session.

110. Regional representatives took the floor to thank the Chair, the Bureau, delegates, the Secretariat and the support staff and to express their satisfaction with the outcomes of the meeting. Thanks were also expressed to governments that had provided financial assistance to support the attendance of delegates from developing countries.

111. The Chair thanked FAO's technical departments and the Commission's Secretariat, along with the interpreters, translators and other support staff. He thanked the Vice-Chairs and the *Rapporteur* and extended best wishes to the incoming Chair and Bureau. Finally, he thanked delegates for their hard work, good spirit, clarity and willingness to compromise.

APPENDIX A**AGENDA OF THE SEVENTEENTH REGULAR SESSION OF THE COMMISSION
ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE**

1. Adoption of the agenda and time-table

CROSS-SECTORAL MATTERS

2. The role of genetic resources for food and agriculture for food security and nutrition
3. Access and benefit-sharing for genetic resources for food and agriculture
 - 3.1 Report of the Fourth Session of the Team of Technical and Legal Experts on Access and Benefit-Sharing
 - 3.2 Distinctive features and specific practices of different subsectors of genetic resources for food and agriculture
4. “Digital sequence information” on genetic resources for food and agriculture
5. The role of genetic resources for food and agriculture in mitigation of and adaptation to climate change
6. Nutrition and genetic resources for food and agriculture

BIODIVERSITY FOR FOOD AND AGRICULTURE

7. Biodiversity
 - 7.1 *The State of the World’s Biodiversity for Food and Agriculture*
 - 7.2 Report of the First Meeting of the Group of National Focal Points on Biodiversity for Food and Agriculture
 - 7.3 Needs and possible actions in response to *The State of the World’s Biodiversity for Food and Agriculture*
8. Aquatic genetic resources
 - 8.1 Report of the Second Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture
 - 8.2 *The State of the World’s Aquatic Genetic Resources for Food and Agriculture*
 - 8.3 Options for follow-up to *The State of the World’s Aquatic Genetic Resources for Food and Agriculture*
9. Plant genetic resources
 - 9.1 Report of the Ninth Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture
 - 9.2 Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture
 - 9.3 Status and trends of seed policies
 - 9.4 Preparation of *The Third Report on the State of the World’s Plant Genetic Resources for Food and Agriculture*

10. Forest genetic resources
 - 10.1 Report of the Fifth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources
 - 10.2 Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources
 - 10.3 Preparation of *The Second Report on the State of the World's Forest Genetic Resources*
11. Animal genetic resources
 - 11.1 Report of the Tenth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture
 - 11.2 Implementation of the Global Plan of Action for Animal Genetic Resources
12. Micro-organism and invertebrate genetic resources
 - 12.1 Report on the Consultation on future work on sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture
 - 12.2 Future work on sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture

STRATEGIC PLAN FOR THE COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

13. Progress report and review

COOPERATION WITH INTERNATIONAL INSTRUMENTS AND ORGANIZATIONS

14. Cooperation with international instruments and organizations

OTHER MATTERS

15. Other business
16. Date and place of the Commission's Eighteenth Regular Session
17. Election of Chair, Vice-Chairs and *Rapporteur*
18. Adoption of the Report

APPENDIX B

**ELEMENTS TO FACILITATE DOMESTIC IMPLEMENTATION OF ACCESS
AND BENEFIT-SHARING FOR DIFFERENT SUBSECTORS OF GENETIC
RESOURCES FOR FOOD AND AGRICULTURE**

WITH EXPLANATORY NOTES

CONTENTS

	<i>Pages</i>
PREFACE	4
ABBREVIATIONS AND ACRONYMS	5
 1. BACKGROUND	 7
Access and benefit-sharing and the Commission on Genetic Resources for Food and Agriculture	7
Convention on Biological Diversity	7
The Nagoya Protocol	7
International Regime	7
Special features of GRFA	7
The Nagoya Protocol and GRFA	8
Development of the Elements to Facilitate Domestic Implementation of Access and Benefit-sharing for Different Subsectors of Genetic Resources for Food and Agriculture	9
 2. OBJECTIVE OF THIS DOCUMENT	 19
 3. CONSIDERATIONS FOR DEVELOPING, ADAPTING OR IMPLEMENTING ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE	 20
I. Assessment of the concerned subsectors of GRFA, including their activities, socio-economic environments and use and exchange practices	20
a) Distinctive features of GRFA	20
b) Different forms of utilization of subsectors and variations within subsectors of GRFA	20
c) Legal, policy and administrative measures, including existing practices	20
d) Possible implications of the scope, including subject-matter and temporal scope, of ABS measures	21
e) Flows of germplasm, including international flows, within the different subsectors	21
f) Possible gaps in ABS measures	23
II. Identification and consultation of relevant governmental entities and non-governmental stakeholders holding, providing or using GRFA	23
III. Integration of ABS measures with broader food security and sustainable agricultural development policies and strategies	25
IV. Consideration and evaluation of options for ABS measures	27
V. Integration of implementation of ABS measures into the institutional landscape	27
VI. Communication of, and awareness-raising regarding, ABS measures for potential providers and users of GRFA	28
VII. <i>Ex ante</i> assessment and monitoring of the effectiveness and impact of ABS measures for GRFA	29

4. ACCESS AND BENEFIT-SHARING FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE: THE INTERNATIONAL LEGAL FRAMEWORK	30
Convention on Biological Diversity	30
Nagoya Protocol	30
International Treaty on Plant Genetic Resources for Food and Agriculture	30
Relationship between the Nagoya Protocol and specialized international ABS instruments	31
5. RATIONALE OF ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE	33
6. ELEMENTS OF ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE	34
I. Institutional arrangements	34
II. Access to and utilization of GRFA	36
<i>(i) Categories of genetic resources covered by access provisions</i>	36
Temporal scope of access measures for GRFA	36
Genetic resources provided by countries of origin/countries that acquired them in accordance with the CBD	37
Privately versus publicly held genetic resources	38
Genetic resources versus biological resources	38
Genetic resources held by indigenous and local communities	38
<i>(ii) Intended uses triggering the application of access provisions</i>	38
Research and development on the genetic and/or biochemical composition of GRFA	38
Development of genetic resources in the course of agricultural production	40
Research and development for food and agriculture	42
Commercial/non-commercial research and development	43
Exemption of specific activities	44
<i>(iii) Authorization procedures</i>	44
PIC	44
Standard and fast-track PIC	44
Implicit PIC	44
Standardization of PIC (and MAT)	44
Framework PIC (and MAT)	46
III. Access to traditional knowledge associated with GRFA	46
IV. Fair and equitable sharing of benefits	47
<i>(i) Scope of benefit-sharing obligations</i>	47
<i>(ii) Fair and equitable</i>	47
<i>(iii) Beneficiaries</i>	48
<i>(iv) Monetary and non-monetary benefits</i>	49
<i>(v) Sharing benefits through partnerships</i>	49
<i>(vi) Global multilateral benefit-sharing mechanism</i>	50
V. Compliance and monitoring	50
ANNEX: Distinctive features of genetic resources for food and agriculture	52

PREFACE

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) has been hailed as a giant step towards the implementation of the third objective of the Convention on Biological Diversity (CBD): the fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to them. Implementing this third objective is intended to contribute to the conservation of biological diversity and the sustainable use of its components, the other two objectives of the CBD.

The Nagoya Protocol confronts policy-makers and administrators responsible for its implementation at the national level with a number of challenges. One of these challenges is the Nagoya Protocol's obligation to consider, in the development and implementation of access and benefit-sharing (ABS) measures, the importance of genetic resources for food and agriculture (GRFA) and their special role for food security. The Nagoya Protocol explicitly recognizes the importance of genetic resources to food security, the special nature of agricultural biodiversity, its distinctive features and problems needing distinctive solutions, as well as the interdependence of all countries with regard to GRFA, and the importance of GRFA for sustainable development of agriculture in the context of poverty alleviation and climate change. However, the Nagoya Protocol provides little guidance as to how the special features of GRFA might adequately be reflected in domestic ABS measures.

In 2013, the Commission on Genetic Resources for Food and Agriculture (Commission) of the Food and Agriculture Organization of the United Nations (FAO) put in place a process, the outputs of which are the Elements to Facilitate Domestic Implementation of Access and Benefit-sharing for Different Subsectors of Genetic Resources for Food and Agriculture (ABS Elements). Developed by a Team of Technical and Legal Experts on Access and Benefit-sharing from all regions of the world, the ABS Elements were considered and welcomed by the Commission at its Fifteenth Regular Session (19–23 January 2015) and subsequently welcomed by the FAO Conference, the highest Governing Body of FAO. The Conference of the Parties to the CBD, at its Thirteenth Session, invited Parties and governments to take note of and apply, as appropriate, the voluntary guidelines contained in the ABS Elements.

In 2017, at its Sixteenth Regular Session, the Commission agreed to produce non-prescriptive explanatory notes describing, within the context of the ABS Elements, the distinctive features and specific practices of different subsectors of genetic resources for food and agriculture (GRFA), to complement the ABS Elements. This document contains the explanatory notes, as endorsed by the Commission in 2019, in shaded boxes to complement the ABS Elements. The ABS Elements with their explanatory notes aim to assist governments considering developing, adapting or implementing ABS measures to take into account the importance of GRFA, their special role for food security and the distinctive features of the different subsectors of GRFA, while complying, as applicable, with international ABS instruments.

ABBREVIATIONS AND ACRONYMS

ABS	access and benefit-sharing
ACM	Asian Consortium of Microbiological Resources
AnGR	animal genetic resources for food and agriculture
AqGR	aquatic genetic resources for food and agriculture
BC	biological control
BLUP	best linear unbiased prediction
CBA	capture-based aquaculture
CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
Commission	Commission on Genetic Resources for Food and Agriculture
EBRCN	European Biological Resource Centres Network
FAO	Food and Agriculture Organization of the United Nations
FGR	forest genetic resources
GPA AnGR	Global Plan of Action for Animal Genetic Resources
GRFA	genetic resources for food and agriculture
InGR	invertebrate genetic resources
IPLC	indigenous peoples and local communities
IPPC	International Plant Protection Convention
MAA	material acquisition agreements
MAT	mutually agreed terms
MCC	microbial culture collections
MIGR	micro-organism and invertebrate genetic resources
MLS	Multilateral System of Access and Benefit-sharing
MoGR	micro-organism genetic resources
MOSAICC	Micro-Organisms Sustainable Use and Access Regulation International Code of Conduct
MTA	material transfer agreements

NGO	non-governmental organizations
OECD	Organisation for Economic Co-operation and Development
PGRFA	plant genetic resources for food and agriculture
PIC	prior informed consent
SMTA	Standard Material Transfer Agreement
SNP	single nucleotide polymorphism
Treaty	International Treaty on Plant Genetic Resources for Food and Agriculture
WFCC	World Federation of Culture Collections

1. BACKGROUND

Access and benefit-sharing and the Commission on Genetic Resources for Food and Agriculture

1. The Food and Agriculture Organization of the United Nations (FAO) and its Commission on Genetic Resources for Food and Agriculture (Commission) have a longstanding history of dealing with issues related to genetic resources for food and agriculture (GRFA), including access to them and the fair and equitable sharing of benefits derived from their utilization. In 1983, the FAO Conference adopted the International Undertaking on Plant Genetic Resources for Food and Agriculture, which provided a policy and planning framework for the Commission with respect to plant genetic resources for food and agriculture (PGRFA). During the following years, the Commission negotiated further resolutions that interpreted the International Undertaking, and in 1994, started revising the International Undertaking. As a result of this process, the FAO Conference in 2001 adopted the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty), the first legally binding and operational international instrument on access and benefit-sharing (ABS) for genetic resources.

Convention on Biological Diversity

2. The Convention on Biological Diversity (CBD), adopted in 1992, is the first international agreement that addresses ABS in its objectives and provisions. It recognizes the sovereign rights of states over their natural resources and affirms the authority governments have, subject to their national legislation, to determine access to genetic resources.

The Nagoya Protocol

3. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) is a supplementary agreement to the CBD. It provides a legal framework for the effective implementation of the third objective of the CBD, the fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources, with a view to contributing to the conservation of biological diversity and the sustainable use of its components, the other two objectives of the CBD.

International Regime

4. As recognized by the Conference of the Parties of the CBD at its tenth meeting, the International Regime of ABS is constituted by the CBD and the Nagoya Protocol, as well as complementary instruments, including the Treaty and the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization.¹

Special features of GRFA

5. The special nature of GRFA, which are included in agricultural biodiversity, their distinctive features and problems needing distinctive solutions, is widely acknowledged.² The Conference of the Parties to the CBD, at its fifth meeting in 2000, considered the distinctive features of agricultural biodiversity to include the following:

- (a) *Agricultural biodiversity is essential to satisfy basic human needs for food and livelihood security;*
- (b) *Agricultural biodiversity is managed by farmers; many components of agricultural biodiversity depend on this human influence; indigenous knowledge and culture are integral parts of the management of agricultural biodiversity;*

¹ COP 10 Decision X/1.

² For the rationale of ABS measures, see Chapter 5.

- (c) *There is a great interdependence between countries for the genetic resources for food and agriculture;*
- (d) *For crops and domestic animals, diversity within species is at least as important as diversity between species and has been greatly expanded through agriculture;*
- (e) *Because of the degree of human management of agricultural biodiversity, its conservation in production systems is inherently linked to sustainable use;*
- (f) *Nonetheless, much biological diversity is now conserved ex situ in gene banks or breeders' materials;*
- (g) *The interaction between the environment, genetic resources and management practices that occurs in situ within agro-ecosystems often contributes to maintaining a dynamic portfolio of agricultural biodiversity.*³

6. The Commission considered, at its Fourteenth Regular Session, the distinctive features of GRFA, as given in the Annex to this document.⁴ The list of features provides information on the characteristics of the different subsectors of GRFA.⁵ It should be noted that the Commission acknowledged the need to further refine this list of distinctive features and to focus on the utilization of GRFA.

The Nagoya Protocol and GRFA

7. The Nagoya Protocol, in its preamble, explicitly recognizes the importance of genetic resources to food security, the special nature of agricultural biodiversity, its distinctive features and problems needing distinctive solutions, as well as the interdependence of all countries with regard to GRFA and the special nature and importance of these resources for achieving food security worldwide and for sustainable development of agriculture in the context of poverty alleviation and climate change. In this regard, the Nagoya Protocol also acknowledges the fundamental role of the Treaty and the Commission.

8. In its operational provisions, the Nagoya Protocol requires Parties to consider, in the development and implementation of their ABS legislation or regulatory requirements, the importance of GRFA and their special role for food security.⁶ Parties shall also create conditions to promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of intent for such research.⁷

9. The Nagoya Protocol leaves room for other international agreements in the field of ABS and it does not prevent its Parties from developing and implementing other relevant international agreements, including other specialized ABS agreements, provided that they are supportive of and do not run counter to the objectives of the CBD and the Nagoya Protocol.⁸ Where a specialized international ABS instrument that is consistent with and does not run counter to the objectives of the CBD and the Nagoya Protocol applies, the Nagoya Protocol does not apply for the Party or Parties to the specialized instrument in respect of the specific genetic resource covered by and for the purpose of the specialized instrument.⁹ One of the instruments explicitly acknowledged in the Preamble of the Nagoya Protocol is the Treaty, which has been developed in harmony with the CBD. Beyond this

³ COP 5 Decision V/5, *Appendix*, paragraph 2.

⁴ This annex was amended by the Commission at its Seventeenth Regular Session to extend to all subsectors of GRFA.

⁵ Throughout this document, unless otherwise specified, “subsectors of GRFA” and “subsectors” are understood as to mean the subsectors: of (1) plant genetic resources for food and agriculture; (2) animal genetic resources for food and agriculture; (3) forest genetic resources for food and agriculture; (4) aquatic genetic resources for food and agriculture and; (5) micro-organism genetic resources for food and agriculture; and (6) invertebrate genetic resources for food and agriculture.

⁶ Nagoya Protocol, Article 8(c).

⁷ Nagoya Protocol, Article 8(a).

⁸ Nagoya Protocol, Article 4.2.

⁹ Nagoya Protocol, Article 4.4.

openness to other international instruments, the Nagoya Protocol also states that due regard should be paid to “useful and relevant ongoing work or practices under such international instruments and relevant international organizations, provided that they are supportive of and do not run counter to the objectives of the CBD and this Protocol.”¹⁰



The Treaty is a “specialized international access and benefit-sharing instrument” as referred to in Article 4.4 of the Nagoya Protocol. The Treaty has established a Multilateral System of Access and Benefit-sharing (MLS) that, for 64 crops and forages, facilitates access, for the purpose of research, breeding and training for food and agriculture, to *ex situ* genetic materials that are under the management and control of Contracting Parties and in the public domain. In accordance with Article 12.3(h) access to PGRFA found in *in situ* conditions will be provided according to national legislation or, in the absence to such legislation, in accordance with such standards as may be set by the Governing Body. These 64 crops and forages are listed in Annex 1 of the Treaty and were selected according to criteria of food security and interdependence. All genetic resources included in the MLS and which are exchanged using the Standard Material Transfer Agreement (SMTA) for the purposes considered by the Treaty, including those held in the Article 15 institutions, do not fall within the application of the Nagoya Protocol. Furthermore, Contracting Parties to the Treaty can decide to exchange accessions of PGRFA of species not included in Annex I, and PGRFA found in *in situ* conditions, according to the terms and conditions of the SMTA. The Treaty has established the Benefit-sharing Fund as its mechanism for monetary benefit-sharing. The Contracting Parties recognize that facilitated access to PGRFA in the MLS constitutes itself a major benefit of the MLS.

10. The Nagoya Protocol also requires Parties to encourage, as appropriate, the development, update and use of sectoral and cross-sectoral model contractual clauses for mutually agreed terms (MAT) and of voluntary codes of conduct, guidelines and best practices and/or standards in relation to ABS.¹¹ The Conference of the Parties to the CBD serving as meeting of the Parties to the Nagoya Protocol shall periodically take stock of the use of the model contractual clauses, codes of conduct, guidelines and best practices and/or standards.¹²

Development of the Elements to Facilitate Domestic Implementation of Access and Benefit-sharing for Different Subsectors of Genetic Resources for Food and Agriculture

11. The Commission, at its Fourteenth Regular Session, considered the need for and modalities of ABS for GRFA, taking into account relevant international instruments. It put in place the process that led to the development of these Elements to Facilitate Domestic Implementation of Access and Benefit-sharing for Different Subsectors of Genetic Resources for Food and Agriculture (ABS Elements).¹³

12. The Commission established a Team of Technical and Legal Experts on Access and Benefit-sharing (ABS Expert Team) consisting of up to two representatives from each of the seven FAO regions. As requested by the Commission, the ABS Expert Team:

- Coordinated, with the assistance of the Secretariat, by electronic means as appropriate, to help prepare meetings of the Commission’s intergovernmental technical working groups, and based on input from their regions prepared written materials and proposed guidance for the intergovernmental technical working groups;
- Participated in the relevant portions of the meetings of the intergovernmental technical working groups, to help inform and shape the intergovernmental technical working group discussions and output on ABS; and

¹⁰ Nagoya Protocol, Article 4.3.

¹¹ Nagoya Protocol, Article 19.1; 20.1.

¹² Nagoya Protocol, Article 19.2; 20.2.

¹³ CGRFA-14/13/Report, paragraph 40.

- Worked after each intergovernmental technical working group meeting with the Secretariat to compile the intergovernmental technical working group outputs into the ABS Elements, and communicated the ABS Elements to their regions for information.

13. The elaboration of the ABS Elements and the work of the Commission's intergovernmental technical working groups built upon and benefited from inputs received, at the Commission's invitation, from governments and relevant stakeholders.¹⁴ In 2015, the Commission, at its Fifteenth Regular Session, welcomed the ABS Elements and invited countries to consider and, as appropriate, make use of them and to provide feedback on their use.¹⁵ The FAO Conference, the highest Governing Body of FAO, echoed the Commission's sentiment and welcomed, at its Thirty-Ninth Session, the ABS Elements and invited Members to consider and, as appropriate, make use of them.¹⁶

Introduction to the different subsectors of GRFA

Animal genetic resources



The livestock industry is a well-established, fast-growing sector. Animal husbandry has been practised worldwide for more than 10 000 years, leading to the development and use of a wide range of breeds under diverse production systems. Substantial technical changes occurred in animal breeding at the end of the eighteenth century, leading to breed development, establishment of herd books and formation of breeder societies. Major developments in quantitative genetics in the mid-twentieth century supported the introduction of science-based tools to estimate breeding value, such as the selection index, and later the best linear unbiased prediction (BLUP) and animal model, which resulted in enhanced selection response and genetic progress in pure-bred populations. The rapid development of molecular genetics enabled the introduction of marker-assisted selection. DNA sequencing helped to determine the genetic backgrounds of many production traits and other important traits in livestock species. Single nucleotide polymorphism (SNP) discovery and analysis led to the introduction of genomic selection. In the commercial production of meat and eggs, science-based cross-breeding methods and selection towards enhanced heterosis were introduced to enhance the yield and profitability of livestock production. Dissemination of genetic progress accelerated with the introduction of biotechnology and reproduction technologies, in particular artificial insemination.

In general, two major processes led to breed development. The first relied on adaptation of livestock populations to specific environmental and husbandry conditions within extensive and mixed production systems. This resulted in the formation of many local breeds worldwide. The second major process was based on the selection of animals for their ability to yield specific products, especially under improved nutrition and management conditions. This led to the development of highly performing, international breeds for commercial production.

Animal genetic resources for food and agriculture (AnGR) are used by a wide range of stakeholders and the level of concentration and specialization of breeding activities is quite variable within the sector both at species and regional levels. Traditionally, the management of AnGR and breeding lies in the hands of livestock keepers who combine breeding and production functions within the same populations. This can be done at a fairly local scale, selecting the animals to form the next generation from locally available herds and flocks, or at a regional or national scale by forming a common breeding population through breeding associations or herd book societies. In recent decades, a highly specialized breeding sector has developed for some livestock species and in some regions of the world. In the poultry sector in particular, relatively high reproduction rates and other biological features have enabled a large-scale breeding industry to enhance genetic improvement and the supply of birds of high genetic potential to producers. Similar structures are present in the pig sector, although to a lesser extent, and also emerging in the dairy sector.

¹⁴ CGRFA/TITLE-ABS-1/14/Inf.2; CGRFA/TITLE-ABS-1/14/Inf.3.

¹⁵ CGRFA-15/15/Report, paragraph 22.

¹⁶ C 2015/REP, paragraph 52.

Only about 40 species are used in livestock production, with some of them making a rather small contribution to total food production. The “big five” species – cattle, pig, sheep, goat and chicken – provide the majority of animal-origin food products. The role of wild relatives of domesticated species in livestock breeding is currently negligible.

Since the 1980s, the livestock sector has been under severe pressure to enhance total contributions to food production. The driving force of this phenomenon, termed the Livestock Revolution,¹⁷ was the growing demand for animal-origin products and the increase of intensive commercial production in developing countries. Between 1980 and 2014, global meat and milk production increased by 234 percent and 170 percent, respectively. The Livestock Revolution resulted in a significant shift of livestock production from temperate zones to the tropics and subtropics. The production increase was fostered by importation of highly selected genetics, while in many cases native breeds were not improved through national breeding programmes.

FAO estimates¹⁸ show that in order to feed 9.1 billion people in 2050, annual cereal production will need to rise to about 3 billion tonnes and annual meat production will need to reach 470 million tonnes if the current trends in consumption continue.

While animals are mainly used for food production and other provisioning services (e.g. fibres, pelts and traction), it is important to underline the fact that they also provide regulatory and supporting ecosystem services (e.g. nutrient recycling and weed control) in a diverse range of agroecosystems. They also have important cultural values (e.g. identity, wealth and status, recreation and sports), which tend to be especially important in extensive and mixed production systems.

Aquatic genetic resources



Aquaculture is a relatively new industry, with major developments having occurred in the last 60 years, although there are some forms such as carp farming that can be traced back thousands of years. The growth rate of aquaculture has been 8–10 percent per annum for the last 20 years, and today 50 percent of finfish consumed are farmed. Farmed fish production now exceeds beef production worldwide. While aquaculture in marine and coastal areas is gaining importance, the overwhelming majority of global aquaculture production is still from inland areas.

Two parallel approaches are taken to satisfy consumer demand and increase food supply: domestication of new species and effective genetic management and genetic improvement of species that are already produced commercially. The number of species items registered with production data by FAO grew from 70 in 1950 to almost 600 in 2018. Some of the most commonly farmed species are salmonids, tilapias, carps, oysters and shrimp, representing three major taxonomic groups: finfish, bivalve shellfish and decapod crustaceans.

Genetic improvement of domesticated fish is still nascent, but the rapid development of the industry is increasingly dependent on the use and exchange of aquatic genetic resources for food and agriculture (AqGR). Different kinds of genetic technologies are used to improve production, including captive breeding, selective breeding, hybridization and chromosome set manipulation. Genetic modification has been used only to a very limited extent. Since aquaculture and genetic improvement of AqGR is such a new undertaking, many farmed species are genetically very close to their wild relatives. Thus, the wild type, i.e. the non-domesticated and non-genetically improved type, continues to play an important role in aquaculture production and breeding. In some cases,

¹⁷ See Delgado, C.H., Rosegrant, M., Steinfeld, H., Ehui, S. & Courbois, C. 1999. *Livestock to 2020. The next food revolution*. IFPRI Food, Agriculture, and the Environment Discussion Paper 28. Washington, DC, International Food Policy Research Institute.

¹⁸ FAO. 2009. *How to feed the world in 2050*. Rome (available at http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf).

these stocks may be in a poor conservation status. The reliance on the wild type in aquaculture thereby provides an incentive to conserve these species and their habitats.

An exception to the continued need for wild species for aquaculture production is the production of some of the species most commonly farmed in industrialized agriculture, such as Atlantic salmon and white-leg shrimp. For these, the need for genetic infusion from the wild has been nearly eliminated, and genetic improvements take place through breeding programmes and exchanges between commercial breeders.

The main source of genetically improved AqGR for aquaculture of these species is large commercial farms or breeding centres. In aquaculture, small farmers have not had the opportunity to domesticate and genetically improve species for thousands of years as has happened in terrestrial crop and livestock production. The recent rapid developments in genetic improvement, in particular in the case of salmon and shrimp, have relied on funding, technology and access to improved AqGR, and are often in the hands of larger businesses. Genebanks for AqGR are still scarce, and publicly financed genebanks are generally available only for a few of the most commonly used species in aquaculture.

Aquaculture has a high number of stakeholders along the supply chain from genetic improvement to farming and the sale of products, ranging from smallholder producers to large-scale companies. While AqGR are primarily used for food production, they are also used for other purposes, for example in the production of fish and other animals to be released into natural or modified waters for restocking and stock enhancement, as bait fish for both commercial and recreational fisheries and in the farming of ornamental fish.

Forest genetic resources



The exploration, assessment and movement of forest reproductive material have a long history in the forest sector.¹⁹ Early provenance trials revealed the existence of “geographical races” within tree species and also that the initial origin of the seed has a major influence on the survival and performance of tree planting efforts. Numerous international provenance trials have been established for many tree species to test the performance of tree germplasm from different countries/regions. Subsequently, the results of these provenance trials have had a large influence on the demand for seed from certain sources as compared to others and were a reason for many germplasm transfers between countries and regions. Provenance trials have also provided incentives for the conservation of forest genetic resources (FGR). Provenance testing is not complete in all species and all countries.

One of the main uses of FGR is direct use as reproductive material (in the form of seeds, cuttings and other propagating parts of a tree) for reforestation, afforestation or establishment of agroforestry systems. The extent to which FGR are used in systematic exploration and breeding programmes varies greatly among different tree species. Systematic exploration and improvement started some 50 years ago for several fast-growing tree species used in plantation forestry (e.g. pines, acacias, eucalypts) in industrial and smallholder plantings. For various temperate and boreal tree species, exploration and assessment efforts started more than 200 years ago, although more systematic improvement programmes were initiated in the course of the twentieth century. More recently, tree breeding has begun to encompass a range of biotechnological techniques, including marker-assisted breeding.

For the majority of other tree species, improvement efforts still remain limited and are mostly restricted to provenance trials and the selection of seed stands. In general, forest-tree breeding is limited by long generation intervals and breeding cycles, such that most species are still within the first generations of genetic improvement. However, genetic gains per generation can be quite

¹⁹ This section draws on Background Study Papers No. 44 & 59.

substantial due to the fact that forest tree species are undomesticated and have high levels of genetic diversity that provide the opportunity for high selection intensity. Some species, such as tropical eucalypts, acacias and some pines, are progressing relatively rapidly because of shorter generation intervals (typically less than ten years) and early-selection techniques. The genepools of tree species in breeding programmes can have large effective population sizes and often have highly fragmented populations. According to the level of improvement involved, reproductive material of forest tree species may be obtained from a wide variety of sources. For example, the collection of seeds from wild stands and natural populations for mass propagation of plantations or forest regeneration is still common. Additionally, seed orchards, special facilities associated with organized breeding programmes, are managed specifically for seed production. The genetic material produced in these orchards has usually been tested and selected in trials across different sites and climatic conditions, and may be optimized for specific commercial traits, such as wood volume, pulp yield, biomass yield or leaf oils. Large-scale nurseries producing tree seedlings and/or cuttings are often managed by large companies or state agencies, but small-scale nurseries operated by farmers and local communities are often the main source of tree seedlings in rural areas, especially in areas where no commercial forestry is practised.

Some *ex situ* collections of FGR have been established for conservation and research purposes and are usually managed by public or semi-public research institutions. While the movement of FGR around the world has a long history and the proportion of exotic forest reproductive material used for plantation and afforestation is quite high, considerable differences exist between species with regard to their involvement in international exchange of germplasm and the extent to which they have spread outside their natural distribution ranges. For example, several fast-growing plantation species, such as acacias, pines and eucalypts, have been moved extensively throughout the world and are now cultivated far beyond their natural distribution ranges. Also, some tropical high-value specialty timber species, such as mahogany, Spanish cedar and teak, are grown as exotics in many countries.

Although the exchange of some species, such as agroforestry tree species, may have taken place on a smaller scale, their distribution to countries beyond their native ranges has played an important role in the development of the sector. However, for many species, exchange of genetic material has been limited to date and takes place mainly at a regional level or between countries sharing the same climatic conditions. Various species are also used largely within their natural habitats in native forests and are only exchanged very occasionally, for example for specific research purposes.

In all these cases, it should be noted that the capture of any economic value takes time. Unlike most agronomic crops, trees must be grown for many years before they can be harvested for food or fibre. Often the economic benefits arising from the transfer of genetic material are hard to determine as they have to do with forest health and other ecosystem goods and services.

Aspects of FGR to consider when dealing with access and benefit-sharing²⁰:

- FGR are often undomesticated species and populations.
- Forest species migrate on their own (albeit slowly) and do not recognize borders.
- There is a long history of moving species around the world. Many plantation programmes depend on exotic species (e.g. *Pinus*, *Eucalyptus*, *Gmelina*).
- Many of the benefits derived from forests are “ecosystem services” and are difficult to value. Unlike production crops, it is difficult to put a monetary value on what may come from a breeding or restoration programme.
- The benefits derived from tree breeding take decades to realize. Breeding intervals range from 10 to 15 years, plantation ages can range from 8 to 40 years. A temperate forest tree breeding programme would need close to 35 years to see any real economic value from a

²⁰ CGRFA/WG-FGR-3/14/Report, Appendix D.

material transfer (maybe less if the seed could be sold for increased value, but the economic benefit is not well documented).

- Unlike agricultural crops, a forest does not generally produce a new crop every year; however, there is a growing number of high value non-timber forest products (including fruit, seed and leaf material) that can contribute to food security.
- Disease resistance is a key trait for which exotic germplasm is often needed. Aspects to consider include:
 - o sometimes the benefits are simply the establishment of a healthy forest, with no plans for harvest in some cases;
 - o often the disease for which resistance is sought through breeding programmes originates from the same region as the germplasm (i.e. the problem originated from the source of the resistance).

Plant genetic resources



PGRFA have been used and exchanged since the beginnings of agriculture, some 10 000 years ago. Farmers and farming communities have planted, selected and exchanged seeds and vegetative propagating material, and a combination of natural and artificial selection has domesticated plant species and adapted them to the changing needs of farming and consumption. Migration, trade and colonization spread many species beyond their regions of origin, which spurred further selective pressures. Since the mid-nineteenth century, professional seed suppliers, followed by specialized plant breeders and biotechnologists, have developed advanced methods for selecting PGRFA at the phenotypic, genotypic and molecular levels to further shape crops and contribute to advanced agricultural systems and the production and supply of agricultural products and cultivars with distinctive characteristics.

PGRFA are maintained *in situ*, on-farm and *ex situ*. A considerable amount of crop genetic diversity is held in farmers' fields and in the breeding pools of specialized plant breeders. Many wild relatives of today's crops are conserved in protected areas or within agricultural ecosystems. In addition, much of the diversity originally found *in situ* has been collected and stored in *ex situ* facilities. The establishment of these collections was initiated at the end of the nineteenth century by plant breeders and associated research concerned about the loss of genetic diversity. They are mainly held by public genebanks at national level and by international research centres, with some of the most relevant collections being managed by the centres of the Consultative Group on International Agricultural Research (CGIAR). Overall, it is estimated that approximately 7 million accessions of PGRFA are stored *ex situ*, and these collections play an important role in the functioning of the sector. Apart from the public genebanks, PGRFA are also held *ex situ* in the breeding collections of a variety of entities including private individuals, universities and private companies. However, the extent of these private collections is mostly unknown and the stored genetic material may not be publicly available.

The sector using PGRFA for breeding purposes is quite diverse and its organization is highly dependent on the crops bred and on the geographic area and type of user group targeted. Large private corporations increasingly dominate the commercial seed market for some of the major and high-value crops, such as maize and major vegetables. Medium- and smaller-sized breeding companies continue to operate, including in smaller seed markets for commercially less attractive crops, such as some self-pollinating crops, for example wheat and oats. Public-sector institutions at national and international levels continue to play a major and important role in breeding and variety development, both for crops not served sufficiently by the private sector, such as cassava, rice, sorghum, chickpea, groundnut, wheat and barley, and for crops grown in marginal environments or by resource-poor farmers who are not likely to be reached by the commercial sector, such as yams, sweet potato, edible aroid, pigeon pea, cowpeas, pearl millet and finger millet. At the level of research for breeding, including rather fundamental research as well as pre-breeding, both large and small biotechnology companies, sometimes integrated with plant breeding and seed production, and

universities are the main players. Other users of PGRFA for breeding include farmer groups and civil society organizations supporting them. They may contribute to the reintroduction of PGRFA from genebanks into farming systems, sometimes combined with participatory plant breeding or participatory variety selection activities involving both farmers and trained breeders.

Different types of PGRFA may be used in plant breeding and cultivar development. The development of new cultivars is usually based upon the use of advanced genetic material, as it is a costly and time-consuming process to bring less-advanced material to the same performance levels. However, old cultivars, landraces and crop wild relatives may be used to introduce particular traits into breeding populations. The genetic diversity contained in landraces and traditional cultivars may also be used for base-broadening activities and for the development of cultivars adapted to less-favourable environmental conditions and low-input production systems.

Historically, crops and PGRFA have been widely exchanged throughout the world, and many people in many different places have contributed in one way or another to the development of today's crop genetic diversity. As a consequence, an important part of current crop production relies on the use of introduced genetic resources and all countries depend to some extent on genetic diversity that originated elsewhere.

The current international flow of PGRFA takes place in many different forms, for example, through the exchange of germplasm samples from *ex situ* collections, through the sale of commercial seed and vegetative propagating material, and through transfers within companies or as part of international breeding nurseries with material under development. The international exchange of genebank accessions amounts to several tens of thousands of transfers annually and plays an important role in conservation, research and development, both in developing and developed countries. At the same time, it has to be noted that the majority of genetic material used directly in breeding and variety development comes from the breeding pools within one region and new "exotic" material is only occasionally accessed.

The modalities for the exchange of PGRFA depend on the crop in question and on the type of exchange partners. Generally speaking, the trend is towards more-formalized exchange practices, mainly through material transfer agreements (MTAs). Transfers of germplasm samples from genebanks are, for instance, increasingly regulated by MTAs. Contracting Parties to the Treaty have agreed to use a standard contract, the SMTA, for each transfer of material falling under the coverage of the MLS under the Treaty.

The MLS includes "all PGRFA listed in Annex I of the Treaty [64 crops and forages] that are under the management and control of the Contracting Parties and in the public domain" (Article 11.2). It includes such PGRFA voluntarily included by natural and legal persons. All PGRFA under the MLS are made available with the SMTA. PGRFA held by the International Agricultural Research Centres of the CGIAR and other international organizations under Article 15 are made available under the terms and conditions of the MLS. Many genebanks voluntarily provide access to their collections using the same terms and conditions regardless of whether their accessions are listed in Annex I of the Treaty or not. Exchange among commercial breeders is free (in the case of the use of commercial cultivars for further breeding) or regulated by commercial material transfer agreements. Exchange among farmers is limited by distance and social factors, but is generally free.

Micro-organism and invertebrate genetic resources



Micro-organism and invertebrate genetic resources (MIGR) have been used as food and as tools in agricultural production for millennia.

*Micro-organism genetic resources*²¹

The number of micro-organism genetic resources (MoGR) currently used for food or agricultural applications is small relative to the huge number of species potentially useful, in part because of technical limitations to the culturing of many living micro-organisms. Agricultural applications of MoGR are nevertheless quite diverse: soil fertility improvement and plant growth promoting agents; biological control; beneficial symbiosis in the digestive tracts of livestock; production of chemicals of direct benefit to agriculture; catalysts in agro-industrial processes; and understanding and surveillance of microbial plant and animal (including fish) pathogens. Food applications are also quite varied: traditional or industrial fermentation; dairy production; probiotics; feed additives; production of chemicals of benefit to food production, including vitamins and organic acids; environmental damage remediation and purification of soils and water; and understanding and surveillance of health-hazardous micro-organisms, such as food toxins and food-borne pathogens.

Use of MoGR is mainly carried out by screening large quantities of naturally occurring micro-organisms or microbial resources conserved in purified form in *ex situ* collections. Synthetic biology may involve genetic improvement, but this remains a marginal phenomenon although it may grow in the future.

Microbial culture collections (MCCs) are at the heart of the sector. All known culture collections with major holdings in food and agriculture belong to the public sector or are non-profit organizations with major governmental funding. They fulfil several objectives: procurement of cultures and *ex situ* conservation of micro-organisms; provision of authentic microbial cultures to industries and academic and research institutes; provision of identification, freeze-drying and other microbiology-related services; depository of cultures deposited for patent purposes; and research on microbial diversity, taxonomy and related areas. Many large MCCs are situated in OECD countries. Many countries are actively involved in collecting and exchanging micro-organisms internationally, and microbial collections from non-OECD countries represent an important and growing subset in the overall network of culture collections. MoGR currently used in agriculture and food systems have been collected both from tropical and subtropical species-rich agro-ecosystems and from non-tropical areas.²²

Because each MCC contains an important set of unique strains (an average of 40 percent of the strains in each collection are unique), collaboration and exchange among MCCs is common.²³ These exchanges, as well as flows from *in situ* to *ex situ*, occur in all geographical directions. Whereas historically these exchanges were quite informal, there has been a noticeable evolution towards formalization in recent decades.²⁴ In particular, MCCs are moving increasingly towards the use of legal instruments: acquisition agreements when acquiring materials and MTAs when distributing them. Some important limitations, especially on further distribution to third parties, generally apply even for non-commercial research purposes, mainly for quality-management purposes and to address biosecurity issues. When commercial development is involved, additional agreements with the MCC, the initial depositor and/or the country of origin may be required, with the general understanding that recipients of materials have the responsibility to take all steps necessary for compliance with ABS measures as they may apply to the material, including with regard to prior

²¹ This section draws on Background Study Paper No. 59, p.9–10.

²² Background Study Paper No. 46, chapter II.

²³ Background Study Paper No. 46, chapter II.

²⁴ Background Study Paper No. 46, chapter II.

informed consent from the country of origin. Exchange between qualified MCCs may involve simplified procedures. Both OECD and non-OECD collections include clauses related to legitimate/legal exchange in their MTAs, which allow public culture collections that comply with strict quality-management criteria to further distribute microbial research material that they have received from other public MCCs (so-called legitimate exchange). The European Biological Resource Centres Network (EBRCN) and the Asian Consortium of Microbiological Resources (ACM) are making efforts to make the cultures available within the networks with few restrictions. However, in response to growing commercial opportunities and to financial restrictions on government spending on culture collections in some countries in the 1990s, this club model is threatened. Some MCCs have departed from the sharing and collaborating practices and have introduced restrictive MTAs even for exchange between MCCs.²⁵

The culture collection community has developed a distinct body of codes of conduct, standards for best practices and model documents addressing specific aspects of access and benefit-sharing.²⁶

*Invertebrate genetic resources used for biological control*²⁷

Invertebrates play a key role in agricultural systems. They participate in essential soil processes, provide biological control (BC) of crop pests, are used for silk, food or feed production or provide pollination from which many of the world's most important crops benefit in terms of yield and/or quality.²⁸

These Explanatory Notes consider under the term invertebrate genetic resources (InGR) primarily invertebrate BC agents. Invertebrate pollinators are covered by the notes relating to animal genetic resources. Aquatic invertebrates used for food are covered by the notes relating to aquatic genetic resources. InGR used for other purposes of relevance in agriculture could be addressed in future work.

The BC of pests plays an important role in integrated pest management approaches in the food and agriculture sector. It is based on the use of natural enemies of pests, often referred to as BC agents. These are predators, parasitoids of invertebrate pests, entomopathogenic nematodes, and herbivores that attack weeds.

There are two main categories of BC. Classical BC is the introduction of one or more BC agents, usually from a pest's area of origin, to control the pest in an area it has invaded. Once introduced, the BC agent becomes established, reproduces and spreads. The BC agent then continues to have its effect on the target pest without the need for any further interventions. Augmentative BC involves the production and release of BC agents – indigenous or exotic – into specific crop situations, where they control the target pest, but are not expected to persist from one cropping cycle to the next.²⁹

The research and development process leading to the use of a new BC agent involves various steps that require access to genetic resources. The largest number of exchanges of genetic material takes place in the early stages of research and development, when it is necessary to study the target pest and its natural enemies. Preliminary surveys of the target pest and its natural enemies will often need to be carried out in several countries, and specimens of pests and natural enemies normally need to be exported for identification and taxonomic studies. Detailed studies on natural enemies to assess their potential as BC agents can, in part, be carried out in the source country, while host-specificity studies involving plants or animals not naturally occurring in the source country are best carried out

²⁵ Background Study Paper No. 46, chapter II.

²⁶ For an overview: McCluskey, K., *et al.* 2017. The U.S. Culture Collection Network responding to the requirements of the Nagoya Protocol on Access and Benefit Sharing. *mBio* 8, Table 1. DOI: 10.1128/mBio.00982-17.

²⁷ This chapter draws on Background Study Paper. No. 59, p. 9–12.

²⁸ Cock, M.J.W., *et al.* 2012. The positive contribution of invertebrates to sustainable agriculture and food security. *CAB Reviews*. 7(043): 1–27. DOI: 10.1079/PAVSNNR20127043.

²⁹ Background Study Paper No. 47.

in quarantine in the target country or in a third country. Overall, only a small fraction of all the species found and studied will actually be recommended for use and released as BC agents. Once a specific BC agent has been identified and is being applied for BC purposes, there is little need for further exchange of genetic material.³⁰

The type of genetic material used in BC consists primarily of living organisms used as BC agents. Organisms are mostly collected *in situ* and exported as live specimens. Product development does not normally include genetic improvement of the BC agent as such. Usually, at most, it entails discrimination between populations in terms of biological characteristics that affect their adaptation to the target country or target pest. As a consequence most of the genetic diversity used in BC can be regarded as wild.

A particular feature of classical BC is the public good nature of its activities. As classical BC agents establish and reproduce themselves in the target environment and from that point on are freely available, it is not possible to make continuous profit from their production and release. Consequently, classical BC is run by the public sector, mainly through national and international research institutions paid by governments or development agencies. Augmentative BC, in turn, is a relatively recently developed activity. The history of commercial mass production and sale of natural enemies spans less than 50 years. It is carried out by a relatively small number of companies worldwide, of which most are located in developed countries and the majority are medium- or small-sized. Even though augmentative BC agents are mainly produced for high-value crops such as greenhouse vegetables and ornamentals, the average profit margin is usually quite low. While the development of rearing, distribution and release methods is mainly carried out by commercial producers, public research institutions and universities sometimes play an important role in the early stages of research and development.

The international exchange of genetic resources relevant for BC plays a critical role in the functioning of the sector. The introduction of BC agents especially in classical BC, is often linked to the use of exotic genetic material, as it follows the movement of target crops and pests around the world. In fact, the great majority of classical BC transfers are intercontinental, which is to be expected as the target pests are themselves introduced species, often of intercontinental origin. Once a BC agent has been used successfully in one country, the opportunity is often taken to repeat the success in other countries through redistribution of the agent. Consequently, the international flow of genetic resources related to BC has been quite significant, involving several thousand BC-agent species from more than a hundred countries, and introductions into an even higher number of countries.³¹

As the BC sector is composed of a small number of actors, exchanges of genetic material have essentially been regulated through informal means, mainly by professional networks, which may be institutionalized or simply operate at a personal level. However, the informal character of exchange practices does not necessarily mean that no terms and conditions apply. Established “customary” practices for use and exchange may, for example, foresee the sharing of results obtained from the use of the material or, in the case of research, the joint publication of results. In addition, in the augmentative BC sector, exchange practices are also regulated through classical commercial practices such as licensing production (i.e. larger augmentative BC companies license production to smaller companies as a way of facilitating the establishment of new companies in new countries to supply new markets).³²

³⁰ Background Study Paper No. 47.

³¹ Background Study Paper No. 47.

³² Background Study Paper No. 47.

2. OBJECTIVE OF THIS DOCUMENT

14. The overall objective of this document is to assist governments considering developing, adapting or implementing legislative, administrative or policy measures for ABS to take into account the importance of GRFA, their special role for food security and the distinctive features of the different subsectors of GRFA, while complying, as applicable, with international ABS instruments.

3. CONSIDERATIONS FOR DEVELOPING, ADAPTING OR IMPLEMENTING ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE

15. In developing, adapting or implementing ABS measures addressing GRFA, governments may wish to consider taking the following steps:

I. Assessment of the concerned subsectors of GRFA, including their activities, socio-economic environments and use and exchange practices

a. Distinctive features of GRFA

As a first step, governments may wish to analyse the distinctive features of the subsectors of GRFA as they present themselves in their countries. Attempts to identify the distinctive features of agricultural biodiversity were made by the fifth meeting of the Conference of the Parties of the CBD³³ and by the Commission at its Fourteenth Regular Session.³⁴ Both bodies stressed: the essential role of GRFA for food security; the dependence of many GRFA on human intervention or influence; the high degree of interdependence between countries for GRFA; the fact that many GRFA have been shaped, developed, diversified and conserved through human activities and practices over generations; the relevance of *ex situ* conservation, to varying degrees depending on the subsector of the GRFA; the relevance of *in situ* conservation to the conservation of all GRFA to maintain a dynamic portfolio of agricultural biodiversity.

b. Different forms of utilization of subsectors and variations within subsectors of GRFA

Governments may also wish to take into account the different forms and existing practices in which the different subsectors of GRFA make use of GRFA.



Tree breeding is sometimes carried out by cooperatives that pool the resources of collaborators through joint breeding programmes. Governments may wish to reflect this common *modus operandi* of modern tree breeding in their ABS measures with a view to encouraging and supporting through them the pooling of FGR and facilitating the sharing of benefits arising from their utilization, including through cooperation agreements that go beyond ABS.

c. Legal, policy and administrative measures, including existing practices

Some subsectors of GRFA have developed specific practices for the use and exchange of genetic resources for research and development purposes; others, such as PGRFA falling under the Treaty's Multilateral System of Access and Benefit-sharing (MLS), are covered by specific administrative or sometimes even legal measures.



The Treaty covers all PGRFA. Its MLS also covers a few tree crops (apple [*Malus*]; breadfruit [*Artocarpus*]; citrus [incl. *Poncirus* and *Fortunella* as root stock]; coconut [*Cocos*]) and some forages that are woody plant species. Under the Treaty, access to these genetic resources shall be provided pursuant to a SMTA for the purpose of utilization and conservation for research, breeding and training for

³³ COP 5 Decision V/5, *Appendix*, paragraph 2.

³⁴ CGRFA-14/13/Report, *Appendix E*.

food and agriculture, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed industrial uses.³⁵

Analysing existing commercial and research practices, as well as regulatory measures addressing the use and exchange of GRFA for research and development, will assist governments in the preparation of ABS measures that make use of and are in line with existing practices and thus avoid, to the extent possible and appropriate, the creation of additional administrative procedures. Governments may also wish to take into account the national legal framework of relevance to the implementation of ABS provisions, including property law, contract law and other laws, as applicable.

d. Possible implications of the scope, including subject-matter and temporal scope, of ABS measures

Governments may wish to analyse in some detail the implications of the scope, including the subject-matter and the temporal scope, of their ABS measures. With regard to the temporal scope of ABS measures, governments may wish to consider, in particular, the implications of applying ABS measures to materials originating from other countries that have been collected prior to the entry into force of their ABS measures.

e. Flows of germplasm, including international flows, within the different subsectors

The extent of the historical and current exchange of germplasm and the proportion of exotic diversity used vary between the subsectors of GRFA. While animal and plant genetic resources have extensively been exchanged, in other subsectors this may not be the case. While some of the most relevant species have been moved extensively throughout the world, others are just starting to be farmed in aquaculture or are only used within their natural habitats in native forests for the time being, and their exchange has been limited so far. In developing, adapting or implementing ABS measures, governments may wish to consider carefully the relevance of germplasm flows for the subsectors relevant to food and agriculture in their countries and possible future changes of germplasm flows due to climate change.



AnGR are widely exchanged throughout the world with well-established protocols and markets for exchange. Livestock keepers and breeders in many parts of the world have contributed to the development of these breeds, and today livestock production in most regions depends on AnGR that originated or were developed elsewhere. Currently, major flows of germplasm in the commercially most relevant species take place between developed countries or from developed to developing countries. Genetic material of some breeds adapted to tropical and subtropical environmental conditions is exchanged from developed to developing and among developing countries. In contrast to the commercially relevant breeds that are widely exchanged, most breeds are used locally and are not involved in international exchange. This may change, as traits needed to respond to future challenges of livestock production may be found in locally adapted breeds. This may not only increase the exchange of AnGR overall but could possibly in the future also lead to some flow of germplasm from developing to developed countries.

The need to adapt livestock production to future challenges also highlights the importance of effectively conserving the full range of existing diversity, *in situ* and/or *ex situ*. Genetic diversity can be lost both at the level of breeds, when local breeds fall out of use and hence risk extinction, and at the within-breed level, when the effective population size of widely used breeds becomes too small because of the extensive use of a limited number of sires or parent animals.

³⁵ Treaty, Article 12.3(a).



Aquaculture is an important and expanding industry in both developing and developed countries. The flows of germplasm go in all directions: South–North, North–South, South–South and North–North.

Chile, for example, is the second largest producer of farmed salmon although salmon does not occur naturally in the southern hemisphere. African tilapia is mainly produced in Asia, and the Pacific oyster, which is the basis for the oyster industry both in North America and Europe, was introduced from Japan. Due to the growing number of species being domesticated, international exchanges of AqGR are expected to increase in numbers and quantity.



Global transfers of forest genetic resources have been a common practice for centuries.³⁶ They have been used to grow trees for various purposes, including the production of wood and non-wood products, the restoration of forests or watershed management.

Acacia seeds from Asia and Oceania were exported to southern Africa. *Eucalyptus camaldulensis* and *Eucalyptus globulus* were introduced from Australia to 91 and 37 other countries, respectively.³⁷ *Theobroma cacao* was introduced from the neotropics to tropical regions of Africa and Asia beginning in the sixteenth century. In several countries, provenance trials of many tree species were established during the last century with seeds originating from other countries. Although in more recent times the documentation of germplasm transfer of agroforestry trees has improved, much information, especially on the origin of provenances, is still unknown.



Today, the agriculture of virtually all countries is heavily dependent on supply of PGRFA from other parts of the world. Crops such as cassava, maize, groundnut and beans, which originated in Latin America but have become staple food crops in many countries in Africa south of the Sahara, demonstrate the interdependence of crop species between developing countries; the same applies for vegetables, for example tomatoes. Even though many countries hold a significant amount of plant genetic diversity for food and agriculture in their genebanks and farmers' fields, in the long term, they are likely to require access to additional diversity from the crop species' centres of diversity or cultivars bred elsewhere. There is a continued need for exchange of plant genetic resources therefore.



Micro-organism genetic resources

Most micro-organisms can easily be spread by host organisms, by wind or water, or attached to any organic material. However, the “ubiquity” of micro-organisms does not mean that every strain can be found everywhere. There is growing recognition that micro-organism can exhibit biogeographical patterns in spite of their widespread availability. This means that certain micro-organisms are only available in specific habitats and cannot be found elsewhere.³⁸

Besides this interdependence in access to *in situ* MoGR, there is interdependence with regard to material stored *ex situ* in MCCs. The largest MCC, with approximately 25 000 strains, holds less than 2 percent of the total number of strain holdings in the collections united under the World Federation of Culture Collections (WFCC) and only an estimated 1.5 percent of

³⁶ Background Study Paper No. 44.

³⁷ CAB International, 2014. Forestry Compendium, Wallingford, UK.

³⁸ Background Study Paper No. 46.

the total biodiversity of unique strain holdings in the WFCC. Many collections have specialized in various areas of microbial research and it is this specialization and the resulting creation of internationally recognized reference culture collections used and referred to in most follow-up research that has led to close international collaboration and exchange of materials and, thus, to a situation that has been considered “*functional interdependency in access to ex situ strains on a global scale*.”³⁹

Invertebrate genetic resources for biological control

Similarly, throughout the history of BC, BC agents that proved effective in one country have been forwarded to other countries affected by the same pest problem. The international exchange of genetic resources relevant for BC thus plays a critical role in the functioning of the BC sector. The great majority of classical BC transfers are intercontinental, which is to be expected as the target pests are themselves introduced species, often of invasive alien species. The international flow of genetic resources related to BC has therefore been quite significant, involving several thousand BC agent species from more than a hundred countries, and introductions into an even higher number of countries.⁴⁰

f. Possible gaps in ABS measures

In reviewing existing ABS measures, governments may wish to identify any gaps with regard to GRFA or related activities and determine the need for additional regulatory measures. Similarly, governments may wish to identify GRFA or related activities that may merit exclusion or modified measures.

II. Identification and consultation of relevant governmental entities and non-governmental stakeholders holding, providing or using GRFA

In the development, adaptation or review of ABS measures, governments may wish to identify and consult relevant governmental and non-governmental stakeholders, providing or utilizing GRFA, including farmers and indigenous and local communities, gene banks and collections, research institutions and private-sector entities. It is particularly important to consult government entities responsible for different subsectors of GRFA. The purpose of such consultations may be manifold, as they may: help raise awareness among stakeholders; allow policy- and decision-makers to get an insight into the specificities of the different subsectors of GRFA and the existing practices of using and exchanging genetic resources; inform potential users and providers of traditional knowledge associated with genetic resources and of genetic resources that are held by indigenous and local communities about their rights and obligations; help facilitate the implementation of future ABS measures.



The competent national authority for ABS will often not be the national authority that is responsible for livestock and animal breeding or animal health and, therefore, it may benefit from direct consultations with relevant governmental authorities and stakeholders.

The livestock sector is characterized by a wide range of stakeholders, including individual livestock keepers and breeders, pastoralists and their associations, breeding and herd book associations, the breeding industry, breeding and research centres, conservation farms and facilities, genebanks, universities, researchers, extension and veterinary services, non-governmental organizations (NGOs), and relevant regulatory national authorities. All these stakeholders should be consulted in the development and implementation of ABS for AnGR. Their involvement will be important to allow ABS policy-makers and regulators to gain insight into the specificities of livestock research and development and existing use and

³⁹ Background Study Paper No. 46, p. 32.

⁴⁰ Background Study Paper No. 47, Annex I.

exchange practices of the subsector in order to avoid regulatory restrictions that unnecessarily impede the use, development and conservation of AnGR and disrupt established AnGR exchange practices.



The national competent authority for ABS will often not be the national authority that is responsible for aquaculture/fisheries. As most stakeholders in aquaculture have limited knowledge of ABS and the implications of ABS for their sector, consultations could help to raise the awareness of the subsector and allow policy- and decision-makers to get an insight into the specificities of aquaculture research and development and existing use and exchange practices of the subsector.



The national competent authority for ABS will often not be the authority that is responsible for the forest sector. As most stakeholders in the forest sector have limited knowledge of ABS and the implications of ABS for their sector, consultations could help to raise the awareness among stakeholders and allow policy- and decision-makers to get an insight into the specificities of forest research and development and existing use and exchange practices of the subsector.



Responsibility for the Treaty may often lie with the agriculture national authorities and responsibility for the Nagoya Protocol with environmental authorities. It is therefore possible that certain (uses of) of certain PGRFA fall in the competence of one authority, whereas (other uses of) other PGRFA fall in the competence of a different national authority. Direct consultations among relevant governmental entities and non-governmental stakeholders are therefore critical and should possibly also seek to clarify the allocation of responsibilities among different national competent authorities.



It is important to note that in most countries research and development on MIGR lies in the hands of very different stakeholders. These include academic researchers, the private sector, and business associations representing specific stakeholders. This subsector's stakeholder groups are highly diverse due to the diverse roles of MIGR in sustainable agriculture: for example as plant growth promoting agents; for biological control; in the digestive tracts of livestock; for the production of biopesticides of direct benefit to agriculture; as catalysts in agro-industrial processes; for understanding and surveillance of microbial plant and animal (including fish) pathogens; and environmental damage remediation and purification of soils and water. MoGR may also be used for food processing, such as traditional or industrial fermentation, the production of alcohols, dairy products, probiotics and feed additives; the production of biological components of benefit to food and feed production (vitamins, organic acids, enzymes, etc.) and understanding and surveillance of health-hazardous micro-organisms, such as food toxins and food-borne pathogens. MIGR are essential for important soil processes and provide BC of crop and animal (including fish) pests.

All these stakeholders should be consulted in the development and implementation of ABS for MIGR. Their involvement will be important to allow policy-makers and regulators to gain insight into the diversity and specificities of MIGR and related research and development activities. Existing use and exchange practices should be taken into account as well as best practices that are either already in use or have been proposed by stakeholders.

III. Integration of ABS measures with broader food security and sustainable agricultural development policies and strategies

ABS measures for GRFA may be considered in the wider context of sustainable agricultural development and food security. Not always will those responsible for ABS also be in charge of sustainable agricultural development and food security strategies. It is important to coordinate different policy areas and goals and integrate them into a broader and consistent agriculture strategy.



Farm animals play an important role in providing food, sustaining livelihoods and providing countries with a variety of economic outputs. In parts of the world that are non- or hardly arable, keeping farm animals is a necessity. Examples of livelihoods that depend solely on livestock keeping include reindeer herders in the tundra, yak herders in Asia's high-altitude zones, keepers of Bactrian camels and dromedaries in deserts and nomadic keepers of cattle, sheep and goats in semi-arid steppes and savannahs. Livestock may be especially important for poor people, who derive multiple benefits from their animals. Livestock contribute to the availability of food at the household level, both for direct consumption and for the supply of products and services that are sold to buy other types of food and goods. Livestock development provides opportunities to achieve poverty alleviation and enhance livelihoods in low-input production systems, for example through provision of environmental services and the further development of niche market products. At the same time, some livestock production systems use fodder that is suitable for human consumption. Moreover, they may also deplete natural resources such as water and land. Maintaining livestock diversity is crucial to efforts to cope with challenges related to climate change.

In many countries, ABS measures have been or are being developed as stand-alone legislation or policy. It is, however, important to develop ABS measures in harmony with related policies, such as agricultural-development or poverty-reduction strategies and other livestock policies, and to integrate them with these policies. It is likewise important to involve the livestock sector from the outset in the development and implementation of ABS measures to ensure that policy-makers have a full understanding of the domestic livestock sector, current flows of AnGR and potential implications of ABS measures for domestic livestock production. ABS measures for AnGR do not need to constitute stand-alone legislation. They can fall under various policies and regulations developed in other sectors.



Aquaculture is an adaptive and resilient farming practice that provides both direct and indirect benefits in terms of food security and poverty alleviation. In many developing countries, fish provide a significant source of high-quality animal protein and farmed fish is often traded and consumed locally. Besides, poverty can be reduced and food security increased through the economic activity that aquaculture brings to communities regardless of whether the fish is consumed locally. Both fish farming itself and the industry processing farmed fish may provide employment opportunities for large numbers of people in developing countries, including rural women. Thus, ABS measures for AqGR should form part of broader food-security considerations and relevant policies, including habitat policies.

While the rapid development of the aquaculture industry has meant that environmental, veterinary and sanitary regulation have not always followed suit, regulations are increasingly being introduced. This includes the regulation of introductions of AqGR from other countries and ecosystems. Such regulations, including legislative, administrative and policy measures as well as codes of practice could be used to address or could make reference to ABS for AqGR, with a view to reducing the bureaucratic burden and streamlining administrative procedures.



Trees have an important role in contributing to food security. They rarely provide a complete diet, but the supply of fruits, nuts and leaves is a crucial complement to agricultural production, especially during drought, famine, disasters and conflicts. Natural forests are also critical for the survival of forest dwellers, including many indigenous peoples. Forests provide key goods and services to the agricultural community in that they help deliver clean water to agricultural lands and provide habitats for pollinators. Farmers increase food security by retaining trees on agricultural land, by encouraging natural regeneration and by planting trees and other forest plants. For most of the year, herders in arid and semi-arid lands depend on trees as a source of fodder for their livestock. Thus, forests, trees and agroforestry systems contribute to food security and nutrition in many ways, even though such contributions are often poorly reflected in national development and food-security strategies. There is the potential to reduce poverty and increase food security through commercial forestry. Thus, ABS measures for FGR should form part of broader food-security considerations and relevant forestry policies.⁴¹

Forests provide various ecosystem services and FGR are important in both adaptation to and mitigation of climate change. Some traits related to adaptation, such as drought tolerance, are and will be of increasing importance, including for relevant selection and breeding programmes using local and exotic materials. In this context, marginal forest populations are especially important to the conservation and use of valuable FGR. Research on genetic diversity is crucial as it facilitates the identification and use of the most suitable materials in reforestation and restoration projects, contributing to the mitigation of climate change in the future.

The risk of spreading pests and diseases through transfer of tree germplasm is often considerable. Restricting the spread of these pests and diseases continues to be a major challenge and is the objective of phytosanitary measures. Such measures, as well as codes of practice, could make reference to ABS for FGR, with a view to reducing the bureaucratic burden and streamlining administrative procedures.



PGRFA play a key role in providing food, feed and fibre. They play multiple roles in helping ensure food security, for example producing more and better food for rural and urban consumers, providing healthy and more nutritious food, and enhancing income generation and rural development.

In many countries, ABS measures have been or are being developed as stand-alone legislation or policy. It is, however, important to develop ABS measures in harmony with other relevant policies, such as agricultural development or poverty reduction strategies, and to integrate them with these policies. It is likewise important to involve the plant-breeding and production sectors from the outset in the development and implementation of ABS measures to ensure that policy-makers have full understanding of the plant sector, exchanges of PGRFA and potential implications of ABS measures for plant production. Some countries have included ABS measures in laws on intellectual property rights by including requirements to disclose the origin of the material when applying for plant variety protection or patents.



In many countries ABS measures have been or are being developed as stand-alone legislation or policy. It is, however, important to develop ABS measures in harmony with related policies, such as regulatory frameworks for biological control, pesticides and food safety and policies, such as food security strategies, and to integrate them with these policies. The integration of approval procedures should,

⁴¹ See [Background Study Paper No. 44](#), p.21.

however, not lead to delays or unnecessary bureaucracy in the process of product development. It is likewise important to involve the different communities behind the various functional groups of MIGR from the outset in the development and implementation of ABS measures to ensure that policy-makers have a full understanding of the taxonomic complexity and multiplicity of functions of the sector, of its current use and exchange practices and of potential effects ABS measures may have on research and development of MIGR.

The International Plant Protection Convention (IPPC) has a broad overlap into biodiversity issues. The Glossary of phytosanitary terms defines pests as “[a]ny species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products” and defines plants as “[l]iving plants and parts thereof, including seeds and germplasm.”⁴² The IPPC obliges National Plant Protection Organizations to carry out surveillance of growing plants, including both areas under cultivation and wild flora for pests⁴³ with the object of reporting the occurrence, outbreak and spread of pests, and of controlling those pests.⁴⁴ ABS measures for MIGR should be aligned with obligations under the IPPC. Other regulatory frameworks in the biomedical and veterinary sectors are relevant to disease-causing micro-organisms and to invertebrates as vectors of diseases.

IV. Consideration and evaluation of options for ABS measures

Based on an assessment of the concerned subsectors of GRFA, including their activities, socio-economic environments and use and exchange practices, and following appropriate consultations with relevant stakeholders and consideration of different options for ABS measures, governments may wish to develop, adopt or implement their ABS measures.

V. Integration of implementation of ABS measures into the institutional landscape

ABS measures cut across different sectors of genetic resources and GRFA, which are often the responsibility of different ministries and competent authorities. Governments may wish to consider using the existing infrastructures of sectors and subsectors for the implementation of ABS measures rather than creating new and additional administrative layers. Using and adapting, as appropriate, existing structures, administrative procedures and sectoral practices may facilitate the smooth operationalization and implementation of ABS measures. It is important to minimize the transaction costs for providers and users of implementing and complying with any ABS measures.



Existing arrangements for forest governance could be used for the implementation of ABS measures for FGR. Examination of existing and past practices demonstrates that the implementation of ABS measures differs widely by country and by entity within a country. In some countries, a central authority may oversee the implementation of ABS measures and the ABS competence for FGR could be delegated to the national forest agency or forest research institute, given its expertise, its knowledge of stakeholders and its responsibility for the implementation of other FGR-related rules or regulations. In other countries, the authority is not centralized and the ABS measures vary widely from the use of phytosanitary certificates only to official agreement on terms of benefit.

⁴² Glossary of phytosanitary terms. ISPM 5.

⁴³ IPPC Convention, Article IV.2.

⁴⁴ IPPC Convention, Article VIII.1.



Historically, the agricultural sector has been a primary regulator of micro-organisms and invertebrates in most countries. As the regulatory environment gets more complex, the integration with wildlife and biodiversity regulatory frameworks is causing confusion for stakeholders. While in many countries one single competent authority is responsible for ABS for all genetic resources, several specialized authorities could share the responsibility for ABS. Whether such sharing of ABS competences is useful will depend on the institutional landscape and other country-specific circumstances.

VI. Communication of, and awareness-raising regarding, ABS measures for potential providers and users of GRFA

Communicating and raising awareness of ABS measures to potential providers, holders and users of GRFA are essential. Various communication and awareness-raising tools may be considered. Effective communication and awareness-raising strategies usually combine different communication tools and aim to provide stakeholder-specific information whenever necessary.



Like other subsectors, the livestock community is in many cases not yet aware of ABS and its potential implications for research and development. On the other hand, countries providing AnGR will increasingly expect recipients/users of their resources to be aware of and comply with applicable ABS measures. Similarly, research partners of international research projects will expect each other to understand and fully comply with relevant national ABS measures.

Awareness-raising measures at national level should target breeders, researchers and policy-makers in particular. Events such as animal shows, meetings of breeder associations and relevant scientific conferences provide excellent opportunities to provide information on ABS to relevant stakeholders and information multipliers. Breeder associations and research organizations may wish to establish and maintain an ABS help desk and facilitate communication with the national competent authority. Information could also be disseminated through publications, newsletters, the Access and Benefit-Sharing Clearing-House⁴⁵ and other media and information channels. Biocultural Community Protocols as well as the ABS Elements may serve as awareness-raising tools.



Awareness-raising measures at national level should target breeders and farmers, indigenous peoples and local communities, scientists, taxonomists, the private sector, botanical gardens and genebanks. Events such as relevant scientific conferences and meetings of plant-breeder associations and seed fairs provide excellent opportunities to provide information on ABS to relevant stakeholders and information multipliers.



The global distribution and exchange of micro-organisms that are publicly available for research is mainly in the hands of MCCs. Various initiatives of MCCs, such as Micro-Organisms Sustainable Use and Access Regulation International Code of Conduct (MOSAICC),⁴⁶ have led to an increased awareness among MCCs of the potential implications of ABS for the distribution and use of MoGR.

MTAs, which are nowadays used by most MCCs, usually impose the responsibility for complying with applicable ABS measures on the recipient of materials. In other words,

⁴⁵ <https://absch.cbd.int/>

⁴⁶ <http://bccm.belspo.be/projects/mosaicc>

receiving material from an MCC does not usually imply that the material can be freely used. Commercial uses of the material are often prohibited unless explicitly authorized. It is furthermore the recipient's sole responsibility to obtain necessary intellectual property licences and ABS permits, as applicable.⁴⁷

Raising the awareness of ABS measures, and improving relevant knowledge, of recipients of materials from MCCs, for example on the occasion of scientific conferences and workshops, might be useful. More specifically, it will be important to guide and possibly assist stakeholders as to how they may obtain the information needed to initiate the necessary approval procedures.

The BC community has also made serious progress in formulating best practices for ABS for InGR.⁴⁸ These best practices could be shared through the Access and Benefit-Sharing Clearing-House.

VII. *Ex ante* assessment and monitoring of the effectiveness and impact of ABS measures for GRFA

Possible implications, side-effects and implementation difficulties may often be anticipated through scenario-based testing of policy measures. Given the many challenges and innovations associated with ABS measures, governments may wish to carry out such tests and/or monitor effects by agreeing on a set of relevant indicators and mechanisms for stakeholder feedback.

⁴⁷ See, for example, the [BCCM Material Transfer Agreement](#).

⁴⁸ Mason, P.G., *et al.* 2018. Best practices for the use and exchange of invertebrate biological control genetic resources relevant for food and agriculture. *BioControl*, 63(1): 149–154. DOI: 10.1007/s10526-017-9810-3 and Smith, D., *et al.* 2018. Biological control and the Nagoya Protocol on access and benefit-sharing – a case of effective due diligence. *Biocontrol Science and Technology*. DOI: 10.1080/09583157.2018.1460317.

4. ACCESS AND BENEFIT-SHARING FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE: THE INTERNATIONAL LEGAL FRAMEWORK

16. In establishing their national frameworks on ABS for GRFA, governments need to be aware of their legal obligations. Essentially three international instruments make up the global framework for ABS for genetic resources: the CBD, the Nagoya Protocol and the Treaty. It is noted that the three instruments are legally binding only for their Contracting Parties.⁴⁹

Convention on Biological Diversity

17. The CBD requires its Contracting Parties to take legislative, administrative or policy measures, as appropriate, with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Parties providing such resources.⁵⁰ Access to genetic resources shall be subject to prior informed consent (PIC) of the Contracting Party providing such resources that is country of origin of such resources or has acquired them in accordance with the CBD, unless otherwise determined by that Party.⁵¹ Access, where granted, shall be on MAT.⁵² Potential benefits to be shared also include: access to and transfer of technology using genetic resources; participation in biotechnological research activities based on the genetic resources; and priority access to the results and benefits arising from biotechnological use of the genetic resources.⁵³

Nagoya Protocol

18. The Nagoya Protocol is a supplementary agreement to the CBD and provides a legal framework for the effective implementation of the third objective of the CBD on benefit-sharing, in support of its other two objectives, namely the conservation and sustainable use of biodiversity. The Nagoya Protocol applies to genetic resources and to traditional knowledge associated with them. It aims to achieve the fair and equitable sharing of benefits, by setting out provisions governing access (for Parties requiring PIC), appropriate technology transfer and funding; and it sets out compliance provisions. (More detailed information on the Nagoya Protocol is provided throughout this document).

International Treaty on Plant Genetic Resources for Food and Agriculture

19. Like the CBD and the Nagoya Protocol, the Treaty is based on the premise that states have sovereign rights over their genetic resources and that the authority to determine access to these resources lies with national governments. Under the Treaty, the Contracting Parties exercised their sovereign rights to establish the MLS, to facilitate access and the sharing of monetary and non-monetary benefits arising from the use of PGRFA through standardized conditions as set out in the Standard Material Transfer Agreement (SMTA). While the Treaty applies to all PGRFA, its MLS applies only to PGRFA set out in Annex I to the Treaty that are under the management and control of the Contracting Parties and in the public domain.



The Treaty is often quoted as a model for ABS for genetic resources. It provides a comprehensive international agreement for PGRFA in harmony with the CBD, which standardizes conditions of access and the modalities of benefit-sharing. It also, in its Article 9, addresses Farmers' Rights. The Treaty also considers information sharing as

⁴⁹ For lists of Parties, see: for the CBD, <http://www.cbd.int/information/parties.shtml>; for the Nagoya Protocol, <http://www.cbd.int/abs/nagoya-protocol/signatories/default.shtml>; for the Treaty, http://planttreaty.org/list_of_countries.

⁵⁰ CBD, Article 15.7.

⁵¹ CBD, Article 15.5; 15.3.

⁵² CBD, Article 15.4.

⁵³ CBD, Articles 15.7; 16; 19; 20; 21.

non-monetary benefit-sharing. Countries that have not yet done so should seriously consider becoming Contracting Parties to the Treaty.

Relationship between the Nagoya Protocol and other international agreements and instruments

20. The Nagoya Protocol states that where a specialized international ABS instrument applies that is consistent with, and does not run counter to the objectives of the CBD and the Nagoya Protocol, the Nagoya Protocol does not apply for the Party or Parties to the specialized instrument in respect of the specific genetic resource covered by and for the purpose of the specialized instrument.⁵⁴ The Treaty is such a specialized international ABS instrument that is consistent with and does not run counter to the objectives of the CBD and the Nagoya Protocol.

21. It should be noted that the Nagoya Protocol shall be implemented in a mutually supportive manner with other international instruments relevant to the Nagoya Protocol. Due regard shall also be paid to useful and relevant ongoing work or practices under such international instruments and relevant international organizations, provided they are supportive of and do not run counter to the objectives of the CBD and the Nagoya Protocol.⁵⁵



In addition to these legally binding instruments, other instruments, such as the Global Plan of Action for Animal Genetic Resources (GPA AnGR), are worthy of being considered in the development and implementation of ABS measures for AnGR. The GPA AnGR, prepared by the Commission and adopted by the International Technical Conference on Animal Genetic Resources for Food and Agriculture in 2007, provides the international framework for the inventory, characterization, monitoring, sustainable use and conservation of AnGR as well as for capacity-building for improved management of these resources.

Through the Interlaken Declaration on Animal Genetic Resources countries committed themselves “to facilitating access to [animal genetic] resources and the fair and equitable sharing of the benefits arising from their use, consistent with relevant international obligations and national laws”.⁵⁶ The Interlaken Declaration also recognizes private ownership and individual breeder improvement of genetic resources and their discretion in how they may choose to sell and maintain their property.⁵⁷ Among the main aims of the GPA AnGR is “to promote a fair and equitable sharing of the benefits arising from the use of animal genetic resources for food and agriculture, and recognize the role of traditional knowledge, innovations and practices relevant to the conservation of animal genetic resources and their sustainable use, and, where appropriate, put in place effective policies and legislative measures”. In addition, the GPA aims “to meet the needs of pastoralists and farmers, individually and collectively, within the framework of national law, to have non-discriminatory access to genetic material, information, technologies, financial resources, research results, marketing systems, and natural resources, so that they may continue to manage and improve animal genetic resources, and benefit from economic development”.⁵⁸

The GPA AnGR provides, as one of the actions of its Strategic Priority 3, *Establish and strengthen national sustainable use policies*, for the development of “approaches, including mechanisms, to support wide access to, and the fair and equitable sharing of benefits arising from the use of animal genetic resources and associated traditional knowledge”.⁵⁹

⁵⁴ Nagoya Protocol, Article 4.4.

⁵⁵ Nagoya Protocol, Article 4.3.

⁵⁶ Interlaken Declaration, paragraph 4.

⁵⁷ Interlaken Declaration, paragraph 12.

⁵⁸ Global Plan of Action for Animal Genetic Resources, paragraph 15.

⁵⁹ Global Plan of Action for Animal Genetic Resources, Strategic Priority 3, Action 2.

GPA AnGR Strategic Priority 4, *Establish national species and breed development strategies and programmes*, proposes as one action the provision of “information to farmers and livestock keepers to assist in facilitating access to animal genetic resources from various sources”.

According to the GPA AnGR “appropriate conservation measures should ensure that farmers and researchers have access to a diverse gene pool for further breeding and research”.⁶⁰

GPA AnGR Strategic Priority 9, *Establish or strengthen ex situ conservation programmes*, proposes the establishment of “modalities to facilitate use of genetic material stored in *ex situ* gene banks under fair and equitable arrangements for storage, access and use of animal genetic resources”.⁶¹

With regard to international policies and regulatory frameworks relevant to AnGR, GPA AnGR Strategic Priority 21 proposes review of “the implications and impacts of international agreements and developments relevant to access to animal genetic resources and sharing the benefits of their use upon animal genetic resources stakeholders, especially livestock keepers”.⁶²

The Funding Strategy for the Implementation of the Global Plan of Action for Animal Genetic Resources, adopted by the Commission in 2009, aims to enhance the availability, transparency, efficiency and effectiveness of the provision of substantial and additional financial resources, and to strengthen international cooperation to support and complement the efforts of developing countries and countries with economies in transition in the implementation of the GPA AnGR.

The GPA AnGR, together with its Funding Strategy, could provide the basis for ABS arrangements that facilitate access to AnGR and ensure at the same time fair and equitable sharing of benefits.

Members reaffirmed their commitment to the implementation of the GPA AnGR in 2017 and, in adopting FAO Conference Resolution 3/2017, invited countries “to consider the distinctive features of the subsector of animal genetic resources for food and agriculture in domestic access and benefit-sharing legislation, where appropriate, taking into account international developments in access and benefit-sharing”.⁶³

⁶⁰ Global Plan of Action for Animal Genetic Resources, paragraph 37.

⁶¹ Global Plan of Action for Animal Genetic Resources, Strategic Priority 9, Action 3.

⁶² Global Plan of Action for Animal Genetic Resources, Strategic Priority 21, Action 2.

⁶³ C 2017/REP, *Appendix D*.

5. RATIONALE OF ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE

22. Considering that GRFA are an integral part of agricultural and food production systems and therefore play an essential role in achieving food security and sustainable agricultural development, and that the international exchange of GRFA is essential to the functioning of the sector, ABS measures may be instrumental in furthering the achievement of food security and improving nutrition. There is general consensus that food and nutrition security requires effective conservation of GRFA and that the effective conservation of GRFA requires their continued use by farmers (including smallholders), indigenous and local communities, research institutions, breeders and other stakeholders. Therefore, ABS measures aimed at achieving food security and the conservation of GRFA should aim to facilitate and actively encourage the continued use and exchange of GRFA and benefit-sharing.

23. There is also agreement that the conservation and sustainable use of GRFA are essential to the sustainable development of agricultural production. Productivity, adaptability and resilience of agro-ecosystems depend on the diversity of GRFA.



Continuous availability of AnGR research and development is indispensable to further enhance the output, sustainability and efficiency of animal production and thereby contribute to food security and nutrition and rural development. Countries may wish to perform *ex ante* cost-benefit analysis in considering development of ABS measures and to identify what ABS regulations would do for users (breeders/producers) in the country as well as for sellers of AnGR. Countries may consider the potential benefits to AnGR gene flow in the absence of ABS measures or due to the exemption of AnGR from the access measures, when exchange of AnGR is based on private contracts.

The conservation of local and regional breeds is also of cultural importance and essential to maintaining traditional lifestyles, for example of many pastoral peoples and other farming communities.



Continuous availability of PGRFA for research and development is indispensable for the improvement of crops. PGRFA offer the potential to provide variable traits that can help meet future challenges such as the need to adapt crops to changing climatic conditions or disease outbreaks. Continued access to PGRFA is therefore important to meeting the rising food demand of a growing population and the challenges of predicted environmental changes. This includes access to neglected and underutilized crops, given their importance for nutrition.



While the importance of access to plant and animal genetic resources is obviously indispensable for the improvement and adaptation of crops and livestock and, thus, for food security, the importance of MIGR for food security may be less obvious to some. The reason might be that for a long time the services provided by soil micro-organisms and natural enemies of pests, among many others, have been taken for granted and therefore received little attention in agricultural management. ABS measures aimed at achieving food security and the conservation of MIGR could therefore, as an objective, also mention the facilitation of exchange, sustainable use and conservation of MIGR as an important contribution to food security.

6. ELEMENTS OF ACCESS AND BENEFIT-SHARING MEASURES FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE

24. Under the Nagoya Protocol, Parties shall consider, in the development, adaptation and implementation of their ABS measures, the importance of GRFA and their special role in food security.⁶⁴ The ABS Elements for national ABS measures for GRFA highlight those areas of ABS policy that may deserve particular attention from the perspective of research and development in food and agriculture.

25. National ABS measures for GRFA should be simple and flexible. *Simplicity* is a challenge given the complexity of the matter and given the variety of situations in which GRFA may be accessed, transferred to others, further improved and used for research and development. *Flexibility* is therefore necessary to allow administrators to adjust the implementation of ABS measures to new and newly identified situations and challenges. ABS measures should leave sufficient flexibility to accommodate new and newly identified situations without having to revise the legislation as such. ABS measures should therefore allow for an evolutionary implementation approach that allows improvement of the operation of the ABS system through practice, self-perfection and innovation. Parties to the Nagoya Protocol need to establish clear and transparent measures to implement it. Developing and implementing ABS measures is a *work in progress* and so is the development of these ABS Elements.

26. National measures on ABS for GRFA may be associated with considerable transaction costs for administrators and stakeholders, and governments may wish to assess and minimize them in developing, adapting or implementing these measures.

27. In designing legislative, administrative or policy measures for ABS that reflect the special needs of GRFA, governments may wish to address a wide range of issues, addressed further below, to facilitate the domestic implementation of ABS for the different subsectors of GRFA:

- I. Institutional arrangements;
- II. Access to and utilization of GRFA;
- III. Access to traditional knowledge associated with GRFA;
- IV. Fair and equitable sharing of benefits;
- V. Compliance and monitoring.

I. Institutional arrangements

28. ABS measures will often specify the institutional arrangements for the management of ABS. Depending on the structure of a state, the form of government, the international ABS instruments to which the state is a party and, where relevant, the jurisdictional division of responsibility, and, depending on the ABS measures chosen, one or several competent authorities may be tasked with the administration of ABS measures. These may be either existing or new authorities. Several authorities within one country may also share the responsibility according to the geographical origin of the resource, the purpose for which it is to be accessed and utilized, the involvement of traditional knowledge associated with the genetic resource, the rights indigenous and local communities may have over the resource or any other criteria that seem appropriate and practical.

- Each Party to the Nagoya Protocol has to designate a single national focal point responsible for liaison with the CBD Secretariat and providing relevant information to applicants.⁶⁵
- Parties to the Nagoya Protocol also have to designate one or more competent national authorities responsible for granting access and advising on applicable procedures and requirements for obtaining PIC and entering into MAT.⁶⁶

⁶⁴ Nagoya Protocol, Article 8(c).

⁶⁵ Nagoya Protocol, Article 13.1.

⁶⁶ Nagoya Protocol, Article 13.2.

- The same entity may fulfil the functions of both focal point and competent national authority.⁶⁷
 - Where more than one competent national authority for the Nagoya Protocol is designated (e.g. for different subsectors of GRFA) the national focal point must provide information about their respective competencies and mandates.
 - Under the Treaty, facilitated access is provided pursuant to the SMTA adopted by the Treaty's Governing Body.⁶⁸ In practice, most Parties to the Treaty have national focal points, and institution(s) actually providing access to MLS material do so only upon acceptance of the SMTA by the recipient of the material.
29. To clarify institutional arrangements around ABS for GRFA, governments may wish to:
- Take stock of existing institutions and institutional arrangements that are potentially relevant;
 - Decide on the allocation of institutional responsibility for various aspects of ABS as they apply to different subsectors of GRFA;
 - Put in place mechanisms and/or procedures for communication and coordination between designated institutions; and
 - Publicize and provide information about the resulting institutional arrangements.
30. Whatever institutional arrangements are chosen, it is of pivotal importance that the institutional arrangements are clear and transparent, and that adequate coordination and information exchange mechanisms are in place. Users of genetic resources need to know when PIC is required, whom they have to ask for PIC and with whom they may negotiate MAT, if this is what the ABS measures require. Where several, e.g. federal and state, authorities are involved in one and the same decision, the authorization procedure may quickly become complicated and time-consuming, and transaction costs may increase considerably. To avoid overly burdensome institutional arrangements, it would be useful to identify existing arrangements that may be used to address PIC and MAT. Where several authorities are involved in the approval procedures, governments may wish to consider designating one lead authority or national clearinghouse to oversee the whole chain of partial approvals, communicate with the applicant and ultimately grant one cumulative authorization once all relevant authorities have given their green light.



Responsibility for the national ABS framework is often with one single competent authority. In fact, national interim reports on the implementation of the Nagoya Protocol show that many countries have chosen to select a single competent authority for ABS, rather than taking a sector or subsector-specific approach to ABS. However, several authorities within one country may share the responsibility for ABS and thus ABS for AnGR may fall under the competence of a specialized authority dealing with livestock matters. Whether such sharing of ABS competences is useful will depend on the institutional landscape and other country-specific circumstances.



Adaptation to distinctive features of sectors and for sectoral competent authorities can be beneficial. Thus, a potential result of consultations between the responsible ministries, the central ABS competent authority and the aquaculture authority could be delegation of ABS competence to the latter for ABS related to AqGR.



If ABS legislative, administrative or policy measures in countries that are regulating their own genetic resources provide for subsector-specific provisions for FGR, policy-makers will have to look into the scope of "FGR". Issues to be considered include whether FGR-specific ABS measures should apply to all FGR that contribute directly or indirectly to food security. FGR could thus include all established use and exchange practices for forest reproductive and genetic material (e.g. seeds, seedlings, rooted cuttings, genes) ranging from tree species providing tree fruits, other edible products for humankind and livestock, and/ or species

⁶⁷ Nagoya Protocol, Article 13.3.

⁶⁸ Treaty, Article 12.4.

providing other services relevant to food and agriculture (erosion control, water storage and filtration, soil fertility improvement, wind shelter, biodiversity conservation, bee forage for honey, nitrogen fixation, shade, etc.) to trees that allow foresters to generate income from non-food forest products (timber, fibre, clothing, shelter, energy, tannin, resin, ecotourism, etc.). In many cases, trees will, of course, serve several purposes at the same time or their originally envisaged purpose will change, which may raise the question of how access to FGR for utilization should be regulated in such cases.



Responsibility for the national ABS framework is often with one single competent authority. In fact, national interim reports on the implementation of the Nagoya Protocol show that many countries have chosen to select a single competent authority for ABS, rather than taking a sector- or subsector-specific approach to ABS. However, several authorities within one country may share the responsibility for ABS and thus ABS for PGRFA may fall within the competence of a specialized authority dealing with plant production. Whether such sharing of ABS competences is useful will depend on the institutional landscape and other country-specific circumstances.



Under the IPPC, National Plant Protection Organizations carry out surveillance of growing plants, including both areas under cultivation and wild flora, for pests,⁶⁹ with the objective of reporting the occurrence, outbreak and spread of pests, and of controlling them.⁷⁰ Responsibility for ABS measures for specific MIGR could therefore lie with the National Plant Protection Organizations. Whether such sharing of ABS competences is useful will depend on the institutional landscape and other country-specific circumstances.

II. Access to and utilization of GRFA

31. In developing, adapting or implementing ABS measures dealing with access to GRFA it is necessary to specify:

- (i) the categories of genetic resources covered by the access provisions;
- (ii) intended uses triggering the application of access provisions;
- (iii) the authorization procedures applicable, depending on the category of genetic resource and the purpose for which the resource is to be used.

(i) Categories of genetic resources covered by access provisions

32. In the CBD and the Nagoya Protocol, the term “genetic resources” means “genetic material of actual or potential value” and genetic material means “any material of plant, animal, microbial or other origin containing functional units of heredity.”⁷¹ This definition is also mirrored in the Treaty, which defines “plant genetic resources for food and agriculture” as “any genetic material of plant origin of actual or potential value for food and agriculture”.⁷² Parties to the Treaty should make sure that their ABS framework addresses their obligations under the Treaty.

Temporal scope of access measures for GRFA

33. There is an international debate about the temporal scope that national ABS measures could or should have. The Nagoya Protocol, in the absence of any rules to the contrary, does not prevent its Parties from applying their national ABS measures to utilizations or access to genetic resources that fall outside the scope of the Nagoya Protocol. However, with regard to resources outside the scope of the Nagoya Protocol, Parties cannot necessarily rely on the support of user country compliance

⁶⁹ IPPC Convention, Article IV.2.

⁷⁰ IPPC Convention, Article VIII.1.

⁷¹ CBD, Article 2.

⁷² Treaty, Article 2.

measures, as set out in Articles 15 to 18 of the Nagoya Protocol, or compliance measures in non-Parties.



Aquaculture is a predominantly new industry that is still dependent on wild species and has few and relatively new *ex situ* facilities for genetic resources. Because of the newness of the industry, the temporal scope of ABS measures is not a particularly relevant topic for aquaculture.

Genetic resources provided by countries of origin/countries that acquired them in accordance with the CBD

34. Parties to the CBD will usually apply their access measures to genetic resources for which they are the country of origin or that they have acquired in accordance with the CBD. “Country of origin of genetic resources” means the country that possesses those genetic resources in *in situ* conditions.⁷³ “*In situ* conditions” means conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.⁷⁴

35. In the case of many GRFA, it may be difficult to determine with certainty the country of origin. GRFA have been widely exchanged across regions, countries and communities, often over long periods of time. Many different stakeholders, including indigenous and local communities, farmers, researchers and breeders have contributed to the development of GRFA, in different places and at different points in time. In fact, the maintenance and evolution of many GRFA depend on continued human intervention, and their sustainable utilization in research, development and production is an important instrument with which to ensure their conservation.



The “country of origin” of a PGRFA is not necessarily its “centre of origin”. ABS measures could provide guidance as to the circumstances under which domesticated crops are considered to have developed their “distinctive properties” within or outside the area of jurisdiction to which the ABS measures applies.

ABS measures could also provide guidance as to whether or to what extent “distinctive properties” (CBD, Article 2) are those properties that make domesticated or cultivated species “clearly distinguishable from any other variety”, as provided in Article 7 of the 1991 UPOV Act.



The Nagoya Protocol requires PIC of the Party providing genetic resources “that is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the Convention.” ABS measures could clarify whether PIC (and MAT) are also required where genetic resources have been received from a country other than the country of origin and have been collected prior to the entry into force of the Nagoya Protocol. ABS measures could point out that, in addition to national ABS laws, recipients of genetic resources have to comply with conditions they accepted under bilateral agreements, such as MTAs.

It will sometimes be difficult if not impossible to determine with certainty the country of origin of MIGR, and especially of those occurring *in situ*. Genetic resources, in particular MIGR, may have several countries of origin.

36. ABS measures need to be clear as to which GRFA are covered by the relevant access provisions.

⁷³ CBD, Article 2.

⁷⁴ CBD, Article 2.

Privately versus publicly held genetic resources

37. While the Treaty's MLS addresses only GRFA "that are under the management and control of the Contracting Parties"⁷⁵ and materials brought within the purview of the Treaty by other holders,⁷⁶ the Nagoya Protocol does not make the distinction between genetic resources that are under the management and control of government and other categories of genetic resources.

38. Given that significant amounts of GRFA are privately held, in particular in sectors such as the livestock sector, ABS measures need to be clear as to whether they apply to privately held or only to publicly held GRFA. ABS measures may have a significant impact on the exchange of such GRFA. Such laws may also need to clarify the hierarchy or relationship of different types of proprietary, including intellectual property, and quasi-proprietary and other rights related to genetic resources.

Genetic resources versus biological resources

39. The Nagoya Protocol covers "genetic resources" and their utilization.⁷⁷ However, some ABS measures also cover "biological resources" and their utilization. Governments should reflect on whether the inclusion of biological resources in ABS measures and their use beyond utilization, as addressed in the Nagoya Protocol, has any effect on the use of and access to GRFA.

Genetic resources held by indigenous and local communities

40. The Nagoya Protocol also addresses, as a special case, genetic resources held by indigenous and local communities. The Protocol requires Parties in such cases to take measures, in accordance with domestic law, as appropriate, with the aim of ensuring that the PIC or approval and involvement of indigenous and local communities is obtained for access to genetic resources where they have the established right to grant access to such resources.⁷⁸

41. ABS measures implementing the Nagoya Protocol may foresee procedures for the PIC or approval and involvement of the indigenous and local communities where they have the established right to grant access to such resources. Community PIC, as such, is a challenging, although not completely new, concept. National measures should address how PIC or approval and involvement of indigenous and local communities may be obtained, taking into consideration indigenous and local communities' customary laws, community protocols and procedures, as applicable.

(ii) Intended uses triggering the application of access provisions

Research and development on the genetic and/or biochemical composition of GRFA

42. Some national ABS measures apply to specific uses of genetic resources, i.e. to their use in research and development. The Nagoya Protocol provides that "access to genetic resources for their utilization shall be subject to PIC by the country providing such resources that is the country of origin of such resources or that has acquired the genetic resources in accordance with the Convention (...)" unless otherwise determined by that Party.⁷⁹ "Utilization of genetic resources" means "to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology (...)."⁸⁰

43. Other ABS measures cover further uses that trigger the application of access provisions. Under those measures, the acquisition of genetic resources for certain purposes other than research and breeding may require PIC, for example the use of genetic resources for the extraction of specific compounds. The measures often refer to "biological resources", meaning that the resources are not used for their genetic composition, but as an end product or commodity. The rationale for such a broad definition is the experience that compounds used in the pharmaceutical and cosmetic industries are

⁷⁵ Treaty, Article 11.2.

⁷⁶ Treaty, Articles 15; 11.3.

⁷⁷ CBD, Article 2.

⁷⁸ Nagoya Protocol, Article 6.2.

⁷⁹ Nagoya Protocol, Article 6.1.

⁸⁰ Nagoya Protocol, Article 2(c).

often extracted from agricultural products sourced through intermediaries from local markets at local prices that at times do not reflect the actual market value of the extracted compounds.

44. A broad definition of purposes that would capture a whole range of activities that typically and regularly happen with agricultural commodities in the course of food production will obviously imply that access provisions would apply to a possibly large number of transactions where for the time being the assumption of buyers of such commodities in most countries might be that in such cases the sales contract manifests the ABS agreement. In fact, the sales contract might or might not satisfy ABS requirements according to national measures.

45. For non-Parties to the Nagoya Protocol there is also the option of a different approach.



AnGR made available for direct use, e.g. for consumption (eggs), slaughter or fattening or production of semen for reproduction, can also be used as genetic resources (for research and development, including breeding). Some countries are concerned that genetic resources that have been accessed without PIC and MAT could end up being used for research and development. Their ABS measures therefore regulate access to genetic resources for both direct use and research and development.

However, regulating access to AnGR for direct use may have a significant impact on trade in animals for slaughter and animal reproductive materials (e.g. semen, embryos) and therefore on food security. If ABS measures do not regulate access to AnGR for direct use, they could still require the user to obtain PIC and share benefits should the intention change and animals or reproductive materials originally intended for direct use end up being used for research and development.



AqGR often reach the market in a form in which they may be used both as a “biological resource” (e.g. for human consumption) or as a genetic resource (i.e. for research and development, including breeding). Regulating access to AqGR used as “biological resources” may have significant impact on trade in fish and aquatic plant commodities, and therefore on food security. Several ABS laws leave the exchange of biological resources unregulated; however, if a biological resource is subsequently used for research or development, they require the user to request a permit and to share potential benefits.



FGR often reach the market in a form in which they may be used as a commodity (e.g. for planting or for food) or for research and development. Some countries are concerned that commodities that have been accessed without PIC and MAT could end up being used for research and development. Their ABS measures therefore regulate access to genetic resources for both: use as a commodity and for research and development. However, regulating access to FGR used as a commodity may have a significant impact on trade of forest reproductive material. If ABS measures do not regulate access to commodities, they could still require the user to request a permit and share benefits should the intention change and the commodities be used for research and development.



PGRFA made available for direct use, e.g. for consumption or multiplication, can often also be used for research and development, including breeding. There is a concern that genetic resources that have been originally accessed for direct use could end up being used for research and development. Some laws therefore require PIC and MAT for access to genetic resources for both research and development and direct use.

However, regulating access to PGRFA for direct use may have a significant impact on trade in seeds and even foods and therefore on food security. If ABS measures refrain from regulating access to PGRFA for direct use, they could still require PIC and benefit-sharing when the intention changes and seeds or foods originally intended for direct use are subsequently used for research and development.



As with commodity crops there are some micro-organisms and invertebrates that are treated as a commodity for food or fibre for use. Some have raised a concern that although originally accessed for direct use, such commodities could end up being used for research and development. InGR, such as insects and snails, made available for direct use, e.g. for trade, consumption or multiplication, can often also be used for research and development, including breeding. A micro-organism requested as reference culture may be used for bioprospecting studies. However, regulating access to MIGR for direct use may have an unwanted impact on trade. If ABS measures refrain from regulating access to MIGR that may be directly used, they could still require PIC and benefit-sharing where the intention of the recipient changes and MIGR originally intended for direct use are used for research and development.

It also needs to be recognized that invertebrates and micro-organisms regularly cross international borders unintentionally through commodity trade.

Most MCC nowadays require depositors to indicate the country of origin of materials they wish to deposit. It appears that most MCC also require information regarding the PIC of the country of origin of the material.⁸¹ Many MCC also require recipients of material to comply with the relevant ABS provisions of the country of origin, often irrespective of whether the material has been collected and deposited prior to or after the entry into force of the Nagoya Protocol. This means that MTAs of MCC might at times require PIC and MAT for materials that are excluded from the scope of ABS measures under the jurisdiction under which the MCC operates. ABS measures and MCC MTAs could clarify if PIC and MAT are required for research and development on pre-Nagoya MoGR.

Development of genetic resources in the course of agricultural production

46. If the activities triggering access provisions are limited to “utilization” within the meaning of the Nagoya Protocol, certain typical uses of GRFA, for example the growing of seeds in order subsequently to use the harvested products for human consumption clearly do not qualify as utilization and therefore do not trigger the application of access provisions.

47. Other activities regularly performed with respect to GRFA are more difficult to classify. The question may arise as to whether selection and reproduction of plant genetic resources by a farmer or farming community based on phenotypic traits and not entailing any genetic methods, qualify as “utilization”. Similarly, fish farming while serving the purpose of producing fish for human consumption may simultaneously, through natural selection due to the hatchery environment, contribute to the genetic development and, indeed, domestication of the fish. Provenance trials that help to identify tree seedlings best adapted to the conditions of a specific planting site may simply serve the purpose of reforestation and the production of timber on sites that are similar to the test environment; on the other hand, provenance research is also important for planned breeding within and between species. The use of cattle embryos or bovine semen for reproduction and, ultimately, dairy or meat production may be considered as falling outside the boundaries of “utilization”. However, the selection of semen-donor bulls and the selection of offspring for multiplication may entail aspects of research and development. Subject to national measures, the assumption of stakeholders when selling genetic material in the form of semen, embryos, etc., will often be that its value as a genetic resource is already reflected in its price, and that the buyer will be free to use it for further research and breeding.⁸² If, however, the planned use of such material qualifies as “utilization,” as defined by national measures, access requirements may apply.

48. Many GRFA are being shaped, developed and improved through their continued use in agricultural production. Where “research and development” and agricultural production occur in tandem, it may be difficult to distinguish “utilization” from activities related to the production of agricultural products for sale and human consumption. ABS measures could provide guidance as to the treatment of these cases, for example by listing examples of activities/purposes of use that fall

⁸¹ Background Study Paper No. 46, p. 49.

⁸² CGRFA Background Study Paper No. 43. 2009. *The use and exchange of animal genetic resources for food and agriculture*, p. 28.

under “utilization” and other examples that fall outside the definition of “utilization”. Further technical guidance will be important to facilitate the implementation of national ABS measures.



There is a need to clearly identify activities related to AnGR that are considered “utilization” and those which are not. States should review and identify activities associated with AnGR that can be considered “utilization”. Activities based on or involving the identification of various phenotypic, genetic or biochemical characteristics of accessed AnGR are usually considered research and development. On the other hand, trade in live animals or their reproductive materials, using or improving reproductive biotechnology methods in given species (artificial insemination, embryo transfer, gonad grafting) and the multiplication of animals for commercial production, as well as the fattening of animals for slaughter or keeping them for milk or egg production, will clearly not qualify as “utilization” and, therefore, dependent on the applicable laws, not trigger the application of ABS measures.

Policy-makers may also wish to address the “re-utilization” of AnGR previously generated through “utilization” with PIC and MAT. If “re-utilization” requires PIC and MAT just like the first utilization of AnGR, this could in the future create “permit pyramids” and complicate the future “utilization” of AnGR. In such circumstances, animal breeders might choose to avoid, rather than to use, conserve and further improve, the respective AnGR. Governments could consider distinctive solutions to this issue, including through supporting the development of subsector standards building on current best practices, such as the breeders’ exemption in the plant sector, or putting in place multilateral solutions.



While practices, such as the capture of live material from the wild and its subsequent use in aquaculture, usually termed capture-based aquaculture (CBA), might not clearly qualify as “research and development” and therefore not trigger the application of ABS measures, aquaculture may simultaneously contribute to genetic improvement and therefore be considered “research and development”. ABS measures could therefore draw a clear line between activities related to AqGR that are considered to be “utilization” and those that are not.



Provenance trials that help to identify seedlings best adapted to the conditions of a specific planting site may simply serve the purpose of reforestation and the production of wood or non-wood products on sites that are similar to the test environment. On the other hand, provenance research is an important component of tree breeding and is often considered “research and development”.⁸³ ABS measures could therefore draw a clear line between FGR-related activities that are considered to be “utilization” and those that are not.



There is a need to clearly identify activities related to PGRFA that are considered “utilization” and those that are not. Plant breeding is generally considered “utilization”. However, it is less clear whether farmer-breeding or activities like mass or pure-line selection of seeds or the creation and selection of spontaneous crosses or mutations are considered “utilization”.

On the other hand, trade in PGRFA for direct use as seeds or food/feed will usually clearly not qualify as “utilization”, and therefore, dependent on the applicable laws, not trigger the application of ABS measures.

Policy-makers may also wish to address the “re-utilization” of PGRFA previously generated through “utilization” with PIC and MAT. If “re-utilization” requires PIC and MAT just like the first

⁸³ See J. Koskela, B. Vinceti, W. Dvorak, D. Bush, I.K. Dawson, J. Loo, E.D. Kjaer, C. Navarro, C. Padolina, S. Bordács, et al. Utilization and transfer of forest genetic resources: a global review. *For. Ecol. Manage.*, 333 (2014), pp. 22-34.

utilization of PGRFA, this could lead to complex stacking of obligations and complicate the future “utilization” of PGRFA. In such circumstances, plant breeders might choose to avoid, rather than to use, conserve and further improve, the respective PGRFA, creating a situation that would be in striking contradiction to the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, which encourages breeders to pursue base-broadening strategies that seek to widen the genetic diversity in plant breeding programmes and in the products of such programmes. Governments could consider distinctive solutions to this issue, including through supporting the development of subsector standards building on current best practices, such as the breeders’ exemption in plant variety protection legislation, or putting in place multilateral solutions.

There is a need to clearly identify activities related to MIGR that are considered “utilization” and those that are not. It is important to note that there are certain “upstream” activities that are related to (or carried out in support of) research on MIGR but are not “utilization” as such, e.g. the maintenance and management of collections for conservation purposes, including storage, rearing, multiplication, identification and evaluation of MIGR. Similarly, the mere description of genetic resources in phenotype-based research, such as morphological analysis or the diagnostic use of a well-known gene sequence for identification, might normally not qualify as utilization. Therefore, not every study of an MIGR may be considered as utilization.⁸⁴

Research and development for food and agriculture

49. In light of Article 8(c) of the Nagoya Protocol, governments could consider treating access to and utilization of genetic resources differently if they are intended to contribute to food and agricultural research and development. One option would be for a country not to require PIC for such resources. Alternatively, special procedural requirements, or benefit-sharing standards, could apply or a special authority could, for example, be responsible for ABS. ABS measures making this distinction, could consider whether they should or should not include non-food/feed agricultural products.⁸⁵ However, drawing a distinction between food/feed and non-food/feed agricultural products faces the difficulty that at the stage of research and development the purpose for which the outcome will ultimately be used will often be unknown. Many agricultural products may be and are used for both food and non-food purposes. Nonetheless, ABS measures could, for example, exempt from “research and development for food and agriculture” research and development that is intended exclusively to serve non-food/feed purposes.



To acknowledge the special role of GRFA for food security, governments could consider treating access to and utilization of genetic resources differently if they are intended to contribute to food and agricultural research and development. One option would be to waive the PIC and MAT requirements for access to AnGR for research and development in the livestock sector.



To acknowledge the special role of GRFA for food security, governments could consider treating access to and utilization of genetic resources differently if they are intended to contribute to food and agricultural research and development. The Treaty provides a comprehensive ABS regime that policy-makers may wish to opt for with respect to non-Annex 1 crops. In fact, a steadily growing group of countries have chosen the Treaty as a special regime for the most important PGRFA. For PGRFA currently not covered by the

⁸⁴ See Table 1 in Smith, D., *et al.* 2018. Biological control and the Nagoya Protocol on access and benefit-sharing – a case of effective due diligence. *Biocontrol Science and Technology*. DOI: 10.1080/09583157.2018.1460317 for an overview of activities and their possible qualification.

⁸⁵ See Treaty, Article 12.3(a).

Treaty's MLS, policy-makers could provide for simplifications, such as to apply the terms and conditions of the SMTA or even waive PIC and MAT requirements.



To acknowledge the special role of MIGR for food security, governments could consider, in line with Article 8(c) of the Nagoya Protocol, treating access to and utilization of them differently if they are intended to contribute to food and agricultural research and development. It is important to note that no country is under an obligation to restrict access to genetic resources within its jurisdiction.

Commercial/non-commercial research and development

50. ABS measures sometimes distinguish between commercial and non-commercial utilization of genetic resources. Non-commercial utilization often benefits from softer authorization requirements and simpler authorization procedures. PIC is often required for both forms of utilization. However, in the case of non-commercial utilization, recipients are sometimes given the option of not negotiating the sharing of monetary benefits immediately, if they agree to get back to the provider and negotiate monetary benefit-sharing should their intent change. Countries should consider how to identify triggers that signal when change of intent occurs and how to address such changes of intent.



In the livestock sector, non-commercial research aims to develop methods focusing on agricultural development, thus providing societal benefits and benefits to farmers (research to improve methods of genetic improvement and selection, research on adaptation and disease resistance of AnGR) and methods for control measures (veterinary checks, food safety and traceability). Public research is fundamental for the livestock sector, and has transitioned to precompetitive research on methods, including sequencing and genotyping, that are freely available.

Commercial research carried out by the breeding industry is focused on methods for genetic improvement of traits of interest (e.g. yield and content of products, reproduction, health, longevity, efficiency of using inputs) and improvement of husbandry conditions (feeding, housing, health care). This research is usually conducted on privately owned genetic stocks (selection) or outsourced (management).



Many activities in the plant-breeding sector ultimately aim at the development of a product and might therefore be considered “commercial”. The plant-breeding sector might therefore not greatly benefit from a distinction between commercial and non-commercial activities and simplifications granted by ABS measures for the latter.

However, policy-makers could consider excluding non-commercial plant breeding research from the application of their ABS measures which, however, would require a clear definition or specification of activities falling under such an exemption.



Many activities related to MIGR for food and agriculture ultimately aim at the development of a product and might therefore be considered “commercial”. Depending on the definition of the term “commercial”, the sectors using MIGR for research and development might not greatly benefit from a distinction between commercial and non-commercial activities and simplifications granted by ABS measures for the latter. However, policy-makers could consider, in line with Article 8(a) of the Nagoya Protocol, excluding certain research and development activities from the application of ABS measures.

51. The distinction between commercial and non-commercial utilization, which is particularly important for taxonomic research and encouraged by the Nagoya Protocol,⁸⁶ might have limited application in the case of certain aspects of agricultural research and development that aim at improving agricultural and food production and therefore might qualify, in most cases, as commercial utilization. However, the distinction may be significant for taxonomic research used to build frameworks for distinguishing pests and pathogens and alien taxa from indigenous, or beneficial or harmless taxa.

Exemption of specific activities

52. ABS measures may also exempt certain utilizations of genetic resources from any ABS requirements. For example, the exchange of genetic resources within and among local and indigenous communities and small-scale farmers, as well as exchange practices within nationally recognized research networks, could be exempted from any access requirements and, possibly, the ABS measures as such.

(iii) Authorization procedures

53. The Nagoya Protocol provides that access to genetic resources for their utilization shall be subject to the PIC of the Party providing such resources that is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the CBD, unless otherwise determined by that Party.⁸⁷

PIC

54. Many variations of authorization procedures exist and governments may therefore wish to consider advantages and disadvantages of the different options and adapt procedures to the different categories of genetic resources and the different purposes for which they are intended to be used. The Nagoya Protocol does not provide in any detail how PIC should be granted and thus leaves its Parties, within the boundaries of Article 6.3 of the Nagoya Protocol, considerable flexibility as to how the authorization procedure may be designed. Parties to the Nagoya Protocol may also provide for different types of authorization procedures depending on the user. In any event, it is important that the procedures be streamlined and clear for providers and users alike. The selection of different types of authorization procedures given below does not claim to be exhaustive.

Standard and fast-track PIC

55. Governments may wish to establish standard procedures and, in addition, fast-track procedures for certain situations, e.g. for access to certain materials; for materials that are to be used for certain purposes, e.g. research and development for food and agriculture; for access by certain stakeholders, e.g. farmers; or for combinations of these scenarios.



Fast-track procedures could be foreseen in ABS legislation (as well as MTA and material acquisition agreements, MAAs) for emergency cases, for example for MIGR required for biocontrol or plant and animal health in line with Article 8(b) of the Nagoya Protocol.⁸⁸

Implicit PIC

56. ABS measures may also provide for implicit informed consent procedures for specific materials, purposes, stakeholders or other situations. In this case, access to and utilization of genetic resources could proceed without an explicit PIC by the competent authority. Implicit PIC does not rule out the possibility of benefit-sharing. Relevant ABS measures could provide, for example, that in the case of implicit PIC, the recipient has to agree with the competent authority on the terms and conditions of benefit-sharing prior to the commercialization of a product derived from the genetic resource.

⁸⁶ Nagoya Protocol, Article 8(a).

⁸⁷ Nagoya Protocol, Article 6.1.

⁸⁸ See, for example, MOSAICC, section I.2.

Standardization of PIC (and MAT)

57. A typical regulatory response to the high number of transfers of GRFA and the recurrent exchange events in the food and agriculture sector could be the standardization of access procedures, terms and conditions. The Treaty already establishes a fully functioning precedent for this approach through its SMTA.



The most common trade in AnGR is carried out between breeders and farmers, which is based on bilateral agreements, and the price usually reflects the value of the animals or their biological material. In the past, such transfers did not require PIC or MAT.

If a country chooses not to exempt AnGR from its ABS measures, the authorization process to obtain PIC will depend on the established ABS framework and the provider of the AnGR. To ensure efficiency in view of the high number of exchanges, standardization of PIC and MAT might be helpful.



Currently, the exchange of AqGR is primarily regulated through commercial contracts. Because most genetically improved aquatic species are fertile and can be easily reproduced, contracts often restrict the use of AqGR and prohibit their use for rival breeding programmes. Current business practices in the aquaculture industry may provide inspiration for the design of the terms and conditions of ABS agreements for AqGR.

Despite the limited attention to ABS in the aquaculture sector, there have certainly been cases where the provider of the original AqGR benefited from the results of research and development performed by a third party on the AqGR. Sharing research and development results with the provider of AqGR will therefore often be a standard condition of ABS agreements.



The SMTA of the Treaty offers a ready-made and tailor-made solution for PIC and MAT. For PGRFA that are not exchanged by using the SMTA, bilateral case-by-case arrangements should not be considered the only possible alternative. The application of the SMTA to non-Annex 1 PGRFA is an option. ABS measures could allow for the conclusion of framework agreements covering a whole range or type of accessions and providing for modalities for the sharing of benefits derived from the utilization of all such accessions.



Best practices, model MTAs and MAAs have been developed for various subsectors of MIGR.⁸⁹ These models may inspire the development of MTAs and MAAs that stakeholders of the relevant subsectors may agree on with a view to facilitating ABS and avoiding the need to conclude bilateral agreements on a case-by-case basis. ABS measures could allow for, and indeed encourage, the use of MTAs and MAAs for MIGR and model contractual clauses, as envisaged by Article 19.1 of the Nagoya Protocol.

58. A good starting point for the use of standardized procedures and conditions could be already existing pools of GRFA, for instance in the form of collections and gene banks, provider and user communities and networks. Their established exchange practices may offer useful models to build upon, as they often include the use of an agreed set of conditions and modalities, sometimes even formalized in the form of codes of conduct, guidelines or material transfer agreements.

59. ABS measures may establish standard ABS conditions for specific materials, purposes, stakeholders or other standard situations. Recipients accessing and using specified genetic resources,

⁸⁹ For an overview: McCluskey, K., *et al.* 2017. The U.S. Culture Collection Network responding to the requirements of the Nagoya Protocol on Access and Benefit Sharing. *mBio* 8, Table, DOI:10.1128/mBio.00982-17; Mason, P.G. *et al.* 2018. Best practices for the use and exchange of invertebrate biological control genetic resources relevant for food and agriculture. *Biocontrol*, 63: 149–154. DOI: 10.1007/s10526-017-9810-3, Supplementary information.

for example for specified research/development purposes, would have to abide by a set of access and benefit-sharing conditions predefined in the ABS measures. Given the variety of resources, the variety of purposes for which they may be used and the variety of stakeholders, standardization of ABS may not work as an overall solution for all GRFA. However, for specific types of utilization of genetic resources that usually generate a similar scale of benefits, standardization of ABS may be a viable option and, in addition, a powerful instrument to attract recipients who prefer abiding by a set of predefined ABS standards over having to negotiate bilateral ABS agreements on a case-by-case basis.

60. The standardization of PIC (and MAT) procedures may, if the agreed standards are adequate and have been developed in line with existing practices and upon consultation with relevant stakeholders, help to reduce transaction costs considerably, and may also help to speed up the administrative decision-making processes.

Framework PIC (and MAT)

61. As the international exchange of genetic material is a longstanding practice in the food and agriculture sector, many stakeholders rely on it, and business practices have been structured accordingly, often characterized by transnational specialization and division of labour. The different stakeholders managing and using GRFA are interdependent and GRFA are often exchanged in the framework of close working collaborations and partnerships, with many stakeholders acting as intermediaries in the value chain, i.e. being neither the original provider nor the end user of a specific GRFA.

62. ABS measures may accommodate these practices by providing for the possibility of concluding framework agreements that authorize access to and utilization of a specified range of genetic resources, possibly limited to specific purposes, provided benefits are shared as and when agreed. In this case, users would not have to request access for each genetic resource separately but would possibly still have to notify every accession they actually accessed and used for research and breeding to provide legal certainty to users and facilitate monitoring of compliance with the framework agreement. The framework PIC may be particularly appropriate for sectors that exchange large amounts of germplasm among the different stakeholders along the value chain during research and development.

III. Access to traditional knowledge associated with GRFA

63. Under the Nagoya Protocol, in accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that traditional knowledge associated with genetic resources is accessed with the PIC or approval and involvement of the indigenous and local communities holding such traditional knowledge, and that MAT have been established.⁹⁰ It is important to note that these requirements apply to traditional knowledge associated with genetic resources irrespective of whether genetic resources are being made available at the same time.

64. The Protocol requires that, in accordance with domestic law, Parties take into consideration indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources. National focal points shall provide, where possible, information on procedures for obtaining PIC or approval and involvement, as appropriate, of indigenous and local communities. Further guidance may well be required as to how PIC or approval and involvement of indigenous and local communities may be obtained. In the case of traditional knowledge associated with GRFA, much of this knowledge may be shared by several communities, and national measures need to clarify how in such cases fully valid approval may be obtained.

65. It should be noted that Article 9 of the Treaty, on Farmers' Rights, includes a provision on the protection of traditional knowledge relevant to PGRFA.

⁹⁰ Nagoya Protocol, Article 7.



Procedures for involving indigenous peoples and local communities (IPLC) in granting access to traditional knowledge on AnGR are diverse and in many countries under development. IPLC should be involved in decisions that concern their traditional knowledge associated with AnGR, and the domestic ABS regulatory measures should respect biocultural community protocols and specific institutional arrangements developed by these communities. In cases where several communities share traditional knowledge associated with AnGR and only one has granted PIC, a mechanism for benefit-sharing involving all relevant IPLCs could be considered, including, where appropriate, a simplified dispute-resolution mechanism. Biocultural community protocols are also useful to support *in situ* conservation of locally adapted breeds, which in some cases may be necessary to maintain endangered breeds and ensure their future availability.



Procedures for involving IPLCs in granting access to traditional knowledge to PGRFA are diverse and in many countries under development. IPLCs should be involved in decisions that concern their traditional knowledge associated with PGRFA, and the domestic ABS regulatory measures should respect biocultural community protocols and specific institutional arrangements developed by these communities. In cases where several communities share traditional knowledge associated with PGRFA and only one has granted PIC, a mechanism for benefit-sharing involving all relevant IPLCs might be considered including, where appropriate, a simplified dispute-resolution mechanism.

IV. Fair and equitable sharing of benefits

(i) *Scope of benefit-sharing obligations*

66. Many GRFA may have been collected long before the application of national ABS measures. For these resources, the question is no longer whether or under what conditions they may be accessed, as access has already occurred. ABS measures should be clear as to whether they require the sharing of benefits arising from new or continued uses of genetic resources or associated traditional knowledge accessed prior to the ABS measures having been put into place. As noted above, there is an international debate on the temporal scope of the Nagoya Protocol.



AnGR have been widely exchanged throughout the world and most breeds are of mixed ancestry. Livestock keepers and breeders in many parts of the world have contributed to the development of these breeds, and today livestock production in most regions depends on AnGR that originated or were developed elsewhere. Over generations, AnGR have been integrated into domestic livestock populations.

It is important to note that there are no examples of any benefit-sharing arrangements for AnGR, or associated traditional knowledge, accessed prior to the entering into force of the Nagoya Protocol, or prior to the introduction of national ABS measures. It would be extremely difficult, if not impossible, to track the progeny of past-imported farm animals.



PGRFA have been widely exchanged throughout the world, and actors in many different places have contributed in one way or another to the development of today's crop genetic diversity. As a consequence, an important part of current crop production relies on the use of the genetic diversity from other places, and all countries depend to some extent on genetic diversity that originated elsewhere.

67. Governments may wish to consider carefully the implications of expanding the scope of their ABS measures to previously accessed GRFA or traditional knowledge. As most countries are using GRFA originating from other countries, ABS measures covering previously accessed GRFA could lead to considerable uncertainty regarding the status of such resources and, more importantly, severely discourage potential users from utilizing such GRFA for research and development.

(ii) Fair and equitable

68. The fair and equitable sharing of benefits arising from the utilization of genetic resources is a key component of ABS measures. Benefits may include monetary and non-monetary benefits. According to the Nagoya Protocol, benefits arising from the utilization of genetic resources, as well as subsequent applications and commercialization, shall be shared in a fair and equitable way with the Party providing such resources that is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the CBD.⁹¹ Such sharing shall be on MAT. Bilateral case-by-case negotiations of MAT for GRFA may entail high transactions costs and therefore not be practical. Providers and users of GRFA may therefore wish to rely on model contractual clauses, codes of conduct, guidelines, best practices and/or standards developed for their sector or subsector. Benefits shared under the MLS of the Treaty include: the exchange of information, access to and transfer of technology; capacity-building; and the sharing of benefits arising from the commercialization of PGRFA.⁹² Some of these benefits are specified in the SMTA of the Treaty.



The fair and equitable sharing of benefits arising from the utilization of genetic resources is a key component of ABS measures. Benefits may include monetary and non-monetary benefits.

With respect to the livestock sector, there are established practices for the exchange of AnGR, and various types of private contracts and standard clauses used by the subsector. ABS measures may take these commercial exchange practices into account.

(iii) Beneficiaries

69. Identifying the proper beneficiary or beneficiaries may be particularly difficult in the case of GRFA. The innovation process for many GRFA, in particular plant and animal genetic resources, is usually of incremental nature and based on contributions made by many different people in different places at different points of time. Most products are not developed out of an individual genetic resource, but with the contributions of several genetic resources at different stages in the innovation process.

70. Sharing the benefits in a fair and equitable way and sharing the benefits with the proper beneficiary may therefore become a major challenge for most subsectors of GRFA, including aquatic and forest genetic resources where breeding technologies play an increasingly important role. Depending on the extent to which genetic resources and associated traditional knowledge contribute to a final product, it may become difficult to determine the fair and equitable sharing of benefits with the different countries and indigenous and local communities that contributed genetic resources and/or traditional knowledge. Where it is difficult to determine the country of origin of GRFA, the question may arise as to whether several countries may be considered the country of origin of a genetic resource where the genetic resource has acquired its distinctive properties in the natural surroundings of these countries.

71. Various options for accommodating the incremental nature of the innovation process typical of many GRFA may be considered. There may be circumstances in which providers and users are best positioned to negotiate benefit-sharing among themselves. Alternatively, benefits could, for example, be decoupled from individual providers or accessions, pooled in a national benefit-sharing fund or other cooperative arrangements and be distributed in line with agreed policies and disbursement criteria. This option could be considered, in particular, for the distribution of benefits among different beneficiaries at national level (e.g. the state and various indigenous and local communities). However, where the genetic resources originate from different countries, governments may wish to consider how to reflect the interests and views of the countries involved in the benefit-sharing models, including through the use of multilateral solutions.

⁹¹ Nagoya Protocol, Article 5.1.

⁹² Treaty, Article 13.2.



Processes to develop AnGR are incremental in nature and are based on contributions of many people in different countries at different points of time. They involve continuous exchange of AnGR that are beneficial to farmers/breeders at each step of the breeding process.

Further globalization of animal breeding has enhanced the availability of highly producing AnGR, without restrictions, worldwide, and on a commercial basis. This has supported rapid enhancement of animal production in developing countries and improved food security.

However, there is also a need for increased access, availability and affordability of adapted and improved genetic material for small-scale farmers. At national levels, benefit-sharing mechanisms may involve returning improved breeding stock from selection programmes, in good sanitary state, to the original owners. At the global level, benefit sharing may be facilitated by projects supported by the Funding Strategy for the implementation of the Global Plan of Action for Animal Genetic Resources.

(iv) Monetary and non-monetary benefits

72. The terms and conditions of monetary and non-monetary benefit-sharing will often depend on the particularities and specificities of the subsector, the species, the concrete intended use, etc. However, access to GRFA will always be a benefit in itself, as is stated for PGRFA in Article 13(1) of the Treaty, and governments may wish to consider how to address forms of utilization that restrict subsequent access. The mutual exchange of GRFA may be an option that governments may wish to consider, as it would allow for access to GRFA without having to negotiate the sharing of monetary benefits and yet offers substantial benefits to both sides.

73. Considering the important non-monetary benefits of GRFA, such as characterization data, research results, capacity-building and technology transfer, ABS measures for GRFA may identify non-monetary benefits that are of particular relevance to the food and agriculture sector. The Nagoya Protocol lists research directed towards food security, taking into account domestic uses of genetic resources in the country providing genetic resources, as well as food and livelihood security benefits, as possible non-monetary benefits.⁹³



While ABS arrangements will sometimes require that monetary benefits be shared as they accrue, some countries may consider opportunities for non-monetary benefit-sharing, as time spans between access to FGR and the generation of benefits may be extremely long. Sharing data is one way to provide value in many cases. Countries may wish to consider monetary benefit-sharing exemptions to promote work on endangered tree species.

(v) Sharing benefits through partnerships

74. As international exchange of genetic material is a longstanding practice in the food and agriculture sector, many stakeholders rely on it, and business practices and scientific collaboration partnerships have been structured accordingly. The different stakeholders managing and using GRFA are interdependent and GRFA are often exchanged in the framework of close working collaborations and partnerships, with many stakeholders acting in the value chain being neither the original providers nor the end users of the GRFA. To manage the sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, ABS measures may allow for benefit-sharing arrangements to be part of broader research partnership agreements. Such framework agreements (see above, paragraphs 61–62) may cover a range of genetic resources. Conversely, governments may wish to consider regulating exchanges of GRFA that could adversely impact the diversity of local GRFA.

⁹³ Nagoya Protocol, Annex, sections 2(m); 2(o).



With respect to AnGR, the sharing of research results is of key importance, as it contributes to the generation of public knowledge on AnGR. Much of the resulting knowledge products and data are freely available. Other forms of non-monetary benefits that could be shared in cooperation agreements include the provision of information on the estimated breeding value of sold breeding stock and on its requirements in terms of management conditions and husbandry practices. Non-monetary benefits may also include capacity development, provision of extension services and technology transfer and cooperation in setting up *in situ* and *ex situ* conservation programmes.

In the AnGR sector a number of global consortia have been established to further AnGR research and knowledge exchange, for example the Swine Genome Sequencing Consortium (SGSC), the International Goat Genome Consortium (IGGC), the International Research Consortium for Animal Health (IRC) and networks such as EUGENA (European Gene Bank Network for Animal Genetic Resources).



If ABS measures consider provenance trials as “utilization” they could still accommodate this specific form of research and development by providing for the possibility of concluding framework agreements that authorize access to and utilization of a range of FGR for such trials and addressing benefit-sharing for all partners contributing to the trials.



ABS measures could encourage stakeholders to address ABS issues, where possible and appropriate, including through use of the SMTA or other ABS agreements, as part of scientific partnership agreements. Partnership agreements could make individual ABS permits on a case-by-case basis for single transfers unnecessary and, at the same time, encourage joint research activities going beyond the exchange of PGRFA.



ABS measures could encourage stakeholders to address ABS issues, where possible and appropriate, as part of scientific partnership agreements and within existing informal and formal networks. It has been argued that “informal cooperative networks of biological control practitioners around the world, involving scientists working with government agencies, intergovernmental organizations, international agricultural research centres, universities, industries, etc, are best suited to assist biological control practitioners for the free multilateral exchange of invertebrate biological control agents.”⁹⁴ The difficulty of working with micro-organisms and invertebrates and the special skills required may make the sharing of non-monetary benefits, including capacity building, particularly relevant.

(vi) *Global multilateral benefit-sharing mechanism*

75. Parties to the Nagoya Protocol have agreed on a process to consider the need for and modalities of a global multilateral benefit-sharing mechanism, which may be relevant to benefit-sharing for GRFA.⁹⁵

V. Compliance and monitoring

76. There are different types of compliance measures in the area of ABS, including: compliance of countries with an international instrument such as the Treaty or the Nagoya Protocol; compliance of users with PIC and MAT; and compliance with domestic legislation of the providing country. With

⁹⁴ Mason, P.G., *et al.* 2018. Best practices for the use and exchange of invertebrate biological control genetic resources relevant for food and agriculture. *Biocontrol*, 63: 151, DOI: 10.1007/s10526-017-9810-3.

⁹⁵ Nagoya Protocol, Article 10; Decisions NP-1/10 and NP-2/10.

regard to the third type of compliance, the Nagoya Protocol requires each Party to take appropriate, effective and proportionate legislative, administrative or policy measures to provide that genetic resources utilized within its jurisdiction have been accessed in accordance with PIC and that MAT have been established, as required by the domestic ABS legislation or regulatory requirements of the other Party. Parties to the Nagoya Protocol shall also take measures to address non-compliance with user country measures and cooperate in cases of alleged violations.⁹⁶ To support compliance, Parties to the Nagoya Protocol shall also take measures, as appropriate, to monitor and to enhance transparency about the utilization of genetic resources, which shall include the designation of one or more checkpoints.⁹⁷ It should be noted that under the Treaty, access shall be accorded expeditiously without the need to track individual accessions.⁹⁸



Sometimes the unknown origin of AnGR in older collections, genebanks or in herds may make it difficult to determine the countries of origin during the checks of user compliance.

77. Compliance measures may pose challenges to the food and agriculture sector if the ABS status of GRFA used in breeding is unknown to users. Governments may wish to consider distinctive solutions to this problem, including through supporting the development of subsectoral standards building on current best practices, such as the breeders' exemption, or putting in place multilateral solutions.

⁹⁶ Nagoya Protocol, Article 15 & 16.

⁹⁷ Nagoya Protocol, Article 17.

⁹⁸ Treaty, Article 12.3(b).

ANNEX

Distinctive features of genetic resources for food and agriculture – revised

The distinctive features of GRFA requiring distinctive solutions for ABS are presented below in seven clusters. They aim to reflect an equilibrium between all subsectors of food and agriculture. Not every feature is necessarily applicable to each and every GRFA and the various subsectors often have different features. Further detailing of subsector-specific features may still be developed.

The features are distinctive, but not necessarily unique to GRFA. While other genetic resources may share with GRFA some of the features listed below, the specific combination of these features distinguishes GRFA from most other genetic resources.

For the purpose of this table InGR are considered invertebrate BC agents. Invertebrate pollinators are considered animal genetic resources. Aquatic invertebrates used for food are considered aquatic genetic resources. InGR used for other purposes of relevance to agriculture could be addressed in future work.

		AnGR ⁹⁹	FGR ¹⁰⁰	PGR ¹⁰¹	AqGR ¹⁰²	MoGR ¹⁰³	InGR ¹⁰⁴
A. The role of GRFA for food security	A.1 GRFA are an integral part of agricultural and food production systems and play an essential role in achieving food security and the sustainable development of the food and agriculture sector.	+	+	+	+	+	+
	A.2 Plant, animal, invertebrate and micro-organism GRFA form an interdependent network of genetic diversity in agricultural ecosystems.	+	+	+	+	+	+
B. The role of human management	B.1 (a) The existence of most GRFA is closely linked to human activity and (b) many GRFA can be regarded as human-modified forms of genetic resources.	+	-	+	-/+	(a): - (b): -/+	-
	B.2 The maintenance and evolution of many GRFA depend on continued human intervention, and their sustainable utilization in research, development and production is an important instrument with which to ensure conservation.	+	-	+	+	-	-
	C.1 Historically, GRFA have been widely exchanged across	+	-	+	-/+	-	+

⁹⁹ CGRFA/WG-AnGR-10/18/Report, *Appendix B.I*.

¹⁰⁰ CGRFA/WG-FGR-5/18/Report, paragraph 22.

¹⁰¹ CGRFA/WG-PGR-9/18/Report, paragraph 38.

¹⁰² CGRFA/WG-AqGR-2/18/Report, *Appendix B*.

¹⁰³ CGRFA/EG-MIGR-1/18/Report, *Appendix C*.

¹⁰⁴ CGRFA/EG-MIGR-1/18/Report, *Appendix C*.

C. International exchange and inter-dependence	communities, countries and regions, often over long periods of time, and a relevant part of the genetic diversity used in food and agriculture today is of exotic origin.						
	C.2 Countries are interdependent with regard to GRFA and act both as providers of some GRFA and as recipients of others.	+	+	+	+	+	+
	C.3 The international exchange of GRFA is essential to the functioning of the sector, and its importance is likely to increase in future.	+	+	+	+	+	+
D. The nature of the innovation process	D.1 The innovation process for GRFA is usually of incremental nature and the result of contributions made by many different people, including indigenous and local communities, farmers, researchers and breeders, in different places and at different points in time.	+	+	+	-/+	-	-
	D.2 Many GRFA products are not developed out of an individual genetic resource, but with the contributions of several GRFA at different stages in the innovation process.	0	-	+	-/+	-	-
	D.3 Most products developed with the use of GRFA can in turn be used as genetic resources for further research and development, which makes it difficult to draw a clear line between providers and recipients of GRFA.	0	+	+	+	+	+
	D.4 Many agricultural products reach the market place in a form in which they may be used both as biological resources and as genetic resources.	0	+	+	-/+	+	+
E. Holders and users of GRFA	E.1 (a) GRFA are held and used by a broad range of very diverse stakeholders. (b) There are distinct communities of providers and users with respect to the different subsectors of GRFA.	+	-	+	-/+	(a): + (b): +	(a): - (b): +
	E.2 The different stakeholders managing and using GRFA are interdependent.	+	+	0	+	-	-
	E.3 A significant amount of GRFA is privately held.	+	-	0	+	-	-
	E.4 An important part of GRFA is held and can be accessed <i>ex situ</i> .	0	-	+	-/+	+	-
	E.5 An important part of GRFA is conserved <i>in situ</i> and on farm under	+	+	+	+	+	+

	different financial, technical and legal conditions.						
F. GRFA exchange practices	F.1 The exchange of GRFA takes place in the context of customary practices and existing communities of providers and users.	+	+	+	-/+	+	+
	F.2 Extensive transfer of genetic material between different stakeholders along the value chain occurs in research and development.	+	-	+	+	-	-
G. Benefits generated with the use of GRFA	G.1 (a) While the overall benefits of GRFA are very high, (b) it is difficult to estimate at the time of the transaction the expected benefits of an individual sample of GRFA.	0	+	+	+	(a): -/+ (b): +	(a): - (b): +
	G.2 The use of GRFA may also generate important non-monetary benefits.	+	+	+	+	+	+
	G.3 The use of GRFA may lead to external effects going far beyond the individual provider and recipient.	+	+	+	+	+	+

Note: The Intergovernmental Technical Working Groups on Animal, Aquatic, Plant and Forest Genetic Resources and the Expert Group on Micro-organism and Invertebrate Genetic Resources, in reviewing the distinctive features, highlighted features particularly relevant (marked in the table above by plus signs [+]) or less (or not) relevant (marked in the table by minus signs [-]) to their respective subsectors. Features considered as neutral to a subsector are marked by zero [0]. Distinctive features which a Working Group considered particularly relevant to a subgroup of its subsector and less (or not) relevant to other subgroup(s) are marked by plus and minus signs (-/+).

APPENDIX C

BIODIVERSITY FOR FOOD AND AGRICULTURE – REVISED DRAFT NEEDS AND POSSIBLE ACTIONS

1. Introduction

1. Biodiversity for food and agriculture (BFA), along with the ecosystem services it supports, is essential to sustainable food and agriculture. It is necessary to enable production systems and livelihoods to cope with and evolve under changing social, economic and environmental conditions, is a key resource in efforts to ensure food security and nutrition while limiting or reducing negative impacts on the environment, and makes multiple contributions to the well-being and livelihoods of many households.

2. Over recent decades, the importance of biodiversity and ecosystem services to food security and nutrition, rural and coastal livelihoods, human well-being and sustainable development more generally has gradually been acquiring greater recognition on international agendas. In 1995, the Commission on Plant Genetic Resources became the Commission on Genetic Resources for Food and Agriculture (Commission) and acquired a mandate covering all components of biodiversity of relevance to food and agriculture. Over the years, the Commission has overseen global assessments of genetic resources in the plant, animal, forest and aquatic sectors and adopted global plans of action for genetic resources in the first three of these sectors (referred to in this text as the sectoral global plans of action).¹ The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, include a number of targets related to the sustainable use and conservation of biodiversity in the context of food and agriculture, including those developed by the Commission. Other global assessments, such as those undertaken by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and reporting by countries on achievements in the implementation of their National Biodiversity Strategies and Action Plans (NBSAPs) to achieve the Convention on Biological Diversity's (CBD's) Aichi Biodiversity Targets, have increased awareness about biodiversity in general and its contribution to livelihoods and human well-being in particular.

3. In adopting its Multi-Year Programme of Work, the Commission, at its Eleventh Regular Session, decided to initiate a country-driven process for the preparation of *The State of the World's Biodiversity for Food and Agriculture* (Report). In 2013, FAO invited Member Countries to submit country reports on the state of their BFA. At its Sixteenth Regular Session, in January 2017, the Commission requested FAO to finalize the Report in 2018.

4. In the course of 2016, the Commission held informal regional consultations to share information on, and identify needs and possible actions for, the sustainable use and conservation of

¹ FAO. 1996. *The State of the World's Plant Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-w7324e.pdf>); FAO. 2007. *The State of the World's Animal Genetic Resources for Food and Agriculture..* Rome (available at <http://www.fao.org/3/a-a1260e.pdf>); FAO. 2007. *The Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration*. Rome (available at <http://www.fao.org/docrep/010/a1404e/a1404e00.htm>); FAO. 2010. *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Rome. (available at <http://www.fao.org/docrep/013/i1500e/i1500e.pdf>); FAO. 2011. *Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture*. Rome. (available at <http://www.fao.org/docrep/015/i2624e/i2624e00.htm>); FAO. 2014. *The State of the World's Forest Genetic Resources*. Rome (available at <http://www.fao.org/3/a-i3825e.pdf>); FAO. 2014. *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*. Rome (available at <http://www.fao.org/3/a-i3849e.pdf>); FAO. 2015. *The Second Report on the State of World's Animal Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-i4787e.pdf>); FAO. forthcoming. *The State of the World's Aquatic Genetic Resources for Food and Agriculture*. Rome.

BFA. The needs and possible actions for the sustainable use and conservation of BFA identified in this document are the result of these regional consultations.

5. This document identifies needs and priority actions for BFA, i.e. “the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the ecosystem structures, functions and processes in and around production systems, and that provide food and non-food agricultural products”.² “Production systems” are taken to include those in the crop, livestock, forest, fishery and aquaculture sectors. As per FAO’s definition, agriculture is inclusive of forestry, fisheries and aquaculture. Further concepts used in this document are described in Annex 1.

2. Rationale

6. BFA, i.e. biodiversity that in one way or another contributes to agriculture and food production, is indispensable to food security and nutrition, sustainable development and the supply of many vital ecosystem services. Many countries have taken action to sustainably use and conserve, through various strategies, a range of plant, animal, forest and aquatic genetic resources. The Commission has provided and continues to provide guidance on the sustainable use and conservation of the various components of BFA through important, though mainly sector-specific, instruments and decisions. FAO monitors the implementation of these instruments and reports back to the Commission on their status of implementation and the status of the different sectors of genetic resources for food and agriculture (GRFA). However, there is a need for integrated management of the various components of BFA, going beyond sector-specific GRFA strategies and sustainably using and conserving BFA, including all GRFA, through more systematic approaches. Specific measures are needed in order to reverse the ongoing loss of BFA, improve its conservation and ensure its sustainable use through holistic and cross-sectoral management approaches, at genetic, species and ecosystem levels.

7. Key features of BFA include the following:

Important components of BFA³

- GRFA are a key component of BFA. Knowledge of the characteristics, population status, breeding for sustainable use and conservation of GRFA exists – for example, of crop varieties, livestock breeds, tree and other woody plant species, aquatic strains and species, micro-organisms and invertebrates, i.e. those directly used in the various sectors – although with regional and sectoral differences.
- Associated biodiversity is another component of BFA and is essential to the supply of many ecosystem services that underpin food and agricultural production. Components of associated biodiversity, for example pollinators, soil and aquatic organisms and the natural enemies of pest species in and around crop, livestock, forest and aquatic production systems, play a significant role in maintaining or increasing biodiversity within these systems, thus strengthening rural livelihoods, improving food security and nutrition and enhancing sustainability and resilience in the face of challenges such as climate change.
- The wild foods component of BFA encompasses those that contribute to major economic sectors such as capture fisheries, and a wide range of other, mostly locally harvested, fungi, plants and animals, including invertebrates. They are important for food security and nutrition in many countries, yet are increasingly at risk of loss. Wild species harvested as sources of food are an important, but often overlooked, component of biodiversity in and around production systems. Some wild foods are relatives of

² FAO. 2013. *Guidelines for the preparation of the country reports for The State of the World’s Biodiversity for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-as644e.pdf>).

³ See Annex 1 for descriptions of concepts used in this document.

domesticated species, have potential for domestication and provide a pool of genetic resources for hybridization and selection.

Assessment and monitoring

- Knowledge of the state of associated biodiversity, ecosystem services and wild foods varies from region to region and is often incomplete. Many invertebrates and micro-organisms, as well as some plant and other animal species, found in and around production systems, have not been recorded or characterized, and their functions within ecosystems remain poorly understood.
- The underdeveloped state of monitoring programmes for associated biodiversity and wild foods means that data on their status and trends are inevitably patchy. Population surveys and proxy measures provide an indication of the status of individual categories of associated biodiversity at local, national or regional levels. Data of this kind present a mixed picture, but there are many grounds for concern about the decline of key components of associated biodiversity.

Drivers of change

- Associated biodiversity and the ecosystem services it delivers are being affected, often negatively, by a range of drivers. Yet they can also serve as a source of resilience to the effects of many of these drivers and as a basis for the adaptation of production systems to current and future challenges. Drivers range from local to global in scale and from developments in technology and management practices within the food and agriculture sector to wider environmental, economic, social, cultural and political factors.

Legal and policy frameworks

- Most countries have put in place policy and legal frameworks targeting the sustainable use and conservation of biodiversity as a whole, and many have nature-protection measures in place for wild biodiversity, often complemented by specific policies for specific GRFA, or they may integrate GRFA into sectoral or rural-development policies. Policies addressing the management of food and agricultural production systems are increasingly based on ecosystem, landscape and seascape approaches. However, these legal and policy frameworks often lack a specific focus on associated biodiversity or wild foods. While national and international agreements are in place to reduce overexploitation of captured fish species or forests, legal and policy measures explicitly targeting other wild foods or components of associated biodiversity and their roles in supplying ecosystem services are not widely reported.
- A number of obstacles constrain the development and implementation of effective policies addressing the sustainable use and conservation of BFA, and of associated biodiversity in particular. Implementation is sometimes hampered by a lack of human and financial resources, a lack of awareness and knowledge on the part of stakeholders, a lack of political will and/or governance and a lack of cooperation among relevant agencies.

Management and cooperation

- Efforts to manage BFA, especially associated biodiversity, to promote the supply of regulating and supporting ecosystem services are widely reported.
- The use of a range of management practices regarded as favourable to the sustainable use and conservation of BFA is reported to be increasing. However, knowledge of how these practices influence the status of BFA still needs to be improved.
- Sustainable management of BFA and promotion of its role in the supply of ecosystem services require multi-stakeholder, cross-sectoral and international cooperation. The use of BFA spans international borders and the conventional boundaries between sectors. Frameworks for cooperation at national, regional and international levels in the

management of genetic resources are relatively well developed in the individual sectors of food and agriculture.

8. The sustainable use and conservation of BFA face several challenges. For example, BFA covers many fields and sectors – ranging from GRFA to associated biodiversity, such as pollinators and soil micro-organisms, to habitats and ecosystems – that cannot be managed in isolation. Among the challenges reported by countries is the need to put in place cross-sectoral collaboration and cooperation mechanisms to manage BFA effectively.

9. The Commission's sectoral global plans of action address GRFA and set out strategic priorities for the sustainable use, development and conservation of genetic resources, as well as provisions related to collaboration, financing and implementation. The Commission guides, supports and monitors the implementation of the sectoral global plans of action and assesses, at regular intervals, the status of their implementation and of the respective components of GRFA.

10. The needs and [possible] actions compiled in this document reflect the challenges identified by countries during the preparation of the Report. A strong emphasis is placed on actions that seek to further improve knowledge of BFA, in particular of the species and ecosystem-level components, for example associated biodiversity, that lag behind others in this respect, and of the impacts of management practices and approaches on BFA. Also stressed is the need to implement practical approaches and actions to improve the management of BFA. Even greater emphasis is given to the importance of cooperation and collaboration, at all levels, in the management, sustainable use and conservation of BFA.

11. Recognizing the importance of avoiding duplication, and the need for collaboration and coordination, this document provides an overarching framework for the sustainable use and conservation of BFA as a whole. Action should be taken by countries in accordance with their national priorities and international commitments, as appropriate. The document neither changes, nor replaces, the Commission's existing sectoral global plans of action. Instead, it complements them and creates an overall enabling framework for their consistent and coherent implementation. Also, in view of the cross-sectoral work of the Commission on access and benefit-sharing for GRFA, the document does not refer to access and benefit-sharing issues.

3. Nature of the document

12. This document aims to promote coordinated action across sectors relevant to BFA at genetic, species and ecosystem levels. It is voluntary and non-binding. It does not aim to replace or duplicate the sectoral global plans of action for GRFA, or other international agreements, but to strengthen their harmonious implementation, as applicable. The document should be updated as and when required.

4. Objectives

13. With regard to BFA, especially associated biodiversity, and the regulating and supporting ecosystem services it underpins, the actions contained in this document aim to:

- raise awareness of the importance of BFA among all stakeholders involved, from producers to consumers and policy-makers;
- create an enabling framework for the coherent and consistent implementation of the Commission's existing sectoral global plans of action and for the sustainable use and conservation of associated biodiversity and wild foods and thus for the conservation of all BFA, as a basis for food security, sustainable food and agriculture and poverty reduction;
- promote the management and sustainable use of BFA, in particular associated biodiversity and wild foods, within production systems and terrestrial and aquatic ecosystems, as a basis for ecosystem services and resilience, in order to foster economic development and to reduce hunger and poverty, particularly in developing countries, as well as to provide options for adapting to and mitigating climate change;

- set the conceptual basis and framework for the development and adoption of national policies, legislation and programmes for the management, sustainable use and conservation of BFA;
- increase national, regional and international cross-sectoral cooperation and information-sharing and enhance institutional capacity, including in research, education and training on the sustainable use and conservation of BFA;
- improve data collection and the development of metrics and indicators to measure the impact of management practices and approaches on the sustainable use and conservation of BFA at genetic, species and ecosystem levels; and
- reduce unintended and unnecessary duplication of actions in order to promote efficiency and effectiveness in global, regional and national efforts to sustainably use and conserve BFA.

5. Structure and organization

14. The document presents a set of integrated and interlinked [possible] actions, organized into three priority areas, for the sustainable use and conservation of BFA. Many of these [possible] actions are relevant to more than one priority area.

Priority Area 1: Assessment and monitoring of biodiversity for food and agriculture

Priority Area 2: Management of biodiversity for food and agriculture

Priority Area 3: Institutional frameworks for biodiversity for food and agriculture

15. The [possible] actions are not listed in order of priority, as the relative priority of each area for [possible] action and associated timelines may vary significantly across countries and regions. Relative priority may depend on the components of BFA themselves, the natural environment or production systems involved, current management capacities, financial resources or policies already underway for the management of BFA.

16. For each area of [possible] action, an introduction presents the needs identified on the basis of country reports prepared as contributions to the Report and the consultative processes described above. A number of specific priorities are then presented. Each priority consists of a rationale and a set of individual [possible] actions.

**PRIORITY AREAS FOR THE SUSTAINABLE USE AND CONSERVATION OF
BIODIVERSITY FOR FOOD AND AGRICULTURE**

**PRIORITY AREA 1: ASSESSMENT AND MONITORING OF BIODIVERSITY FOR FOOD
AND AGRICULTURE**

- 1.1** Improve availability of, and access to, information on biodiversity for food and agriculture

**PRIORITY AREA 2: MANAGEMENT OF BIODIVERSITY FOR FOOD AND
AGRICULTURE**

- 2.1** Promote integrated approaches to the management of biodiversity for food and agriculture
2.2 Improve conservation of biodiversity for food and agriculture

**PRIORITY AREA 3: INSTITUTIONAL FRAMEWORKS FOR BIODIVERSITY FOR
FOOD AND AGRICULTURE**

- 3.1** Build capacity through awareness raising, research, education and training
3.2 Strengthen legal, policy and incentive frameworks
3.3 Cooperation and funding

PRIORITY AREA 1: ASSESSMENT AND MONITORING OF BIODIVERSITY FOR FOOD AND AGRICULTURE

Introduction

The identification, characterization, assessment and monitoring of biodiversity for food and agriculture (BFA) (see Annex 1 for concepts used in this document) are essential to its sustainable use and conservation. The assessment and monitoring of the state and trends of BFA and of its management at national, regional and global levels are uneven, and often limited and partial. The extent and character of existing knowledge gaps also vary significantly across the various categories of BFA.

In the case of domesticated plant, animal and aquatic genetic resources for food and agriculture (GRFA) – and of species that are widely harvested from the wild (e.g. forest trees and other woody plant species and species in capture fisheries) – inventories and information exist, although to varying degrees across the regions of the world and across sectors. At global level, monitoring systems for GRFA have been developed, for example the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS), the Domestic Animal Diversity Information System (DAD-IS) and the FAO Worldwide Information System on Forest Genetic Resources (Reforgen).

Monitoring of major ecosystems of importance to food and agriculture is generally conducted at national, regional and global levels for inland and coastal wetlands, coral reefs, mangroves, seagrass beds, forests and rangelands, although at varying levels of comprehensiveness.

In contrast, many associated biodiversity species that provide regulating and supporting ecosystem services, particularly micro-organisms and invertebrates, have not been identified and documented. Population trends are relatively well documented for some taxonomic groups (such as some vertebrates) but, for others, knowledge is almost non-existent. In many cases, characterization and systematization of individual species are very difficult, and metagenomics and other “omics” methods can be used to identify assemblages.

In many cases, the contributions of specific components of BFA to the supply of ecosystem services are poorly understood, as are the effects of particular drivers (including climate change) on population sizes and distributions and on the ecological relationships that underpin the supply of ecosystem services.

In view of the above, there is an overall need to improve the availability of data and information. More specific needs include improving methodologies for recording, storing and analysing data (including geographic information systems) on changes in the abundance and distribution of species and ecosystems and improving capacity for monitoring and assessment, for example by increasing the number of skilled taxonomists.

Priority 1.1 Improve availability of, and access to, information on biodiversity for food and agriculture

Rationale

BFA is composed of a myriad of species, and within them of populations, varieties, breeds and strains. Recognizing the central importance of GRFA, and of their characterization, assessment and monitoring, provisions for these actions have been agreed in the sectoral global plans of actions for the respective genetic resources.

There is a need to improve knowledge of other species of importance to food and agriculture, for example associated biodiversity providing pollination and pest and disease regulation services and wild foods, as well as entire ecosystems and habitats, building on and strengthening existing data where possible. Given the wide scope of these components of BFA and variations in the needs and capacities of countries, priority species, ecosystems or ecosystem services for assessment and monitoring need to be established at national level.

A wide range of management practices and approaches exist that make use of various components of BFA and are thus considered to contribute to its maintenance and enhanced use. Such practices and approaches include those used at production level (e.g. conservation agriculture, pollination management, organic agriculture and integrated pest management), mixed production systems (e.g. agroforestry, integrated crop–livestock–aquatic systems and diversification practices in aquaculture), restoration practices, and approaches at terrestrial and aquatic ecosystem level (e.g. ecosystem approaches to fisheries and aquaculture, sustainable forest management and agroecology). However, in most cases, it is difficult to evaluate the extent to which these are being used, owing to the variety of scales and contexts involved and the absence of information on the application of practices. Although the impacts of BFA-focused practices on BFA are generally perceived to be positive, there is clearly a need for more research and for the development of appropriate assessment methods in this regard.

[Possible] Actions

Genetic resources for food and agriculture

1.1.1 Promote the implementation of the sectoral global plans of action to improve the characterization, assessment and monitoring of the respective genetic resources, as appropriate.

Associated biodiversity and ecosystem services

1.1.2 Improve understanding of the effects of particular drivers (including climate change) on population sizes and distributions of associated biodiversity and on the ecological relationships that underpin the supply of ecosystem services.

1.1.3 Identify priority species, ecosystems and ecosystem services, as relevant, for assessment and monitoring at national level.

1.1.4 Identify responsibilities for assessment and monitoring of associated biodiversity and their ecosystem services. This could involve mandating a national agency (e.g. from the agriculture or environment sectors, or both) to collect data and undertake monitoring activities.

1.1.5 Use, to the extent feasible, existing monitoring systems (e.g. those developed for the Sustainable Development Goals [SDGs], Convention on Biological Diversity [CBD] or the Commission) and existing data and indicators at national level and explore the potential of indicators that serve multiple purposes.

1.1.6 Taking into account relevant international initiatives and existing tools and methodologies, strengthen existing and/or develop new tools, standards and protocols for data collection, inventory, assessment and monitoring.

1.1.7 Integrate existing national monitoring systems (e.g. those developed for the SDGs, CBD or the Commission) into an overarching framework for BFA, with a view to improving the assessment and monitoring of BFA by making full use of all existing data and indicators at national level.

Integrated management

1.1.8 Develop tools for data collection and methodology for their analysis, knowledge management systems and methods for exchange and dissemination of BFA-related knowledge, including on its integrated management, in a participatory way.

1.1.9 Improve the availability of the data needed to monitor the extent to which management practices and approaches are being used, taking into account traditional knowledge.

1.1.10 Develop and apply methods, including proxies, to assess the impact of management practices on BFA and the provision of ecosystem services.

PRIORITY AREA 2: MANAGEMENT OF BIODIVERSITY FOR FOOD AND AGRICULTURE

Introduction

Managing the capacity of BFA to supply various ecosystem services involves a range of activities at a range of levels (from genetic and species to landscape or seascape levels). These activities involve the sustainable use and the conservation of BFA.

In the case of BFA, “use” includes the various practices and activities involved in cultivating or raising domesticated species, the implementation of formal or informal genetic-improvement activities and the domestication of additional wild species, the introduction of domesticated or wild species into new production systems, the management of wild species and associated biodiversity and their habitats in and around production systems to promote the delivery of ecosystem services, and the harvesting of food and other products from the wild.

The term “sustainable use” applied to associated biodiversity involves two main areas: (a) the management *in situ* of all BFA to maintain the diversity of organisms and their interactions to ensure the continued provision of ecosystem services, and (b) the targeted domestication and selection of species to improve the delivery of ecosystem services. It is widely acknowledged that the management of diversity, including habitats for associated biodiversity species, contributes to building resilient production systems and livelihoods, promoting food security and nutrition and sustainably intensifying food and agricultural production. With a few exceptions, selection and genetic improvement do not focus on associated biodiversity species.

Numerous management practices and approaches applied at farm, tree-stand or other production unit level, or at ecosystem, land or seascape levels, are considered to be of positive influence on the sustainable use and conservation of BFA. At the same time, the principal drivers of change at production-system level that negatively impact BFA and associated ecosystem services are related to management practices, including changes in land and water use and management, pollution and overuse of external inputs, and overexploitation and overharvesting of resources. The development, adoption and implementation of BFA-focused practices and approaches, and the mitigation and avoidance of negative ones, face several challenges. For one, while each component of BFA – from individual genes and species of plants, animals and micro-organisms to entire ecosystems – is important, it does not exist in isolation and must, therefore, be managed as part of the wider landscape or seascape. This requires, *inter alia*, bringing together and engaging the diverse stakeholders operating within the respective landscape or seascape.

Other priorities for the management of BFA could include:

- i) promoting activities to strengthen and maintain traditional knowledge that contributes to the sustainable management of BFA. Much knowledge has already been lost without ever having been documented, and this loss is ongoing as the use of traditional practices dwindles;
- ii) maintaining areas of natural or semi-natural habitat within and around production systems, including those that are intensively managed, where necessary restoring or reconnecting damaged or fragmented habitats;
- iii) addressing specific threats such as invasive alien species or particular unsustainable practices in agriculture, forestry, fisheries or aquaculture; and
- iv) promoting and expanding the development, adoption and implementation of ecosystem or landscape/seascape approaches in the management of production systems to ensure the supply of ecosystem services and improve livelihoods.

In the context of BFA, *in situ* conservation comprises measures that promote the maintenance and continued evolution of biodiversity in and around crop, livestock, forest, aquatic and mixed production systems. *Ex situ* conservation comprises the conservation of components of BFA outside their normal habitats in and around production systems. This may involve the maintenance of live

organisms at sites such as botanical gardens, *ex situ* stands, aquaria, field gene banks, zoos or rare-breed farms, or storage of seeds, pollen or vegetative plant tissues or cryoconserved materials, such as animal semen or embryos, in genebanks.

Priorities for the conservation of GRFA have been agreed by the Commission in the sectoral global plans of action. In general, *ex situ* conservation has made progress in the past decade in all sectors of GRFA, while *in situ* and on-farm conservation face greater challenges, including those related to economic drivers.

In view of the above, inadequate funding and a lack of trained personnel are common resource constraints, as is a lack of technical resources. Where human resources are concerned, weaknesses are particularly noticeable in taxonomy and systematics. The lack of an interdisciplinary approach in research hampers efforts to improve conservation methods and strategies. A lack of resources makes it more difficult to bridge knowledge gaps of the kind described above, and constrains programme implementation or prevents effective enforcement of regulations aimed at protecting biodiversity. Conservation-related education, training and awareness-raising activities for stakeholders at all levels from producers to policy-makers need to be strengthened.

The other main category of constraints comprises weaknesses in legal, policy and institutional frameworks and/or their implementation. The provision of regulating and supporting ecosystem services and the conservation of the associated biodiversity that underpins them are not sufficiently mainstreamed into policies targeting the various sectors of food and agriculture and those addressing other sectors of the economy. There is also limited focus on associated biodiversity in general biodiversity-related policy frameworks. In countries that have developed relevant policies and laws, these are often not properly implemented.

Lack of collaboration and coordination between stakeholders is another widely recognized constraint. Generally, there is a lack of cross-sectoral coordination, including at policy level. There are constraints associated with a lack of adequate links between ministries, between researchers and policy-makers and between policy-makers and producers or local communities.

Priority 2.1 Promote integrated approaches to the management of biodiversity for food and agriculture

Rationale

A wide range of management practices and approaches can be identified that make use of various components of BFA and therefore contribute to its maintenance and enhanced use, within and outside production systems. Associated biodiversity, in particular, is often managed indirectly rather than through specific actions targeting its sustainable use or conservation.

Management approaches for BFA range in scope from the landscape or seascape to the production system or the individual plot. Landscape and seascape approaches and integrated land- and water-use planning have been adopted, at least to some extent, in numerous countries. Sustainable forest management, the ecosystem approach to fisheries and aquaculture, agroecology and restoration practices are also applied in many countries. At production system level, specific practices related to the diversification of production systems, and specific management practices and production approaches, may promote the sustainable use and conservation of BFA. Such approaches and practices should be more widely applied. However, a lack of research and knowledge, capacity and resources and enabling frameworks makes their adoption and implementation difficult.

Many of the management practices and approaches that make use of various components of BFA are relatively complex and require a good understanding of the species composition of the ecosystem, the functions of these species within the ecosystem and the trophic relationships among them. Such practices and approaches can be knowledge-intensive, context-specific and provide benefits in the long term rather than the short term. Technical and policy support, as well as capacity development, are needed to overcome these challenges and promote wider implementation.

[Possible] Actions*Genetic resources for food and agriculture*

2.1.1 Promote the implementation of the sectoral global plans of action to improve the sustainable use of the respective genetic resources.

Integrated management

2.1.2 Promote sustainable food and agricultural production practices and approaches that make use of, conserve and restore BFA while improving livelihoods and supporting economic performance and environmental health.

2.1.3 Take into account drivers of change that negatively affect BFA and associated ecosystem services when developing or implementing integrated approaches to the management of BFA.

2.1.4 Promote research, including participatory research, on management practices and approaches that make use of various components of BFA.

2.1.5 Identify best management practices (including those based on traditional knowledge) that contribute to the increased sustainable use and conservation of BFA and develop guidelines and tools to facilitate their implementation, as appropriate.

Priority 2.2 Improve conservation of biodiversity for food and agriculture**Rationale**

Conservation systems for GRFA exist, albeit with regional differences in their coverage and effectiveness, and priorities for their conservation have been agreed by the Commission in the sectoral global plans of action. There are many challenges to the conservation of associated biodiversity, including a lack of adequate information on methods and strategies for both *in situ* and *ex situ* conservation. Especially with respect to *ex situ* conservation, there are still biological and technical barriers to the long-term conservation of some species, for example those that cannot be cultured. Another practical constraint is the difficulty of targeting individual associated biodiversity species for conservation programmes. In many cases, it may prove more efficient to prioritize conservation methods and approaches targeting ecosystems than those targeting individual species.

Priorities for action in other priority areas include addressing the underlying knowledge, resource and policy-related constraints to the establishment of effective conservation programmes for associated biodiversity. With respect to conservation activities and strategies *per se*, priority should be given to expanding the use of *in situ* conservation via biodiversity-friendly management practices in agriculture, forestry, fisheries and aquaculture, including, where relevant, traditional management practices associated with local or indigenous communities. It is important in this context to improve landscape structure to provide habitats for associated biodiversity species. Intercommunity and intracommunity, as well as intergenerational transfer of knowledge and skills that enable continued conservation, development and sustainable use of BFA and its related ecosystem functions, should be promoted.

[Possible] Actions*Genetic resources for food and agriculture*

2.2.1 Promote the implementation of the sectoral global plans of action to improve the *in situ*, on-farm and *ex situ* conservation of the respective genetic resources.

Associated biodiversity and ecosystem services

2.2.2 Identify priority species, ecosystems and ecosystem services for conservation at national level and establish targets or goals relative to these priorities.

2.2.3 Strengthen conservation programmes, in particular *in situ* or on-farm conservation, which may be more effective for many types of associated biodiversity and wild foods, and seek to optimize complementarity between *in situ* and *ex situ* conservation approaches, where appropriate.

2.2.4 Promote conservation through a combination of traditional management practices and innovative technologies, as appropriate, and improve their use for characterization, collection, storage, documentation or data management.

2.2.5 Establish or strengthen effective infrastructure, including at local level, for the conservation of micro-organism, invertebrate and other associated biodiversity species, and improve documentation and overviews of collections within countries.

2.2.6 Create and strengthen networks, including at national and regional levels, linking users and communities that maintain associated biodiversity and ecosystem services on-farm and *in situ*, research institutes, scientists and other relevant stakeholders.

Integrated management

2.2.7 Promote multipurpose production systems managed for both sustainable use and conservation of BFA, such as multiple-use forests.

2.2.8 Develop or expand designated areas, such as protected areas (including International Union for Conservation of Nature Categories 5 and 6) and other effective area-based conservation measures for BFA and related ecosystem services, as well as Globally Important Agricultural Heritage Systems and areas recognized for origin-linked products (e.g. geographic indications).

PRIORITY AREA 3: INSTITUTIONAL FRAMEWORKS FOR BIODIVERSITY FOR FOOD AND AGRICULTURE

Introduction

In developing countries in particular, increasing demand for food production is driving rapid structural change in agriculture sectors, often related to land-use change and habitat degradation and fragmentation. Proper policies and management frameworks, including spatial and physical planning, are essential to ensure the conservation of BFA and the provision of ecosystem services, sustainable production and human well-being and health.

In addition to developing national planning capacity, popular awareness of the importance of BFA needs to be increased in order to promote investments in the sustainable management of BFA. In many instances to date, agriculture-sector development has focused on the promotion of intensification packages that depend on external inputs, rather than on improving management of associated biodiversity to promote the supply of regulating and supporting ecosystem services.

As noted under Priority Area 1, one of the major constraints to the development, adoption and implementation of policies for the sustainable use and conservation of BFA is the significant lack of data on the characteristics of ecosystems and limited understanding of ecosystem functions and services, and specifically the roles of BFA in this context.

As noted under Priority Area 2, other constraints include weaknesses in legal, policy and institutional frameworks. Regulating and supporting ecosystem services, and the conservation of the associated biodiversity that underpins their supply, are insufficiently mainstreamed into sectoral policies, both within food and agriculture and beyond. General biodiversity-related policy frameworks usually give limited attention to associated biodiversity. Where relevant policies and laws exist, their implementation is often inadequate. Lack of consultation between policy-makers at national or regional levels and stakeholders at local level is leading to a disconnection between political and operational levels.

Producers in all agriculture sectors rely on BFA. Despite their significance to BFA management, small-scale and indigenous producers – including women – are often marginalized and excluded from decision-making processes that affect their production systems. Many producers' and community-based organizations play significant roles both in providing practical support to the sustainable management of BFA and in advocating policies or marketing strategies that support the roles of small-scale producers as custodians of BFA.

Many small-scale producers depend on communal resources for their livelihoods. Social and economic policies need to aim at ensuring equity for rural populations, so that they are enabled to build up, in a sustainable way, their productive capacity to supply goods and services in increasing quantity and of increasing quality to expanding national economies. This includes regulating and supporting ecosystem services for clean water, fresh air and healthy soils, for which no market exists in many countries.

Economic valuation tools can help to make the hidden benefits and costs of biodiversity and biodiversity loss more visible, increasing awareness of the need for conservation and driving more effective conservation policies, including incentive schemes. However, quantifying the values of ecosystem services and biodiversity is often challenging because of the difficulty and cost of data collection, the complexity of the ecological processes involved, and geographical and cultural differences in how biodiversity and the benefits it provides are perceived. A number of country reports highlight the importance of valuation studies, but note that major knowledge gaps remain.

In many countries, the market for certified products with health-promoting attributes or products that comply with environmental or social standards can be expected to increase. Such increased consumer demand provides opportunities for producers to combine income generation with biodiversity-friendly production. An increased share of high-value products, linking back to specific biodiversity-friendly production practices, may contribute to the sustainable use of BFA. Cultural

identity, often expressed in terms of food preferences, can provide a basis for a growing awareness of the value of BFA, including for small producers and currently marginal communities.

Incentives for the sustainable use and conservation of BFA can take a range of forms and originate from public programmes, private-sector investments or civil-society initiatives. Incentive measures are still often absent and where they do exist a lack of coordination in their implementation often hampers success. Combining a range of incentive measures into an integrated package may promote the sustainable use and conservation of BFA.

As noted under Priority Area 2, constraints include a lack of collaboration and coordination between stakeholders. Coordination within and beyond agriculture sectors, including at policy level, is generally weak. Gaps in this regard include a lack of adequate links between ministries, between researchers and policy-makers and between policy-makers and stakeholders at production-system and community levels. The integrated management, sustainable use and conservation of BFA cross the conventional organizational and administrative boundaries between sectors, nationally, regionally and internationally.

In a time of rapid change and growing privatization, national planning will need to ensure the long-term supply of public goods, including biodiversity maintenance and ecosystem services, such as clean air and secure water supplies, and human health. Such national planning will inevitably lead to trade-offs between different national policy goals. Short- and long-term policies for the sector, integrated within the larger cross-sectoral planning framework for the achievement of the SDGs, are required.

Priority 3.1 Build capacity through awareness raising, research, education and training

Rationale

Research, education and training, at all levels, are widely recognized as key means of promoting the sustainable management of BFA. As described in Priority Areas 1 and 2, despite their vital contributions to food and agriculture, knowledge of the many components of BFA, ecosystem services and the impacts of drivers and management practices and approaches needs to be improved to better guide decision-making.

In many developing countries in particular, a lack of human capacity and financial resources is a major obstacle to developing the necessary institutions and to planning and implementing a strategic approach to managing, sustainably using and conserving BFA. For this reason, and in order to achieve these objectives, many countries will need to devote particular attention to establishing and building up relevant institutions, adopting and implementing appropriate policies and effective regulatory frameworks and building a strong and diverse skills base, including in taxonomy and through citizen science.⁴

Education and training in order to build sustainable capacity in all priority areas are required. Research at national and international levels in all aspects of BFA management needs to be strengthened. The support of agricultural research, for example National Agricultural Research Systems (NARS) and research networks on associated biodiversity, is crucial in this context.

[Possible] Actions

Genetic resources for food and agriculture

3.1.1 Promote the implementation of the sectoral global plans of action to raise awareness of the roles and values of GRFA, and build capacity to strengthen research, education and training for their sustainable use and conservation, as appropriate.

⁴ Citizen science refers here to the collection of data relating to biodiversity by the general public.

Associated biodiversity and ecosystem services

3.1.2 Raise awareness at the national level of the importance of associated biodiversity and ecosystem services, and of the need for their sustainable use and conservation, among farmers, livestock keepers, fisherfolk, forest dwellers, the wider public, donors, policy-makers, the private sector, consumers, children and youth and the media.

3.1.3 Support regional and international campaigns to raise awareness of the importance of associated biodiversity and the ecosystem services it provides, and of the need for its sustainable use and conservation, with a view to strengthening support from governments, institutions and other relevant stakeholders.

3.1.4 Improve capacity for research on associated biodiversity and ecosystem services and encourage the formation of multidisciplinary research teams. Promote innovative ways of building capacities, such as through the use of information and communication technologies.

3.1.5 Strengthen cooperation and synergies in research on associated biodiversity and ecosystem services and other components of BFA and improve the transfer of research outputs to producers and policy-makers.

Integrated approaches

3.1.6 Strengthen the teaching of taxonomy, soil science, ecology, systems biology and other cross-sectoral subjects relevant to BFA in universities, schools and in professional and informal education targeting various stakeholders, including citizen scientists.

3.1.7 Integrate BFA issues into education and training so as to promote interdisciplinary skills among practitioners.

3.1.8 Promote opportunities for ongoing training and education for farmers, fisherfolk, livestock keepers and forest dwellers, including via farmer field schools, producer group extension programmes or community-based organizations, to strengthen the sustainable use and management of BFA and the ecosystem services it supports.

3.1.9 Strengthen research-related policy frameworks to ensure support for long-term research activities, and increase the availability of human, physical and financial resources for this purpose.

3.1.10 Incentivize, through various means (e.g. increasing recognition, including through adequate remuneration, providing adequate infrastructures, such as laboratories, and logistical support), education and research in the field of biodiversity.

Priority 3.2 Strengthen legal, policy and incentive frameworks**Rationale**

Appropriate legal and policy frameworks are essential for the effective management of BFA, but often remain underdeveloped or poorly implemented. Improving such frameworks is challenging, particularly in view of the multiple stakeholders and interests involved and the need for provisions to keep up with emerging issues in BFA management. Laws and policies beyond the field of BFA management with indirect or unintended effects on BFA are also often overlooked. With regard to associated biodiversity and ecosystem services in particular, a lack of adequate coordination between the food and agriculture and nature conservation sectors and limited understanding of these components of biodiversity and of their significance to food and agriculture among policy-makers are major constraints to the development of adequate laws and policies.

The importance of valuation of biodiversity and ecosystem services is widely recognized. Nevertheless, the integration of the results of valuation studies into national accounting systems or into broader measures of social welfare is limited. Valuation data could play a more prominent role, *inter alia* in the development of conservation strategies and research programmes. Overall, valuation efforts for BFA and ecosystem services still need to fill major knowledge gaps, including, for example, with respect to microbial genetic resources, wild pollinators and wild medicinal plants.

In terms of the use of incentive programmes, countries often use individual incentive schemes rather than approaches based on multiple incentive measures. While individual public programmes, private-sector investments or civil-society initiatives may provide incentives related to their own particular purposes, a coordinated package of measures can create a much larger impact in terms of improving outcomes for BFA. Challenges to the establishment of multiple-incentive programmes include the need for a suitable enabling environment to support the high level of coordination required between institutions and across scales (international, national and subnational), the need to engage with the private sector and promote responsible investment, and the need for cross-sectoral dialogue, i.e. among the environmental, food and agriculture production and other sectors in the food system. Overall, there is also a need to better document and map incentive schemes.

[Possible] Actions

Genetic resources for food and agriculture

3.2.1 Promote the implementation of the sectoral global plans of action to strengthen institutions and policy frameworks for GRFA, as appropriate.

Integrated approaches

3.2.2 Develop coherent cross-sectoral policies and programmes for the management, sustainable use and conservation of BFA at national and regional levels, addressing the various sectors of GRFA, ecosystem services, associated biodiversity and wild foods and establishing systems or mechanisms that provides integrated and multisectoral support.

3.2.3 Adapt existing or develop new legislation or policies to counter drivers of change that negatively affect BFA and associated ecosystem services.

3.2.4 Mainstream BFA into existing national policies, programmes and strategies on biodiversity (e.g. National Biodiversity Strategies and Action Plans [NBSAPs]) and into those with a possible impact on BFA, for example through the establishment of cross-sectoral (interministerial) and multi-stakeholder working groups (taking into account existing efforts, as relevant).

3.2.5 Encourage relevant international organizations to consider the importance of BFA and the ecosystem services it supports when revising global agreements on biodiversity.

3.2.6 Inventory and review existing legislative, administrative and policy measures on the management, use and conservation of – and access to and exchange of – BFA, their implementation and the extent of their (negative or positive) impacts on the sustainable use of BFA. Where gaps are identified, strengthen or develop such measures, as appropriate.

3.2.7 Develop and standardize valuation methodologies and tools for BFA and ecosystem services.

3.2.8 Conduct assessments, including participatory assessments, of the use and non-use values of BFA, in particular ecosystem services, associated biodiversity and wild foods, building as far as possible on existing information and assessments.

3.2.9 Document and map existing incentive schemes for the improved management of BFA across environmental and food and agriculture sectors and public, non-governmental and private-sector stakeholders.

3.2.10 Strengthen and establish national policies, strategies and frameworks that provide support, including through incentives, to producers and other value-chain actors in applying practices that favour the maintenance and sustainable use of BFA and ecosystem services, in particular indigenous and local production system stakeholders. Relevant incentives and support in this context may include the provision of extension services, delivery of microcredit for women in rural areas, appropriate access to natural resources and to the market, resolving land-tenure issues, recognition of cultural practices and values, and adding value to their specialist products.

3.2.11 Strengthen policy and institutional frameworks for integrating the outcomes of valuation studies into incentive schemes and conservation strategies.

3.2.12 Improve coordination in the management of incentive schemes between the environment and food and agriculture sectors and between public-sector, non-governmental and private-sector stakeholders.

3.2.13 Enhance cooperation between the different actors in the value chain, and, where possible, promote short value chains and diverse retail infrastructures to strengthen the linkages between farmers, markets and consumers.

3.2.14 Raise consumer awareness, including by supporting marketing that encourages consumers to make responsible and sustainable purchasing choices.

3.2.15 Further develop markets and value chains for products from production systems that favour the maintenance and sustainable use of BFA (e.g. through labelling, certification, traceability, denomination of origin, geographic identification, branding, gastronomy and tourism) and promote the use of local/traditional foods to improve nutrition and health.

Priority 3.3 Cooperation and funding

Rationale

The management of BFA spans the conventional boundaries between the sectors of food and agriculture and those between food and agriculture and nature conservation. Strengthening the sustainable use and conservation of BFA often requires actions on a large geographical scale (e.g. across watersheds or along migration routes) and involving a wide range of different stakeholders. The distributional ranges of associated biodiversity species often cross national boundaries. Global challenges such as climate change and emerging disease threats require global responses. Multi-stakeholder, cross-sectoral and international cooperation in BFA assessment, monitoring and management is therefore vital.

Cooperation within and between countries is needed in order to develop national and regional networks. Networks are important in linking stakeholders, and in supporting research, institutional development and capacity building. In some countries where networks are well developed, they draw upon the support of active non-governmental organizations, including from the environment sector, and consumers. National Focal Points for BFA – established for the development of country reports on the state of BFA – could become key agents of change through which networks for the management of BFA could be built and maintained.

Numerous regional and international collaborative initiatives target the sustainable use and conservation of crop, livestock, forest and aquatic genetic resources. While a number of subregional, regional and international organizations and partnerships contribute to the management of specific components of associated biodiversity, including through projects targeting pollinators or biological control agents or *ex situ* collections, far fewer such efforts target the management of associated biodiversity or its role in providing ecosystem services to food and agriculture.

Besides lack of political will and/or governance, capacity, awareness, knowledge and cooperation, lack of financial resources is one of the major constraints to the effective implementation of all actions listed in all three priority areas for the sustainable use and conservation of all BFA.

[Possible] Actions

Cooperation

3.3.1 Inventory and describe relevant institutions and their mandates to enable the development of coordination mechanisms for the establishment of, for example, a national BFA steering committee to strengthen collaboration between relevant institutions, seek synergies and coordinate the implementation of their respective activities.

3.3.2 Improve multi-stakeholder cooperation between producers, researchers, consumers and policy-makers, within the sectors of agriculture and between agriculture and other sectors, in order to reduce the gap between policies and reality on the ground.

3.3.3 Establish new and promote existing national, regional or global networks linking scientists and researchers to improve information sharing.

3.3.4 Further develop and strengthen international cooperation to mainstream BFA within and beyond agriculture sectors.

3.3.5 Ensure special attention is given to sustainable smallholder agriculture, and to the role of women as knowledge keepers for BFA, across priority areas and actions, as appropriate.

Funding

3.3.6 Explore opportunities, and where possible establish fund-raising mechanisms and integrated investment plans, for research, training and capacity development on – and assessment and monitoring, sustainable use and *in situ* and *ex situ* conservation of – BFA and ecosystem services.

3.3.7 Identify opportunities for efficient use of resources, for example by promoting synergies and cooperation between projects at national and regional levels.

3.3.8 Support the funding strategies for the Commission's sectoral global plans of action and the implementation of its Multi-year Programme of Work.

ANNEX 1

Table 1. Concepts used in this document.

Biodiversity			Biological diversity (often referred to as biodiversity) is defined in Article 2 of the Convention on Biological Diversity (CBD) as “the variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems”. ⁵
Biodiversity for food and agriculture (BFA)			BFA is a subcategory of biodiversity taken for the purposes of <i>The State of the World's Biodiversity for Food and Agriculture</i> report to correspond to “the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the ecosystem structures, functions and processes in and around production systems, and that provide food and non-food agricultural products”. Production systems are here taken to include those in the crop, livestock, forest, fishery and aquaculture sectors.
Components of BFA			BFA includes plant, animal and aquatic genetic resources for food and agriculture, forest genetic resources, micro-organism and invertebrate genetic resources, associated biodiversity and wild foods.
	Genetic resources for food and agriculture	Plant genetic resources for food and agriculture (PGRFA)	The term PGRFA refers to genetic material of plant origin of actual or potential value for food and agriculture. ⁶ These include farmers' varieties/landraces maintained on-farm, improved varieties, breeding materials in crop improvement programmes, genebank accessions (i.e. <i>ex situ</i> collections), crop wild relatives and wild plants harvested for food.
		Animal genetic resources for food and agriculture (AnGR)	AnGR are genetic resources of animal origin used or potentially used for food and agriculture. ⁷ In line with the scope of previous global assessments, ⁸ the term is used in this document to refer to the genetic resources of domesticated avian and mammalian species used in food and agriculture.

⁵ CBD. 1992. *Convention on Biological Diversity*. Montreal, Canada, Secretariat of the Convention on Biological Diversity.

⁶ FAO. 2010. *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/docrep/013/i1500e/i1500e.pdf>).

⁷ FAO. 2007. *The State of the World's Animal Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-a1260e.pdf>); FAO. 2007. *The Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration*. Rome (available at <http://www.fao.org/docrep/010/a1404e/a1404e00.htm>).

⁸ FAO. 2007. *The State of the World's Animal Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-a1260e.pdf>); FAO. 2015. *The Second Report on the State of World's Animal Genetic Resources for Food and Agriculture*. Rome (available at <http://www.fao.org/3/a-i4787e.pdf>).

		Forest genetic resources (FGR)	FGR are the heritable materials maintained within and among tree and other woody plant species that are of actual or potential economic, environmental, scientific or societal value. ⁹
		Aquatic genetic resources for food and agriculture (AqGR)	AqGR are the genetic resources of aquatic animal and plant species used or potentially used in fisheries or aquaculture and the biodiversity of the associated ecosystems that support them. The scope of the global assessment undertaken for the forthcoming report on <i>The State of the World's Aquatic Genetic Resources for Food and Aquaculture</i> is farmed aquatic species and their wild relatives within national jurisdiction. ¹⁰
		Micro-organism and invertebrate genetic resources for food and agriculture	Micro-organism and invertebrate genetic resources for food and agriculture are a major component of associated biodiversity. Important groups include pollinators, in particular honey bees, micro-organisms of relevance to ruminant digestion, food processing and agro-industrial processes, biological control agents and soil micro-organisms and invertebrates. ¹¹
	Associated biodiversity		<p>Associated biodiversity is a subcategory of biodiversity for food and agriculture that consists largely of non-domesticated species. Exceptions include the domestic honey bee, some other pollinator species and various biological control agents (natural enemies used to control pest species) that are bred in captivity. Where ecosystem services (see below) are concerned, associated biodiversity is particularly important to the supply of supporting and regulating services. Associated biodiversity species may also be direct sources of food and other products (provisioning ecosystem services) or have cultural significance (supply cultural ecosystem services).</p> <p>The concept is perhaps most familiar in the crop sector, where the biodiversity of harvested domesticated crop plants is distinguished from “crop-associated biodiversity” – the range of other species present in and around the production system that sustain ecosystem structures, functions and processes. Examples include pollinators, the predators of crop pests, the vegetation found in hedgerows and at field margins, and the invertebrates and micro-organisms that create and maintain the soil and its fertility. In addition to beneficial species such as pollinators, crop associated biodiversity includes the various species that inhibit crop production by acting as weeds or pests.</p>

⁹ FAO. 2014. *The State of the World's Forest Genetic Resources*. Rome (available at <http://www.fao.org/3/a-i3825e.pdf>).

¹⁰ FAO. forthcoming. *The State of the World's Aquatic Genetic Resources for Food and Agriculture*. Rome.

¹¹ CGRFA/16/17/Report Rev.1, paragraph 79.

		<p>In a livestock production system, for example, the domesticated animals can be distinguished from associated biodiversity such as rangeland plants, the micro-organism and invertebrate communities associated with these plants and with the soil, and the micro-organisms found in the animals' digestive systems. In a forest ecosystem, trees are surrounded by a multitude of plants, animals and micro-organisms that contribute in various ways to the functioning of the ecosystem. In capture fisheries, harvested species rely on a range of animals and plants and micro-organisms as sources of food and for services such as water purification and waste treatment. They benefit from oxygen provided by aquatic plants and the protection provided by habitats such as kelp forests, seagrass beds and coral reefs. Some species rely on others as hosts. Aquatic species farmed in extensive systems or raised in culture-based fisheries also interact with these various components of associated biodiversity. Similarly, species raised in aquaculture ponds benefit from a range of services provided by the flora and fauna that surround them, particularly with respect to water purification and nutrient cycling.</p> <p>Management of associated biodiversity encompasses a wide range of different intensities. Many components of associated biodiversity are not, in any deliberate way, managed to promote their role in supplying ecosystem services to food and agriculture (or subject only to broad measures targeting whole ecosystems). In other cases, habitats in and around production systems are deliberately managed in order to promote the presence of associated biodiversity species and thereby increase the supply of the ecosystem services they provide (e.g. management of hedgerows and field margins to support pollinators). In yet other cases, associated biodiversity species are deliberately introduced into production systems (e.g. introduction of biological control agents to address pest problems or soil micro-organisms to support plant nutrition).</p>
	Wild foods	<p>Wild foods are food products obtained from non-domesticated species. They may be harvested (gathered or hunted) from within food and agricultural production systems or from natural or semi-natural ecosystems. The group of species that supplies wild foods overlaps to various degrees with those in the above-described "sectoral" categories of genetic resources. In the aquatic sector, the majority of production comes from wild foods and many aquaculture facilities use wild-caught stocks for broodstock or larval grow-out. Capture fisheries are probably the largest single example of the human use of wild foods.</p>
	Ecosystem services	<p>Components of BFA provide ecosystem services. Ecosystem services are "the benefits humans derive from</p>

	<p>ecosystems”.¹² The Millennium Ecosystem Assessment identified four categories of ecosystem service: provisioning, regulating, supporting and cultural. “Provisioning services” are “the products obtained from ecosystems”, i.e. food and raw materials of various kinds. “Regulating services” are “benefits obtained from the regulation of ecosystem processes”. Examples include regulation of the climate, air and water quality, diseases and natural disasters. “Cultural services” are the “nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences”. “Supporting services” are services “that are necessary for the production of all other ecosystem services”. Examples include photosynthesis and nutrient cycling. The distinguishing feature of supporting services is that they have a less direct effect on human welfare.</p>
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¹² MA. 2005. *Ecosystems and human well-being: synthesis*. Washington DC, Island Press.

APPENDIX D**FUNDING STRATEGY FOR THE IMPLEMENTATION OF THE GLOBAL PLAN
OF ACTION FOR THE CONSERVATION, SUSTAINABLE USE AND
DEVELOPMENT OF FOREST GENETIC RESOURCES**

TABLE OF CONTENTS

	Paragraphs
I. Purpose.....	1
II. Priority areas of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources	2–3
III. Objectives of the Funding Strategy.....	4–6
IV. Financial resources relevant to the Funding Strategy	7–9
V. Considerations for the implementation of the Funding Strategy.....	10–16
VI. Monitoring and review	17–18

I. PURPOSE

1. The purpose of this Funding Strategy is to mobilize financial resources and to strengthen international cooperation to support developing countries and countries with economies in transition in their efforts to implement the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources (Global Plan of Action), adopted by the FAO Conference at its Thirty-eighth Session in June 2013, to contribute to the United Nations Strategic Plan for Forests 2017–2030, the 2030 Agenda for Sustainable Development and other relevant international commitments on forests.

II. PRIORITY AREAS OF THE GLOBAL PLAN OF ACTION FOR THE CONSERVATION, SUSTAINABLE USE AND DEVELOPMENT OF FOREST GENETIC RESOURCES

2. The Global Plan of Action identifies a total of 27 strategic priorities at national, regional and global levels grouped into the following four priority areas:

- Improving the availability of and access to information on forest genetic resources;
- Conservation of forest genetic resources (*in situ* and *ex situ*);
- Sustainable use, development and management of forest genetic resources; and
- Policies, institutions and capacity building.

3. It acknowledges that the importance of each strategic priority may differ significantly in different countries and regions. Strategic Priority 27 calls for action to “*strengthen efforts to mobilize the necessary resources, including financing, for the conservation, sustainable use and development of forest genetic resources.*” The Global Plan of Action further acknowledges that resource mobilization for its implementation requires due attention and efforts at all levels, including coordination with numerous initiatives under way within countries, regionally and globally.

III. OBJECTIVES OF THE FUNDING STRATEGY

4. The Funding Strategy has the following objectives:

- to mobilize financial resources from existing multilateral financing mechanisms for the implementation of the Global Plan of Action by mainstreaming actions on the conservation, use and development of forest genetic resources into large and holistic country-led actions that are designed to enhance the implementation of sustainable forest management, including conservation and use of forest biodiversity, and forest-based adaptation and mitigation measures for climate change;
- to further seek and mobilize financial resources from all possible sources for strategic and specific actions on forest genetic resources at national, regional and international levels; and
- to cooperate with relevant ongoing forest financing initiatives, in particular the Global Forest Financing Facilitation Network (GFFFN) established by the United Nations Forum on Forests (UNFF), to make available information on, and facilitate access to, existing and emerging funding sources.

5. The mainstreaming and strategic actions on forest genetic resources for which financial resources are mobilized under the Funding Strategy should address the priority areas of the Global Plan of Action, and be in line with relevant international agreements. Furthermore, these actions should be tailored to meet specific needs and conditions of different countries and regions, and be fully aligned with existing forest, biodiversity, climate change, food security and other relevant policies.

6. In addition to making information available on funding sources, the cooperation with ongoing forest financing initiatives should also promote the integration of forest genetic resources into national forest financing strategies and create awareness on the fundamental role of these resources in sustainable forest management.

IV. FINANCIAL RESOURCES RELEVANT TO THE FUNDING STRATEGY

7. The Funding Strategy covers all known and potential sources of financial resources, including:

- financial resources allocated at national level for the conservation, use and development of forest genetic resources, in accordance with each country's national capacities and financial situation;
- the main multilateral financing mechanisms for forests, i.e. the Global Environment Facility (GEF)¹ and the Green Climate Fund (GCF),² providing co-funding for large and holistic country-led actions to enhance the implementation of sustainable forest management, including forest restoration, forest-based adaptation measures and REDD+³ activities;
- other multilateral, as well as bilateral and regional, support to countries, regional networks and international organizations for the implementation of the Global Plan of Action;
- financial resources provided by foundations, the private sector, non-governmental organizations and other sources for the implementation of the Global Plan of Action;
- extrabudgetary funds made available for FAO to provide technical and financial support to the implementation of the Global Plan of Action at national, regional and international levels, and/or to the implementation of broader projects on sustainable forest management including components on forest genetic resources; and
- FAO Regular Programme resources, including the Technical Cooperation Programme.

8. The control of these financial resources is scattered between, and often within, countries and other entities or mechanisms. In addition to controlling their own financial resources, countries eligible for GEF and GCF financing can decide on their priorities for using the funds allocated to them by the two multilateral financing mechanisms. In the case of the FAO Technical Cooperation Programme, countries can also define, through Country Programming Frameworks, their priorities for FAO action at country level.

9. Developed countries and other donors make decisions on the allocation of international development assistance or investments based on their own criteria and aims that may, or may not, reflect the priority areas of the Global Plan of Action. The same applies to the funding criteria or priorities used by foundations, the private sector, non-governmental organizations and others. This situation makes it necessary to increase coordination within countries as well as among entities involved in multilateral, regional and bilateral financing, and to seek synergies while mobilizing financial resources from different sources for the implementation of the Global Plan of Action. Furthermore, it is also crucial to continue creating awareness of the importance of forest genetic resources.

V. CONSIDERATIONS FOR THE IMPLEMENTATION OF THE FUNDING STRATEGY

10. Most of the relevant financial resources to support the implementation of the Global Plan of Action are beyond FAO's control. Therefore, FAO can only play, in collaboration with its partners and subject to the availability of resources, a facilitating role in mobilizing financial resources for this purpose, building on its existing partnerships with the GEF and the GCF, as well as on its ongoing contributions to the international arrangement on forests. In parallel, FAO will explore ways to increase human and financial resources available for its work on forest genetic resources as these resources are currently very limited.

11. There is increasing evidence that multilateral financing mechanisms and other donors are recognizing the importance of managing forest genetic resources, and that they are willing to support this work as part of larger projects or programmes that support sustainable forest management,

¹ <http://www.thegef.org/>

² <https://www.greenclimate.fund>

³ Reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

including forest restoration, forest-based adaptation measures and REDD+ activities.⁴ However, FAO's experience from supporting countries in the preparation of project proposals for GEF and GCF funding suggests that national agencies leading the preparations of GEF and GCF proposals are often poorly aware of the need for national-level action on forest genetic resources, and that they may have little collaboration with those national agencies and other stakeholders that are dealing with forest genetic resources. Concerning FAO's Technical Cooperation Programme, the findings of the 2016 evaluation of FAO's work on genetic resources indicate that countries give forest genetic resources lower priority in Country Programming Frameworks as compared to animal and plant genetic resources.

12. To address these problems, it is necessary for national agencies and other stakeholders dealing with forest genetic resources to identify strategic and specific actions on forest genetic resources, and prioritize them, so that they can be brought to the attention of those national agencies that are acting as GEF and GCF focal points, and interacting with other donors. The identified strategic actions on forest genetic resources should also be communicated to relevant ministries and FAO country offices for consideration in Country Programming Frameworks. If a country has already developed a national strategy for forest genetic resources, the strategic activities have been identified in this document.

13. The Commission on Genetic Resources for Food and Agriculture (the Commission) shall oversee, based on the recommendations of the Intergovernmental Technical Working Group on Forest Genetic Resources (the Working Group), the implementation of the Funding Strategy. In this regard, several considerations should be kept in mind.

14. First, the Global Plan of Action is voluntary and non-binding by nature, and it should be implemented in line with existing national legislation and international agreements. Second, the sources of the financial resources from which funding for the implementation of the Global Plan of Action will be sought are not under the direct control of the Commission. Third, collective actions are needed by Members of the Commission and other actors to implement the Funding Strategy.

15. The Commission encourages its Members to identify strategic actions on forest genetic resources that are necessary to enhance the conservation, sustainable use and development of these resources in the country, and to communicate the identified actions to relevant national agencies leading resource mobilization with different donors and the development of large country-led projects to the implementation of sustainable forest management, including forest restoration, forest-based adaptation measures and REDD+ activities. Based on the identified strategic actions, Members of the Commission are then encouraged to formulate brief concept notes describing the identified strategic actions in detail, including proposed timeframes for necessary activities and financial resources needed to implement them. The identification of the proposed strategic actions should be supported by relevant information, such as the country progress reports on the implementation of the Global Plan of Action and/or the country reports to *The State of the World's Forest Genetic Resources*. The Commission also encourages its Members to communicate the identified strategic actions on forest genetic resources to relevant ministries and FAO country offices for consideration in the formulation of Country Programming Frameworks.

16. The Commission encourages FAO to continue promoting the mainstreaming of forest genetic resources when supporting eligible countries in preparing project proposals to the GEF, the GCF and other multilateral or regional financing mechanisms. It further encourages FAO to continue pursuing extra-budgetary funds for its work on forest genetic resources and enhance its cooperation with the GFFFN to provide information on existing and emerging funding sources available for developing countries to enhance the management of their forest genetic resources. Furthermore, the Commission encourages FAO to continue strengthening its partnerships with international, regional and national agencies to facilitate the implementation of the Global Plan of Action.

⁴ CGRFA-17/19/10.2/Inf.2, paragraph 11.

VI. MONITORING AND REVIEW

17. The Commission shall monitor the implementation of the Funding Strategy based on different sources of information. These sources include FAO progress reports to the Commission, global assessment reports on the implementation of the Global Plan of Action and reports released by the GEF and the GCF on their funding to forest-related actions, as well as information gathered by the GFFFN on the status and trends on global forest financing. The Commission also invites its Members to inform the Secretariat on country-led actions that are supported by various multilateral and regional financing mechanisms, as well as bilateral donors, to implement the Global Plan of Action.

18. The Commission is scheduled to review the Global Plan of Action at its Twentieth Regular Session in 2025. It shall then also review the Funding Strategy, as necessary.

APPENDIX E

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.¹

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 pollinators² and soil biodiversity³ 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 micro-organisms and invertebrates, including those relevant for soil biodiversity and the sustained provision of soil-mediated ecosystem functions and services essential for sustainable agriculture.⁴ 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 2020.⁵
5. Other organizations, such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), also significantly contribute to strengthening 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*⁶ 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.⁷ FAO is one of the four UN collaborative partners of IPBES.

¹ <http://www.fao.org/cgrfa/topics/microorganisms-and-invertebrates/en/>

² COP 6 Decision VI/5, *Annex II*.

³ COP 8 Decision VIII/23.

⁴ CBD/COP/DEC/14/30, paragraph 22.

⁵ CBD/COP/DEC/14/30, paragraph 23.

⁶ 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.

⁷ More information available at: www.ipbes.net/deliverables/3a-pollination

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. 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 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, including honey bees; biological control agents and biostimulants; soil micro-organisms and invertebrates, with emphasis on bioremediation and nutrient-cycling organisms; micro-organisms of relevance to ruminant digestion; edible fungi and invertebrates used as dietary

components of food/feed; and micro-organisms used in food processing and agro-industrial processes.⁸

12. In light of the recent activities and developments at the global level with respect to pollinators⁹ and biological control agents, the work plan addresses these groups first.

13. Moreover, the work plan addresses two functional groups per Commission session.

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

CGRFA-18	Pollinators, including honey bees ^a Biological control agents and biostimulants
CGRFA-19	Soil micro-organisms and invertebrates, with emphasis on bioremediation and nutrient cycling organisms ^b Micro-organisms of relevance to ruminant digestion ^c
CGRFA-20	Edible fungi and invertebrates used as dietary components of food/feed ^d Micro-organisms used in food processing and agro-industrial processes ^e

Notes:

^a With respect to honey bees, this work will address their roles in pollination as opposed to their roles in the production of honey and wax. The latter is covered under animal genetic resources.

^b Symbionts, including endophytes, should be included in the scope of this work.

^c This work should build on Background Study Paper 61.

^d Aquatic organisms used for food, such as algae, will not be included in this study, as these are covered under aquatic genetic resources for food and agriculture.

^e This work should build on Background Study Papers 64 and 65.

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;
- 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; and

⁸ CGRFA/16/17/Report, paragraph 79.

⁹ 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.

- pursue taxonomic work for the MIGR sector, which is vital for monitoring pests and diseases, including invasive alien species.

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 conservation, use and access and benefit-sharing, 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
- an analysis of the gaps and needs, and possibilities for the Commission and its Members to address them.

IV. PARTNERSHIPS

17. The 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, and monitored closely together with the activities to follow up on *The State of the World's Biodiversity for Food and Agriculture* to avoid duplication of efforts.

APPENDIX F**STRATEGIC PLAN FOR THE COMMISSION ON GENETIC RESOURCES FOR
FOOD AND AGRICULTURE (2019–2027)**

TABLE OF CONTENTS*Paragraphs**Vision, Mission, Goals and Operative Principles*

I.	RATIONALE FOR THE STRATEGIC PLAN (2019–2027)	1–4
II.	IMPLEMENTING, MONITORING AND REVIEWING	5–8
III.	PARTNERSHIPS	9–10

*Annex 1. Multi-Year Programme of Work: Major Outputs and Milestones (2019–2027)**Annex 2. Session Planning for CGRFA-18 and CGRFA-19*

VISION

Valuing and conserving biodiversity for food and agriculture and promoting its use in support of global food security and sustainable development, for present and future generations.

MISSION

Cognizant that genetic resources for food and agriculture are a common concern of all countries, in that all countries depend on genetic resources for food and agriculture that originated elsewhere, the Commission on Genetic Resources for Food and Agriculture (Commission) strives to halt the loss of genetic resources for food and agriculture, and to ensure world food security and sustainable development by promoting their conservation and sustainable use, including exchange, and the fair and equitable sharing of the benefits arising from their use.

GOALS

In line with its mission, the Commission's Goals are cross-sectoral and in support of the Sustainable Development Goals (SDGs). The cross-sector goals build on the global assessments prepared under its guidance, the strategic priority areas, long-term goals and targets of the Commission's global action plans on plant, animal and forest genetic resources for food and agriculture and other Commission activities taken in response to the global assessments.

Goal 1: Sustainable use: Promote the sustainable use and development of genetic resources for food and agriculture and, more generally, all biodiversity relevant to food and agriculture, to increase production for world food security and sustainable development.¹

Goal 2: Conservation: Maintain the diversity of genetic resources for food and agriculture.²

Goal 3: Access and benefit-sharing: Promote appropriate access to genetic resources for food and agriculture and fair and equitable sharing of benefits arising from their utilization.³

Goal 4: Participation: Facilitate the participation of relevant stakeholders in decision-making.⁴

¹ Goal 1 supports SGD 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality; SDG Target 14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics; and SDG Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

² Goal 2 supports SDG 2.5: By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

³ Goal 3 supports SDG 2.5 and SDG 15.6: Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed.

⁴ Goal 4 supports SDG 16.7: Ensure responsive, inclusive, participatory and representative decision-making at all levels.

OPERATIVE PRINCIPLES

Principle 1: The Commission has a coordinating role and deals with policy, sectoral and cross-sectoral matters related to the conservation and sustainable use of genetic resources of relevance to food and agriculture.

- The Commission guides and monitors FAO's policies, programmes and activities related to genetic resources for food and agriculture within the framework of FAO's strategic objectives.
- The Commission keeps under continuous review relevant matters in other forums, including policy developments, relating to the conservation and sustainable use of genetic resources for food and agriculture, access to these resources and the fair and equitable sharing of benefits derived from their use.

Principle 2: The Commission monitors the state of the world's biodiversity, including genetic resources, for food and agriculture.

- The Commission oversees the periodic preparation of global assessments on genetic resources and biodiversity for food and agriculture, and, as appropriate, the development of a comprehensive global information system or systems for relevant genetic resources in support of this role.

Principle 3: The Commission strives to reach international consensus on policies and action programmes to ensure the conservation and sustainable utilization of biodiversity, including genetic resources, for food and agriculture, as well as the fair and equitable sharing of benefits derived from their use.

- The Commission provides an intergovernmental forum for negotiation of international policies on genetic resources for food and agriculture.
- The Commission oversees the implementation of, and updates, global action plans and other instruments addressing the conservation and sustainable utilization of biodiversity, including genetic resources, for food and agriculture, as well as access to these resources and the fair and equitable sharing of benefits derived from their use.
- The Commission responds to developments in other forums, where appropriate.

Principle 4: The Commission contributes to the strengthening of national and regional policies on biodiversity for food and agriculture and promotes cooperation in capacity-building.

- The Commission supports the development or strengthening of national and regional policies and programmes on genetic resources and biodiversity for food and agriculture, in particular by facilitating the implementation of Global Plans of Actions for genetic resources, and establishes coordination mechanisms to promote national and regional cooperation across relevant sectors and among actors.
- The Commission identifies and facilitates the availability of financial, human, scientific, technical and technological resources to enable Commission Members to contribute actively to the achievement of the outputs and milestones of the Commission's Strategic Plan and to implement policies and recommendations developed by the Commission.
- The Commission supports its Members in the development and implementation of strategies and activities that raise public awareness and facilitate education that creates a better understanding of the relevance of biodiversity for food and agriculture and thereby promotes broader

participation of stakeholders in the conservation and use of genetic resources for food and agriculture.

Principle 5: The Commission continues and strengthens cooperation and partnerships on biodiversity for food and agriculture.

- The Commission facilitates and oversees cooperation between FAO and other relevant intergovernmental and non-governmental bodies.
- In addition to its activities on plant, animal, forest, aquatic genetic resources, microorganisms and invertebrates, the Commission brings together international partners addressing biodiversity for food and agriculture, to facilitate exchange of experiences and to create new partnerships.
- The Commission's cooperation with other relevant international bodies strives to ensure that negotiations in other forums take into account the special needs of the agricultural sector with regard to all components of biological diversity relevant for food and agriculture.
- The Commission will strengthen the involvement of all stakeholders, such as civil society and producer organizations, including organizations representing women and small-scale producers, breeding institutions and industries, and public- and private-sector organizations involved with genetic resources for food and agriculture.

I. RATIONALE FOR THE STRATEGIC PLAN (2019–2027)

1. Biodiversity for food and agriculture is among the Earth's most important resources. Crops, livestock, aquatic organisms, forest trees, micro-organisms and invertebrates – thousands of species and their genetic variability – make up the web of biodiversity upon which the world's food production depends. Biodiversity for food and agriculture contributes to food security and nutrition and sustainable livelihoods and, through the provision of regulating and supporting ecosystem services, underpins the natural potential for adaptation to ever-changing socio-economic and environmental dynamics, such as population growth, dietary preferences, nutritional needs and climate change.
2. Aware of the importance of each component of biodiversity for food and agriculture to global food security and nutrition, the Commission aims to ensure the conservation and sustainable use of genetic resources for food and agriculture, access to these resources and the fair and equitable sharing of benefits derived from their use, for present and future generations.
3. Since 2007, the Commission has been operating under a Multi-Year Programme of Work (MYPOW).⁵ The *Strategic Plan for the Commission on Genetic Resources for Food and Agriculture 2014–2023* embraces the MYPOW and contains the Commission's vision, mission and goals. The Commission's goals of the *Strategic Plan for the Commission on Genetic Resources for Food and Agriculture 2018–2027* build on the "State of the World" global assessment reports, and the strategic priority areas, long-term goals and targets of the global action plans and other policy responses to these assessments, as well as the established indicators and monitoring procedures for assessing the global action plans' and the implementation of other instruments agreed.
4. This Strategic Plan supersedes and replaces all previous versions of the Multi-Year Programme of Work and of strategic plans. It includes in *Annex 1* the MYPOW's major outputs and milestone for the forthcoming five regular sessions of the Commission and in *Annex 2* more detailed plans for the next two sessions of the Commission.

II. IMPLEMENTING, MONITORING AND REVIEWING

5. The Strategic Plan guides the Commission in the implementation of its mandate. The Strategic Plan is a rolling, and therefore flexible, set of outputs and milestones, which the Commission keeps under review. Reviewing this Strategic Plan at each second Session will enable the Commission to assess the progress of its work towards its goals, to address and include new and emerging issues in the field of biodiversity, including genetic resources, for food and agriculture, and to take into account new developments and processes in other relevant forums. The MYPOW with major outputs and milestones and the Session Planning are reviewed at each Session.
6. For the implementation of this Strategic Plan, the Commission continues to rely on technical support from its subsidiary bodies, including the intergovernmental technical working groups that advise the Commission on issues in the areas under their respective competences. They provide advice and make recommendations to the Commission on these matters and consider the progress made in implementing this Strategic Plan.
7. Through this Strategic Plan, the Commission foresees the continued preparation and presentation of its global assessments of the state of the world's biodiversity for food and agriculture, including animal, plant, aquatic and forest genetic resources.
8. The success of the implementation of this Strategic Plan and its MYPOW will depend on the support provided through FAO's Programme of Work and Budget, and on the mobilization of extra-budgetary resources, as well as on partnerships with, and the contributions of, other international organizations.

⁵ CGRFA-11/07/Report, *Appendix E*.

III. PARTNERSHIPS

9. To achieve its goals and targets and support the implementation of this Strategic Plan, the Commission will continue to seek synergies and strengthen partnerships with the relevant specialized agencies and conventions of the United Nations as well as other intergovernmental organizations, including the Convention of Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture, with a view to achieve synergies and avoid duplication of work. Cooperation will also be enhanced with international agricultural research centres, national and regional scientific organizations, international and regional non-governmental organizations, civil society, producer organizations, relevant funding agencies and the private sector. Information exchange and capacity development will be facilitated through regional networks and South–South and triangular cooperation.

10. To facilitate the implementation of this Strategic Plan and strengthen cooperation in the field of biodiversity for food and agriculture, the Commission has established a consultation process by which international organizations are invited to provide information on their policies, programmes and activities relevant to the prioritized themes of each of the Commission’s regular sessions.

ANNEX 1: Multi-Year Programme of Work: major outputs and milestones (2019–2027)

	17 th Session 2019	18 th Session 2021	19 th Session 2023	20 th Session 2025	21 st Session 2027
Sectoral matters					
Animal genetic resources (AnGR)		Review of implementation of the Global Plan of Action for AnGR		Presentation of <i>The Third Report on the State of the World's AnGR</i>	Review of the Global Plan of Action for AnGR
Aquatic genetic resources (AqGR)	Presentation of the finalized <i>State of the World's AqGR</i>	Consideration of the draft Global Plan of Action for AqGR			Review of implementation of the Global Plan of Action for AqGR
Forest genetic resources (FGR)	Review of implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of FGR		Presentation of <i>The Second Report on the State of the World's FGR</i>	Review of the Global Plan of Action for the Conservation, Sustainable Use and Development of FGR	
Micro-organism and invertebrate genetic resources (MIGR)		Review of work on MIGR		Review of work on MIGR	
Plant genetic resources (PGR)	Review of status and trends of seed policies		Presentation of <i>The Third Report on the State of the World's PGR</i>		Review of implementation of the (Second) Global Plan of Action for PGR
Cross-sectoral matters					
<i>The State of the World's Biodiversity for Food and Agriculture (SoW BFA)</i>	Follow-up to SoW BFA	Follow-up to SoW BFA	Follow-up to SoW BFA		Follow-up to SoW BFA and presentation of <i>The Second Report on the State of the World's Biodiversity for Food and Agriculture</i>
Access and benefit-sharing (ABS)	Develop explanatory notes for subsectors of GRFA to complement the ABS Elements	Review of work on ABS		Review of work on ABS	
Biotechnologies		Review of the work on biotechnologies for the conservation and sustainable use of GRFA		Review of the work on biotechnologies for the conservation and sustainable use of GRFA	
“Digital sequence information” (“DSI”) on genetic resources for food and agriculture (GRFA)	Consider the use of “DSI” on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA		Consider the use of “DSI” on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA		Review the work on “DSI” on GRFA and the potential implications for conservation, sustainable use and ABS of GRFA
Climate change		Review of work on climate change and GRFA	Review of a country-driven global assessment of climate change effects and genetic resource adaptation and mitigation measures	Review of work on climate change and GRFA	
Nutrition and health	Review of work on GRFA and nutrition	Concept note on biodiversity for food and agriculture and human health	Review of work on GRFA and nutrition and health		Review of work on GRFA and nutrition and health
Management	Progress report/review of the Strategic Plan Reporting on SDGs	Options paper for future organization of work	Progress report/review of the Strategic Plan Reporting on SDGs		Progress report/review of the Strategic Plan Reporting on SDGs

Note: As reviewed by the Commission at its Seventeenth Session in the light of comments received from its intergovernmental technical working groups.

*The term is taken from decision CBD COP XIII/16 and is subject to further discussion. There is a recognition that there are a multiplicity of terms that have been used in this area (including, inter alia, “genetic sequence data”, “genetic sequence information”, “genetic information”, “dematerialized genetic resources”, “in silico utilization”, etc.) and that further consideration is needed regarding the appropriate term or terms to be used.

ANNEX 2: SESSION PLANNING FOR CGRFA-18 AND CGRFA-19**Activities in preparation of CGRFA-18 (2020/2021)**

Sectoral matters	
Animal genetic resources	<ul style="list-style-type: none"> • Prepare draft outline, timeline and budget and develop process for collecting national data to support the preparation of <i>The Third Report on the State of the World's Animal Genetic Resources for Food and Agriculture</i> • Prepare synthesis progress report to provide a global overview of progress made to implement the Global Plan of Action • Prepare FAO progress report on the implementation of the Global Plan of Action and the Funding Strategy • Prepare international organizations' progress report • Prepare brief report on the status and trends of animal genetic resources
Aquatic genetic resources	<ul style="list-style-type: none"> • Consider draft Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture
Forest genetic resources	<ul style="list-style-type: none"> • Prepare FAO progress report on the implementation of the Global Plan of Action for Forest Genetic Resources • Prepare an update on the preparation of Second Implementation Report and <i>The Second Report on the State of the World's Forest Genetic Resources</i> (including collection of national data)
Micro-organisms and invertebrates	<ul style="list-style-type: none"> • Review of work on micro-organisms and invertebrates • Follow-up on previous recommendations by the Commission on this matter
Plant genetic resources	<ul style="list-style-type: none"> • Prepare FAO progress report on the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture • Follow up on previous recommendations by the Commission on this matter • Prepare update on the preparation of <i>The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture</i>
Cross-sectoral matters	
<i>The State of the World's Biodiversity for Food and Agriculture</i>	<ul style="list-style-type: none"> • Follow-up to <i>The State of the World's Biodiversity for Food and Agriculture</i>
Access and benefit-sharing	<ul style="list-style-type: none"> • Survey on domestic legislative, administrative and policy measures of existing access and benefit-sharing instruments and their impact on genetic resources for food and agriculture and define future work • Follow-up on previous recommendations by the Commission on this matter
Biotechnologies	<ul style="list-style-type: none"> • Review of the development of biotechnologies and their potential impact or implications on the conservation and sustainable utilization of genetic resources for food and agriculture
"Digital sequence information" on GRFA	<ul style="list-style-type: none"> • Follow-up on previous recommendations by the Commission on this matter
Climate change	<ul style="list-style-type: none"> • Status of preparation of the global assessment of the role of genetic resources for food and agriculture for climate change adaptation and mitigation • Follow-up on previous recommendations by the Commission on this matter
Nutrition and health	<ul style="list-style-type: none"> • Follow-up on previous recommendations by the Commission on this matter • Concept note on biodiversity for food and agriculture and human health
Management	<ul style="list-style-type: none"> • Prepare progress report / review of the Strategic Plan, MYPOW • Options paper on future organization of work • SDG reporting
Other matters	<ul style="list-style-type: none"> • Invite international instruments and organizations to report on their work in supporting the activities of the Commission and collate their inputs

Activities in preparation of CGRFA-19 (2022/2023)

Sectoral matters	
Animal genetic resources	<ul style="list-style-type: none"> • Advance preparation of <i>The Third Report on the State of the World's Animal Genetic Resources for Food and Agriculture</i> and report on progress made • Prepare document on the implementation and possible updating of the Global Plan of Action for Animal Genetic Resources • Prepare FAO progress report on the implementation of the Global Plan of Action for Animal Genetic Resources • Prepare brief report on the status and trends of animal genetic resources
Aquatic genetic resources	<ul style="list-style-type: none"> • Develop follow-up to the Global Plan of Action for Aquatic Genetic Resources for Food and Agriculture
Forest genetic resources	<ul style="list-style-type: none"> • Prepare FAO progress report on the implementation of the Global Plan of Action for Forest Genetic Resources • Present the Second Implementation Report and <i>The Second Report on the State of the World's Forest Genetic Resources</i>
Micro-organisms and invertebrates	<ul style="list-style-type: none"> • Review of work on micro-organisms and invertebrates • Follow-up on previous recommendations by the Commission on this matter
Plant genetic resources	<ul style="list-style-type: none"> • Presentation of <i>The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture</i> • Progress report on the implementation of the Second Global Plan of Action for Plant Genetic Resources • Prepare draft Third Global Plan of Action for Plant Genetic Resources, if relevant
Cross-sectoral matters	
<i>The State of the World's Biodiversity for Food and Agriculture</i>	<ul style="list-style-type: none"> • Prepare progress report on the implementation of the follow-up to <i>The State of the World's Biodiversity for Food and Agriculture</i>
Access and benefit-sharing	<ul style="list-style-type: none"> • Follow-up on previous recommendations by the Commission on this matter
Biotechnologies	<ul style="list-style-type: none"> • Follow-up on previous recommendations by the Commission on this matter
“Digital sequence information” on GRFA	<ul style="list-style-type: none"> • Consider the use of “digital sequence information on GRFA” and the potential implications for conservation, sustainable use and ABS of GRFA
Climate change	<ul style="list-style-type: none"> • Review of a country-driven global assessment of climate change effects and genetic resource adaptation and mitigation measures • Prepare follow-up to the assessment
Nutrition and health	<ul style="list-style-type: none"> • Review of work on GRFA and nutrition and health
Management	<ul style="list-style-type: none"> • Prepare progress report / review of the Strategic Plan, MYPOW • Follow-up on previous recommendations by the Commission on targets and indicators, SDG reporting
Other matters	<ul style="list-style-type: none"> • Invite international instruments and organizations to report on their work in supporting the activities of the Commission and collate their inputs

APPENDIX G
**MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL
WORKING GROUPS, ELECTED AT THE SEVENTEENTH REGULAR SESSION
OF THE COMMISSION**

**MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL
WORKING GROUP ON ANIMAL GENETIC RESOURCES FOR FOOD AND
AGRICULTURE**

<i>Composition (no. of countries per region)</i>	<i>Country</i>
Africa (5)	Algeria Central African Republic Côte d'Ivoire Kenya Zimbabwe <i>First Alternate:</i> Namibia <i>Second Alternate:</i> Tunisia
Asia (5)	China Lao People's Democratic Republic Philippines Republic of Korea Thailand <i>First Alternate:</i> Bhutan <i>Second Alternate:</i> Malaysia
Europe (5)	France Germany Netherlands Norway Poland <i>First Alternate:</i> Sweden <i>Second Alternate:</i> Switzerland
Latin America and the Caribbean (5)	Argentina Brazil Cuba Panama Uruguay <i>First Alternate:</i> Costa Rica <i>Second Alternate:</i> Jamaica
Near East (4)	Iran (Islamic Republic of) Iraq Lebanon United Arab Emirates <i>First Alternate:</i> Jordan <i>Second Alternate:</i> Qatar
North America (2)	United States of America Canada
Southwest Pacific (2)	Fiji Tonga <i>First Alternate:</i> Vanuatu <i>Second Alternate:</i> Samoa

**MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL
WORKING GROUP ON AQUATIC GENETIC RESOURCES FOR FOOD AND
AGRICULTURE**

<i>Composition (no. of countries per region)</i>	<i>Country</i>
Africa (5)	Burkina Faso Chad Morocco South Africa Uganda <i>First Alternate:</i> Angola <i>Second Alternate:</i> Mauritania
Asia (5)	India Indonesia Japan Malaysia Philippines <i>First Alternate:</i> Thailand <i>Second Alternate:</i> Lao People's Democratic Republic
Europe (5)	Bosnia and Herzegovina Czechia France Germany Norway <i>First Alternate:</i> -- <i>Second Alternate:</i> --
Latin America and the Caribbean (5)	Argentina Brazil Chile Panama Peru <i>First Alternate:</i> Jamaica <i>Second Alternate:</i> Paraguay
Near East (4)	Egypt Oman Saudi Arabia Syrian Arab Republic <i>First Alternate:</i> Kuwait <i>Second Alternate:</i> Iraq
North America (2)	Canada United States of America
Southwest Pacific (2)	Palau Solomon Islands <i>First Alternate:</i> Tonga <i>Second Alternate:</i> Marshall Islands

**MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL
WORKING GROUP ON FOREST GENETIC RESOURCES**

<i>Composition (no. of countries per region)</i>	<i>Country</i>
Africa (5)	Angola Cameroon Ethiopia Togo Tunisia <i>First Alternate:</i> Eswatini <i>Second Alternate:</i> Ghana
Asia (5)	China Lao People's Democratic Republic Republic of Korea Malaysia Thailand <i>First Alternate:</i> India <i>Second Alternate:</i> Indonesia
Europe (5)	Finland Italy Poland Russian Federation Sweden <i>First Alternate:</i> France <i>Second Alternate:</i> Norway
Latin America and the Caribbean (5)	Argentina Brazil Costa Rica Cuba Guyana <i>First Alternate:</i> Peru <i>Second Alternate:</i> Panama
Near East (4)	Jordan Lebanon Sudan Yemen <i>First Alternate:</i> Iran (Islamic Republic of) <i>Second Alternate:</i> Syrian Arab Republic
North America (2)	United States of America Canada
Southwest Pacific (2)	Papua New Guinea Vanuatu <i>First Alternate:</i> Fiji <i>Second Alternate:</i> Solomon Islands

**MEMBERS AND ALTERNATES OF THE INTERGOVERNMENTAL TECHNICAL
WORKING GROUP ON PLANT GENETIC RESOURCES FOR FOOD AND
AGRICULTURE**

<i>Composition (no. of countries per region)</i>	<i>Country</i>
Africa (5)	Algeria Cameroon Eritrea Senegal Zambia <i>First Alternate:</i> Malawi <i>Second Alternate:</i> Morocco
Asia (5)	Bangladesh India Indonesia Japan Thailand <i>First Alternate:</i> Malaysia <i>Second Alternate:</i> Bhutan
Europe (5)	France Georgia Netherlands Russian Federation Switzerland <i>First Alternate:</i> Bosnia and Herzegovina <i>Second Alternate:</i> Sweden
Latin America and the Caribbean (5)	Brazil Chile Ecuador Jamaica Peru <i>First Alternate:</i> Costa Rica <i>Second Alternate:</i> Cuba
Near East (4)	Egypt Kuwait Sudan Yemen <i>First Alternate:</i> Saudi Arabia <i>Second Alternate:</i> United Arab Emirates
North America (2)	Canada United States of America
Southwest Pacific (2)	Cook Islands Samoa <i>First Alternate:</i> Tonga <i>Second Alternate:</i> Fiji

APPENDIX H

LIST OF DOCUMENTS

Working and information documents

Provisional agenda	CGRFA-17/19/1
Provisional annotated agenda and timetable	CGRFA-17/19/1 Add.1 Rev.1
Statutes of the Commission on Genetic Resources for Food and Agriculture	CGRFA-17/19/1/Inf.1
Rules of Procedure of the Commission on Genetic Resources for Food and Agriculture	CGRFA-17/19/1/Inf.2
Declaration of competences and voting rights submitted by the European Union and its 28 Member States	CGRFA-17/19/1/Inf.3
List of documents	CGRFA-17/19/1/Inf.4
Review of work on the role of genetic resources for food and agriculture and food security	CGRFA-17/19/2
Submissions by Members on the contribution of genetic resources for food and agriculture to the four pillars of food security and to the achievement of relevant Sustainable Development Goals	CGRFA-17/19/2/Inf.1
Report of the Fourth Session of the Team of Technical and Legal Experts on Access and Benefit-Sharing	CGRFA-17/19/3.1
Draft explanatory notes describing, within the context of the ABS Elements, the distinctive features of the different subsectors of genetic resources for food and agriculture	CGRFA-17/19/3.2
Inputs by Members and observers on access and benefit-sharing for genetic resources for food and agriculture	CGRFA-17/19/3.2/Inf.1
Report of the First Meeting of the Expert Group on Micro-organism and Invertebrate Genetic Resources for Food and Agriculture	CGRFA-17/19/3.2/Inf.2
Outputs of the International Workshop on Access and Benefit-sharing for Genetic Resources for Food and Agriculture	CGRFA-17/19/3.2/Inf.3
Access and benefit-sharing for genetic resources for food and agriculture: Survey findings	CGRFA-17/19/3.2/Inf.4
“Digital sequence information” on genetic resources for food and agriculture and its relevance for food security	CGRFA-17/19/4
Submissions by Members and observers on “digital sequence information” on genetic resources for food and agriculture	CGRFA-17/19/4/Inf.1
Assessment of the role of genetic resources for food and agriculture for climate change adaptation and mitigation	CGRFA-17/19/5
Submissions by countries on the implementation of the voluntary guidelines to support the integration of genetic diversity into national climate change adaptation planning	CGRFA-17/19/5/Inf.1

Review of work on genetic resources for food and agriculture and nutrition	CGRFA-17/19/6
Preparation of <i>The State of the World's Biodiversity for Food and Agriculture</i>	CGRFA-17/19/7.1
Report of the First Meeting of the Group of National Focal Points for Biodiversity for Food and Agriculture	CGRFA-17/19/7.2
Biodiversity for food and agriculture – needs and possible actions	CGRFA/17/19/7.3
Submissions by countries on the draft needs and possible actions for the conservation and sustainable use of biodiversity for food and agriculture	CGRFA-17/19/7.3/Inf.1
Report of the Second Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture	CGRFA-17/19/8.1
Statutes of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources, and Members and Alternates elected by the Commission at its Sixteenth Regular Session	CGRFA-17/19/8.1/Inf.1
Preparation of <i>The State of the World's Aquatic Genetic Resources for Food and Agriculture</i>	CGRFA-17/19/8.2 Rev.1
<i>The State of the World's Aquatic Genetic Resources for Food and Agriculture – Proofing version</i>	CGRFA-17/19/8.2/Inf.1
Report of the Thirty-third Session of the Committee on Fisheries	CGRFA-17/19/8.2/Inf.2
Report of the Ninth Session of the Sub-committee on Aquaculture	CGRFA-17/19/8.2/Inf.3
Report of the Second Session of the Committee on Fisheries Advisory Working Group on Aquatic Genetic Resources and Technologies	CGRFA-17/19/8.2/Inf.4
Options for Follow-up to <i>The State of the World's Aquatic Genetic Resources for Food and Agriculture</i>	CGRFA-17/19/8.3
Report of the Ninth Session of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture	CGRFA-17/19/9.1
Statutes of the Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture, and Members and Alternates elected by the Commission at Its Sixteenth Regular Session	CGRFA-17/19/9.1/Inf.1
FAO activities in support of the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture	CGRFA-17/19/9.2
Draft voluntary guidelines for the conservation and sustainable use of farmers' varieties/landraces	CGRFA-17/19/9.2/Inf.1
Status of development of the World Information and Early Warning System on plant genetic resources for food and agriculture	CGRFA-17/19/9.2/Inf.2
Proposal for an international symposium on on-farm management of farmers' varieties/landraces and networking mechanisms	CGRFA-17/19/9.2/Inf.3
Proposal for an international symposium on <i>in situ</i> conservation of crop wild relatives and wild food plants	CGRFA-17/19/9.2/Inf.4

Facilitating the implementation and monitoring of the Genebank Standards	CGRFA-17/19/9.2/Inf.5
Draft revised Reporting Format for Monitoring the Implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture	CGRFA-17/19/9.2/Inf.6
Status and trends of seed policies and laws	CGRFA-17/19/9.3
Review of the status and trends of seed policies and seed laws	CGRFA-17/19/9.3/Inf.1
Preparing <i>The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture</i>	CGRFA-17/19/9.4
Preparation of country reports for <i>The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture</i>	CGRFA-17/19/9.4/Inf.1
Report of the Fifth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources	CGRFA-17/19/10.1
Statutes of the Intergovernmental Technical Working Group on Forest Genetic Resources, and Members and Alternates elected by the Commission at Its Sixteenth Regular Session	CGRFA-17/19/10.1/Inf.1
Status of implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources	CGRFA-17/19/10.2
First report on the Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources	CGRFA-17/19/10.2/Inf.1
Global framework on forests and main forest-related financing mechanisms	CGRFA-17/19/10.2/Inf.2
Revised draft voluntary guidelines for preparing a national strategy for forest genetic resources	CGRFA-17/19/10.2/Inf.3
Updated draft funding strategy for the implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources	CGRFA-17/19/10.2/Inf.4
Preparation of <i>The Second Report on the State of the World's Forest Genetic Resources</i>	CGRFA-17/19/10.3
Draft guidelines for the preparation of country reports for <i>The Second Report on the State of the World's Forest Genetic Resources</i>	CGRFA-17/19/10.3/Inf.1
Report of the Tenth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture	CGRFA-17/19/11.1
Statutes of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture, and Members and Alternates elected by the Commission at its Sixteenth Regular Session	CGRFA-17/19/11.1/Inf.1
Review of implementation of the Global Plan of Action for Animal Genetic Resources	CGRFA-17/19/11.2
Review of methods for identification and valuation of ecosystem services provided by livestock breeds	CGRFA-17/19/11.2/Inf.1

Funding Strategy for the Implementation of the Global Plan of Action for Animal Genetic Resources: achievements and challenges	CGRFA-17/19/11.2/Inf.2
Report on the status of development of the Domestic Animal Diversity Information System	CGRFA-17/19/11.2/Inf.3 Rev.1
Status and trends of animal genetic resources – 2018	CGRFA-17/19/11.2/Inf.4
Revised draft FAO guidelines on developing sustainable value chains for small-scale livestock producers	CGRFA-17/19/11.2/Inf.5
Status of preparation of guidelines on results-based incentive systems supporting the continued provision of ecosystem services	CGRFA-17/19/11.2/Inf.6
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	CGRFA-17/19/12.1
Draft work plan for the sustainable use and conservation of micro-organism and invertebrate genetic resources for food and agriculture	CGRFA-17/19/12.2
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	CGRFA-17/19/12.2/Inf.1 Rev.1
Progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Pollinators	CGRFA-17/19/12.2/Inf.2
Progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity	CGRFA-17/19/12.2/Inf.3
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	CGRFA-17/19/13
Cooperation with international instruments and organizations	CGRFA-17/19/14
Submissions by international instruments and organizations	CGRFA-17/19/14/Inf.1
Report from the Secretariat of the Convention on Biological Diversity	CGRFA-17/19/14/Inf.2
Report from the Global Crop Diversity Trust	CGRFA-17/19/14/Inf.3
Report from CGIAR	CGRFA-17/19/14/Inf.4
Report from International Treaty on Plant Genetic Resources for Food and Agriculture	CGRFA-17/19/14/Inf.5
Collaboration with the International Treaty on Plant Genetic Resources for Food and Agriculture	CGRFA-17/19/14/Inf.6

Other documents

ABS Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture

Proceedings of the International Workshop on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture

Voluntary Guidelines for the Conservation and Sustainable Use of Crop Wild Relatives and Wild Food Plants

Background Study Papers

Background Study Paper No. 68	Exploratory Fact-Finding Scoping Study on “Digital Sequence Information” on Genetic Resources for Food and Agriculture
Background Study Paper No. 69	Biodiversity for food and agriculture and food security - An exploration of inter-relationships

