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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON FOREST GENETIC RESOURCES

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PREPARATION OF *THE SECOND REPORT ON THE STATE OF THE WORLD'S FOREST GENETIC RESOURCES*

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I. INTRODUCTION

1. At its Eighteenth Regular Session in 2021, the Commission on Genetic Resources for Food and Agriculture (Commission) considered the preparation of *The Second Report on the State of the World's Forest Genetic Resources* (Second Report) and took note of the progress made. The Commission invited countries that had not yet done so to nominate a National Focal Point (NFP) and alternates, as needed. It also urged countries, regional networks and relevant international organizations that had not yet done so to submit their reports to FAO by 31 October 2021, or as soon as possible thereafter.¹
2. The Commission requested FAO to present the draft Second Report for review by the Working Group at its Seventh Session and then for consideration by the Commission at its Nineteenth Regular Session.² It also requested FAO to ensure an inclusive process for the expert meetings that will gather additional information on forest genetic resources (FGR) from the scientific community for the preparation of the Second Report. Furthermore, the Commission requested FAO to explore innovative and cost-effective ways of publishing and distributing the Second Report and its key findings.³
3. This document presents a summary of activities undertaken for the preparation of the Second Report, the current status of the preparatory process, preliminary findings and next steps, for consideration by the Working Group. The draft Second Report is provided in the document *Draft Second Report on the State of the World's Forest Genetic Resources*.⁴

II. ACTIVITIES UNDERTAKEN FOR THE PREPARATION OF THE SECOND REPORT ON THE STATE OF THE WORLD'S FOREST GENETIC RESOURCES

4. The preparatory process was initiated in June 2019 when FAO invited Members, through Circular State Letter C/CBD-10,⁵ to update the nominations of NFPs, as appropriate, and submit the country reports for the preparation of the Second Report. Through the same letter, FAO also invited the regional networks on FGR and relevant international organizations to submit reports on their contributions to the implementation of the Global Plan of Action on the Conservation, Sustainable Use and Development of Forest Genetic Resources (Global Plan of Action).⁶
5. During 2019, FAO briefed the regional networks in Asia,⁷ Europe⁸ and sub-Saharan Africa⁹ on the preparatory process for the Second Report. FAO also provided a similar briefing to its Regional Forestry Commissions in Africa, Asia-Pacific, Europe, Latin America and the Caribbean, Near East and North America in 2019 and 2020. Moreover, the FAO Committee on Forestry was informed of the preparatory process in October 2020. The Committee invited Members to finalize their country reports for the Second Report and submit them to FAO, as soon as possible.¹⁰
6. Following the adoption of the outline,¹¹ timeline¹² and reporting guidelines¹³ for the preparation of the Second Report by the Commission at its Seventeenth Regular Session, FAO approached several potential donors for their interest to support this effort. In October 2019, FAO hired a United Nations Volunteer for two years with resources from the multi-donor trust fund project

¹ CGRFA-18/21/Report, paragraph 65.

² CGRFA-18/21/Report, paragraph 66.

³ CGRFA-18/21/Report, paragraph 67.

⁴ CGRFA/WG-FGR-7/23/3/Inf.1.

⁵ <http://www.fao.org/3/ca5229en/ca5229en.pdf>

⁶ FAO. 2014. *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*. Rome. <http://www.fao.org/3/a-i3849e.pdf>

⁷ Asia Pacific Forest Genetic Resources Programme, <https://www.apforigen.org/>

⁸ European Forest Genetic Resources Programme, <https://www.euforgen.org/>

⁹ Sub-Saharan Forest Genetic Resources Programme, <https://www.biodiversityinternational.org/forests/saforigen/>

¹⁰ COFO/2020/REP, paragraph 16.

¹¹ CGRFA-17/19/10.3, *Appendix I*.

¹² CGRFA-17/19/10/3, *Appendix II*.

¹³ CGRFA-17/19/10.3/Inf.1.

supporting the implementation of the Commission's Multi-Year Programme of Work (GCP/GLO/841/MUL).¹⁴ Furthermore, a forestry expert seconded to FAO by France contributed to this work among other forest management-related activities between January 2020 and July 2021.

7. In July 2020, the Government of Germany and FAO signed an agreement for a three-year global project¹⁵ supporting the preparation of the Second Report. The project activities included the organization of regional training workshops for the NFPs in Africa, Asia, Latin America and the Caribbean, Near East and Southwest Pacific to support the finalization of the country reports. Due to the COVID-19 pandemic and related travel restrictions, the planned workshops were conducted as virtual meetings and this also allowed other national experts to attend the meetings in addition to the NFPs. The meetings helped to clarify the reporting schedule and guidelines, demonstrate the use of the online reporting system and share experiences on the preparation of country reports. In 2020, virtual meetings were organized for the NFPs and other experts in Asia (26–27 October), and in the Southwest Pacific (12–13 November). In 2021, virtual meetings were organized for sub-Saharan Africa (11–12 March), Latin America and the Caribbean (11–12 March), Near East and North Africa (19–20 April) and Central Asia (22–23 April). The virtual meetings were attended by a total of 96 NFPs and experts from 48 countries.

8. Throughout the preparatory process, FAO provided, upon request, technical support to NFPs in the finalization of country reports through video calls and electronic mail. Furthermore, FAO screened the submitted country reports for possible data-entry errors and inconsistencies, and contacted NFPs, as necessary.

9. The extended deadline of 31 October 2021 for submitting the country reports proved too challenging for many countries. FAO therefore continued to provide technical support for the finalization of country reports. Moreover, many countries informed the Secretariat that they could only complete the first section of the country report (i.e. the online questionnaire gathering data on the management of FGR) but not the second one (i.e. a written report providing complementary information). The questionnaire is focussed on targets, indicators and verifiers for FGR, as adopted by the Commission at its Sixteenth Regular Session for the purpose of monitoring the implementation of the Global Plan of Action.¹⁶

10. While preparing the draft Second Report, FAO continued collaborating with the regional networks on FGR and international partners, in particular Bioversity International, Botanic Gardens Conservation International, the Royal Botanic Gardens, Kew, and World Agroforestry. Moreover, FAO benefited from contributions provided by a large group of scientists and experts across the world who provided additional information and from scientific literature, which complemented the information contained in the country reports.

11. As part of the global project, FAO initiated a series of expert meetings to compile state-of-the-art knowledge for the Second Report. As travel and other restrictions related to COVID-19 remained in place in many parts of the world during the past two years, the expert meetings were organized as short online events to allow experts from different regions to meet as conveniently as possible. For each meeting, eight to ten experts were invited based on their research experience and considering the regional coverage of their work.

12. The group of experts on species and genetic diversity met thrice between December 2021 and February 2022. The presentations and discussions focused on the state and diversity of the world's tree, bamboo and rattan species, as well as on the current knowledge on the genetic diversity of forest trees with examples of scientific studies carried out in Africa, Australia, Europe, Latin America, Southeast Asia and North America. For the second expert group, Bioversity International and World Agroforestry prepared reviews of scientific advances in the *in situ* and *ex situ* conservation of FGR,

¹⁴ See CGRFA/WG-FGR-7/23/8, paragraphs 12-13.

¹⁵ GCP/GLO/041/GER.

¹⁶ CGRFA-16/17/Report, paragraph 74; CGRFA-16/17/20, *Appendix C.*; see also CGRFA/WG-FGR/7/23/4 Inf.1.

respectively, and the expert discussions on this topic are planned for early 2023. The third and fourth expert groups will also meet in the first semester of 2023 and focus on tree breeding, and international and regional collaboration on FGR, respectively.

III. CURRENT STATUS AND PRELIMINARY FINDINGS

13. As of January 2023, 107 countries¹⁷ nominated NFPs. The online questionnaire was completed by 66 countries representing 72 percent of the global forest area. However, less than half of these countries (31) submitted in addition a written report providing complementary information. FAO received reports from two regional networks (the Asia Pacific Forest Genetic Resources Programme and the European Forest Genetic Resources Programme) and two international organizations (Botanical Gardens Conservation International and the Royal Botanic Gardens, Kew).

Table 1. List of countries that completed the online questionnaire (Q) and/or submitted a written report (W).

Region	Countries
Africa (12)	Burkina Faso (Q), Eswatini (Q), Ethiopia (Q), Guinea (Q,W), Kenya (Q), Madagascar (Q), Mauritania (Q), Morocco (Q), Namibia (Q), Niger (Q), South Africa (Q), Zimbabwe (Q)
Asia (8)	China (Q,W), India (Q), Japan (Q), Lao People's Democratic Republic (Q), Malaysia (Q), Republic of Korea (Q,W), Sri Lanka (Q), Thailand (Q,W)
Europe (32)	Armenia (Q), Austria (Q), Belgium (Q), Bulgaria (Q,W), Croatia (Q,W), Cyprus (Q), Czechia (Q,W), Denmark (Q,W), Estonia (Q), Finland (Q,W), France (Q,W), Georgia (Q), Germany (Q,W), Greece (Q), Iceland (Q,W), Ireland (Q,W), Italy (Q,W), Lithuania (Q,W), Luxembourg (Q), Malta (Q,W), The Netherlands (Q,W), Norway (Q,W), Poland (Q,W), Portugal (Q,W), Russian Federation (Q), Serbia (Q,W), Slovenia (Q), Spain (Q,W), Sweden (Q,W), Switzerland (Q,W), Türkiye (Q), Ukraine (Q,W)
Latin America and the Caribbean (7)	Argentina (Q,W), Brazil (Q,W), Chile (Q), Ecuador (Q), El Salvador (W), Mexico (Q), Saint Lucia (Q)
Near East (3)	Iran (Islamic Republic of) (Q), Lebanon (Q,W), Yemen (Q)
North America (2)	Canada (Q,W), United States of America (Q)
Southwest Pacific (3)	Australia (Q,W), Fiji (Q), Vanuatu (Q)

14. The delayed completion of questionnaires and the late submission of many written reports slowed down the preparation of the draft Second Report. Thirty countries completed the questionnaire and eight countries submitted their written reports after the extended deadline (October 2021). Many questionnaires and written reports were only submitted during the second semester of 2022. Four countries have informed the Secretariat that their written reports will be submitted in early 2023. Six countries have started completing the questionnaire but have not yet submitted it.

15. The draft Second Report was prepared based on the above-mentioned contributions received by 16 January 2023 from countries, regional networks and international organizations, and taking into account additional information and scientific literature. A total of 59 scientists and experts from 23

¹⁷ <https://www.fao.org/forest-genetic-resources/background/national-focal-points/en/>

countries in Asia, Africa, Europe, Latin America and the Caribbean, North America and Southwest Pacific contributed to the preparation of the draft Second Report, including FAO staff and consultants.

16. The draft Second Report includes preliminary versions of 10 of the 13 chapters. It is, thus, incomplete and additional work is required to prepare a complete draft of the report for final publication. All chapters will need to undergo a peer-review process and the complete report needs to be further edited to ensure consistency and improve readability. The final report will include a foreword, acknowledgements (including a complete list of contributing authors and reviewers), a list of abbreviations and acronyms, a summary of the preparatory process as well as an executive summary.

Preliminary findings

17. Trees and other woody plants are the foundation species of forest ecosystems and they are often an important component also in other ecosystems, such as woodlands and agricultural landscapes. Forests provide goods and services that are essential for people and they are increasingly recognized for their role in contributing to sustainable development. However, the importance of FGR in maintaining the supply of these goods and services often goes unrecognized. Despite of the efforts made during the past decade, there is thus a continued need to increase awareness of the role and value of FGR.

18. Globally, forests still cover 31 percent (4.06 billion hectares) of the total land area and trees are also found in woodlands and agroforests, representing 7–13 percent (1–1.7 billion hectares, depending on definitions) of the total land area. Most forests (45 percent) are found within the tropical biome and naturally regenerating forests account for 93 percent of the global forest area. Deforestation continues, but increasing reforestation and restoration efforts during the past decades are starting to bear fruit. The annual rate of net forest loss decreased from 7.84 million hectares in 1990–2000 to 4.17 million hectares in 2010–2020. Between 2000 and 2018, almost 90 percent of direct drivers of deforestation were related to agriculture, i.e. conversion of forests to cropland and livestock grazing.

19. There are over 58 000 tree species in the world and their diversity varies from Europe's 465 native tree species to nearly 19 000 species in tropical Asia. Of all tree species, 58 percent are single-country endemics. However, there are also tree species with extremely wide geographical distribution, some even covering nearly 100 countries and territories. New tree species are described every year. The latest global conservation assessments have classified 30 percent (17 510) of all tree species as threatened and 0.2 percent (142) as extinct. Most of the world's tree species remain inadequately studied and for only about a quarter of them (14 014) uses have been documented.

20. In addition to trees, bamboos and palms also play an important role in forestry and people's livelihoods in many countries across the world. There are nearly 1 600 species of woody bamboos and about 2 500 species of palms. Rattans (climbing palms) account for 20 percent of all palm species. Although several bamboo and palm species are widely cultivated as agricultural crops, the majority of them are growing in the wild and provide people with many non-wood forest products. However, uses have been documented only for 12 percent of woody bamboos.

21. Trees and other woody species exhibit different ecological and life history traits (e.g. distribution, population size and density, pollination mechanism and mating system) making it challenging to draw general conclusions on the level and distribution of their genetic diversity. Recent studies have shown that genetic structure and diversity can even differ across the same landscape among multiple species within a single tree genus. Moreover, forests themselves are dynamic systems that change both spatially and temporally, driving the evolution and adaptation of all species within them.

22. The draft Second Report makes an attempt to summarize the current knowledge of the genetic diversity, based on studies from the main forest biomes and from different geographical regions, to inform practical efforts to conserve and manage FGR. It reaffirms that the ecological and life history traits of trees and other woody species are generally linked to higher genetic diversity, lower

population differentiation and lower levels of inbreeding when compared to other plants, such as herbaceous annuals.

23. In tropical forests, tree species often have low population densities and small distribution ranges, and they mainly rely on short-range pollination by animals or insects. While these traits may be expected to lead to lower genetic diversity in tropical forests when compared to boreal and temperate ones, studies have recorded similar levels of genetic diversity for tree species across all main forest biomes. However, tropical and subtropical tree species tend to have genetically more differentiated populations as compared to boreal and temperate tree species.

24. The ability of tropical trees to maintain high genetic diversity is more vulnerable to anthropogenic and other disturbances than the one of boreal and temperate tree species. Large-scale deforestation, typically occurring in the tropics, can wipe out large parts of, or even entire, tree populations and the remaining fragmented subpopulations are pushed to a path towards reducing genetic diversity and fitness. Wood harvesting can also reduce genetic diversity more easily in tropical forests than in boreal and temperate forests. Therefore, it is crucial that genetic aspects are considered when taking decisions on land use and forest management.

25. *In situ* conservation remains the preferred approach for conserving FGR and typically takes place in protected areas, specific conservation stands and managed forests. *Ex situ* conservation is often carried out to complement *in situ* conservation, especially when the population size is critically low in the wild. The reported *in situ* and *ex situ* conservation programmes include 1 283 and 978 species, respectively. Globally, the countries reported 25 618 *in situ* units with a total area of over 108 million hectares, complemented by 12 300 *ex situ* conservation stands covering nearly 165 000 hectares. Furthermore, 168 140 accessions in seed banks and field collections were reported.

26. Conservation efforts can nowadays benefit from advanced molecular and genomic tools. Genetic and genomic data, including range-wide characterizations of genetic diversity, are now available for many more species. These and advances in spatial analyses of threats allow better targeting of *in situ* measures in practical conservation of FGR. Moreover, the advances also make possible more sophisticated analyses on the implications of climate change for *in situ* conservation of FGR. Concerning *ex situ* methods, research has made progress in increasing the knowledge on storage characteristics, requirements and technologies for diverse sets of tree and other woody species.

27. Concerning the use of FGR, the supply of forest reproductive material is organized in different ways within countries. In some countries, practically all of this material is produced in seed orchards established with improved or selected germplasm while others may rely entirely on seed stands. However, the majority of the reporting countries obtain the material from both sources. Tree seed and tree breeding programmes are in place in 71 and 76 percent, respectively, of the reporting countries and public or government entities play the dominant role in these programmes in nearly all countries. The reported tree seed programmes include 675 species and the tree breeding programmes 475 species. Globally, a total of 381 697 seed stands, covering nearly 8.2 million hectares, were reported together with 4 775 seed orchards totalling 30 790 hectares. The global production of planting stock through macro- and/or micropropagation was nearly three billion plants annually and the most advanced breeding programmes have reached their 4th generation. Climate change is also creating challenges for the deployment of forest reproductive material but science-based guidelines and many tools are available for FGR users.

28. Despite of these seemingly high numbers of seed stands and seed orchards, as well as the mass propagation efforts, many countries across the world noted in their reports that their supply of forest reproductive material is unable to meet its demand, which is increasing due to reforestation, restoration and climate change mitigation. The production and supply chains of this material function poorly, or may even be non-existent, in many developing countries, which are typically species-rich with ambitious goals for forest restoration. In both developing and developed countries, the supply problems also result from changes in preferred species (e.g. native trees instead of introduced ones, or broadleaves instead of conifers) to which the tree seed and breeding programmes have not yet been able to adjust. Moreover, seed production of trees typically fluctuates from one year to another due to

seed biology and climatic conditions, hampering efforts to ensure a steady supply or to increase seed production. Possibilities for sourcing the seed from international markets are also very limited as compared to the seed of agricultural crops.

29. In addition to tree seed and breeding programmes, 65 percent of the reporting countries have ongoing extension programmes or activities on FGR use. The main FGR users targeted by these efforts are forest owners, local communities and farmers. Many countries also reported targeting forest managers, indigenous communities, nurseries, seed traders and traditional healers.

30. Concerning policies, institutions and capacity-building, several countries reported progress in establishing a national coordination mechanism and a national (or subnational) strategy on FGR that are now in place in 58 percent and 62 percent, respectively, of the countries. The main stakeholders involved in the national coordination mechanisms are governmental agencies, research organizations and relevant ministries. The integration of FGR into relevant national policies has also advanced, with 71 and 79 percent of the countries having addressed FGR in national forest programmes (or national forest policies) and in national biodiversity action plans, respectively. However, only 50 percent of the countries reported having integrated FGR into national adaptation strategies for climate change. This suggests that the important role of FGR in maintaining the resilience of forests and in enabling them to adapt to climate change is not adequately recognized despite a large amount of practical experiences and scientific research.

31. Concerning regional and international cooperation on FGR, the draft Second Report confirms the important role that regional networks and international organizations play in providing technical, and sometimes also financial, support to the management of FGR at the national or sub-national levels. Overall, the regional and international cooperation on FGR is very active worldwide, but there are several issues that deserve further attention in the future. These include strengthening of the regional collaboration in Africa and in the Latin America and the Caribbean, for example, and improving the dissemination of the many tools and knowledge products developed by regional networks and international organizations to relevant stakeholders on the ground.

32. Another issue of concern is the inadequate coverage of FGR in forest education across all regions. The country reports called for improved FGR education, especially in technical and vocational education and training, to ensure that professionals and students are capable of responding to the current and future needs of the forest sector and to support stakeholders in field-level activities.

33. Despite many positive developments during the past decade, another common challenge for both developed and developing countries is the lack, or limited availability, of species-specific data at the national level. This is demonstrated by the fact that several countries, even those with ample human and financial resources available, could only report if species are included in conservation or tree seed programmes but were unable to provide any data at all on the number and areas of conservation units or seed stands, for example. The situation raises doubts about the effectiveness of FGR conservation in these countries but also the availability of even basic information for practitioners and policymakers (e.g. on the production of forest reproductive material for reforestation and restoration).

34. Many countries (68 percent) have a national FGR inventory or a similar arrangement in place, and 59 percent of countries have also created a national FGR information system. However, it seems that these mechanisms do not always connect to, or gather data from, all stakeholders that are involved in the management of FGR. Therefore, the national inventories and information systems seem to provide an incomplete picture of the efforts made. The information on FGR is also made available by many regional and global information systems developed and maintained by regional networks and international organizations. However, these regional and global information systems often collect data on specific aspects related to FGR, based on which their data providers are then selected. In other words, the availability of information on FGR remains scattered at the national, regional and global levels.

35. Countries reported a total of 2 523 tree and other woody plant species (including hybrids). For 2 003 of them the up-to-date national distribution range is available, and 1 574 and 733 species have been characterized based on non-molecular and molecular information, respectively. These figures cannot be directly compared to the findings of the First Report, which found that of the nearly 8 000 species mentioned in the country reports, only around 2 400 were actively managed for products and/or services. The main reason is that the reporting requirements for the Second Report were different from those used for the preparation of the First Report.

36. In conclusion, the preliminary findings of the draft Second Report indicate that progress has been made under all four priority areas of the Global Plan of Action, albeit to varying degrees. The four priority areas remain highly relevant, and efforts currently underway at national, regional and global levels need to be continued and increased.

IV. NEXT STEPS

37. Following the review by the Working Group, FAO will continue work on the Second Report. Additional questionnaires and reports received before 30 April 2023 will be included in the final analyses. FAO is also in the process of concluding the remaining expert meetings and will then finalize, in collaboration with experts involved in the preparation of different chapters, a complete draft of the Second Report.

38. The Secretariat proposes that the revised draft Second Report be made available on 1 October 2023 for review and comments by 30 November 2023. The final Report, taking into account comments received, could then be launched by 30 June 2024.

V. GUIDANCE SOUGHT

39. The Working Group may wish to take note of progress made in the preparation of the Second Report and the activities reported in support of this. It may also wish to review the draft Second Report, recommend changes and provide further guidance, as appropriate.

40. The Working Group may wish to note that completed questionnaires and written reports received by FAO before 30 April 2023 will be reflected in the revised draft Second Report.

41. The Working Group may wish to recommend that the Commission review the draft Second Report and request the Secretariat to:

- i. prepare a revised draft Second Report by 1 October 2023;
- ii. invite Members and observers to provide comments on the revised draft Second Report by 30 November 2023;
- iii. publish the finalized Second Report by 30 June 2024, taking into account the comments received;
- iv. prepare and publish an in-brief version of the Second Report in all official languages of FAO; and
- v. present the Second Report at relevant international meetings and actively disseminate its findings to inform global processes on biodiversity, climate change, forests and ecosystem restoration.