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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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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 Intergovernmental Technical Working Group on Forest Genetic Resources (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. The Working Group reviewed the status of the preparatory process and the draft Second Report at its Seventh Session in March 2023. It noted that completed questionnaires and written country reports, including updated versions, received by FAO before 30 April 2023, would be reflected in a revised draft Second Report.⁴
4. 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 Commission. The draft Second Report is provided in the document *Draft Second Report on the State of the World's Forest Genetic Resources*.⁵

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

5. The preparatory process was initiated in June 2019 when FAO invited Members, through Circular State Letter C/CBD-10,⁶ to update the nominations of NFPs, as appropriate, and submit 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).⁷
6. During 2019, FAO briefed the regional networks in Asia,⁸ Europe⁹ and sub-Saharan Africa¹⁰ 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, the Near East and North America in 2019 and 2020. 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.¹¹

¹ CGRFA-18/21/Report, paragraph 65.

² CGRFA-18/21/Report, paragraph 66.

³ CGRFA-18/21/Report, paragraph 67.

⁴ CGRFA-19/23/8.1, paragraph 9.

⁵ CGRFA-19/23/8.2/Inf.1.

⁶ <http://www.fao.org/3/ca5229en/ca5229en.pdf>

⁷ 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>

⁸ Asia Pacific Forest Genetic Resources Programme, <https://www.apforngen.org/>

⁹ European Forest Genetic Resources Programme, <https://www.euforgen.org/>

¹⁰ Sub-Saharan Forest Genetic Resources Programme, <https://www.biodiversityinternational.org/forests/saforgen/>

¹¹ COFO/2020/REP, paragraph 16.

7. Following the adoption of the outline,¹² timeline¹³ and reporting guidelines¹⁴ for the preparation of the Second Report by the Commission at its Seventeenth Regular Session, FAO approached several potential donors regarding their interest in supporting this effort. With extra-budgetary funds made available in 2020, FAO initiated the organization of regional training workshops for NFPs in Africa, Asia, Latin America and the Caribbean, the Near East and the 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 allowed other national experts to attend the meetings in addition to the NFPs. The meetings allowed the reporting schedule and guidelines to be clarified, the use of the online reporting system to be demonstrated and experiences on the preparation of country reports to be shared. In 2020, virtual meetings were organized for 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), the 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. FAO also screened the submitted country reports for possible data-entry errors and inconsistencies, and contacted NFPs when 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 (the online questionnaire gathering data on the management of FGR) but not the second section (a written report providing complementary information). The questionnaire focuses 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.¹⁵

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 complemented the information contained in the country reports with information obtained from a large group of scientists and experts across the world and from scientific literature.

11. FAO also initiated a series of expert meetings to obtain state-of-the-art knowledge for the Second Report. Because of the COVID-19 pandemic, the expert meetings were held as short online events to allow experts from different regions to meet at convenient times. Eight to ten experts were invited to each meeting based on their research experience and the regional coverage of their work.

12. The group of experts on species and genetic diversity met three times 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 of the genetic diversity of forest trees, with examples given 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, respectively. The expert discussions on this topic are scheduled for May 2023. The third and fourth expert groups will also meet in May–June 2023 and focus on tree breeding, and international and regional collaboration on FGR, respectively.

¹² CGRFA-17/19/10.3, *Appendix I*.

¹³ CGRFA-17/19/10/3, *Appendix II*.

¹⁴ CGRFA-17/19/10.3/Inf.1.

¹⁵ CGRFA-16/17/Report, paragraph 74; CGRFA-16/17/20, *Appendix C*.; see also CGRFA-19/23/8.3/Inf.1.

III. CURRENT STATUS AND PRELIMINARY FINDINGS

13. As of April 2023, 107 countries¹⁶ had nominated NFPs. The online questionnaire was completed by 73 countries, representing 75 percent of the global forest area. However, fewer than half of these countries (34) also submitted 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 four international organizations (Biodiversity International, Botanical Gardens Conservation International, the Royal Botanic Gardens, Kew and World Agroforestry).

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

Region	Countries
Africa (14)	Burkina Faso (Q), Eswatini (Q), Ethiopia (Q), Guinea (Q,W), Kenya (Q), Madagascar (Q), Mali (Q), Mauritania (Q), Morocco (Q), Namibia (Q), Niger (Q), Nigeria (Q), South Africa (Q), Zimbabwe (Q)
Asia (9)	China (Q,W), India (Q), Indonesia (Q), Japan (Q), Lao People's Democratic Republic (Q), Malaysia (Q), Republic of Korea (Q,W), Sri Lanka (Q), Thailand (Q,W)
Europe (33)	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,W), Hungary (Q), Iceland (Q,W), Ireland (Q,W), Italy (Q,W), Lithuania (Q,W), Luxembourg (Q), Malta (Q,W), Netherlands (Kingdom of the) (Q,W), Norway (Q,W), Poland (Q,W), Portugal (Q,W), Russian Federation (Q), Serbia (Q,W), Slovenia (Q,W), Spain (Q,W), Sweden (Q,W), Switzerland (Q,W), Türkiye (Q), Ukraine (Q,W)
Latin America and the Caribbean (8)	Argentina (Q,W), Brazil (Q,W), Chile (Q), Ecuador (Q), El Salvador (Q,W), Mexico (Q), Panama (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,W)
Southwest Pacific (4)	Australia (Q,W), Cook Islands (Q), Fiji (Q), Vanuatu (Q)

14. The delayed completion of questionnaires and the late submission of many written reports slowed the preparation of the draft Second Report. Thirty-six countries completed the questionnaire and 11 countries submitted written reports after the extended deadline (October 2021). Many questionnaires and written reports were only submitted during the second half of 2022, and the final ones were received by the end of April 2023.

15. The draft Second Report was prepared based on the contributions received by 16 January 2023 from countries, regional networks and international organizations, taking into account additional information and scientific literature. A total of 59 scientists and experts from 23 countries in Asia, Africa, Europe, Latin America and the Caribbean, North America and the 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. Moreover, the country data

¹⁶ <https://www.fao.org/forest-genetic-resources/background/national-focal-points/en/>

and reports received after the Seventh Session of the Working Group need to be incorporated into the analyses and reflected in relevant chapters. 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 and an executive summary.

Preliminary findings

17. Trees and other woody plants are the foundation species of forest ecosystems, and they are also often an important component 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 the efforts made during the past decade, there is thus a continued need to increase awareness of the roles and values of FGR.

18. Globally, forests still cover 31 percent (4.06 billion hectares) of the total land area,¹⁷ 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.¹⁸ Most forests (45 percent) are found within the tropical biome and naturally regenerating forests account for 93 percent of the global forest area.¹⁹ Deforestation continues, but increasing reforestation and restoration efforts during recent 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 2010–2020.²⁰ Between 2000 and 2018, drivers related to agriculture, i.e. conversion of forests to cropland and livestock grazing, were the direct drivers of almost 90 percent of deforestation.²¹

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 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 uses have been documented for only about a quarter of them (14 014).

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 grow 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 have a range of different ecological and life history traits (e.g. distribution, population size and density, pollination mechanism and mating system), making it difficult to draw general conclusions about 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

¹⁷ FAO. 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. <https://doi.org/10.4060/ca9825en>

¹⁸ FAO. 2019. *Trees, Forests and Land Use in Drylands: the First Global Assessment. Full Report*, Rome; FAO 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. <https://doi.org/10.4060/ca9825en>; FAO. 2022. FRA. 2020. Remote Sensing Survey. Rome. <https://doi.org/10.4060/cb9970en>; Zomer RJ, Trabucco A, Coe R, Place F, van Noordwijk M, Xu JC. 2014. *Trees on Farms: an Update and Reanalysis of Agroforestry's Global Extent and Socio-Ecological Characteristics*. ICRAF Working Paper No. 179. Nairobi.

¹⁹ FAO 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. <https://doi.org/10.4060/ca9825en>

²⁰ FAO 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. <https://doi.org/10.4060/ca9825en>

²¹ FAO 2022. *FRA 2020 Remote Sensing Survey*. Rome. <https://doi.org/10.4060/cb9970en>

that change both spatially and temporally, driving the evolution and adaptation of all species within them.

22. The draft Second Report attempts to summarize current knowledge of 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 confirms 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 than those of 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 insects or other animals. While these traits may be expected to lead to lower genetic diversity in tropical forests than in boreal and temperate forests, studies have recorded similar levels of genetic diversity for tree species across all the main forest biomes. However, tropical and subtropical tree species populations tend to be genetically more differentiated than their boreal and temperate counterparts.

24. The ability of tropical trees to maintain high genetic diversity is more vulnerable to anthropogenic and other disturbances than that of boreal and temperate trees. Large-scale deforestation, typically occurring in the tropics, can devastate tree populations or even wipe them out completely, and the remaining fragmented subpopulations are pushed onto a path towards reduced genetic diversity and fitness. Wood harvesting can also reduce genetic diversity more easily in tropical forests than in boreal and temperate forests. It is therefore crucial to consider genetic factors 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 *in situ* and *ex situ* conservation programmes reported by countries include 1 283 and 978 species, respectively. Globally, 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. The number of reported accessions in seed banks and field collections was 168 140.

26. Conservation efforts can now 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, along with advances in spatial analyses of threats, allow better targeting of *in situ* measures in practical FGR conservation. Moreover, such advances also allow more sophisticated analyses of the implications of climate change for *in situ* conservation. Where *ex situ* methods are concerned, research has increased knowledge of the storage characteristics, requirements and technologies of diverse sets of tree and other woody species.

27. Regarding the use of FGR, the supply of forest reproductive material within countries is organized in a variety of different ways. In some countries, practically all such material is produced in seed orchards established with improved or selected germplasm, while other countries may rely entirely on seed stands or any other seed sources. However, the majority of reporting countries obtain material from both seed orchards and seed stands. Tree seed programmes and tree breeding programmes are in place in 71 percent and 76 percent, respectively, of reporting countries, and public or government entities play the dominant role in these programmes in nearly all cases. The reported tree seed programmes include 675 species, and the tree breeding programmes include 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 3 billion plants annually, and the most advanced breeding programmes have reached their fourth generation. Climate change is creating challenges for the deployment of forest reproductive material, but science-based guidelines and many tools are available for FGR users.

28. Despite the seemingly high numbers of seed stands and seed orchards, as well as the mass propagation efforts that are taking place, many reporting countries across the world noted that their supply of forest reproductive material is unable to meet demand, which is increasing as a result of reforestation, restoration and climate change mitigation. The production and supply chains for such

material function poorly (or may be non-existent) in many developing countries, which are typically species-rich and have ambitious goals for forest restoration. In both developing and developed countries, changes in preferred species (e.g. native trees instead of introduced ones, or broadleaves instead of conifers) also cause supply problems, as tree seed and breeding programmes have not yet been able to adjust. Moreover, tree seed production typically fluctuates from year to year because of seed biology and climatic conditions, which hampers efforts to ensure a steady supply or increase production. Options for sourcing 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 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, and these are now in place in 58 percent and 62 percent, respectively, of reporting 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 percent and 79 percent of countries having addressed FGR in national forest programmes (or national forest policies) and in national biodiversity action plans, respectively. However, only 50 percent of 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 for the management of FGR at national or subnational levels. Overall, 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 regional collaboration in Africa and in 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 supporting stakeholders in field-level activities.

33. Despite many positive developments over the past decade, another common challenge for both developed and developing countries is the lack of, 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 report on whether 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. This raises doubts about the effectiveness of FGR conservation in these countries but also about 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, national inventories and information systems seem to provide an incomplete picture of efforts made. 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 of FGR, and their data providers are selected on this basis. In other words, the availability of information on FGR remains scattered at national, regional and global levels.

35. Countries reported a total of 2 523 tree and other woody plant species (including hybrids). The up-to-date national distribution range is available for 2 003 of them, 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 first report on *The State of the World's Forest Genetic Resources* (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 for 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. At its Seventh Session, the Working Group recommended that the revised draft Second Report, including a more profound analysis of the data provided by countries, be completed and made available by 1 October 2023, and that Members and observers be invited to provide comments on it by 30 November 2023. FAO would subsequently, based on comments received, finalize and publish the Second Report by 30 June 2024.²² The Working Group further recommended that FAO prepare and publish an in-brief version of the Second Report in all official UN languages.

38. The Working Group also recommended that FAO 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.²³ Moreover, it recommended that the Commission explore the reasons for the low response rate to ensure that more countries report in the future.²⁴

V. GUIDANCE SOUGHT

39. The Commission may wish to take note of the draft Second Report and provide inputs and comments, as appropriate.

40. The Commission may wish to recommend that FAO:

- (i) prepare a revised draft Second Report, including a more profound analysis of the data provided by countries, by 1 October 2023;
- (ii) invite Members and observers to provide comments on the revised draft Second Report by 30 November 2023;
- (iii) finalize the Second Report, taking into account all comments received, and publish it by 30 June 2024;
- (iv) prepare and publish an in-brief version of the Second Report in all official UN languages; 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.

41. The Commission may wish to invite its Members to:

- (i) make full use of the findings of the Second Report in the development and implementation of relevant policies and actions; and
- (ii) keep their nominations for the NFPs and possible alternates up to date.

²² CGRFA-19/23/8.1, paragraph 10.

²³ CGRFA-19/23/8.1, paragraph 11.

²⁴ CGRFA-19/23/8.1, paragraph 9.