



COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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

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I. INTRODUCTION

1. At its Nineteenth Regular Session in 2023, the Commission on Genetic Resources for Food and Agriculture (Commission) took note of a first draft of *The Second Report on the State of the World's Forest Genetic Resources* (Second Report)¹ and recommended that FAO prepare, by 1 October 2023, a revised version, including a more profound analysis of the data provided by countries. It further recommended that FAO invite Members and observers to provide comments on the revised draft Second Report by 30 November 2023, subsequently finalize the Second Report, taking into account all comments received, and publish it by 30 June 2024, with an in-brief version in all official languages of FAO.²

2. This document presents activities undertaken by FAO since July 2023 to finalize the Second Report and summarizes its key findings for consideration by the Commission. Both the Second Report and the in-brief version will be launched on the occasion of the Commission's Twentieth Regular Session.

II. BACKGROUND

3. Forests and trees enhance and protect landscapes, ecosystems and production systems. They provide goods and services which are essential to the survival and well-being of all humanity. Forest genetic resources (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. FGR are essential for the adaptation and evolutionary processes of forests and trees as well as for improving their productivity.

4. The Commission, at its Eleventh Regular Session in 2007, emphasized the urgency to conserve and sustainably use FGR and approved the inclusion of a global assessment of FGR in its Multi-Year Programme of Work. FAO published the first-ever report on *The State of the World's Forest Genetic Resources* (First Report) in 2014. The report constitutes a major milestone in building the information and knowledge base required for action to improve the management of FGR at national, regional and international levels. The report was prepared based on information provided by 86 countries, outcomes from regional consultations and findings of thematic studies.³ In response to the findings of the First Report, the Commission agreed on, and the FAO Conference adopted, the rolling Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources (Global Plan of Action).⁴

5. At its Seventeenth Regular Session, the Commission agreed on the outline,⁵ timeline⁶ and reporting guidelines⁷ for the preparation of the Second Report. In June 2019, FAO invited Members to submit country reports for the preparation of the Second Report. It 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. FAO reported since regularly on the status of preparation of the Second Report to the Intergovernmental Technical Working Group on Forest Genetic Resources (Working Group)⁸ and the Commission.⁹

¹ CGRFA-19/23/8.2/Inf.1.

² CGRFA-19/23/Report, paragraph 64.

³ <https://www.fao.org/forest-genetic-resources/assessments/first-report/thematicstudies/en/>

⁴ FAO. 2014. *Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources*. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i3849e>

⁵ CGRFA-17/19/10.3, *Appendix I*.

⁶ CGRFA-17/19/10.3, *Appendix II*.

⁷ CGRFA-17/19/10.3/Inf.1.

⁸ CGRFA/WG-FGR-6/21/3; CGRFA/WG-FGR-7/23/3.

⁹ CGRFA-18/21/9.3; CGRFA-19/23/8.2.

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

6. Since the Commission's last session, FAO conducted, as requested, further analyses of country reports. This included re-analysing the data gathered through the online questionnaire and reviewing of the complementary information presented in the written reports. The questionnaire was based on targets, indicators and verifiers adopted by the Commission at its Sixteenth Regular Session for the purpose of monitoring the implementation of the Global Plan of Action.¹⁰ The written reports followed the structure of the Second Report, as explained in the reporting guidelines¹¹ made available for the National Focal Points (NFPs).

7. In a number of cases, FAO contacted NFPs to clarify the reported data or information, when needed, while carrying out the further analyses. Moreover, FAO continued developing the different chapters of the Second Report in collaboration with contributing authors. Regrettably, the revised draft of the Second Report could not be finalized within the timeframe requested by the Commission. NFPs were briefed on the progress made in preparing the Second Report during regional online meetings, held between December 2023 and February 2024, to present a test version of the new global information system on FGR.¹²

8. The revised draft of the Second Report was released for comments on 1 July 2024. NFPs, the NFPs to the Commission and relevant international organizations were invited by electronic mail to provide comments by 30 August 2024. The call for comments was also announced in the Commission's newsletter¹³ and on relevant FAO websites.¹⁴ Comments were received from 15 countries¹⁵ and three international organizations.¹⁶

IV. CURRENT STATUS AND KEY FINDINGS

9. As of 1 December 2024, 110 countries¹⁷ have nominated NFPs. The Second Report is based on information provided by 77 countries (Table 1) representing 77 percent of the global forest area. Less than half of these countries (37) submitted a written report providing complementary information in addition to the online questionnaire. FAO also received reports from two regional networks (the Asia Pacific Forest Genetic Resources Programme and the European Forest Genetic Resources Programme) and four international organizations (Alliance of Bioversity International and the Center for International Tropical Agriculture, Botanic Gardens Conservation International, the Royal Botanic Gardens, Kew and World Agroforestry).

Key findings

10. **The importance of FGR remains neglected in the context of sustainable development, biodiversity and climate change, as well as in the implementation of sustainable forest management.** International awareness of the importance of FGR remains low, although the country reports show many examples of how the conservation, use and development of FGR have contributed to countries' efforts towards sustainable development. The Kunming-Montreal Global Biodiversity Framework offers a renewed opportunity to raise global awareness of the importance of genetic

¹⁰ CGRFA-16/17/Report, paragraph 74; CGRFA-16/17/20, *Appendix C*.

¹¹ AR: <http://www.fao.org/3/cc3967ar/cc3967ar.pdf>; EN: <https://www.fao.org/3/cc3967en/cc3967en.pdf>; ES: <https://www.fao.org/3/cc3967es/cc3967es.pdf>; FR: <https://www.fao.org/3/cc3967fr/cc3967fr.pdf>; RU: <https://www.fao.org/3/cc3967ru/cc3967ru.pdf>

¹² CGRFA/WG-FGR-8/24/4.

¹³ <https://newsletters.fao.org/q/119z0y88g3fT/wv>

¹⁴ <https://www.fao.org/cgrfa/news/news-detail/call-for-comments-on-the-revised-draft-of-the-second-report-on-the-state-of-the-world-s-forest-genetic-resources/en>; <https://www.fao.org/forest-genetic-resources/news/detail/en/c/1697528/>

¹⁵ Argentina, Brazil, Burkina Faso, Canada, Denmark, Finland, Germany, Japan, Netherlands (The Kingdom of), Poland, Russian Federation, Spain, Sweden, Switzerland and the United States of America.

¹⁶ Alliance of Bioversity International and CIAT, European Forest Institute and World Agroforestry.

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

diversity of all species, including forest trees and other woody plant species. Calls to intensify efforts with new investments to achieve the Sustainable Development Goals and Global Forest Goals by 2030 also offer opportunities to raise awareness and mobilize support for the implementation of the Global Plan of Action.

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

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,W), Lao People's Democratic Republic (Q), Malaysia (Q), Republic of Korea (Q,W), Sri Lanka (Q,W), Thailand (Q,W)
Europe (34)	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), United Kingdom of Great Britain and Northern Ireland (Q,W)
Latin America and the Caribbean (11)	Antigua and Barbuda (Q), Argentina (Q,W), Brazil (Q,W), Chile (Q), Ecuador (Q), El Salvador (Q,W), Guatemala (Q), Mexico (Q), Panama (Q), Peru (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)

11. **The availability of information on FGR has increased during the past decade but remains inadequate, hindering efforts to improve FGR management.** For the preparation of the Second Report, countries reported on over 2 800 species and provided detailed data on the management of their genetic resources. Globally, 64 percent of the reporting countries have a national FGR inventory and 55 percent of them also have a national FGR information system. However, the information on FGR is still scattered nationally, with existing FGR inventories often struggling to connect multiple-data sources maintained by different stakeholders to gain a comprehensive country-wide picture of the status of FGR.

12. **Deforestation continues at alarming rates, particularly in tropical forests, but forests still cover nearly one-third of the world's land area.** In 2020, the global forest area was about 4.06 billion hectares (31 percent of the total land area). 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 of the world's forests are found within the tropical biome (accounting for 45 percent of the global forest area), followed by the boreal (27 percent), temperate (16 percent) and subtropical (11 percent) biomes. Naturally regenerating forests account for 93 percent (3.75 billion ha) of the

global forest area and planted forests seven percent (294 million hectares). From 1990 to 2020, the global forest area decreased by 178 million hectares. More than 90 percent of global deforestation in 2000–2018 took place in tropical forests, and nearly 90 percent of deforestation was due to agricultural expansion.

13. Taxonomic and threat assessments carried out over the past decade have increased the information on tree and other woody plant species but most of the species remain inadequately studied. Globally there are approximately 58 000 tree species (including nearly 2 000 tree-like palms), about 1 600 woody bamboo species and over 600 species of rattans (climbing palms). Trees are found in nearly all parts of the world, but the diversity of tree species is concentrated in the tropical and subtropical forest biomes. Of all tree species, 58 percent are endemic occurring in one country while most other tree species have natural distribution limited to a given region or a specific habitat. Threatened tree species, about 30 percent of all species, are found across the world but most of them are growing in the tropical and subtropical areas. Two-thirds of bamboos and all rattans are also found in tropical regions of the world. Relatively few bamboo species are common and widespread, and most of them are rare. However, no comprehensive threat assessment has been carried out for bamboos and rattans.

14. The loss of genetic diversity in trees and other woody plants continues, especially in the tropical and subtropical areas, and rare and threatened species across the world are exposed to genetic erosion. Of the species reported by countries for the Second Report, 1 573 have been characterized based on non-molecular information (typically provenance trials) and 733 based on molecular information (e.g. range-wide sampling of populations for molecular marker studies). Over the last ten years many new studies to characterize genetic diversity with molecular techniques have been carried out in different parts of the world, increasing the number of species for which genetic diversity has been assessed. However, most of these studies have sampled species and their populations only at one point in time and very few studies have assessed changes in genetic diversity over time. There is evidence that genetic diversity remains at high levels in common and widely distributed species while rare and threatened species have lost a significant amount of their genetic diversity. Globally, deforestation, forest degradation, fire, pests and diseases, and invasive species are not only threatening many tree and other woody plant species but also eroding their genetic diversity.

15. The number of tree and woody plant species conserved *in situ* has increased during the past decade but *in situ* FGR conservation programmes include only two percent of all species. *In situ* conservation is the preferred approach for conserving FGR as it maintains evolutionary processes within populations of trees and other woody plant species. It is also intrinsically dynamic, allowing temporal and spatial changes in genetic diversity, rather than attempting to preserve genetic diversity at a particular point in time. Another advantage is that *in situ* conservation does not exclude the use of FGR by people, provided the regeneration and continued evolution of species are not jeopardized. Of the reporting countries, 82 percent have national *in situ* conservation programmes in place. Over the past decade, the number of species included in the *in situ* conservation programmes increased from nearly 1 000 (including subspecies) to nearly 1 400 species, representing approximately two percent of all species. Globally, countries reported over 35 000 FGR conservation units.

16. *Ex situ* conservation plays a crucial role in connecting the conservation and use of FGR, and in complementing *in situ* conservation. *Ex situ* conservation of FGR has long aimed at capturing representative samples of species' genetic diversity not only for conservation purposes but also for reforestation and tree breeding. Of the reporting countries, 73 percent have national *ex situ* conservation programmes in place, covering nearly 1 100 species. Tree seed centres (or tree genebanks) are the most important storage facilities, and they are typically operated separately from crop genebanks. Globally, there are approximately 296 000 accessions in seed banks and field collections. Additionally, countries reported about 14 500 *ex situ* conservation stands.

17. Many countries experience persistent or periodic shortages of forest reproductive material that create challenges for achieving the target of a three-percent increase in the global forest area by 2030 and other global commitments on forests, biodiversity and climate. The

demand for forest reproductive material has remained strong across the world but progress in reinforcing national tree seed programmes has been modest over the past decade. Of the reporting countries, 70 percent have such a programme in place, while in some countries the material is produced by multiple initiatives without national-level coordination and oversight. Globally, countries reported over 600 species for which reproductive material is produced from seed stands and seed orchards, and through macro- and micropropagation. Countries reported nearly 83 000 seed stands covering approximately seven million hectares and over 5 800 seed orchards covering about 39 000 hectares. Across the world, the annual number of seedlings planted by country varies considerably, from well below one million to billions, with unimproved germplasm continuing to play a major role. In many countries, however, the production of forest reproductive material is limited in terms of quantity and quality, and unable to meet the demand.

18. Tree improvement and breeding programmes focus only on one percent of species and most programmes have not advanced beyond the first-generation of selection. Tree improvement and breeding programmes have continued in all regions, albeit at different levels of intensity and investment. Globally, 75 percent of the reporting countries have such programmes focusing on nearly 500 species. Breeding programmes for 59 percent of the reported species remain at the first generation of selection and a further 12 percent of species have first-generation seed orchards culled based on progeny tests. The fourth generation of selection represents the most advanced selection deployed to produce forest reproductive material. Tree-breeding research has continued using modern tools, such as marker-assisted selection and genomic technologies. New gene-editing technology is also being used by scientists in several countries to study gene functions in forest trees and to explore how related research results could be used to accelerate tree breeding.

19. Genetic aspects need to be better incorporated into the management of both natural and planted forests. The genetic composition of forests across the world has been shaped both by people and natural disturbances at different scales since ancient times. Of the many drivers of change, many countries consider climate change, including increased frequency of catastrophic events (e.g. drought, fire, outbreaks of insect pests and diseases, and storms), and invasive species the most damaging ones, creating considerable challenges for FGR management. Paying attention to genetic aspects is thus crucial for truly sustainable forest management and for maintaining the adaptability, resilience and productivity of both natural and planted forests. Unfortunately, the country reports show that forest managers and policymakers tend to overlook genetic aspects and, when they do consider them, they do so more frequently in the case of planted forests. Natural forests are commonly assumed to harbour ample genetic diversity although their history is often poorly documented. Although deforestation and forest fragmentation have slowed and harvesting practices have become more sustainable in different parts of the world, many tree species and their populations, especially in tropical forests, remain in genetically uncertain conditions. On the positive side, the country reports show examples of efforts to increase species and genetic diversity in both natural and planted forests, and in forest restoration.

20. Several countries have made progress in strengthening their institutional framework for the conservation, use and development of FGR but, globally, there are still considerable limitations and gaps, especially in terms of human and financial resources. Of the reporting countries, only 52 percent have a national coordination mechanism on FGR such as a national committee or working group. National strategies for FGR have been developed by 58 percent of the countries but these strategies often focus on FGR conservation and give less attention to FGR use and development. The integration of FGR into other relevant national policies remains inadequate. Countries have made less progress in the strengthening of the human capacity needed for managing FGR and some countries even noted that their human resources have declined. In addition to human resources, many countries reported struggling to mobilize the necessary financial resources for FGR work.

21. International and regional cooperation on FGR is indispensable for the implementation of the Global Plan of Action and needs to be reinforced. International and regional cooperation on FGR is of crucial importance because the natural ranges of many tree and other woody plant species extend across several countries or even different regions, neither do the many drivers of change threatening FGR respect political borders. Countries benefit from international and regional

cooperation in many ways. They can share information, experiences and knowledge on FGR management. The cooperation also offers opportunities for carrying out the FGR work more efficiently and sharing related costs, as well as avoiding duplication of efforts. Of the reporting countries, 70 percent are participating in international research and development collaboration on FGR and 71 percent in regional FGR networks. Several countries reported a lack of financial and human resources, as well as research infrastructure, as the main factors impeding their participation in international and regional cooperation.

22. **The Global Plan of Action remains highly relevant to the needs and priorities reported by countries for the future action.** Progress has been made in the implementation of the Global Plan of Action at national, regional and global levels but there are still limitations and gaps that require continued and reinforced action. The four priority areas, namely (1) improving the availability of, and access to, information on FGR, (2) conservation of FGR (*in situ* and *ex situ*), (3) sustainable use, development and management of FGR, and (4) policies, institutions and capacity building, remain relevant and recommended actions for now and the future are presented in the Second Report. As FGR underpin the many contributions of forests and trees to sustainable development and their benefits to people, biodiversity and climate, it is also important to increase international awareness of the Global Plan of Action.

V. NEXT STEPS

23. The Working Group, at its last session, took note of the proofing version of the Second Report and recommended that the Commission welcome the report and take note of its findings. It invited FAO to widely disseminate the report and its in-brief version. It further recommended that FAO gather from the NFPs, regional networks on FGR and relevant international organizations suggestions for the improvement of the reporting process for future global assessments on FGR and present options to the next session of the Working Group for its consideration.

24. In response to the findings of the Second Report, the Working Group also reviewed and revised the Global Plan of Action, as given in the Report on the Eighth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources.¹⁸

VI. GUIDANCE SOUGHT

25. The Commission may wish to:

- (i) welcome the Second Report and take note of its findings;
- (ii) request the Secretariat to:
 - (a) disseminate widely the Second Report and its in-brief version and communicate its key messages to relevant stakeholders;
 - (b) increase international awareness of the importance of FGR by bringing the Second Report to the attention of governments and relevant stakeholders; and
- (iii) gather from NFPs, regional networks on FGR and relevant international organizations suggestions for the improvement of the reporting process for future global assessments on FGR and present options to the next session of the Working Group for its consideration; and
- (iv) invite countries to respond to the findings of the Second Report, through relevant policies and actions at national and regional level, as appropriate.

¹⁸ CGRFA-20/25/10.1, *Appendix C*.